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TITLE: RISK COMMUNICATION AS A STRATEGY TO COMBAT MATERNAL MORTALITY IN NIGERIA: A CASE STUDY IN RIVERS STATE.

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Dedication

This thesis work is dedicated to my parents Mr Joe Light Oyibo and Mrs Justina Oluchi Oyibo. Thank you for being a constant source of support and encouragement during the challenges of this journey. I would truly not be here if not for your prayers and unconditional love. Your good examples and kind words have taught me to work hard and never give up.

DECLARATION

This thesis is the result of my own work and includes nothing which is the outcome of work done in collaboration except where specifically indicated in the text. It has not been previously submitted, in part or whole, to any university of institution for any degree, diploma, or other qualification. This thesis contains approximately 91,000 words including appendices, references, footnotes, and has about 31 figures and 31 tables.

Natasha Chinwendu Oyibo

ABSTRACT

This study was initiated following the high maternal mortality ratio in Rivers State, Nigeria, which stands at 889 maternal deaths per 100,000 live births. Approximately two thirds of Nigerian women deliver their babies outside of health facilities and without medically skilled attendants, thereby, indicating the need for a risk communication, thus increasing the chances of potentially avoidable maternal deaths. A mental models approach to developing risk communication was applied to this study to elicit the knowledge of maternal health experts and lay people, in order to achieve a better understanding of factors that lead to maternal death. The intent is to discover better ways of engaging the stakeholders to achieve a better understanding of the risk in order to enable an improved risk communication in the maternal health sector.

An expert mental model about maternal mortality has been developed based on literature review, and expert interviews. This model provides a framework of components that influence the high rates of maternal mortality seen in the State. The concepts within the model were used as a guide in developing questions for use in semi-structured interviews with the lay participants (Rivers State women of childbearing age). This led to the derivation of 6 emergent themes (religion, negative perception of government's health provision/responsibility, compassion and skill of workers, influence of native midwives, lack of maternal health information, folklore, customs and tradition), and a diagram illustrating participant's mental models. Comparison of the expert's and women's mental models revealed vital beliefs, knowledge gaps and misconceptions in the women's understanding. The prevalence of the emerging information was further tested with a wider sample of women participants through means of a questionnaire survey. Finally, analysis of findings led to the derivation of key risk communication messages for the women. The original one-way mental

model approach was adapted to become a two-way model, which includes critical findings from the lay participants for expert attention, potentially encouraging a holistic communication solution.

While the mental model approach is established in risk communication research, this is the first known application to the maternal health field. The mental models of experts and participants that emerged identify the diverse ways stakeholders perceive the issue, and components that influence risk attitudes and health care behaviour. On the basis of the findings, key messages have been suggested that may instil behavioural change.

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1 INTRODUCTION

1.1 Introducing the research

It has been reported that maternal deaths globally have fallen by nearly half (43.9%) since 1990, and the use of maternity services has increased in so many regions (Alkema *et al*., 2016). Unfortunately, Nigeria is not one of those regions, as the state of maternal health in the country is atrocious, with the country failing to meet the recently past Millenium Development Goal 5 (to reduce the maternal mortality ratio by three quarters in 2015, from the 1990 ratios, and achieve universal access to reproductive health) (Nnamuchi *et al*., 2015). Nigeria has one of the world's worst indices for maternal mortality[1] rate, with an estimated lifetime risk of maternal death being 1 in 31, a stark contrast to that of high resource countries (1 in 4000) (Agboghoroma and Gharoro, 2015; Njemanze and Okoro, 2015; Oppong and Ebeniro,2016; Quarles, 2016). The continuing loss of women's lives in Nigeria due to avoidable factors occurring under preventable conditions remains an extremely worrisome issue.

In the majority of the cases of maternal deaths recorded, they could have been avoided if the birth was attended by skilled health care professionals, equipped with the right tools and medicines, also with the capability of referring the patient to urgent emergency care if a caesarean section is needed (Quarles, 2016). However, scholars have reported that

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[1] Maternal mortality can be defined as "Death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes" (MacDorman *et al*., 2016, p3)

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approximately two-thirds of the women (three-quarters in rural Nigeria) give birth outside of health facilities and without medically skilled birth attendants (Al-Mujtaba *et al*., 2016; Oyibo *et al*., 2016). This fact evokes an immediate question; why are the women not going to hospitals to deliver? Considering such high proportion of women do not utilise skilled birth attendants during pregnancy, it becomes logical to expect that reducing maternal deaths, will require empowering the women with adequate information about the importance of the inclusion of experienced health care professionals at the time of pregnancy and childbirth. The need to educate the women forms part of the underlying issues to be addressed in the current study.

Utilisation of skilled birth attendants has been championed by health care professionals as a major component to maternal survival (WHO, 2004; Afulani and Moyer, 2016). However, this strategy has to take into account the cultural, socio-economic, and personal barriers limiting the women's health service attendance, especially among the poor population. To reduce maternal deaths in Nigeria drastically, efforts must address the root causes of delays in seeking health care, accessing health care, and receiving help at a health centre (Wakabi, 2013). There is an apparent disparity in the maternal mortality ratio seen in the urban areas (351 per 100,000 live births) compared to the rural areas (828 per 100,000 live births) (FMOH, 2004). This urban-rural divide clearly highlights the existence of varying barriers to different women in their various locations. Saving the women's lives cannot lie in just telling the women to attend the hospitals, they have to be empowered with the right information for effective decision-making. The importance of intrapartum facility-based care is a crucial strategy, but, this one-size-fits-all approach is not feasible in all settings, there is a significant need for alternative context-specific service and community based strategies (Costello *et al*.,

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2006).

There is a need to provide new evidence-based studies, which will lead to more efficient decision-making (Hulton *et al*., 2014; Kana *et al*., 2015). The need for education and awareness has been long proferred as a solution for maternal mortality. In the United States, a National Maternal Welfare Committee was set-up, with one of the main methods for preventing maternal deaths being the education of the laity, hospital members, community and medical profession (Llewellyn-Jones, 1974; De-Brouwere *et al*., 1998). Communication has been utilised in studies as a tool to make an impact in maternal mortality reduction. For example, Aradeon and Doctor (2016) used a community communication emergency referral strategy (CCER) which is a community mobilisation approach used to establish and maintain emergency maternal care support structures. The CCER method led to the reduction of maternal mortality ratio by 16.6% from extremely high levels within four years in the intervention sites (Northern Nigeria). The important aspect to note in this strategy was that the first step involved community communication, where the low and non-literate community members were mobilised with adequate knowledge to become communicators of maternal health messages.

Risk communication, which emphasises on the empowerment of the target audience through education and awareness of the problem (Sandman, 1989; Coombs, 2015), has been a widely used concept in instilling behavioural change. Individuals possess unique mental models, which are formed over time through experiences and interactions, and are used to translate messages into action, thereby affecting their perceptions and attitude to risks (Morgan *et al*., 2002). To practice effective risk communication, it is necessary to investigate the underlying reasons why the particular issue occurs, hence indicating the need to understand individual

mental models and decision-making processes. This research seeks to identify the mental models that underlie the women's interpretations of maternal mortality, their circumstances, and outcomes of possible actions. In the context of the case study area, Rivers State, there are 36 general hospitals, but it was recorded that from the year 2005- 2010, only 48% of the 2,525,690 females in the state delivered in hospitals (RSMOH, 2010). There are hospitals present, but many women just will not attend, they prefer home, church or native births, they don't utilise the available preventative interventions (e.g malaria prophylaxis measures), or misjudge the consequence of their actions.

In the context of maternal mortality prevention, perhaps mental models can lead to the women making poor decisions such as:

- They may be underestimating risks due to their knowledge gaps or misconceptions, or overestimating the preventative measures they are taking.

- The women's actions may seem natural, so that they carry on as normal without thinking about consequences

- The women may fail to recognise risk factors and changes in their circumstances that may lead to maternal death.

- The women may simply not be able to understand helpful instructions and follow them due to their literacy level.

If these issues can be reduced through context-specific risk communications, then their improved mental models may help the women engage in effective behavioural actions that are in their best interest. The process of investigating holistically the different perspectives of stakeholders may potentially reveal important concepts and information necessary for an

improved risk analysis and communication of maternal mortality in the state. Showing the various perceptions of the stakeholders to the issue ensures the added provision of evidence-based recommendations for policy makers and health care professionals. This research seeks to provide insights that may potentially help people develop a common understanding how to engage more constructively in working through their differences in beliefs and culture to arrive at positive health seeking decisions to prevent maternal death.

The current research postulates that the knowledge processes of the women of childbearing age need to be improved for effective decision-making. In situations where the women's mental models may be flawed or where they have little knowledge, these individuals need empowerment via education for the refinement of their ways of thinking. However, studies have reported that there is a research-to-practice gap, where there is limited communication between experts (health care practitioners and decision makers) and lay people, which contributes to the ineffectiveness of many interventions, especially behavioural ones (Glasgow *et al*., 2003; Mallonee *et al*., 2006; Bugeja *et al*., 2011). As such, participatory research methods have been suggested to bridge this gap, where intervention ideas are produced with input from the intended target audience (Glasgow *et al*., 2003; Uneke *et al*., 2014; WHO, 2014). This study is further driven by the need to bridge this research-to-practice gap, where expert practitioners may not be acutely aware of the underlying issues faced by the lay participants.

The mental models approach offers such an opportunity to understand people's ways of thinking. The methodology has been utilised in a variety of research fields, to effectively relay communication messages, such as climate change research (Otto-Banaszak *et al*., 2011), carbon monoxide risk (Galada *et al*., 2009), agricultural research (Schoell and Binder, 2009),

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and computer security research (Bravo-Lillo *et al*., 2010). Morgan *et al*. (2002) developed the approach to utilises four main phases (see list below) in achieving the ultimate goal of informing a target audience:

- Identification of expert knowledge

- Elicitation of lay knowledge

- Identifying the differences between expert and lay knowledge and understanding of a particular risk

- Identification of misconceptions and gaps in knowledge and developing an effective risk communication protocol (Morgan *et al*., 2002)

The mental models approach to risk communication addresses barriers that may limit the necessary information from getting to the lay individual. The models proposed in this study is deemed useful for the unshrouding of the complexity associated with maternal mortality issues, since a) the expert mental model will be developed by consulting maternal health experts from several domains, b) the women's mental models will be derived from semi-structured interviews including a wide range of women located in the case study area.

1.1.1 Main aim of this study:

This project aimed to better understand the factors leading to a high rate of maternal mortality in Nigeria. It was carried out with the intention of finding better ways to engage the major stakeholders in a constructive process to achieve a mutual understanding of the issue and lead to better communication to combat maternal mortality.

To achieve this, four main questions were asked:

- What do different experts engaged in maternal health consider when analysing the risk of maternal mortality? This was explored via the creation of an illustrated expert mental model.

- What are the different ways of thinking that the Nigerian women use to make decisions about maternal health and mortality?" Answering this question was to help in identifying key challenges to the transfer of reproductive health knowledge and perception of the problem by the women.

- What differences in ways of thinking about maternal mortality exist between the experts and lay participants?" Answering this question was to enable the identification of gaps and misconceptions between the women and the experts.

- How will the information be disseminated? Ultimately, answering this question led to the formation of evidence-based risk communication recommendations to bridge the knowledge gap, instil behavioural changes and improve understanding.

1.2 Intended contributions from the study

The work described in the following chapters will delve into the knowledge of these women of childbearing age, for a better understanding of influences on their decision-making. Increasing service utilisation and the proportion of skilled attendants at deliveries has been advocated by international agencies as crucial to reducing maternal mortality (WHO, 2014). The consideration of the women's perspectives has often been forgotten when addressing the importance of skilled care and service attendance (Bullough *et al*., 2005). It should, however, be noted that the success of any intervention lies in the acceptance of the intervention by the target audience (Larson *et al*., 2012), and is dependent on understanding the contributory causes and factors (Ameh *et al*., 2014). This study aims to answer the burgeoning question as

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to why so many women do not use skilled birth attendants during pregnancy.

Secondly, most of the maternal health risks can be prevented by actions from the women and key stakeholders (Moran *et al*., 2016). Therefore, to improve stakeholder understanding, it is necessary to bridge the knowledge gap and correct misconceptions in the target audience, for effective informed healthcare decision-making. To do this, it is useful to know what experts think regarding the issue, and capture the solutions proferred, in order to identify incorrect information, missing gaps and knowledge. Since one of the research objectives of the current study was focused on investigating what experts know, it is expected that the framework that emerges from the knowledge capture process will serve as a useful tool in understanding the maternal health situation in the case study area. Furthermore, reduction of maternal deaths in low resource settings is possible; however, knowing the underlying factors that lead to women dying during childbirth is required. Health care professionals may use the mental models provided in the current study as an evidence-based aid for recognising how people especially the women of childbearing age think about their health care choices during pregnancy. Finally, the study will contribute to the body of knowledge by pioneering the usage of the mental model approach in the maternal health sector.

1.3 Document organisation

In response to achieving the research aim and objectives, the thesis document is organised as follows:

Chapter Two will provide a review of the literature, presenting the background information on maternal mortality globally, followed by exploring the state of maternal health in Nigeria. Furthermore, the determinants of maternal mortality in Nigeria will be discussed, adopting the

framework by Fatusi (2004). Key theories and concepts such as Arnstein's ladder of citizen participation, message framing, risk attitude, and cultural theory will be explored with the purpose of justifying the need to take into account stakeholders mental models in the efforts to make an impact on maternal death rates.

Chapter Three will present the epistemological stance of the researcher and give adequate justifications regarding the various tools utilised in the study. This will be followed by the elaboration of the methodology, which is the mental models approach. This method details three key types of data (literature review, qualitative and quantitative), which will be employed to achieve the study objectives.

Chapter Four will focus on the first empirical phase of the research, which reveals expert views on maternal mortality, and presents this knowledge in an expert mental model diagram. Discussions about the components contained within the expert mental models will be presented alongside direct quotes from the expert participants.

Chapter Five will discuss the women's mental models, following identification of emergent themes derived from thematic analysis of the participant's interviews. In doing so, critical gaps in knowledge, and misconceptions will begin to emerge, to aid future risk communication.

Chapter Six will present the findings from the comparison of the expert mental models (analysed in Chapter four) and participant mental models (explained in Chapter five). This will lead to the identification of key beliefs, knowledge gaps and misconceptions between the women and the experts. Prevalence of the knowledge gaps, misconceptions, and beliefs was captured to estimate how widespread the information is, with the purpose of identifying

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important messages for risk communication.

Chapter Seven will draw out key messages for a risk communication. This will be accompanied by a number of recommended message delivery strategies, which have been employed effectively in other studies and countries. This chapter specifically addresses the issue of message dissemination with the aim of bridging the gap between the experts and lay people.

Chapter Eight summarises the most significant findings from chapters four, five and six, to answer the research questions and draw out implications for policy and practice. This chapter will conclude with discussions of the strengths and limitations of the research alongside recommendations for future studies.

2 LITERATURE REVIEW

2.1 Introduction

This review examines current knowledge of the epidemiology of global maternal mortality, honing down to Nigeria, to define the research perspective and identify any gaps in the literature. The discussion contains the causes and determinants of women dying during pregnancy, using the conceptual framework established by Fatusi (2004).

While much commonly recognised and accepted knowledge exists about the causes and solutions to maternal deaths, differences persist within different stakeholder groups about how to approach the risk. This dissimilarity may be due to the diverse mental models, goals, and objectives that exist among the lay people and the experts. Bridging the knowledge gap between these different stakeholders, will require the identification of risk factors and communication of these risks, hence, supporting the objectives of this research. In particular, this study responds to the need for empirical research that evaluates the different ways by which Nigerian women of childbearing age and experts think about maternal deaths, and make health care decisions.

It is evident from Table 1 that the maternal mortality rate is very low in developed countries while substantially higher in developing countries. Globally, the average maternal mortality rate has been estimated to be about 210 maternal deaths per 100,000 live births in 180 countries studies (see Table 1), with Africa accounting for a large number of maternal deaths (WHO, 2014). An example of this was observed in 2010 when there were an estimated 289,000 maternal deaths globally, with developing countries accounting for 99%, and Sub-Saharan Africa including Nigeria responsible for 56% (Montoya *et al*., 2014; WHO, 2014).

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Table 1: Estimates of maternal mortality ratio worldwide (WHO, 2014, p22)

Region	MMR[a]	Range of MMR uncertainty		Number of maternal deaths[a]	Lifetime risk of maternal death[a] 1 in:
		Lower estimate	Upper estimate		
World	210	160	290	289000	190
Developed regions[b]	16	12	23	2300	3700
Developing regions	230	180	320	286 000	160
Northern Africa[c]	69	47	110	2700	500
Sub-Saharan Africa[d]	510	380	730	179 000	38
Eastern Asia[e]	33	21	54	6400	1800
Eastern Asia excluding China	54	35	97	480	1200
Southern Asia[f]	190	130	280	69 000	200
Southern Asia excluding India	170	110	270	19 000	210
South-eastern Asia[g]	140	98	210	16 000	310
Western Asia[h]	74	50	120	3600	450
Caucasus and Central Asia[i]	39	31	53	690	940
Latin America and the Caribbean	85	66	120	9300	520
Latin America[j]	77	59	110	7900	570
Caribbean[k]	190	130	310	1400	220
Oceania[l]	190	100	380	510	140

[a] The MMR, number of maternal deaths, and lifetime risk have been rounded according to the following scheme: <100, no rounding; 100–999, rounded to nearest 10; 1000–9999, rounded to nearest 100; and >10 000, rounded to nearest 1000.

[b] Albania, Australia, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Montenegro, The Netherlands, New Zealand, Norway, Poland, Portugal, Republic of Moldova, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, The former Yugoslav Republic of Macedonia, Ukraine, United Kingdom of Great Britain and Northern Ireland, United States of America.

[c] Algeria, Egypt, Libya, Morocco, Tunisia.

[d] Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cabo Verde, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Swaziland, Togo, Uganda, United Republic of Tanzania, Zambia, Zimbabwe.

[e] China, Democratic People's Republic of Korea, Mongolia, Republic of Korea.

[f] Afghanistan, Bangladesh, Bhutan, India, Iran (Islamic Republic of), Maldives, Nepal, Pakistan, Sri Lanka.

[g] Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, The Philippines, Singapore, Thailand, Timor-Leste, Viet Nam.

[h] Bahrain, Iraq, Jordan, Kuwait, Lebanon, Occupied Palestinian Territory, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Turkey, United Arab Emirates, Yemen.

[i] Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan.

[j] Argentina, Belize, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Uruguay, Venezuela (Bolivarian Republic of).

[k] Bahamas, Barbados, Cuba, Dominican Republic, Grenada, Haiti, Jamaica, Puerto Rico, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago.

[l] Fiji, Kiribati, Micronesia (Federated States of), Papua New Guinea, Samoa, Solomon Islands, Tonga, Vanuatu.

Nigeria is the most populous country in Africa with a population of about 171 million people, and it has been marked as one of the countries with the highest maternal deaths in Sub-Saharan Africa (Achem and Agboghoroma, 2014). According to the 2013 Nigerian Demographic and Health Survey report, the number of maternal deaths per 100,000 live births

reached a peak of 576 (Mbachu *et al*., 2016), with the estimated number of maternal mortality in 2013 as 40,000 (WHO, 2014). Table 1 clearly shows the differences in the maternal mortality rates in the world, revealing that the developed countries have much lower rates compared to the developing regions. The presence of well regulated effectively functioning health care systems in the developed countries contributed greatly to the reduction of maternal deaths over the years (Fatusi, 2004; WHO, 2014). The availability, accessibility, and affordability of required health services, have considerable influence on maternal health and survival outcome (Singh *et al*., 2014). Unfortunately, there are limitations in the Nigerian context with regards to the health care facilities. Majority of the government provided hospitals in Nigeria have been reported to be low in quality, with some of them lacking emergency obstetric care services (EmOc) (Erim *et al*. 2012). In addition, Nigeria introduced user fees for government health services within the framework of the Bamako Initiative revolving drug funds, as a measure to address the governments difficulties in health care financing (Onwujekwe *et al*., 2012). This in turn potentially led to the reduction in the affordability of such vital services for the poor women of childbearing age. Section 2.3.1.2 of the current document provides an indepth discussion of the different tiers of the Nigerian health system and their difficulties faced. It is however, important to note that reducing maternal deaths in Nigeria requires attention to increasing the number of facilities with EmOC capability, improving the quality of facilities, and both identifying and addressing the barriers facing Nigerian women in accessing these facilities (Erin *et al*., 2012).

Additional explanations of these alarming maternal death rates began to emerge as it was revealed that approximately two-thirds of all the Nigerian women and three-quarters of rural women deliver their babies away from health facilities and without skilled birth attendants

(Shiffman *et al*., 2006; Al-Mujtaba *et al*., 2016). This revelation may suggest that changing behavioural patterns of the women has the potential to save their lives.

To design appropriate interventions and strategies, obtaining valid data on the levels and trends of maternal mortality is important and determines the ability to make necessary decisions about health (Campbell and Graham, 1992). However, maternal mortality can be difficult to measure as such deaths are hard to identify, this is because it requires accurate information about deaths among women of childbearing age, the medical cause of death, and pregnancy status at or near the time of death (WHO, 2004). Developing countries such as Nigeria are plagued with issues like incomplete or non–existent registration of maternal deaths and lack of medical certification of cause of death (Adegoke *et al*., 2007; Graham *et al*., 2008; Merdad *et al*., 2013). As a result of these challenges, the existing estimates are subject to some uncertainty, as the death rates may be higher or lower than recorded (Zahr *et al*., 2004). Nonetheless, an apparent disparity in the maternal mortality rates in the world has been demonstrated, where the developing countries continue to maintain the highest amount of deaths.

As alarming as worldwide maternal deaths are, the problem seems even more catastrophic when it is apparent that many of these deaths are preventable (Lawn *et al*., 2016; Natzke, 2008). For instance, investigations into the preventability of maternal deaths in a rural and urban province of Zimbabwe revealed that avoidable factors were identified in 90% of the 105 rural deaths and 85% of the 61 urban deaths recorded (Fawcus *et al*., 1996). As mentioned by Ossai and Uzochukwu (2015), avoidable factors are still prevalent in the majority of maternal mortality seen across Nigeria, and the issue remains persistent. It is, therefore, necessary to identify measures to address them to lower the high death rates

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(Fawcus *et al.*, 1996; Ozumba and Nwogu-Ikoji, 2008).

2.2 International and national policies for tackling maternal mortality

Emphasis on public health in the developing world was increased with the introduction of the Millennium Development Goals (MDGs), and most recently with the introduction of the United Nations Sustainable Development Goals (SDGs) (Grove *et al.*, 2015). 189 countries, including Nigeria, endorsed the development of the MDGs during the United Nations general assembly in 2000, with each of the goals, having quantitative indicators (DerSarkissian *et al.*, 2013). Improving maternal health was the fifth goal, and consisted of two primary targets, firstly, to reduce maternal mortality by three-quarters between 1990 and 2015, and secondly, to achieve universal access to reproductive health by 2015. The rate of maternal death was chosen as the outcome on which to judge the progress of MDG5 (Ronsmans *et al.*, 2006).

According to the 2014 World Health Organization trends in maternal mortality report, a number of countries/regions remained on track to reduce maternal mortality by three-quarters between 1990 and 2015, some countries remained unlikely to attain MDG5. Countries with a MMR ≥100 in 1990 are in the "on track" category if their rates have declined by at least 75% between 1990 and 2013 (WHO *et al.*, 2014). 11 countries (Maldives, Bhutan, Cambodia, Equatorial Guinea, Lao People's Democratic Republic, Romania, Timor-Leste, Cabo Verde, Eritrea, Nepal, and Rwanda) were categorised as "on track." A further 63 countries as "making progress, and 13 countries as "insufficient progress" (WHO *et al.*, 2014). Nigeria was classified as "making progress" as the change in 1990 (1200 per 100000 live births) estimate to the current estimate is -52% (see Table 2), although, the accuracy of statistics on maternal mortality could be called into question (see Table 1), considering the wide range of the lower and upper estimate of uncertainty for the MMR reported.

Table 2: Maternal mortality rate trends from 1990 to 2013 in Nigeria (WHO *et al*., 2014, p44; Mamaye, 2015)

Nigeria	1990	1995	2000	2005	2013	Change in MMR between 1990 and 2013
MMR	1200	1100	950	740	560	-52%

Significant strides have been made in increasing the life expectancy of women of childbearing age in some countries. However, in others, more efforts are needed to make a significant difference. With the 2015 MDG deadline exceeded, the 2015 United Nations General Assembly has set much higher health-related goals, with maternal mortality represented within the third Sustainable Development Goal (United Nations and Unicef, 2015). SDG3 concerns ensuring healthy lives and promoting well-being for all ages (reducing maternal mortality to less that 70 per 100,000 live births) (Tangcharoensathien *et al*., 2015). Immediate action is thereby needed to meet the high SDG 2030 target for the prevention of avoidable maternal mortality (Alkema *et al*., 2016)

As discussed by Graham *et al*. (2016), due to the increased diversity in the reasons for maternal morbidity and mortality, policy makers and health care professionals are faced with a major challenge of matching varying needs with diverse types of care across different settings. The concept of knowing what works is complicated by a vast diversity of country cultural contexts and determinants of maternal health (Campbell and Graham, 2006). Efforts towards the reduction of maternal deaths are likely to be more efficient if the underlying causes are known, particularly where they vary in extent (Loudon, 2000). Consequently,

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implementing country-specific targets may allow countries to better assess their performances given their resources and potential (Cohen *et al*., 2014).

Before the Millennium Summit in 2000, global initiatives to intensify policy intervention began in February 1987, Nairobi, Kenya during the Safe Motherhood Conference held by the UNFPA, and the World Bank (Starrs, 2006). They launched the "Safe Motherhood Initiative (SMI)", in response to the fact that primary health care programmes in many developing countries were not adequately focused on maternal mortality (Hogan *et al*., 2010). The initiative called for necessary actions at both local and international level to reduce high maternal death rates and improve women's health in developing countries (Starrs, 2006). The initiative goals were to be achieved by including programmes intended to improve pregnant women's health status and their access to quality health care during pregnancy and delivery (Thaddeus and Maine, 1994). However, Islam (2007) noted that countries such as Nigeria with the highest burdens of maternal mortality made the least progress since the inception of the Safe Motherhood Initiative.

Nigeria adopted the Safe Motherhood Initiative in 2000 to confront adverse social, health and political conditions that lead to a high rate of maternal mortality (Shiffman and Okonofua, 2007; Bankole *et al*., 2009). Despite the adoption of this initiative, Nigeria was reported to fail in its achievement of the MDG5, implying that the Nigerian efforts towards safe motherhood were disappointing and underachieving (Bankole *et al*., 2009; Adinma and Adinma, 2011; Oyewole and Ahmadu, 2014).

The process of achieving safe motherhood and reducing maternal mortality demands a multi-sectoral comprehensive approach, to understand the social determinants of maternal deaths (Storeng and Behague, 2014; Kuruvilla *et al*., 2014). For instance, a study in the Southwest

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region of Nigeria revealed that primary health workers in the area had no understanding of the nutritional component of the Safe Motherhood Initiative (SMI), irrespective of nutrition being one of the SMI core elements (Oyewole and Ahmadu, 2014). In another instance, abortion is a criminal offence as indicated in the criminal and penal code from the "Offence Against the Persons Act" 1861 (Ubajaka *et al*., 2014). These instances basically highlight the importance of a multi-sectoral comprehensive approach to include stakeholders from the lower level primary health care workers to the higher-level policy makers.

2.3 Causes and determinants of maternal mortality in Nigeria

Maternal mortality is influenced by different categories of conditions, including clinical, cultural, economical, biological, demographic and health services conditions (McCarthy, 1997; WHO, 2014). Firstly, the clinical conditions are divided into direct and indirect, with the direct obstetric causes of maternal deaths resulting from complications of the pregnancy, intervention, delivery and treatments (WHO *et al*., 2012). The indirect causes of maternal mortality are those that occur as a consequence of the worsening of existing conditions by pregnancy or delivery. The five major direct causes include; postpartum haemorrhage, sepsis, pre-eclamsia/eclampsia, unsafe abortion, and obstructed labour (Lanre-Abass, 2008; Omoruyi, 2008; Mojekwu and Ibekwe, 2012; Oye-Adeniran *et al.*, 2014). Indirect causes include conditions such as HIV/AIDS, malaria, anaemia renal and cardiovascular diseases (Boerma, 1987; WHO *et al*., 2005; Oye-Adeniran *et al.*, 2014). Ultimately, as Ameh *et al*. (2014) suggested, the development of interventions and consequent reduction of the burden of the issue is dependent on understanding the underlying causes and factors contributing to maternal death. Accordingly, the current study was designed to achieve greater insight of the perception and knowledge of different stakeholder's groups to achieve the aspirations of

reducing maternal deaths.

A variety of economic, social and health system factors intertwine to contribute to health outcomes in pregnancy (see Figure 1), and these factors operate at different levels such as the household, community, health sector, other social sectors and the larger political environment (Fatusi, 2004). Figure 1 was utilised in the current study to discuss the determinants of maternal mortality because it provided a well-developed sequence of events related to pregnancy, including the nature of integration of one level/category to another.
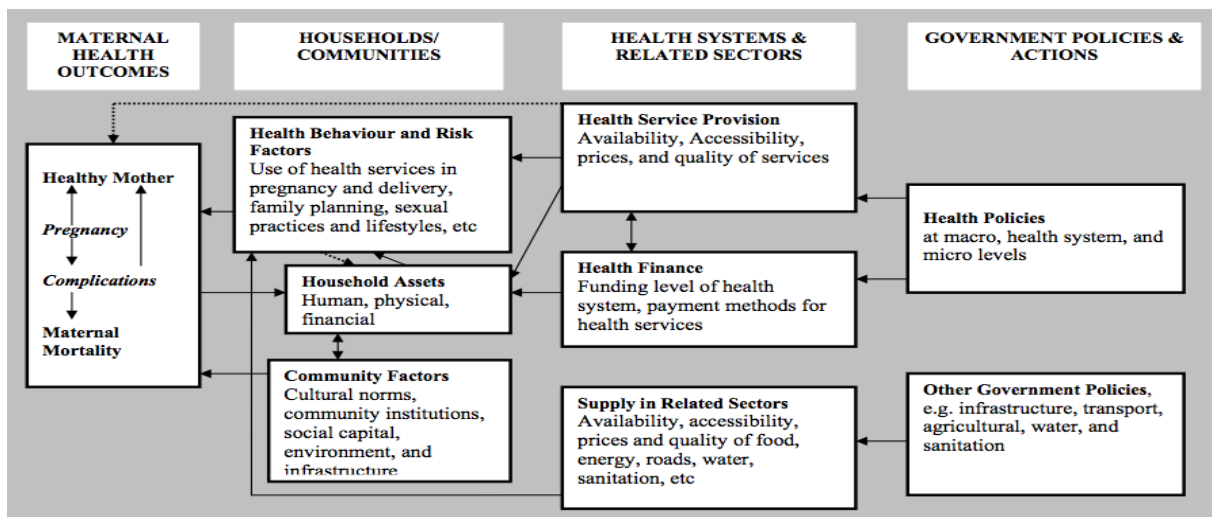
Figure 1: Determinants of maternal mortality in Nigeria (Fatusi, 2004, p1)

Note: Solid lines in the illustration link the main pathways through which various factors influence health outcomes and the dashed lines refer to some of the feedbacks and secondary linkages that should be considered.

The current study focused on developing a model of the knowledge of the issue of maternal mortality to distinguish those components that offer a way forward to tackling the problem using risk communication strategies. On this premise, the Fatusi (2004) framework was used over Wagstaff's (2002) framework. Wagstaff's primary focus was on poverty and health sector inequalities, which is only a portion of the current study's interest. The following

subsections discuss the different factors (See Figure 1) influencing maternal health outcomes at the various operational levels as they relate to Nigeria.

2.3.1 Household/communities

2.3.1.1 Health behaviour and risk factors

The health behaviour of individuals can be seen as the actions taken or not taken to maintain their health (Kim *et al*., 2012). For instance, maternal mortality can be related to the woman's decision to get pregnant or not, or to attend antenatal care or not. These behaviours can be influenced by a variety of factors, ranging from perception and beliefs to cultural norms and practices. The principle of health seeking behaviour and choices focuses on the individual. However, most of the decisions the women take concerning their health show outside influences such as religion and social networks (Onah *et al*., 2006; David and Olufumilayo, 2007; Babalola and Fatusi, 2009).

Boyer (2002) identified a particularly intriguing role played by religion in influencing decision-making. Religious institutions have been seen to play a central role in the lives of people, contributing to shaping and forming their values and beliefs. Religions are deeply rooted into the foundations of communities and the power structures within them (Peel, 2003). Hunt (2002) describes how much religion means to Nigerians, in particular with the massive increase of Pentecostal churches such as the Redeemed Christian Church of God. He suggested that this growth is due in large part to the ability to offer symbolic and material resources, and establishments of social organisation. Scholars (Ferree and Mueller, 2004; Gallagher, 2004) have argued that religion, especially Evangelicalism, has contributed to gender inequality in communities and family structures. For example, Grasmick *et al*. (1990) argued that religion is an influential force, which supports a patriarchal family structure.

Chapter 2: LITERATURE REVIEW

Nigeria possesses a distinct geo-religious makeup, with a mostly Christian South and a Muslim North (Al-Mujtaba *et al*., 2016). With the country being a very religious nation, this might perhaps explain its highly patriarchal nature where female children are more likely to suffer rejection, discrimination, and abandonment (Izugbara, 2004; Olaogun *et al*., 2009; Agbalajobi, 2010), potentially limiting or impeding their decision-making power. Nonetheless, the adequate identification of the risk factors that predispose the women to complications, and preventing these problems from resulting in maternal mortality is still considered a major push in preventing maternal deaths (McCarthy and Maine, 1992). Patriarchal constraint to maternal health may be addressed by community participation and mobilisation interventions that involve making the community more aware and responsible for their well-being (Prata *et al*., 2012; WHO, 2014). Implying that in all regions of the world (Patriarchal or not), empowering the stakeholders of a risk potentially decreases their chances of an adverse outcome.

Recognition of risk factors may potentially influence health behaviours eventually affecting the women's use of health services, family planning, antenatal care and delivery. For example, in Nigeria, the total fertility rate remains high in women of childbearing age, estimated to be 5.7 children per woman (4.9 in urban and 6.7 in rural areas), with a birth rate of 41.9 per 1000 population (Fatusi, 2004; FMOH, 2010). These high levels may be explained by the fact that 1 in every 4 Nigerian women has an 'unmet need[2]' for safe ways of delaying

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[2] Unmet need refers to fecund women wishing to postpone the next birth or stop childbearing, but who are not using a contraceptive method (Igwegbe *et al*., 2009)

or avoiding pregnancy, potentially leading to unsafe abortions and even death (Igwegbe *et al*., 2009; Agbonkhese, 2014). Insights such as these should aim to inform maternal health interventions, as the unmet need for family planning is consistently contributing to maternal deaths (Madera, 2012).

Although the Nigerian government intensified efforts to meet the unmet need by approving the distribution of free family planning supplies in public health facilities, there is a low-level utilisation of family planning (NPC and ICF, 2014). The combined high fertility rate, high level of unmet need for family planning contraceptives, non-attendance of antenatal care, and the non-utilisation of skilled birth attendants during pregnancy and delivery are important risk factors that should be investigated and solutions provided. This is because when a skilled birth attendant provides antenatal care, it enables birth preparedness, early detection and prevention of complications/diseases, health promotion and counselling (NPC and ICF, 2014). Unfortunately, according to the 2013 Nigerian Demographic and Health Survey, a larger proportion of Nigerian women have consistently delivered at home rather than at a health facility with skilled birth attendants (see Figure 2).
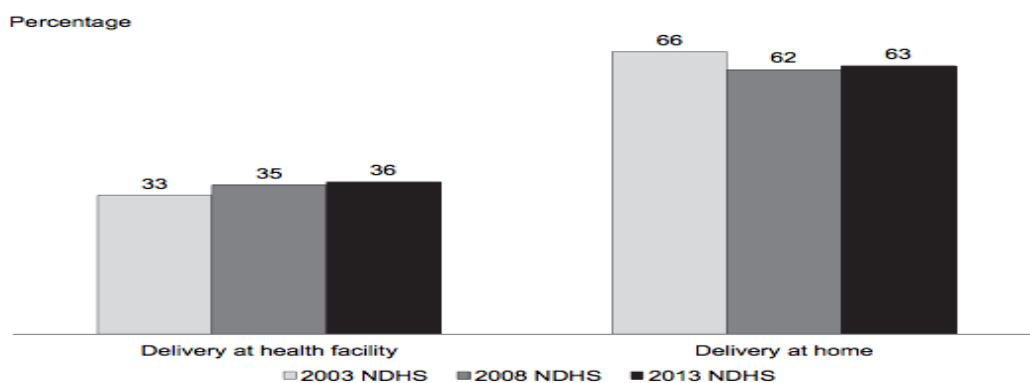
Figure 2: Trends in places of delivery (NPC and ICF, 2014, p137)

Information from Figure 2 suggests that there is a need for academic research into

understanding why 63% of the women (in 2013) preferred home deliveries, and how to communicate the risks to them. These trends in places of delivery may be attributed to the fear of surgical operations, poverty (unable to pay fee/gratuity to clinicians), education, employment status, family influence and availability of relatives /native midwives (Lindross and Luukkainen, 2004; Shiffman *et al*., 2006; Adekanle and Isawumi, 2008). The current study responds to this need for primary data on what influences the women's healthcare decision-making.

2.3.1.1.1 Household assets

Poverty and low income have been shown to cause ill health, and poor countries tend to have worse outcomes than high-income countries (Wagstaff, 2002). An individual's inability to achieve a certain minimal standard of living is, in essence, the definition of poverty (Aigbokhan, 2000), which can be looked at from two different perspectives, pennilessness and powerlessness. Pennilessness means both insufficiencies of cash and deficiency of resources of all types while powerlessness means the individual's life seems to them to be governed by forces or persons outside their control (Ijaiya *et al*., 2011). Nigeria is one of the 20 poorest countries in the world with over 66% of the population living in poverty (see Figure 3) (Lanre-Abass, 2008; Anyanwu, 2012). Poor women of childbearing age are at a higher risk of being malnourished and deprived of bare necessities, thereby potentially making them more prone to poor maternal health and eventually death.
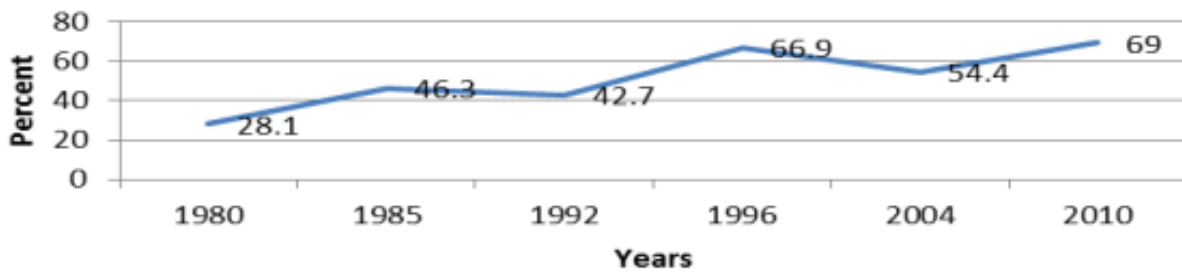
Figure 3: Trend in national poverty incidence in Nigeria from 1980-2010 (Anyanwu, 2012, p8)

Fatusi (2004) pointed out that another consequence of a high poverty rate is that many of the women are subjected to infections, due to the unhealthy environments in which they live. Also, these women are less likely to use qualified health care attendants and services due to the unaffordability of these services (McCarthy and Maine, 1992; Fatusi, 2004). Lessons learnt from the implementation of the United Nations Population Fund country programmes, show that an increase in individual and household income will lead to an improvement in the way these people access and employ basic social services, which include health and education (Chimbwete *et al*., 2012).

2.3.1.1.2 Community factors

The presence of community, socio-economic constraints and the lack of decision-making power by the women affects their ability to take adequate and informed health care decisions (Fatusi, 2004). For example, during four zonal seminars organised on safe motherhood in Nigeria, women identified a range of constraints to their maternal health. These include poverty, lack of decision-making power of women, work burdens during pregnancy, obstacles to family planning practices/contraceptives, harmful traditional practice (e.g. female genital mutilation), women's value/status, women's education, and young age at

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marriage/childbearing (Okafor and Olukoya, 1990).

In addition to the above-mentioned constraints, the presence of a skilled birth attendant remains very important to women's survival in childbirth because there is an inverse relationship between skilled attendants' presence, and the occurrence of maternal death (Babalola and Fatusi, 2009). However, it was estimated that a skilled birth attendant assisted 38% of all births in Nigeria while traditional birth attendants (native midwives) supported 22% of deliveries, with a further 23% helped by relatives and 13% being unassisted (NPC and ICF, 2014). Therefore, it is possible to suggest that there is a critical gap in communication and education to the women of the importance of skilled birth attendants and hospitals.

Additionally, in the communities, the issue of domestic violence/intimate partner violence comes into play in a patriarchal society. The potential abuse of pregnant women could lead to an adverse pregnancy outcome, as the abdomen is the most frequent target, with the women at a higher risk of ruptured membranes, pregnancy loss and maternal mortality (Eno *et al*., 2014; Onoh *et al*., 2014). Therefore, healthcare workers ought to be alert to the clues to protect the women from further domestic abuse (Ezechi *et al*., 2004). However, study of cultural norms has reported that the existence of this type of violence is relatively commonplace, with the victims least likely to report these situations to avoid breaking traditional standards and risking punishment from their partner and/or family (Illika *et al*., 2002).

As Pallito *et al*. (2005) suggested, the domestic violence climate of fear and control that is instilled in these women limits their ability to control fertility, which may lead to unintentional pregnancies, linked to adverse pregnancy outcomes. This may be because when unintended pregnancies are at short intervals (less than five months compared to 18 to 23 months), it potentially leads to maternal depletion, premature membrane rupture and anaemia

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(Pallito *et al*., 2005; DaVanzo *et al*., 2007). Unfortunately, Umeora *et al*. (2008) reported that gender–based violence has been a neglected area of health research in Nigeria, especially in the South.

Individuals in the mainly rural communities, often have some knowledge regarding the potential solutions to their health problems from their lay perspective within their social, economic and cultural lives (Adindu *et al*., 2012). Therefore, Ndep *et al*. (2014) highlights the importance to include them in defining their health needs, planning, implementing, monitoring and evaluation of interventions. Accordingly, the current study will investigate the extent of knowledge of the women of childbearing age in the case study area, to tease out the socio-cultural factors presently impeding the positive maternal health outcomes of the women. However, no single 'magic bullet' panacea intervention exists for the reduction of maternal mortality (Nyamtema *et al*., 2011). In combination with community interventions, and individual roles in their maternal health outcomes, health systems are an important aspect of maternal health; the Nigerian health system organisation is discussed in the section below.

2.3.1.2 Health systems and related sectors

The public health care system in Nigeria operates on three-tiers, with primary, secondary, and tertiary levels. The primary health care system is run by the local government with support from the state ministries of health and constitutes 74.7% of the public sector facilities (Gupta *et al*., 2003; Fatusi, 2004). For example, in the case study area, the Rivers State government supports any primary health care facilities found in each Local Government Area located in the state. With this level being the entry point of the three-tier system, healthcare is mostly preventative, curative and promotive (Amaghionyeodiwe, 2008).

However, the primary health care system in the country has faced obstacles such as lack of

support from the government including financing, weak health infrastructure, maldistribution of the health workforce and reduced coordination (Abosede and Sholeye, 2015). This is a possible explanation of the reasons why the primary healthcare centres account for less than 20% of potential patients (Abdulraheem *et al*., 2012), and why the private health sector and non-governmental organisations account for 50% of the country's health care delivery (Ukwaja *et al*., 2013).

As a general approach to all healthcare, upon referral from the primary health care centres, individuals are directed to the secondary health care centres, which constitute 25.2% of the public sector facilities, and are available at the state level, serving as a supervisory administrator for primary health care centres (Fatusi, 2004; Amaghionyeodiwe, 2008). Finally, the government has provided tertiary health care centres, which constitutes 0.2% of the public sector facilities, to provide highly specialised services to citizens, e.g. psychiatric hospitals (Amaghionyeodiwe, 2008). In the context of the current study area, Rivers State has about 377 public health facilities, with 36 general hospitals spread across 23 Local Government Areas (LGAs). However, the health status of individuals in the state has been reported to be in a deplorable condition, perhaps because the majority of the public health facilities are not adequate and well equipped (RSMOH, 2010), nor regulated to any national or international quality standards, for example, the United Kingdom has a Care Quality Commission (Burns *et al*., 2012). Private health centres in Nigeria have been reported to perform better than public facilities, due to private hospital fee based resourcing (Adesanya *et al*., 2012) and with 467 private hospitals in Rivers State, there still remains the issue of women's service underutilisation, despite the presence of all these establishments.

As part of understanding the reasons for service underuse, it may be useful to investigate

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whether these women have some expectations as patients that the hospitals were not meeting to their satisfaction. For example, the health service provision in developed countries such as the UK have undergone several reforms over the past decades, including changing and improving the relationship between patients and professionals (Harrison *et al*., 2002; Hodge, 2005; Tait and Lester, 2005; Fudge *et al*., 2008). This relationship, in turn, encourages the patients to have a greater control and influence over their health care and improves involvement in the development of health services (Fudge *et al*., 2008). However, even in the United Kingdom, barriers to the process of service user involvement include the responsiveness of staff and the representativeness of the service users, information shortage, the cost of participation and professional resistance (Crawford *et al*., 2003; Tait and Lester, 2005; Bradshaw, 2008). It would seem that the service user involvement philosophy is not being used in Nigeria, perhaps in part resulting in the poor state of the health care system in the country (Tyson, 2013).

The persistent low quality health services in the county may be due to the fact that there is a lack of any regulatory body/processes to ensure that health centres (both public and private) operate to a defined national or international quality standards, with the power to close unsatisfactory facilities (Ogunbekun *et al*., 1999). For instance, in developed regions, the health centres are expected to uphold international standards of health facility operation (e.g ISO 9001 certification) (Staines, 2000). Reforms addressing the proper functionality of the Nigerian health systems are needed if the hospitals are to be adjusted to fit service user expectations.

Financing remains a critical issue in healthcare usage. As discussed in section 2.3.1.1.1, poverty is a major inhibiting factor to women's utilisation of services. Health finance may be

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considered in two dimensions, the funding of the health system and the payment method for health services. The Nigerian health care system is funded mainly by tax revenue, out of pocket payment, donor funding, and health insurance, but it was observed that the Nigerian health expenditure is small compared to its African counterparts (Olakunde, 2012). The Nigerian Demographic and Health Survey 2013 highlighted that less than 2% of women of childbearing age have health insurance coverage (NPC and ICF, 2014). The citizens are at a risk of acquiring catastrophic health expenditures due to issues such as a high level of user fees and out of pocket spending to pay for health expenses in the health systems (Soyibo *et al*., 2005; Onwujekwe *et al*., 2010; Onwujekwe *et al*., 2012). There is a need for the government to reduce the high burden of health care cost on the Nigerian households because health has generally been shown to improve with income (Deaton, 2002; Marmot, 2002).

Owing to the inequalities present in the socio-economic status of the Nigerian women, the less privileged may potentially suffer the most from these high user health service fees and out of pocket spending on medications. As stated by Marmot (2010):

> *If fairness were put at the heart of all societal decision-making, the health of the population would improve, and health inequalities would diminish (Marmot, 2010, p282)*

In essence, if proper health insurance/financing was provided for the Nigerian citizens, then maybe more women would use health facilities and thereby potentially reduce maternal deaths. Essentially, scholars (Sambo *et al*., 2005; Soyibo *et al*., 2005) have recommended health financing to address these problems of poor financial access to healthcare by the poor in society.

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Filmer and Pritchett (1999), stated that 95% of cross-national mortality variation can be explained by income distribution inequality, the extent of female education, ethnic fragmentation, religion and country's income per capita. Furthermore, Ogungbenle *et al.* (2013) reported bi-directional causality between public health spending and economic growth in Nigeria, thereby indicating that pumping money into health care may most likely improve the Nigerian economy, thereby reducing income distribution inequalities and eventually empowering the women financially. There is a critical need to review the country's health financing, to ensure efficient use of resources and removal of financial barriers to health access, by shifting focus from out of pocket payments to other hidden resources (Uzochukwu *et al.*, 2015). The following section explores the policies and actions the Nigerian government has employed and implemented for maternal health care.

2.3.1.3 Government policies and actions

The Nigerian health policies have evolved (see Appendix 7) with the most promising development being the introduction of the National Health Bill 2014 (Mamaye, 2015). The regulatory frameworks and interventions pronounced by the policy makers are impressive, but in most cases, neither the budget allocation nor health outcomes match these good intentions as evidenced by the persistent high maternal mortality in the country (British Council, 2012). The way evidence is utilised in planning and policy is an ongoing challenge (Olakunde, 2012). This may partly explain the non-sustainable policies, considering that the decision makers may not understand the gravity of the issue in respect of health service planning and implementation. It is important to develop an understanding of stakeholder knowledge of these policies/interventions and limitations to their operations.

In addition to the Federal government policies, some states have implemented their own

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policies. For instance, in Lagos State (MMR, 400-650/100,00 live births) there is a free antenatal care programme, including intermittent preventative treatment (IPT) of malaria, insecticide-treated nets (ITN) and routine drugs for pregnant women in hospitals (Fabamwo and Okonufua, 2010). In Enugu state (MMR, 1400/100,000 live births), policy on free maternal and child health was also initiated (Okeibunor *et al*., 2010). In the less wealthy states like Borno state (MMR, 1600/100,000 live births), although the government has a policy on free maternal health care, the programme was not officially gazetted, owing to lack of funds and minimal political will (Mariga *et al*., 2010). Despite the fact that these states implemented policies, the MMR remains high, so it is increasingly evident that the federal government has to make practical and significant contributions at the national and sub-national levels, to make these promising state policies sustainable (Okeibunor *et al*., 2010).

It was established from the earlier discussion that the pathway to reducing maternal deaths is a multi-dimensional, multi-perspective and multi-sectoral issue. Provision of policies and health infrastructure is one aspect of the puzzle. The risk of maternal mortality is an important concept that requires comprehensive understanding from its stakeholders. This is because the methodologies for managing this risk are becoming more complex with the added variables of the stakeholder's perspective and communication challenges. The explanation for these difficulties may be rooted in the psychological and cultural influences on risk perception of maternal mortality.

2.4 Psychological and cultural influences on risk perception

Individual choices are affected by the perception of the risk, disease or threat, and these opinions are formed by personal reasoning, common sense, and social communication (Sjoberg, 2003; Larson *et al*., 2012). Several factors can modify the individual's perception

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including physical, social factors, their perceived susceptibility and the seriousness of the threat (Sjoberg, 2003; Larson *et al.*, 2012). However the risk perception of an individual is inherently subjective, with people having varying risk attitudes (see Figure 4) (Hillson and Murray-Webster, 2007).
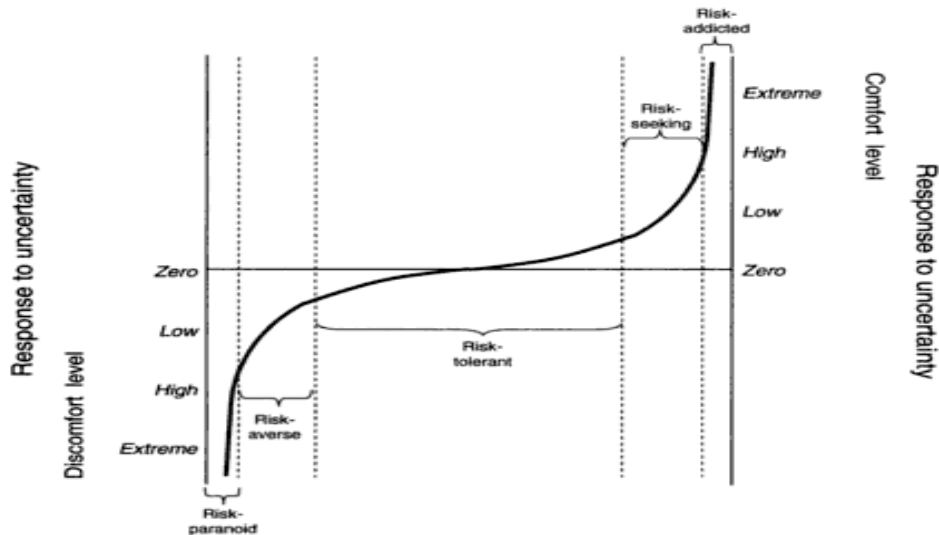
Figure 4: Risk attitude spectrum (Hillson and Murray-Webster, 2007, p44)

A study of 129 African American women about their perceptions of breast cancer screening and their intention to be screened, revealed some psychological influences on risk perception. 41% of participants were underestimators, 23% overestimators and 37% were extreme overestimators of their personal risks for breast cancer, and this affected their need to attend breast-screening sessions (Bowen *et al.*, 2014). Several psychological variables were seen to influence the women's decision to undergo breast screening, such as ethnic identity, attitudes towards the physician, emotional distress and risk estimation.

Research (Slovic *et al.*, 2004; Rusou *et al.*, 2013; Ayal *et al.*, 2015) has indicated that individuals can use some combination of two modes of thinking: an intuitive and an analytical

mode in making decisions. Decisions are made intuitively when they are made quickly, and may rely mostly on heuristics, or mental shortcuts, which sometimes leads to biassed decisions. Conversely, the analytical mode tends to be favoured when an individual has time to analyse data, and assess available options for the best decision. Using these two modes of thinking, one can infer that women of childbearing age from the general public, who have limited time, expertise and, resources to evaluate a maternal health risk assessment may rely upon an intuitive mode of decision-making. Conversely, policy makers, maternal health experts and professionals equipped with the necessary resources to conduct a risk assessment, and logically make their decisions ought to favour the analytical mode of thinking. However, care must be taken in perceiving that people, whether experts or lay individuals, rely solely on the analytical or the intuitive way of thinking when making judgements and taking decisions. As Slovic *et al*. (2004) expressed, rationality is not only a product of the analytical mind but the intuitive mind as well.

Psychology provides one framework for understanding how different people may perceive and react to risks, but sociology has offered another approach for understanding individual risk perception and risk attitudes. The variety of risk perspectives of women of childbearing age may be due to their different worldviews as identified in cultural theory literature (Dake, 1991; Oltedal *et al*., 2004; Tsouhou *et al*., 2006). Cultural theorists make a distinction between worldviews (shared mental representations, values and general social, cultural and political attitudes held by a group of individuals) and social relations (patterns of social interaction between people and or social organisation) (Wildavsky and Dake, 1990). Studies (Peters and Slovic, 1996; Oltedal *et al*., 2004; Tsouhou *et al*., 2006) have summarised a range of 'ideal type' worldviews categories as follows:

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Heirarchists: These individuals place an emphasis on the natural order of society, and preservation, and the perseverance of this order.

Egalitarians: This group of people fear any development that may increase inequalities amongst people.

Individualists: They fear things that have the potential to hinder their individual freedom.

Fatalists: They take a minor part in social life, are resigned to tight controls on their behaviour and have a "why bother' attitude toward risks. (Peters and Slovic, 1996; Oltedal *et al*., 2004; Tsouhou *et al*., 2006)

Thus, hierarchists, egalitarians, individualists, and fatalists may each respond differently to evidence of the risk of maternal mortality and act accordingly:

> *"...an understanding of who fears what and why requires serious attention to the political, historical, and social context in which risks are framed and debated...mental models of risk are not solely matters of individual cognition, but also correspond to worldviews entailing deeply held beliefs and values regarding society, its functioning, and its potential fate" (Dake, 1991, p62).*

Understanding the perception of stakeholders (lay citizens and experts) of maternal health is essential to an improvement of health services and women's acceptability of intervention programmes. In the context of the laywomen in Nigeria, a cultural theory understanding of their worldview could be interpreted using the following ideal types: that hierarchists tend to trust experts, doctors, and those in authority. They should support and trust hospitals and health centres, as long as the government appropriately legitimises them. Egalitarians should

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most likely display distrust to the experts and be concerned/wary of interventions of experts, especially if there is a sense of inequality. Individualists should be most concerned about impositions of constraining regulations (e.g. ban on traditional health practices and cultural practices like female genital mutilation). Finally, the fatalists would possess a "Que sera sera" or 'why bother' attitude about their maternal health, hence leaving their health outcome to fate.

This theory, if borne out by empirical research, could have important implications for maternal health policymaking and risk communication, revealing that 'one-size-fits-all' universal policies and interventions may fail. Cultural theory has been criticised as lacking empirical testing through organised case studies and more rigorous evidence based social science techniques (O'Riordan and Jordan, 1999). Dellicour *et al*. (2013) further exacerbated the criticism by revealing that women's perception, clients and service providers understanding, risk attitudes towards adverse pregnancy outcomes, and the relation to health seeking behaviour have received scant research attention. Furthermore, Adewemimo *et al*. (2014) identified that there is a dearth of research exploring skilled birth attendant utilisation in respect of a continuum of care from the women's perspectives. Therefore, the current study will specifically involve these stakeholders in an exploration of their metal models.

In summary, the psychological and sociological perspectives on risk perception suggest that lay citizens interpret a particular risk and make decisions towards that risk using several intuitive and analytical processes. The psychometric paradigm points to cognitive factors as the causes of differences in perceptions and attitudes exhibited by stakeholders, and the preferred remedy is, not surprisingly, public education through risk communication (Slovic, 1986). The importance of social relations, either involving individuals or social organisations

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has been highlighted, indicating the importance of communication. Igboanugo and Martin (2011) recommended that providing critical information to women on how to identify risk factors during pregnancy was important. They also considered that health ministers responsible for maternity service provision should be encouraged to hear the voices of the people they represent. Overall, communication plays a vital role in addressing the individual/ community perception and worldviews.

2.4.1 Risk communication

The paramount goal of risk communication is to enable stakeholders to understand the rationale of risk assessment results and risk management (Renn, 2005). According to Rowan, 1991, the five possible goals of risk management/communications include; motivating action, educating, reaching an agreement, building trust with the communicator and raising awareness (Rowan, 1991). The health care sector has, over the years, increasingly investigated the concept of risk in thinking about health (Gifford, 1986; Vachon *et al*., 2000). However, as Gigerenzer *et al*. (2007) pointed out, risk communication is a challenging aspect for healthcare professionals. Although many believe that it is a crucial part of primary and secondary preventative and intervention strategies for maternal mortality (Igboanuago and Martin, 2011).

Risk communication has evolved from one-way to two-way models where the public are recognised as partners in the process. Binder and Scholl (2010) highlighted that the single sided model may be useful for some purposes, however, it is limited in some circumstances. Practitioners of the one-way method have a traditional technical view, believing that risk communication is to revolve around one party trying to influence another party to accept a representation of a hazard (Gurabardhi and Gutteling, 2002; Breakwell, 2007).The other

group see risk communication as a constructive exchange of information among stakeholders to reach open and honest dialogue (Gurabardhi and Gutteling, 2002).This transformation from a one-way, 'top-down' hierarchical power relationship of experts exerting their control, to 'two-way' more equal and open model pluralist is not a simple one but has arisen from the reflexive advances in science and applications (Pearce, 2008).

Several studies (Simonds, 1995; Binder and Scholl, 2010; Scholl and Binder, 2010) have highlighted the shortcomings of the one–way model in effecting change needed for a particular risk. For example, physician's offices notice boards and communities are bombarded with messages from experts that were ignored (Simmonds, 1995). This is an attestation of the ineffective role of the one-way model of communication where the needs, concerns and interests of different stakeholders cannot be derived, due to the lack of a feedback mechanism in the model (Simmonds,1995; Kreuter *et al*.,1999). The more efficient two-way model of communication takes into account four major elements (information, feedback, networks and purpose) (Narula, 2006).

In the framework of the current study, not only are the women the receivers of the message as proposed in the one-way model, but they are also important producers of messages. Engaging the women in a productive dialogue may tease out vital information on their methods of decision-making, and gaps in their knowledge for a targeted risk message. The women's risk perception of maternal mortality may vary, depending on socio-economic, cultural, political context and historical experiences (Larson *et al*., 2012). However, communication efforts have often failed to engage stakeholders to change behaviour within the context of their lives (Neuhauser and Kreps, 2003).

In the current study area, the situation of the mostly rural, poor and needy women is

particularly acute, since the policy makers and experts may have excluded the women's voices in their decision-making processes. One solution to this problem would seem to be based on the progressive involvement of the women, which implies citizen participation and control, to achieve self and mutual-help. An apparent attempt to determining the scale of participation by the stakeholders is that of Arnstein's ladder of citizen participation (see Figure 5). She defined citizen participation as:

"A redistribution of power that enables the 'have-not' citizens, presently
excluded from the political and economic process, to be deliberately included in
the future" (Arnstein, 1969, p216).

Transferring Arnstein's rungs of the ladder of participation to the current study area is, however, an idea that is in theory the cornerstone of democracy in principle, but sadly not the true case in Nigeria. Perhaps it is a distant prospect but nonetheless worth aiming for, as citizen's inclusion is an underlying foundation of this research.
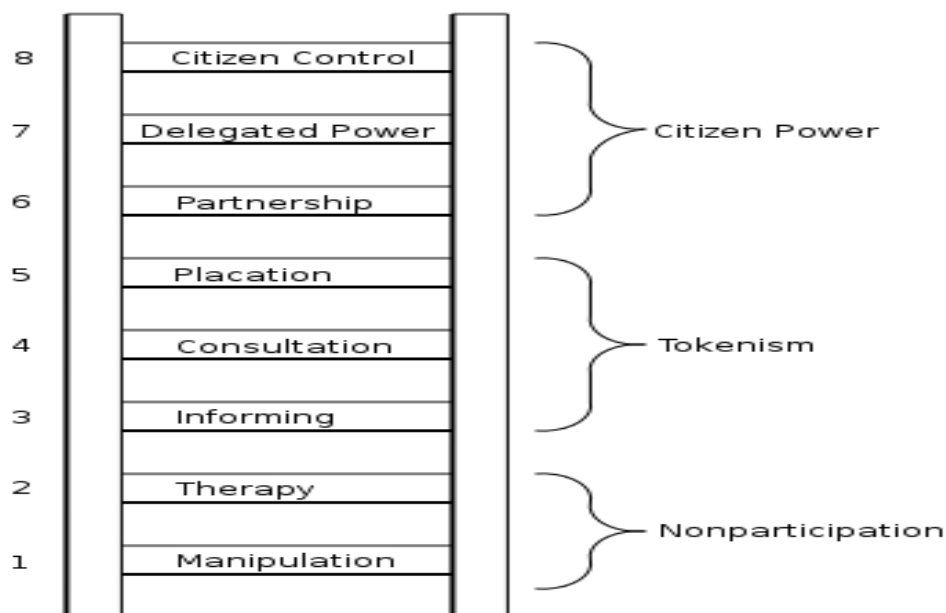
Figure 5: Arnstein's ladder of citizen participation (Arnstein, 1969, p217)

Within the developed world, such as in the United States, Arnstein highlighted processes by which the poor 'have-nots' can participate and influence social reforms (e.g urban renewal and anti-poverty) that enable them to share in the benefit of the country's resources (Arnstein, 1969). Critiques (Choguill, 1996; Collins and Ison, 2006; Tritter and McCallum, 2006) of the Arnstein's ladder approach have suggested that it is time to jump off the ladder as it may provide misleading results within a development context. Choguill (1996) suggested that, in developing countries such as Nigeria, the citizens need more than power alone, for example, in terms of infrastructure they need a strategic input of outside assistance, whether government or non-government sources (Choguill, 1996). Despite the criticisms, it is assumed that increasing citizen's involvement will form resilient, self-determining communities, needed to deal with complex issues such as poor maternal health (Kenny *et al*., 2015). Looking at participation from the participatory approaches view, Pretty (1995) takes into account participation which involves self-mobilisation, where individuals take the initiative independently of external organisations, developing contacts for resources and technical assistance but still retaining control over resources (Cornwall, 2008). Pretty helps make it clear that in shaping interventions (e.g. risk communication programmes), motivating the people to adopt and practice participatory approaches is necessary (Pretty, 1995). Self-mobilisation can also be achieved if an enabling framework is provided (Pretty, 1995; Cornwall, 2008). To achieve this, and improved health literacy, education and communication activities are required to mobilise the women's collective energy, skills, and resources towards the advocacy and improvement of health (Nutbeam, 2000). However, several psychological and social factors may be obstacles to risk communication (Covello and

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Sandman, 2001):

Mental shortcuts/ heuristics: Everyone, including experts, uses mental shortcuts to measure the probability of an adverse action happening. However sometimes as a result of these mental shortcuts, individuals can make biassed judgements or decision without analysing critically (Covello and Sandman, 2001). For example, while doctors might use their mental shortcuts as a frugal and fast method for immediate diagnoses, they sometimes misdiagnose when the pattern is taken for something else (Croskerry, 2009). These heuristics have been argued to leave adult human reasoning prone to errors (Hertwig and Todd, 2003).

Apathy: This may affect an individual's processing of risk information, making them simply not interested in gaining knowledge on the risk, because they lack motivation (Covello and Sandman, 2001). For example, disaster managers found that apathy was an aspect of emergency preparedness that was frustrating because individuals think disasters like terrorism can never happen in their area or affect them (Littlefield *et al*., 2012). Considering maternal health, some women saw the risk of vaginal bleeding and high blood pressure as more dreadful than stomach cramps and vaginal discharges during pregnancy, which they showed little interest in, although all these conditions are potentially harmful to a pregnant woman (Ogujuyigbe and Liasu, 2007). On a country scale level, maternal death had been labelled a "neglected tragedy", highlighting the apathy of developing countries to the issue (Udjo and Lalthapersad-Pilay, 2014). It should be noted that reducing apathy as important as clinical acumen (Ramaswamy *et al*., 2015).

Overconfidence and unrealistic optimism: People tend to ignore or disregard risk information when the risk is voluntary and when high levels of personal control lead to a reduced feeling of susceptibility (Covello and Sandman, 2001). For example, in Equatorial Guinea, women,

especially grand multiparas (women with 5 or more children), limited their utilisation of health services (Jimoh, 2003). They considered themselves experienced, thereby less likely to have an adverse pregnancy outcome irrespective of antenatal attendance or not (Afolabi and Adeyemi, 2013). Also, overconfidence has been observed in the case of the care providers like the traditional birth attendants, who preferred their ways of using herbs and traditional methods to manage danger signs (Bisika, 2008).

Difficulties in understanding probabilities and technical information: Cognitive demands are even greater when patients are presented with risk statistics for decision-making based on risk and benefit comparisons (Fagerlin *et al*., 2011). The way individuals view risk may be profoundly impacted if the risks are presented to them regarding their probability of surviving rather than dying (Covello and Sandman, 2001). Therefore, risk communication may prove more useful if simplified terms are used, to reduce the amount of cognitive effort required by the audience to understand the level of risk (Waters *et al*., 2006).

Public desire and demand for scientific certainty: Individuals are opposed to uncertainty; they have difficulties imagining information about risk possibilities especially if presented as probabilities rather than facts (Covello and Sandman, 2001; Frewer *et al*., 2002). In the maternal health sector, the women's demand for accurate information on recognising signs of complications, nutritional and dietary advice amongst other demands show the desire of the women for information about their conditions (Igboanugo and Martin, 2011).

Prior belief and reluctance to change these beliefs: Strong beliefs about risks, once formed by an individual, especially socially and culturally established ideas, may change very slowly and it can prove quite difficult to change the original impression, even in the face of contrary evidence (Covello and Sandman, 2001). The perception of women regarding the comparative

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efficacy of the medical versus traditional belief may affect their choice of health care provider (Babalola and Fatusi, 2009). So, an understanding of the women's perceptions and prior beliefs regarding their maternal health may perhaps give insights that permit communication to address behavioural change.

Individual judgement of the actual magnitude of the risk: Research on the complexity of the considerations involved in non-scientific risk perception/ assessment revealed that there was a small correlation between the level of physical danger in a situation and the amount of worry it arouses (Covello and Sandman, 2001). Rather people's level of anxiety or response is determined by what Covello and Sandaman (2001) termed "outrage factors." Examples include controllability, familiarity, benefits, uncertainty, trust, dread, media attention, reversibility, understanding, process and fairness (Sandman, 1987; Covello and Sandman, 2001). So it is important for communicators of vital maternal health messages to control the outrage, sometimes people ignore a risk, so outrage has to be increased and vice versa (Holladay and Coombs, 2013).

2.4.2 Maternal mortality and risk communication

A review of the literature has revealed that pregnancy-related deaths are a significant cause of women dying in Nigeria, and importantly, most of these deaths are partially preventable by reducing behavioural risk factors such as poor utilisation of health services, and lack of skilled birth attendants during delivery. The current study was carried out in response to the need for additional empirical research to the maternal health field assessing the decision-making process of different stakeholder groups. Identified similarities and differences in the various ways of thinking are necessary to reveal communication obstacles that can lead to various ideas on how best to relay vital messages.

Lay individuals have been perceived to judge risk based on their feelings and emotions, implying that the cognitive biases and social factors that distort risk perception and hinder risk communication tend to affect lay individuals (Slovic, 2010). However, experts may be less prone to these influences because they may have more experiences and recognise patterns effectively, and some may use quantitative expression of the impact of certain risks such as maternal mortality (Leiss, 2004; Slovic, 2010). In other words, experts and lay people may use different criteria to judge the risks during pregnancy and post-partum. Psychometric studies assume an apparent difference between the expert and lay perception of risk, and the aim of risk communication has been to fill the gap in risk perception between experts and the public (Slovic, 1987; Renn; 1992; MacGregor *et al*., 1994).

The success and failure in reducing maternal mortality lie with the intervention of the government, their willingness to implement policies, public acceptance of the interventions, and willingness to achieve individual change (Campbell, 2003; Cooke and Tahir, 2013). Therefore, communication and advocacy should include all the necessary stakeholders of the risk, from the lay people to the experts'/policy makers. Scholars (Archibong and Agan, 2010; Adinma and Adinma, 2011; Uneke *et al*., 2014) have endorsed the importance of communication in the reduction of maternal mortality in Nigeria, either via media, community associations, churches, and community leaders. Although Shehu (1999) reported the success of community participation and mobilisation in improving maternal health in Kebbi State, Nigeria, there are limited studies in Nigeria about the effectiveness and outcomes of communication interventions and community participatory studies regarding maternal mortality.

The effectiveness of communication and maternal death reduction has, however, been shown

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in several studies elsewhere. For example, in a cluster randomised control trial in Nepal, the effect of participatory intervention with a women's group on birth outcomes was measured, local perinatal problems were identified, and strategies formulated to address them. The maternal mortality ratio was 69 per 100000 live births in intervention clusters, compared with 341 per 100,000 live births in control groups (Manandhar *et al*., 2004). Women from the intervention cohort were more likely to have antenatal care, institutional delivery, trained birth attendance and sanitary care than their counterparts in the control group (Manandhar *et al*., 2004). Similar outcomes were observed in a participatory intervention study with women's groups in eastern India (Tripathy *et al*., 2010). A systematic review and meta-analysis of controlled trials on the effect of womens groups participatory interventions revealed that practising participatory learning and action is a cost effective strategy to improve maternal and neonatal health survival in low-resource settings (Prost *et al*., 2013). Based on the participatory communication intervention outcomes discussed above, cultural theory and varied worldviews suggest that a universal solution may not be sufficient to reduce the maternal mortality rate in Nigeria. Women and communities can and should be empowered to demand their rights to pregnancy, childbirth and newborn care (Costello *et al*., 2006).

The expert-lay dichotomy has remained a fundamental concept in the psychometric paradigm and serves as an essential foundation for the development of innovative risk communication approaches (Morgan *et al*., 2002):

> *'In the absence of evidence, no one can predict confidently how to communicate*
>
> *about a risk. Effective and reliable risk communication requires empirical study'*
>
> *(Morgan et al., 2002, p182)*

Klimoski and Mohammed (1994) have suggested that every person has mental models for making sense of situations and processing of information. These mental models are fragmentary beliefs and perceptions that have been formed over time by interactions and society (Morgan *et al*., 2002). So to effect behavioural changes in the Nigerian women of childbearing age, it is vital to understand the underlying cause of individual actions.

In understanding the expert-lay person dichotomy and realising that the reduction of maternal mortality requires interventions at multi levels, it was suggested that the stakeholder theory may assist health promoters to make changes at the organisational and policy level to promote health (Kok *et al*., 2015). The theory originated as a guide for the response to stakeholder demands, and it is usually focussed on business corporations trying to understand the multiple views of those involved in the activity of the organisation (Boonstra and Vries, 2008; Freeman, 2010; Kok *et al*., 2015). Principally, it advocates corporate social responsibility (CSR), and can give a voice to customers (Harrison and Mort, 1998; Freeman, 2010).

CSR messages have however, attracted critical attention and research suggests that the more institutions expose their ethical and social responsibilities and ambitions, the more they are prone to attract significant stakeholder attention (Morsing and Schultz, 2006). Perhaps the Nigerian institutions, experts and organisations may not welcome such attention. Hence they side-line or ignore the service users in the fundamental decision-making process, thereby rendering the lay people less empowered. Patients in Sub-Saharan African hospitals have continuously complained of not having a voice, long hospital waiting times, and a poor feedback mechanism (Pam *et al*., 2014). While the CSR concept still suffers some level of abstraction, shrouded in organisation politics, the stakeholder approach offers a practical alternative for performance assessing vis-à-vis key stakeholder groups (Jamali, 2008). The

current study therefore aims to bridge the gap between the expert and lay people, by eliciting the maternal health knowledge of the different stakeholder groups to bring about a more informed citizenry.

Risk communication has several useful techniques (e.g. the crisis communication approach and the mental noise approach) (Lundgren and McMakin, 2013). However, the mental model approach was chosen for the current study (discussed further in Chapter 3), due to its four main key features, which succinctly serve to explore the expert-lay person dichotomy, for the creation of communication messages. The central characteristic of the mental models approach is that the elaboration of communication tools is based on the differences between the mental models of the expert community and those elicited from the target audience (Vari, 2004).

The approach is established in the risk communication field and provides a structured process for eliciting experts' depiction of a risk. Expert knowledge is then tested in other cohorts with the principal aim of passing on relevant messages and dispelling misconceptions (Morgan *et al.*, 2002). This methodology has been applied to the communication of various risks (Bostrom *et al.*, 1994; Galada *et al.*, 2009). For example, Galada *et al.* (2009) successfully applied the mental model framework to carbon monoxide intoxication risk during usage of unvented heaters among the primarily low socioeconomic status population in Northern Mexico. The implications of Type 2 diabetes (T2D) on adolescent reproductive health were also studied using the mental model approach, with the result that early culturally sensitive preconception counselling was needed for teens with T2D (Downs *et al.*, 2010).

2.4.2.1 Risk message framing and implementation tactics

A theoretical approach to constructing effective risk communication regarding behaviour

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change is "message framing" (Rothman *et al*., 1993) which is grounded in the field of prospect theory3 (Kahneman and Tversky, 1979; Rothman *et al*., 1993). In this approach health messages can be framed in terms of positive (gains) or negative (losses) associated with a particular behaviour, this framing then influences decision-making (Rothman and Salovey, 1997). For example, "presence of a skilled birth attendant during delivery, reduces the risk of mortality" (gain-framed), and absence of skilled birth attendants during delivery increases the risk of death" (loss-framed).

According to prospect theory, the framing of the risk message determines the acceptability and the responses of different individuals. When the benefits are more salient, people are risk averse, on the other hand when presented with potential losses, individuals are more likely to tolerate risks (Kahneman and Tversky, 1979). As a result, this leads to two categories of behaviours. According to the theory, for *detection* behaviours perceived as risky (e.g. to detect a health problem), a loss-framed health message is considered useful (Rothman and Salovey, 1997; Rothman *et al*., 2006). For *prevention* behaviours (e.g. to prevent the onset of a health problem), a gain-framed health message is more compelling (Rothman and Salovey, 1997; Rothman *et al*., 2006).

The efficiency of message framing has been debated in the literature. A meta-analytic review of 93 studies (N= 21,656) showed that for health messages encouraging disease prevention behaviour, gain-framed messages are statistically more persuasive than loss-framed messages,

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[3] Prospect theory proposes that people prefer taking risks to options that are certain when considering losses and prefer certainty to risk when considering gains (Kahneman and Tversky, 1979; Rothman *et al*., 1993)

but with only a slight advantage (O'Keefe and Jensen, 2007). However, this may be due to a vast effect size in studies related to dental hygiene. Despite the high statistical power, the review concluded that there was no statistically significant difference in the effectiveness of gain and loss-framed messages concerning other non –dental related behaviours like safer sex and cancer prevention.

Another meta-analytic review (94 studies) investigated message framing, with a focus on attitudes, intentions, and actions. Results revealed that for prevention behaviours (skin cancer prevention, smoking cessation and physical activity); gain-framed messages were more likely to encourage habits than loss-framed messages (Gallagher and Updegraff, 2012). Also, the effects of gain-framed over loss-framed message were not significant for detection behaviours. Finally, the authors conclude that to make firm conclusions, more studies are needed in the domain of prevention actions.

Gerend and Shephard (2007) have suggested that the relaying of messages effectively to stakeholders of maternal mortality depends on the output method of the message. Message framing has been applied to some health habits. Loss rather than gain-framed messages have resulted, for example, in increased human papilloma virus (HPV) vaccination intentions. Conversely, gain framed messages against lung disease, cancer and mortality warnings were more efficient in the motivation of smokers to quit smoking (Mays *et al*., 2014). Similar findings are also reported for individual intentions to avoid high-calorie food (Pavey and Churchill, 2014). A review of the message framing literature suggests that the manipulation of risk messages can lead to changes in perceptions, attitudes, intentions and behaviours. Providing the benefits and losses of behaviours, treatments and interventions has become an important part of modern health care. Finally, the provision of messages in a more

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understandable format to patients has been shown to make an impact on the improvement of patient knowledge (Edwards *et al.*, 2002).

As compelling as the results from message framing studies have been, they should be treated with caution, given the paucity of well-designed experimental studies. Further research has been advised to examine the potential mediating process to changing behaviours (Pavey and Churchill, 2014). Indeed, Covey, 2014 found that the efficiency of message framing can depend on the disposition of the audience, and therefore, to maximise persuasiveness of a message, people's differences and perceptions should be accounted for when tailoring risk communication strategies. This will be further developed in chapter 7.

Consistent adoption of preventative and detection health behaviours by the Nigerian women could save many lives (e.g. attendance at antenatal classes, and regular hospital check-ups). Understanding the most efficient ways to frame the risk communication is one aspect, and implementing the delivery is another important aspect. An essential component is the provision of the health messages to the women, which could be achieved via different outlets (e.g. media) or forms of subtle indicative clues, for example, the use of "Nudges" as advocated by Thaler and Sunstein (1976). Nudges introduce the concept of "choice architecture", where the message simply is that individual's decision-making on a particular issue can be influenced in the way the choices are presented; which can act as a nudge to the target audience (Brown, 2012). The nudge theory assumes that, while individuals are rational beings, many decisions undertaken are unconscious, not rational, and influenced by contextual cues (Cote, 2010; Bonell *et al.*, 2011).

Researchers (Carroll *et al.*, 2011; Vallgarda, 2012; Luoto *et al.*, 2014) have indicated the usage of 'nudges' in behavioural change interventions, is basically helping people make better

choices gently. For example, in the United Kingdom, 'nudges' were mentioned in the health promotion white paper "Healthy lives, healthy people" with Prime Minister David Cameron endorsing a "Nudge Unit" (Department of Health, 2010; Carroll *et al*., 2011; Vallgarda, 2012). People were encouraged to reduce their sugar intake by bringing in legislation to educate consumers about the sugar and other additives contained in food products (Rayner *et al*., 2015). Nudging was also used successfully to encourage safe water behaviours in Kenya and Bangladesh, where experimental marketing messages were used to promote the usage of free trial low-cost water treatment products, and the results indicated a positive and incremental effect from all the behavioural nudges (Luoto *et al*., 2014)

Irrespective of the advocacy for the use of nudges, several debates have emerged on the ethical legitimacy of the concept and its use. Scholars have identified questions about freedom of action and will (Fischer and Lotz, 2014), asking if 'nudging' is, in fact, a manifesto for a new paternalism (Leonard, 2008). Of these arguments, Thaler and Sunstein (1976) argue that traditionally, paternalism is coercive, though a nudge steers an individual but leaves them with their freedom of choice. This may stand true as the concept of nudging is being used in the United Kingdom, and it is recognised that the UK Government eschews the use of coercion (Michie e*t al*., 2011). Nudging builds on psychological and sociological theory, and has been noted to be an effective behavioural change tactic (Marteau *et al*., 2011). Perhaps a combination of message framing and nudging may be vital routes to take when preparing risk communications for the Nigerian women of childbearing age.

2.5 Chapter Summary

Maternal death has been conceptualised as the passing of a woman from pregnancy-related causes or childbirth within 42 days of termination of pregnancy. Existing research indicates

that different people may apply different perspectives regarding the issue of maternal mortality and how they make decisions and approach the problem. Such differences in views can lead to communication barriers and frustrate efforts to work together. The review also presented a general background to maternal mortality in Africa, focussing on Nigeria with the determinants of the issue explicitly discussed. Evidence was then presented of the drawbacks in the availability, access and utilisation of health care services and institutions. This led to a discussion of the concept of risk, its perception, and future communication to the target stakeholder. The major obstacles to risk communication were also discussed for clearer information on the barriers to proper interventions and behavioural changes being undertaken.

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3.1 Introduction

This research takes the position that much of the health decision-making carried out by the stakeholders of maternal mortality originates from their unique mental models. The cultural theory and worldviews literature provides a practical and theoretically grounded perspective from which these differences can be understood and responded to. So this research seeks to explore individual views on this issue and to discover ways of engaging stakeholders in a constructive process to achieve a mutual understanding of the problem. The current study seeks to apply a novel application of an established and useful methodology for understanding the thought processes that individuals use to make decisions about maternal health.

Maternal mortality is associated with some co-morbidity and risk factors related to health behaviours, such as non-utilisation of health services and identification of vital health deterioration signs (Anorlu *et al*., 2005; Adamu *et al*., 2014; Singh *et al*., 2014). While risk communication is a major field in its right, studies in the context of maternal health in Nigeria and Rivers State are limited. Specifically, little is heard of the voices of the women about their knowledge of the issue and the most efficient methods of communicating risks to them. As discussed in section 2.4.1, risk communication has several approaches, however, this research applies a mental models methodology because it is well suited for the exploration of the numerous variables and relationships among them that describe how the stakeholders make decisions (Morgan *et al*., 2002). The mental models research design is applied to identify the various components of how individuals think about maternal health and the inter-relationships among these elements.

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3.1.1 The Mental Models Approach- an overview

In 1943, a Scottish psychologist, Kenneth Craik, first proposed that the mind constructs "small scale models" of reality, used to reason, to anticipate events and to provide underlying explanations. These models are built from perceptions, imagination, knowledge and interpretation of discourse. Craik's work was advanced by the development of the mental model theory proposed by Philip Johnson-Laird to explain the basic structure of cognition (Johnson-Laird *et al*., 1998). These authors defined mental models as the mental representation of real, hypothetical or imaginary situations. It was asserted that people have a working model in their mind that:

> *"plays a central and unifying role in representing objects, states of affairs, the sequence of events, the way the world is and psychological actions of daily life" (Johnson-Laird, 1983, p397).*

It can be said that the mental modelling theory poses an explanation as to how people solve problems and make decisions, and why individuals can make incorrect (seemingly illogical) and suboptimal decisions (Johnson-Laird *et al.,* 1998). According to the theory, human beings focus on information gathering that is consistent with their needs as understood by their existing mental models and these individuals are seemingly reserved about seeking out information that would enhance and expand or prove their mental models to be false. The mental model theory has been applied successfully to the understanding of how individuals learn, communicate and make decisions. For example, in exploring the source of disagreement about safety in the workplace between employees and managers (Prussia *et al*., 2003), and examining the acquisition of early knowledge of astronomy by children (Hannust and Kikas, 2010).

As the first known application of the mental models approach to maternal health research, this study takes an initial step towards the development of a mental model of the components involved in the maternal health stakeholders' decision-making. The approach (see Figure 6) involves a systematic process of inquiry that enables differences in risk perception between experts and lay people to be explored, such that more efficient strategies for experts to communicate to lay persons can be developed (Morgan *et al*., 2002).

Phase 1   Phase 2

| Create expert mental model' | Semi structured'interviews'with lay participants _' | Identify gaps between public and expert Knowledge ' |

Phase 3

| Structured questionnaire'to'elicit public knowledge on larger scale' ' | Assess frequency'of'public misconceptions and knowledge gaps' | Identify key information gaps between lay participants and experts' |

Phase 4

| Recommendations for the development of a risk communication protocol for target audience' | Develop risk communication protocol' | Evaluate and revise risk communication protocol' |

| Recommendations for the development of a risk communication protocol for experts' |

Figure 6: Mental Models Approach framework as adapted from Morgan *et al*. (2002)

This study draws principally upon the mental models methodology created by Morgan *et al*. (2002), which focused on the practical implication of the mental model theory to safety, environmental and health risks. The objective of all mental models research and applications is to understand better how individuals understand, evaluate and communicate to make

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decisions. Similarly, the purpose of the current study on maternal mortality is to understand better how experts and women of childbearing age make decisions and to discover ways of engaging these stakeholder groups in a constructive process to achieve a mutual understanding of the issue. To achieve this objective, this research seeks to address four main research questions:

1. What do different experts engaged in maternal health decisions consider when analysing the risk of maternal mortality? The cognitive process and mental models used by experts in understanding and tackling maternal health issues will be identified and illustrated in a mental model influence diagram format. A process of literature review and interviews with maternal health experts in academia, hospitals and government/non-governmental organisations will achieve the proposed model.

2. What are the different ways of thinking that Nigerian women use to make decisions about their maternal health and maternal mortality? Empirically grounded lay participants mental models data were derived to answer this question. This objective will involve a series of semi-structured interviews with the women of childbearing age. These interviews were recorded, transcribed verbatim, and the text coded and analysed. The encrypted data was systematically examined, by identifying significant dominant variables/components, which was, in turn, used to derive and construct the empirically grounded lay participant mental model.

3. What differences in ways of thinking about maternal mortality exist between the experts and lay participants? By comparing the components in the expert and women mental models, key beliefs, critical gaps and misconceptions in knowledge was identified. Recognising new nodes that can be added to the lay participant's mental

model identified components overlooked or under-recognised by experts. Elements missing, or under-recognised by the lay participants, was determined through the identification of variables in the expert model not used or mentioned by one or more of the lay people. The prevalence of these findings was estimated from a much larger sample of lay participants using a structured questionnaire for the identification of information gaps and missing knowledge. The information derived from this phase was to propose relevant information for a culturally adapted risk communication protocol.

4. How will the information be disseminated? Ultimately, answering this question led to the formation of evidence-based risk communication recommendations to bridge the knowledge gap, instil behavioural changes and improve understanding. Finally, any critical information missing in the expert knowledge was identified, and communication messages recommended.

3.1.2 Research perspective

It is important in social science research to be critically self-aware of the epistemological stance within which the research is conducted and to accommodate that awareness into the methodology used to collect and analyse the data (Rubin and Rubin, 2005). Mental model research that uses expert knowledge to construct the expert mental model can reveal the understanding that may be deemed missing and useful to lay participants. For example, research to facilitate the public education of women of childbearing age of the reduction of unsafe sex may involve the transmission of expert knowledge and may be devoted to correcting women's misconceptions. However, even in this circumstance, it is vital to know that the lay participants may have interests and needs that are previously unknown or under-

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recognised by the experts, and may prove useful for the development of effective communication strategies.

Women's health care decisions may be subjected to a variety of possible influences (e.g. culture and tradition), so understanding the triggers of why decisions are made is critical to finding solutions to preventable maternal death. Accordingly, this research is being conducted with a constructionist epistemological stance. Constructionists suggest that reality is socially constructed, and there is no truth without the mind, because individuals form meanings, as they engage with the world they are interpreting (Crotty, 1998, p43). Culture has been suggested to shape the way in which people see things, and gives a definite view of the world (Patton, 2002, p97) and, according to Vygotsky, the role of social collectivity is important in individuals learning and development, by increasing their potential 'zone of proximal development' (Vygotsky, 1978; Liu and Matthews, 2005). The constructionist viewpoint allows the researcher to engage with the stakeholders on the risk of maternal mortality, in addition to enabling the reconstruction, analysis and critique of the subject's views in a manner that will lead to meaningful conclusions (Saunders *et al*. 2007). The constructionist epistemology was a foundation for understanding the social dimension of how the women of childbearing age develop their understanding of the risk of maternal mortality, through their interactions with social groups (e.g. church and community meetings).

The theoretical perspective linked to the current study is pragmatism; this emerged in contradiction to other paradigms, for example positivism; The positivist suggests that reality is stable and can be viewed from an objective viewpoint, believing that phenomena need to be isolated, and investigations should be able to be replicated (Greenwood and Levin, 1998). The major focus of understanding different individual perspective for practical solutions of

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maternal mortality tends to locate the mental models methodology in the pragmatic research paradigm to conducting studies. Several research paradigms exist (e.g. positivism, and interpretivism, however, the current study methodology fits into the more pragmatic paradigm, as it focuses on the 'what' and 'how' of the research problem (McKenzie and Knipe, 2006). In addition, the pragmatic paradigm provides an opportunity for different worldviews and assumptions as well as different forms of data collection and analysis in a mixed method study (Creswell, 2003, p12) The current study in essence, lays emphasis on understanding the reasons women of childbearing age do not use health facilities, and how to get them motivated to use such services and make better health care decisions.

For a long time, there have been debates between the quantitative and qualitative researchers on superiority (Tashakkori and Teddlie, 1998). The positivists use the quantitative methods while the interpretivist utilise the qualitative methods so therefore in an attempt to make peace, it led to the emergence of the pragmatists who are of the position that both approaches are indeed compatible (mixed methods) (Tashakkori and Teddlie, 1998). The paradigm argument has diminished because:

> *"Most researchers had become bored with philosophical discussions and were more interested in getting on with the task of doing their research" (Teddlie and Tashakkori, 2009)*

The originators of the methodology were approached to further assess the validity of the approach in addressing the topic, with the purpose of understanding the perspective inherent to the methodology, and the quotes below explain their stance on the issue:

> *"I must admit, I have a somewhat limited patience for many of the ideas and*

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arguments in that literature (research paradigms). In the case of our work on risk communication, we are simply using the construct of a "mental model" as a description of how a layperson or an expert frames and thinks about a specific risk issues. Obviously that framing may depend upon a variety of factors, including empirical evidence, literature, reports and press discourse, and the broader social and cultural setting in which the person (either and expert or layman) lives and operates" M. Granger Morgan (First Author, Risk Communication: A mental models approach, 2016)

"The expert model that structured our work is pooled from discussions with diverse experts asked to apply their knowledge to problems faced by decision makers. Our interactions with (lay or professional) decision makers often lead to revision of the expert model. Given the complexity of the problems captured by the typical expert or mental model, no single theory could provide the requisite guidance" Baruch Fischoff (Second author, Risk Communication: A mental models approach, 2016)

"The approaches we've taken are in support of decision-making. That means comparing - in some way, shape or form - decision makers' mental models of hazardous processes to risk decision models. But even among risk researchers focused on supporting decision makers, approaches to modeling risk decisions vary, as do approaches to eliciting and representing mental models of hazardous

processes.Variations in approaches to decision modeling, in approaches to mental models elicitation, and in approaches to comparing within or across decision models or mental models may correspond to differing theoretical outlooks" Ann Bostrom (Third author, Risk Communication: A mental models approach, 2016)

In this study, the methodology is applied as a practical problem-solving tool, knowing that the initiation of the research is not solely reliant or contingent upon any existing theory about the issue being investigated. The mental models approach can be conducted in the absence of existing theory on the problem of maternal mortality. Also, the development of the expert mental model is not restricted to exhibiting only the components that are regarded as an objective statement of fact. In the current study, the methodology is more concerned with elucidating stakeholder perspectives to understand those elements that are necessary for risk communication and potentially inspire positive behavioural changes.

During the pilot phase of the research, modifications of the methodology occurred to account for the voices of the lay participants. This led to the adaptation of the Morgan *et al*. (2002) originally created mental model methodology (see Figure 6). The addition of this new pathway (from a one-way to two-way communication) may be seen as a transformative process, as it is concerned with producing new patterns, and new ways of seeing what is familiar (Portwood, 2007). The adaptation provides a framework for addressing injustice and inequality, using mixed method strategies that are culturally competent (Mertens, 2007). Culturally competent research is defined as:

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"Research that both utilises and develops knowledge and skills that promote the delivery of healthcare that is sensitive and appropriate to individual needs, whatever their cultural diversity' (Papadopoulos, 2006, p.1)

The cultural perspective of the majority is often taken into account at the expense of the minority view (Papadopoulos and Lees, 2003), and this may lead to neglect of the needs of a particular group. In response, this project was carried out on the foundation of reaching out to a diverse cultural group of individuals, ranging from the women in the easy to reach urban areas, to the hard to reach rural dwellers, for the development of culturally sensitive/competent recommendations for policy and practice.

The two-way strategy has previously been used by Zaksek and Arvai (2004), they used a bilateral approach to improve public communication about wildland fire as an essential component of natural resource management. They identified gaps and misconceptions in both experts and non-expert respondents (for example, only 3 out of 6 experts identified fire suppression practices and pest infestations as important drivers for fuel accumulation in the area). Utilising lessons learnt from the pilot phase of the current study (see Section 3.2.3.3.1), and Zaksek and Arvai's (2004) study, the mental model methodology was adapted to include a sub-phase that involves the development of recommendations of key messages for the experts. This was achieved by identifying vital information targeted at the lay participants alongside information aimed at the experts, to reduce any existing barriers to risk communication for maternal survival (Section 3.2.3 explains how the methodology adaptation arose as a research need)

This research is also a case study, since it focusses on Rivers State. A case study is a well-established research strategy that focuses on a case, to develop detailed intensive knowledge

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about that case (Robson and McCartan, 2016). Researchers such as Stake (2005) have suggested that case study is not a methodology, but a choice of what is to be explored, other researchers (Robson and McCartan, 2016; Yin, 2013) have presented it as a strategy of inquiry or a methodology (Creswell, 2007).

The above epistemology is well suited as an exploratory and problem-solving research tool for achieving a holistic explanation for how several elements interact in the absence of pre-existing theories. The mental models that were developed in the study not only identify variables affecting decisions but seek to determine relationships between them. They provide a more detailed format for exploring the perspectives involved in stakeholder's maternal health decision-making. As the first known application of the mental models method in maternal health research, the study was expected to provide a unique perspective on maternal mortality in Nigeria.

3.2 Data collection in the Mental Model Approach

A mixed method approach was used for data collection, it is a general term for when both qualitative and quantitative data collection techniques and analysis procedures are used in research either in parallel or sequentially (Saunders *et al*., 2007). The main aim of the researcher is to use the appropriate methods as required by the research strategy to answer the research question. Therefore, an exploratory sequential mixed method (Creswell, 2014) was applied in this study.

In the application of the mental model methodology, qualitative and quantitative methods were employed for data generation as proposed by Morgan *et al*. (2002) (see Figure 6). Information derived from the utilisation of this approach should potentially serve as valuable

knowledge in the creation of a risk communication protocol that leads to better-informed stakeholders for more efficient health seeking behaviours. The mental model methodology comprises four main phases, although all four phases need not be used (Morgan *et al.*, 2002). The first phase included the development of an expert mental model, based on interviews with experts on maternal health. An interview protocol guided by the expert model was developed for the second phase, following interviews with the lay participants to tease out the different ideas and knowledge they hold about maternal mortality. In the third step, the prevalence of these identified ideas and knowledge were then tested using a structured questionnaire for the identification of critical information gaps. The final phase required the development of a risk communication instrument, using the most prevalent identified ideas/misconceptions and gaps in knowledge. The scope of the current study used the first three phases as explained in the subsections that follow, and then develops an evaluation of the principal requirements for risk communication with recommendations for effective delivery.

A qualitative research phase (see Figure 6, phases 1 and 2) was performed which explored the views of the expert and lay participant, the data was then analysed and the information used to develop a structured questionnaire instrument for the quantitative phase (see Figure 6, phase 3). The qualitative study tools were used in this research for describing and understanding the stakeholders' worldview and experiences. The critically important strength inherent to this qualitative phase is the ability to illustrate the depth to which the investigations are conducted and descriptions are written for the reader to capture the idiosyncrasies of the situation (Myers, 2000). Although there have been concerns about the replicability of qualitative studies (Morse *et al.*, 2002; Polit and Beck, 2010), the primary aim of qualitative research is to offer perspective and prepare reports that speak to the reader via words and illustrations

(Myers, 2000). Futhermore, Stake (1980) suggests that such gathering and presentation of information may be in conceptual harmony with the readers experience and therefore be a basis for achieving naturalistic generalisation[4].

Phases 1 and 2 of the current study methodology aimed to explore experts and women's perspectives about maternal mortality; hence the interviewing technique had to allow the participants to reflect deeply upon their experiences. There are four basic categories of qualitative interviewing that may be used with the participants during the qualitative phase of the methodology: focus group, Internet interviews, casual conversations/in-passing clarification, and interviews either structured, semi-structured or unstructured (Rubin and Rubin, 2005). This research design used the semi-structured interviews, one of the core forms of in-depth qualitative interviews, in which the researcher has a topic to explore, prepares a limited number of questions in advance and plans to follow up with more questions (Rubin and Rubin, 2005). The semi-structured interviews consisted of a series of open-ended questions, conducted on the basis of a loose structure. The question mostly defined the area to be explored initially and then allowed the interviewee or interviewer to pursue an idea in more detail. To achieve productive and valid data, the keynote in the process was active listening, and giving the interviewee the freedom to talk and ascribing meanings while bearing in mind the broader aims of the project (Britten, 1995; Silverman, 2006). The

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[4] Naturalistic generalisation can be defined as a process where readers gain insight by reflecting on the details and descriptions presented in case studies, which may be transferable to other similar situations (Melrose, 2009, p1)

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interviewing technique was appropriate because it relied on the interaction between the interviewer and interviewee, unlike focus group discussions, which rely on interactions between members of the group (Longhurst, 2003, p105).

Phase 3 aimed to elicit the women's perspectives on a larger scale, and this included assessing the frequency of public misconceptions and knowledge gaps. There are several types of questionnaires and quantitative formats, but the following types are frequently used; attitude scales – this type includes measures of belief, self-perception, attitude, intentions and aspirations (Jamieson, 2004). Personality inventories – questionnaires and checklists are used to measure the personality attributes of respondents, which are theoretically expected to be stable and different from individual to individual (Teddlie and Tashakkori, 2009). The Likert-type rating scale questionnaire was utilised in the study and possesses an advantage, because of its simplicity in its construction, which is likely to produce a highly reliable scale (Hasson and Arnetz, 2005; Bertram, 2007).

A 5-point Likert-type rating scale was used in this study (1- strongly agree; 2-agree; 3- neither agree nor disagree; 4- disagree; 5-strongly disagree). Garland (1991), suggested that the presence or absence of a mid-point may potentially produce distortions in the result obtained. However, it has been argued that respondents with a truly neutral stance should be accorded the opportunity to select the middle option, and not be forced to choose a polar alternative (Schuman and Presser, 1981). Consequently, Weijters *et al*. (2010) hypothesised and discovered that when no mid-point is provided, uncertain respondents (and approximately half of the indifferent respondents) will tend to express disagreement. Whereas they would have selected the mid-point if provided, thereby supporting the choice of a 5-point Likert-type rating scale in the current study.

3.2.1 Ethical consideration and approval

Before data collection commenced, most importantly, ethical considerations were made for the study. Research ethics relates to questions on how the research topics are formulated and clarified, how the study is designed, data collection, storage, analysis and write-up (Saunders *et al*., 2007). Moral involvement with participants includes these key areas as identified by Saunders *et al.* (2007):

The privacy of participants and maintaining confidentiality: questions about the personal information of the participants were required to investigate patterns in the data collected, potential differences in perception on the issue of maternal mortality between different socio-demographics. The anonymity of the participants in this research was assured by assigning codes to all the participants, which only the researcher could link to the various individuals. To maintain privacy and anonymity in the handling of the research data, the codes that were assigned to each participant were inaccessible and non-understandable to any other person but the researcher. When the research is published, the identity of the participants will remain anonymous.

The voluntary nature of participation and withdrawal rights from the process either partially or wholly should be clarified: The participants in this study were each given participant information sheet (see Appendix 1). Where the individuals were not literate enough to read this sheet, it was thoroughly read to them. As seen on the participant information sheet, they were fully within their rights to reject participation or stop the interviews at any point without needing to give a reason.

Informed consent: The process of getting consent facilitates enough understanding of the project for interviewees to make a decision on whether they want to participate or not.

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Reading and trying to get an informed consent increases the time the participant must spend in the study, and its formal, legalistic tone may easily intimidate the participants (Bailey, 1994, p459). However, this was not an issue in the study because the participants were all given ample time to understand the participant information sheet and details of the project were fully explained and completion of the demography questionnaire was taken as consent in proceeding with the project (shown in Appendix 2).

Effects on participants of the way in which the data is used, analysed and reported to avoid embarrassment, stress, pain and discomfort: The physical, social, psychological well-being of research participants are the responsibility of the researchers (The British Sociological Association's Statement of Ethical Practice, 2002). The topic of maternal mortality is a very delicate issue and related to a negative emotion, which may trigger upset in the participant. In order to overcome this potential issue, the researcher made it clear to the participant that the study was on how to reduce maternal deaths, thereby highlighting the possible positive outcome of their participation. As a precautionary measure to the adverse impacts of the topic, the researcher provided contact details where the participants could initiate any future contact. However, the need for this did not arise, as all the participants were eager to discuss the issue.

It has been proposed that research ethics should be modified to the cultural values of a local community. For example, some cultures are known to have ideas about health and diseases that do not correlate with any scientific explanation (Barry and Molyneux, 1992). As part of the solution to this, a community-based approach has been suggested by some authors, where permission to participate in a project is taken from the village or community leader (WHO, 1982, DeCosta *et al*., 2004). This recommendation is a potentially viable approach because women in Nigeria do not have the same autonomy as women in developed countries

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concerning their decision-making. In this research, some interview participants were selected during community town hall meetings, and before the process began, permission was sought from the community leader for ease of access.

The researcher's responsibility towards the study participants exists beyond the data collection process, and into the interview transcription, analysis, interpretation and the dissemination of the research. It was vital that the personal stories of the women that emerged from the interview process were not neglected. Dissemination of the research findings is essential to ensure that they are heard. The researcher attended conferences and workshops throughout the duration of the PhD and future publications in academic journals will aim to retain the legacy of the current study and serve as a measure of gratitude to the participants for their great endeavours (Gibbs, 2009). Ethical approval was obtained from Middlesex University Natural Sciences research ethics sub-committee (01/06/12. Re: 947) (Appendix 5).

3.2.2 Expert mental model development (Phase 1)

The expert mental model was developed in two stages. Firstly, an extensive literature review was conducted, with a focus on maternal mortality in Nigeria. Key variables were identified and included in an initial mental model. These variables were compiled and illustrated using a mental model diagram format. Secondly, selected experts (see Table 3) in academia, hospitals and governmental/non-governmental organisations were shown the model and asked to comment on the structure and adequacy of the components included.

Efforts to produce an objective definition to an expert have proved elusive (Shanteau, 1992). However, different scholars (Shanteau, 1992; Nordhaus, 1994; Bray and Von Storch, 1999) have developed several definitions of who an expert is. An expert can be defined as someone

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that has thought deeply about a particular subject or an individual who because of special training or knowledge, has status authority on a subject (Nordhaus, 1994, p46; Bray and Von Storch, 1999). Experts have the ability to provide a coherent and well-judged opinion based on their knowledge and experience (Alberts, 2007). It is potentially limiting to rely mostly on experience when defining experts, so peer nomination was also advocated for, because in every domain, there are individuals considered the best by their peers (Shanteau, 1992). Berliner (2004) suggested that in the teaching field, it takes an individual about 5 to 7 years to develop high-level expertise, although competence might come about two years earlier.

For the purpose of this research, utilising lessons from all the above descriptions of experts, experts with several years of performance, possessing expertise by experience and subject knowledge were chosen to be invited to participate. The experts were individuals who have specialised in their various areas of work and had authority in their departments. The experts selected for this study had to have over five years of experience in their chosen field to be qualified to meet the inclusion criteria for this study. Finally, Morgan *et al*. (2002) referred to the term expert as the individual creating the expert model, not implying that their beliefs were superior to the views of the lay people. Fifteen expert participants were identified by analysis of their previous works and recognition in their fields of study based on their published or physical work (e.g. medical doctors, healthcare specialists, and academics) and by recommendations from their fellow experts. Attention was paid to contact participants with a range of backgrounds and viewpoints on the issue of maternal mortality, including, for example, medical and health promotion specialists. The list of expert participants in the study are shown in Table 3 below, and as suggested by Binder and Scholl (2010), the specialist areas of expertise overlap, to ensure robustness of the expert mental model. Medical experts

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were invited from both public and private health sectors.

Table 3: Expert participant list

Name (Pseudonym)	Research/area of interest	Organisation
Nigerian experts		
Dr Harvey	Obstetrics and Gynaecology and midwifery	Community health centre 1
Dr Mike	Obstetrics and Gynaecology	Hospital 1
Dr John	Obstetrics and Gynaecology	Hospital 2
Dr Cyril	Obstetrics and Gynaecology	Private hospital 1
Dr Liam	Obstetrics and Gynaecology	Hospital 3
Professor Barney	Obstetrics and Gynaecology	Private hospital 2
Ms Grace	Public health intervention	Public health programme 1
Dr Raymond	Obstetrics and Gynaecology	Hospital 4
Dr Morgan	Obstetrics and Gynaecology	Community health centre 2
Dr Joy	Obstetrics and Gynaecology	Hospital 5
Dr Christain	Obstetrics and Gynaecology	Hospital 3
Mrs Sandra	Midwifery	Hospital 6
International experts		

Dr Natalie	Nursing, Midwifery and Social work	International organisation 1
Ms Maureen	Maternal health expert	International organisation 2
Dr Alfred	Health Promotion	International organisation 2

The interview duration was typically 30 minutes to one hour, each session was recorded, and notes were taken. However, in cases where the expert could not be contacted in person, the expert mental model diagram was presented to them via e-mail and, followed up with telephone interview. With each subsequent interview, the model was modified to account for the expert comments, finally turning the originally presented illustration from a simple model of unstructured interconnected variables (Figure 7) to a more structured, information rich and coherent expert mental model design presented in the thesis (see Chapter 4).
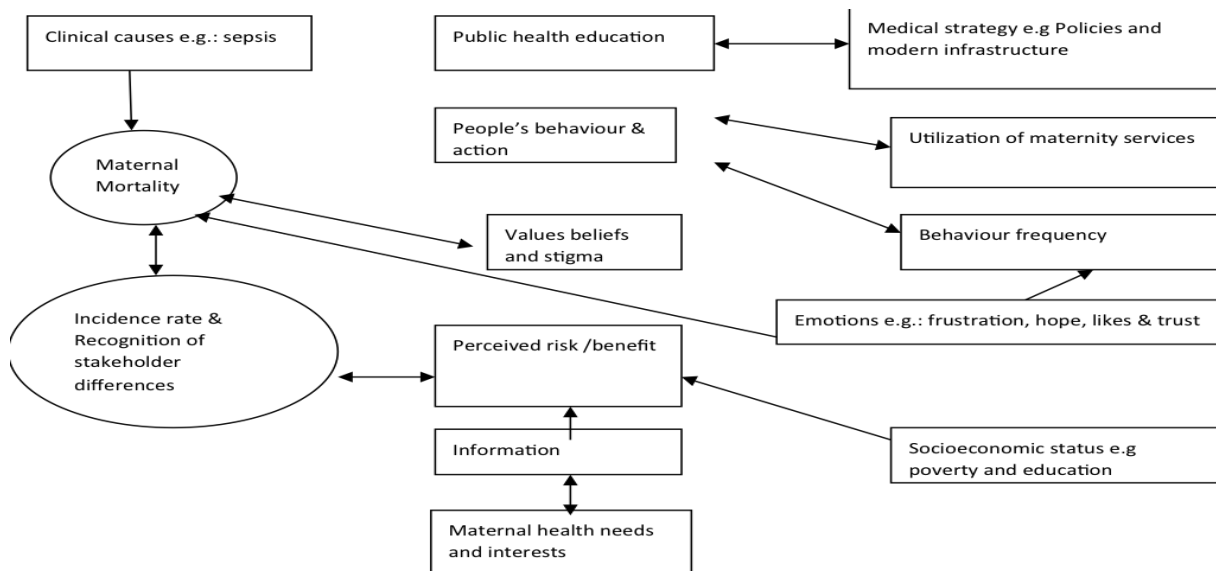
Figure 7: Preliminary expert mental model diagram derived from relevant literature

The process of construction of the mental model adapted the guidelines provided by Fischhoff *et al.* (2006) (see Appendix 9) in checking the final model's clarity. They contained questions about the variable, linkages, endpoints, and overall constructions of the model that are useful to achieve clarity. The mental models produced in this research are illustrated in Figure 16 and Figure 23.

3.2.3 Lay participant mental model development (Phase 2)

Lay participant mental models development required the selection of the study site, choice of the interviewees, interview protocol development, transcription and coding of the data, leading to the capture of the participant's mental models.

3.2.3.1 Case study site

The study aimed to investigate the topic of maternal mortality in Nigeria, and Rivers State had been reported to have a high rate of 889 maternal deaths per 100,000 live births, indicating that this issue was prevalent in the state and required research and attention (RSMOH, 2010). Also, the literature review showed that Rivers State had received a scant amount of maternal health research attention irrespective of the high maternal deaths observed. The state is located in the Southeastern region of Nigeria in the Niger Delta (Obiorah and Amakiri, 2013; Olube, 2013). The state had a population of 2,710,665 males and 2,474,735 females (1,402,749 women of child bearing age 15-49 years) according to the Nigerian National Census of 2006 and is divided into 23 main local government areas (see Figure 8). The study was conducted in four of the twenty-three available local government areas (LGA), which included: Etche, Tai, Port-Harcourt (State capital) and Ogba/Egbema/Ndoni.
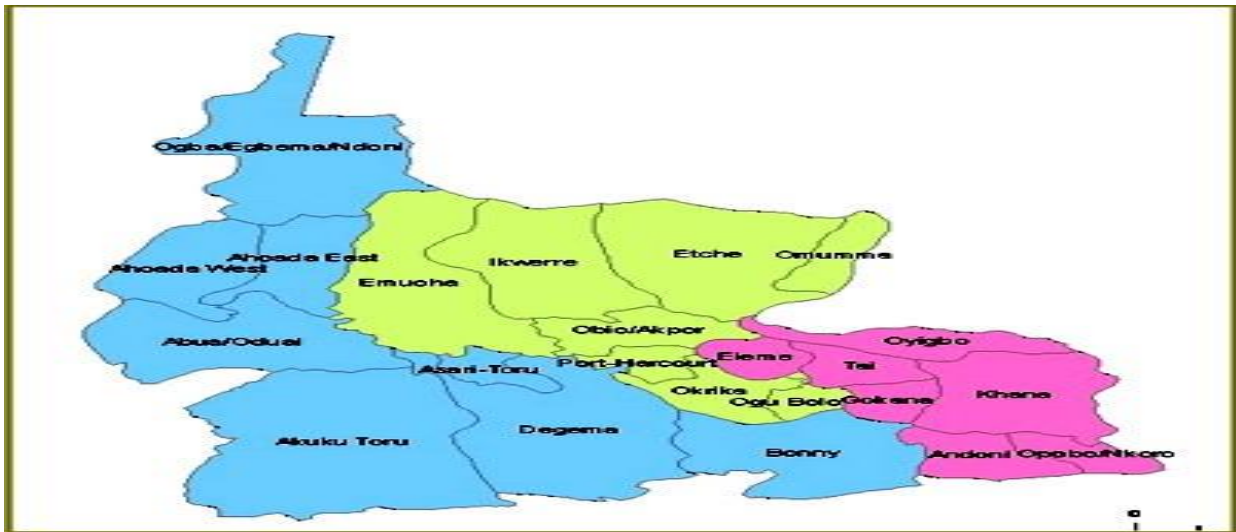
Figure 8: River State, revealing the different senatorial districts and LGAs (Guardian, 2016)

Key: Green: Rivers East; Pink: Rivers South-East; and Blue: Rivers West senatorial district

Three LGAs (Etche, Tai, and Ogba/Egbema/Ndoni) were chosen because they represented the different senatorial districts, with each community comprising individuals with different cultural practices, languages, and perspectives. Port-Harcourt LGA was chosen because it is the state capital and consists of individuals from all the 23 LGAs.

3.2.3.2 Lay participant selection

Purposive and convenience sampling were used for participant selection. Purposive sampling focuses on interviewee selection using 'expert judgement' and on the depth of information that can be generated by an individual case (Teddlie and Tashakkori, 2009). Accordingly, individuals were chosen to ensure they met the sample inclusion criteria below. Purposive sampling was combined with convenience sampling, to include interviewees who were available and accessible for practical reasons (Tongco, 2007).

Sample inclusion criteria: Participation was restricted to women of childbearing age (defined as 15-49 years (WHO, 2012)) because the study aimed to explore and understand the

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perspectives and socio-cultural health practices of women of reproductive age.

Sample exclusion criteria: i) Women under the age of 15 because they are considered non-adults below the usual childbearing age (WHO, 2012).

ii) Women from other non Rivers State ethnic groups (e.g Hausa and Yoruba tribal groups) visiting the area unless they have a generational link to the area. Other ethnic groups were excluded because they may introduce new ideas to the project that are unfamiliar to the Rivers State women.

Thirty-seven interview participants were selected from the urban (15), rural (15) and semi-urban (7) areas of the study area. The women were recruited from the major community centres, religious houses, and health facilities of the study sites, some women were interviewed in their houses upon invitation. In the cases where women were contacted in health and community meeting points, appropriate permission was sought from the leaders of such centres, before the interviews commenced.

In obtaining access to participants and leaders, the fact that the researcher was a 'cultural insider', made the process relatively easy. Social researchers (Kanuha, 2000; Dwyer and Buckle, 2009; Taylor, 2011) have often debated the benefits and dilemmas of cultural insider research. For example, Kanuha (2000), discusses the dilemma of the need to distance one's self from the project. This dilemma was addressed in the current study by ensuring that during interviews, the researcher endeavoured to reduce researcher's bias by using well thought out prompts, without influencing the answers. Finally, Mercer (2007) highlighted that the insider/outsider dichotomy is a continuum of multiple dimensions, depending on the time, location, topic and participants. Unlike Zinn (1979), who experienced anxiety in the process

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of establishing relationships with individual informants at the initial phase of research, being a cultural insider was felt to be beneficial to the current study researcher, as it increased the level of ease and access to the participants.

Prior experience indicates that most ideas on a topic can typically be identified with twenty – thirty interviews, and by the 20th, information saturation has been achieved (Morgan *et al*., 2002). This proved to be relatively true in the study because information saturation was reached by the 25th interview. However, the remaining interviews were analysed to examine the different contexts each information was discussed. Additionally, in a research environment, only the researcher can make the decision as to when to stop collecting information (Morse, 1994; Morgan *et al*., 2002).

3.2.3.3 Interview protocol development and application

A semi- structured interview protocol (see Appendix 3) was developed consistent with the mental model methodology (Morgan *et al*., 2002). The interview questions were created to elicit responses in each general area of the protocol and consisted of a series of open-ended questions, conducted in a loose structure. The semi-structured method permits the exploration of issues on the opinion of the lay participants with a minimal degree of prompting and control by the interviewer (Britten, 1995; Silverman, 2006).

The interviews lasted for an average of 30 – 40 minutes per person and were audio recorded using the Olympus VN-77130C digital voice recorder. Most of the interviews were conducted

in the English language and Pidgin[5] English. However, in some extremely rural terrains, the interview was undertaken with the assistance of an interpreter in the local dialect of the interviewee. As a precautionary measure, to prevent incorrect interpretations of words by the translator, an interpreter was chosen and trained under the following criteria:

- Possession of an undergraduate degree

- The interpreter was a woman, to ensure that the women were comfortable when discussing personal experiences

- Fluency in the English language, Pidgin and local dialect

- The interpreter was trained by the researcher, and a mock practice interview session was carried out.

The interpreter training focused on ethical principles, including the importance of the participant information sheet and informed consent (see section 3.2.1 for the project's ethical considerations). During the interviews, the interpreter was only needed for a few of the rural women (3) as the other rural women were able to communicate directly in Pidgin English solely with the researcher. Before the interview with the three local dialect women commenced, the researcher sought permission to be included in the process as an observer and occasional consultant, if the interpreter required any urgent assistance. Furthermore, the researcher possessed some knowledge of the local dialect, however, not fluent enough to conduct the full interviews, but just sufficient to have an understanding of the interview process. However, the translator needed no extra support as she had undergone adequate training to carry out the interview on her own.

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[5] It is an English-based pidgin and creole language spoken as lingua franca across Nigeria.

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3.2.3.3.1 Pilot Phase 2: Lay participants mental models

The objectives of the Phase 2 pilot study were to test the adequacy of the interview instrument for the study site and to test if the prompts created for the semi-structured interviews adequately covered all the proposed areas of interest, finally to make necessary additions/ deletions required for future meetings. The pilot study was conducted in London, UK, where, it being a multicultural city, it was relatively easy to find Nigerian-born women of childbearing age to take part in the pilot study. Five women were recruited at this stage (two nurses, two administrative staff and one student). The pilot interviewees were given the participant information sheet and the interviews were audio recorded.

It was important to identify adequate prompts needed to prevent under recognition or ignorance of vital issues. During the interviews, two out of 5 of the participants mentioned the issue of 'fear of caesarian' amongst the Nigerian women being one of the key reasons for the rise of maternal mortality in Nigeria. The two nurses expressed this valid point and consequently, it was included in the main study. Apart from this addition to the prompts, no other corrections were made to the wording of the way the interview layout was set up. The pilot study data was used only for refining and validating the guide questions and was not included in the project data analysis.

Another lesson learnt was the cathartic nature of the interview; the participants were willing to participate because they all had strong emotions towards the plight of the Nigerian women on the issue of dying during pregnancy. They also gave a significant insight into the need for their voices to be heard by the experts. This led eventually to the modification and adaptation of the mental model methodology. An extra component was added (see Figure 6), which was the recommendation of risk communication information for the potential development of a

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communication protocol for the healthcare profession. This idea was further investigated and its importance validated during the study, and is further discussed in section 7.2/chapter 7.

3.2.3.4 Coding, thematic analysis and lay participant mental model development

The recorded interviews were transcribed verbatim (see Appendix 8 for an anonymised full transcript example), and analysed thematically, to highlight the major themes surrounding the topic, from the words of the women. The idea of thematic analysis is to build theory from the emergent construct themes and subthemes, which are recurring motifs in the transcript that are then applied to data; they are a product of thorough reading through of the transcripts (Bryman, 2012). To identify significant statements, Braun and Clarke (2006), six step thematic analysis proved useful, and these included:

- *"Familiarise oneself with your data: Data transcribed, read and re-read.*

- *Generate initial codes: Significant statements are colour coded across transcripts.*

- *Search for themes: Significant statements from transcripts grouped into data streams.*

- *Review themes: Each major statement read to develop emerging themes.*

- *Define and name themes: On-going analysis to refine and name each theme.*

- *Produce research report: Final report written illustrating themes with selected participant quotes, use of literature to underpin theory" (Braun and Clarke, 2006, p87)*

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Analysis included transferring the transcript to a Microsoft Excel spreadsheet, initial coding was performed by assigning specific codes to repeat patterns and striking information (see Table 4). Within each transcript, the paragraph consisting of one or more sentences expressed by the interviewee containing a revealing pattern was highlighted in red and labelled as a memo. For example, if the respondent expressed a topic concerning adequate skills, this was captured in the assigned code. This coding method achieved the exploratory objectives of this piece of research. To enhance the reliability of the coded data, the act of "constant comparison of data" as advocated by Glaser and Strauss (1967) was always practised. This is where the transcripts were regularly reread for new code emergence and cross checking of older codes realised (Glaser, 2001). As a means of staying true to the data, 'in-vivo' codes were used to illustrate key emergent themes, the critical messages were highlighted using the participant's words (Smith and Firth, 2011).

Table 4: Example anonymized transcribed interview on an excel spreadsheet with codes shown (see Appendix 8 for full transcript)

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PROMPTS	Interview 0 (Mrs J)	
Analysis		
A) Initial Introductory questions (General knowledge of MM)	What can you tell me about child birth and women dying during pregnancy	What i have to say about maternal mortality and concerning children dying during childbirth, i will say it is as a result of, to my own opinion what i have seen so far during the days of my pregnancy, i can say it is as a result of the carelessness of the doctors or nurses as i will say. More especially like for instance when i say carelessness of a nurses ehmm from my own experience so far, when i am in labour i was going to the hospital right from the beginning, attending the antenatal all through but at the end of the time when i want to have my child , i went to the hospital i reported to the doctor , i told the doctor that this the experience I am having, as my first issue i explained to the doctor and the doctor was taking care of me and the nurses were taking care of me . Reaching when i am in proper labour, i went to the doctor and said this is the experience am having, the doctor looked at me and said its labour, he admitted me then i stayed there. I was there in the hospital, and the labour pain was coming up. At a time when i had my child, after a day or more of having my child, i found out that after some mins or hours , my child begin to change colour and my child could no more breathe normally, then i called the nurses and told them i don't like the way my child is behaving because my child started running temperature. At the end of the time the nurses that were in charge came up, carried my child and started doing things i don't know and they want to call the doctor. Not knowing that they did not call the doctor, but all they did was take the child downstairs and began pumping the child. So when my husband came and saw the nurses	Emerging codes Carelessness of doctor and nurses a)Lack of regular observation of mother and new born b)Lack of skilled nurse and doctor Inaccessibility of doctor

Lay participant mental models was developed (see Chapter 5) to illustrate the perspective of the women of childbearing age interviewed about maternal mortality. A representation of the lay participant model that matched the expert mental model was constructed to facilitate comparison.

3.2.3.5 Assessment of expert versus lay participants mental models

The objective of this stage of the methodology was to compare the expert mental model and the lay participant mental model for the identification of gaps, misconceptions and differences in knowledge and perspectives between these two groups. The framework derived from the expert mental model illustration was used on the lay participant mental model, to create a degree of similarity, which would ensure consistency in comparison and information

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identification.

The following assessment criteria were employed to identify differences in perception, important beliefs, knowledge gaps and misconceptions.

- The variables/components that were included in the expert model but not in the lay mental models were identified.

- The variables that were included in the lay mental models but overlooked in the expert mental models were identified

- The researchers discretion was used to explain some components that occurred in both models but were addressed differently, in particular by the participants. For example, experts mentioned haemorrhage as a cause of maternal death, but some women referred to it as "when plenty blood dey pour out of the woman body."

Findings identified from this process were used for the phase 3 of the methodology, to identify critical information necessary for a risk communication protocol recommendation. This phase and the findings are more fully discussed in chapter 5.

3.2.4 Structured questionnaire to test prevalence of beliefs (Phase 3)

Phase 3 aimed to elicit the general knowledge on a larger scale, thereby assessing the frequency of public misconceptions and knowledge gaps.

Sample design for data collection

The sampling population for this phase of the study consisted of Rivers State women within the sample inclusion criteria (see section 3.2.3.2). For this reason, purposive sampling was used. The participants were drawn from the three main senatorial districts in Rivers State as illustrated in Figure 8. The study used a Likert-scale rating structured questionnaire (see section 3.2) developed using information from phases 1 and 2. The sample size of 250 respondents was deemed to be sufficient for this survey, as Morgan *et al*. (2002) suggested

that 100-300 participants should suffice for this phase. Sixty-five respondents from each of the three districts, and 55 from the capital city (Port-Harcourt) were approached. Women were recruited from the major churches, health centres and community town hall meetings.

Ethical guidelines were carefully followed when collecting the survey data: confidentiality and informed consent were explained to the respondents together with the aims of the study. Respondents were given a detailed participant information sheet and were invited to fill in the demographic questionnaire if they were interested in taking part in the study. A major limitation encountered during data collection was the ease to reach women in distant rural regions. This was overcome in this study by the usage of personal funds in hiring special trucks that could navigate the rough terrains.

Pilot testing of survey

A pilot study was carried out on a new set of five women that fit the sample inclusion criteria, located in the case study area, the results were not included in the main study, but were only used to test the adequacy of the research questionnaire. During the pilot study some respondents needed the survey to be interpreted by the researcher or the interpreter in their local dialect. So, the questions were reworded into an easily understandable format for the target audience to minimise the need for interpretation.

The data collected was compiled in a password protected SPSS package. Results were then analysed using Chi-square tests. This was done to compare the different responses amongst the women from different demographic backgrounds. A Chi-square test of association was carried out to determine if observations could be assigned to one or more of the socio-demographic variables (Dytham, 2011). For example, if a woman believes that delivering her

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baby is better in the church than in the hospital, statistical analysis may reveal potential associations between the woman's demographic characteristics and her decision. A P-value of <0.05 was used for determining statistical significance. Ultimately key findings from this phase were analysed and served as evidence-based recommendations for a risk communication protocol.

3.3 Rigour of the study

The guiding framework proposed by Lincoln and Guba (1985) is considered for the rigour of this research:

Credibility: To ensure credibility, it is important to use an authentic representation of data (Lincoln and Guba, 1985). Throughout the presentation of the research findings, verbatim quotes from the participants were utilised to present meanings and experiences as expressed by the participants themselves. However, the representativeness of quotes can be challenged:

> *"While there need not be a model for the size and number of quotations, it is reasonable to expect some discussion of shy particular voices are heard and others silenced through the selection of quotes" (Baxter and Eyles, 1997, p508).*

Because it is not possible to represent the quotes of every participant, ultimately, the aim and research question of the research steers the goal of data presentation. Moreover, presenting all participants quotes may reduce the clarity of the discussion. The findings in this thesis are grounded in the analysis of the whole sample data and quotes utilised to enhance connectivity between concepts and data analysed. Also, the research employed a purposive sampling strategy, which stresses the search for information-rich cases.

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Transferability: Refers to the degree the research findings fit within contexts outside of the study. It is consistent with the notions of generalisation. This is a process where the outside reader gains information by reflecting on the details and descriptions presented in the study, and applies ideas from the natural and depictions as shown in the study to personal context (Melrose, 2009). Data from qualitative research are often more descriptive and particular to their situational context, involving humans in the real world. Nevertheless, to support transferability, the original researcher must describe the study context as thoroughly as possible because transferability includes the degree in which constructs are meaningful to other groups (Baxter and Eyles, 1997).

Stake and Tumbull (1982) suggested that the role of the researcher is to assist practitioners in reaching new understandings, new naturalistic generalisation. Accordingly, Chapter 8 discusses the implications of this research to theory and future mental model research. The core insights and knowledge considered useful to the readers and other researchers for the application to other study settings are summarised. Knowledge gaps that may limit transferability of knowledge gained in this research are further identified, and future research recommended to address the gaps proposed.

Confirmability: Focuses attention on both the researcher and the interpretations. It is important to acknowledge the position of the researcher as an active participant in the process, as both the researcher and the researched collectively shape the interview process (Charmaz, 2006). Researchers are thus expected to display accounts of their interests and motivations by showing how they have affected interpretations; confirmability can be seen as the audit process of the research (Baxter and Eyles, 1997). Confirmability is demonstrated in this study through examination and transparency of the researcher's perspective, understanding of

participants' perspective, and application of quality assurance procedures (such as supervisory confirmation of raw data) to ensure the accuracy of data collection and interpretation.

Dependability (comparable with reliability): This considers the consistency to which the same constructs and study's results may be matched with the same phenomena over space and time. It shares some similarity to the reliability criterion used in quantitative research (Tobin and Begley, 2004). Reliability applies where the focus of the study is assumed to be static (Crawford *et al*., 2000), however, when human beings are involved, the fluidity of the environment must be acknowledged. They are always evolving and reconstructing their mental models of the world. So it is nearly impossible to entirely replicate qualitative studies. However, the dependability of this study can be assessed by the inclusion of verbatim quotes, usage of audio recordings, and another researcher can use these instruments to compare the interpretations of the original investigator.

3.4 Chapter Summary

This chapter started out by discussing the methodological approach of the current study, followed by the theoretical perspectives employed and its rationale. The chapter then went on to describe the study sites and participants. The sample inclusion and exclusion criteria have also been discussed along with ethical considerations and approval of the research. This was followed by the primary research strategy adopted (mental model methodology), data analysis, and concluded by the account of the rigour of study. The next chapter presents and discusses the findings from the first phase of the mental model approach methodology.

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4 EXPERT MENTAL MODEL

4.1 The expert mental model

This chapter addresses research question 1: what do different experts engaged in maternal health decisions consider when analysing the risk of maternal mortality? The answer is achieved by summarising information obtained from the literature review and expert interview elicitations. The relationship among factors identified is illustrated using a mental model influence diagram format, which is described in detail herein.

The creation of the expert mental model began with a focused objective of expert knowledge elicitation on the issue. However, there may be some overlap in literature referenced in Chapter 4 and Chapter 2. Chapter 2 consisted of a more thematic approach to identifying current knowledge and practices in the maternal health sector, with the primary goal of identifying the perspective, reasoning and knowledge gaps to be addressed by the study. The literature supporting the development of the expert mental model here in Chapter 4 focuses on addressing the knowledge gaps identified in Chapter 2. Most significantly, the expert mental model created (See Figure 16) was derived from the literature review, and modified via iterative interviews/consultations with maternal health experts.

The expert mental model features three broad categories, and a number of sub-categories. The first considers the causes of maternal mortality and encapsulates the clinical reasons, factors surrounding the individual way of thinking (behavioural influences), and the macro state/national factors. The elements within this category are interpreted as those that are responded to or are directly related to maternal deaths. The second category involves mitigation, including interventions and strategies for tackling the issue, revealing components that identify the various groups involved in these interventions. Finally, group three (impact category) shows the effects to the stakeholders at the national, community and individual

levels.

The following subsections provide a detailed discussion of the model, and its categories, including information used to inform the model development

4.1.1 Causes

Expert elicitation revealed five direct causes, and an extensive list of indirect causes (see Appendix 6). 7 out of 10 obstetrics and gynaecology experts mentioned ruptured uterus, anaemia, and malaria as the main indirect causes as observed in their medical practices in Rivers State (see Figure 9).
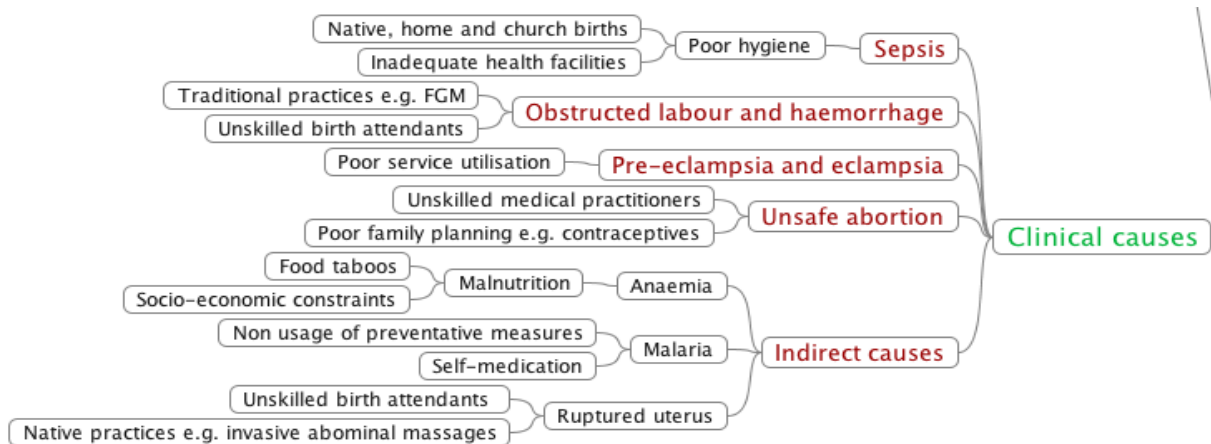
Figure 9: Sub sectional view of the link between clinical causes and social, cultural and economic conditions

It seems, therefore, pertinent for the health care professionals to further investigate tailoring the classification of these causes to become region specific to encourage funds and research allocation as appropriate. Creating context-specific interventions was advocated by Cross *et al*. (2010), who argued that interventions such as access to skilled birth attendants tackling direct causes of maternal death may address, and reduce maternal deaths attributed to direct

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obstetric complication. Alternatively, indirect causes such as anaemia, HIV/AIDS and, malaria require alternative interventions (Cross *et al*., 2010). For example, in adolescent pregnancies, due to the physical immaturity of the girls, they may enter pregnancy with depleted nutrition and anaemia (Bhutta *et al*., 2014)). This in turn makes them vulnerable to adverse birth outcomes, signifying that in regions prone to early marriages, allocating resources to tackle poor nutrition should be considered very important. This highlights the need to track evidence based causes, in their specific context, and tailor treatment options to the target audience.

Understanding the context-specific nature of the direct and indirect causes of maternal deaths shows that priorities may vary regarding what is to be managed and where. Evidence presented from an evaluation conducted in Ghana between 2003 and 2006 revealed that the introduction of a user fee exemption policy where official delivery fees were waived, led to a substantial reduction in direct maternal deaths, but made no impact on indirect maternal deaths (Cross et *al*., 2010). In another instance, a ten-year review carried out at the Nnamdi Azikiwe University teaching hospital located in the South-East of Nigeria, revealed that the main indirect causes there were anaemia, anaesthesia, HIV/AIDS (Obiechina *et al*., 2013), so different types of interventions are needed. Although the study area for this current study was in the same Southern region, Obiechina *et al*. (2013), made no mention of ruptured uterus or malaria as their primary indirect or direct causes. So understanding the primary indirect causes of maternal deaths in Rivers State should indicates the need for prioritisation of interventions potentially focussed on evidence based issues such as those listed in Figure 9. Notwithstanding, other causes need not be neglected because they may potentially fill the missing research gaps, and provide more evidence on prevention of maternal death.

At this point, it is necessary to note that the main objective of this project was not to investigate the biological intricacies of the clinical causes as a scientific entity, but to examine the social nature of factors eventually directly or indirectly linked to the clinical causes. If progress is to be made into the investigation of the high rate of maternal death beyond the clinical reasons, it is necessary to understand the social, cultural, organisational and societal factors that lead to a woman developing these clinical conditions. However, most studies have focused attention on risk factors that are relatively proximal causes of maternal mortality, while social factors, which tend to be more distant causes did not receive enough attention (Link and Phelan, 1995).

4.1.1.1 Socio-economic/cultural links to clinical causes of maternal mortality in Rivers State
Women of low socio-economic status are shown to be at increased risk of dying during childbirth, due to factors such as poor nutrient intake, strenuous activities, and lack of health related awareness amongst others (Nwokocha, 2012; Oye-Adeniran *et al*., 2014). Therefore, further analysis of how these clinical cases link to the socio-economic and cultural factors are encapsulated in the expert mental model, with direct expert quotes included as appropriate to buttress and clarify a point.

4.1.1.1.1 Sepsis
Puerperal sepsis is defined as:

> *"Infection of the genital tract occurring at anytime between the rupture of membrane or labour, and the 42nd day postpartum, of which two or more of the following are present: pelvic pain, fever 38.5^{o}C or more, abnormal vaginal discharge, abnormal smell of discharge, and delay in the rate of reduction of size*

of uterus (less than 2cm a day during the first 8 days)" (Bamfo, 2013, p583).

Some experts in the study (see illustrative quote below) highlighted the link between unhygienic circumstances and sepsis, suggesting that women may encounter such situations when they utilise unskilled native midwives for deliveries:

"I don't know what is wrong with so many of our women; they just go to give birth anywhere, at home or with some native women, disregarding their hygiene. And we both know what unsanitary places can cause to a woman that is exposed. Their cuts can get infected, baby can get infected, leading to the outcome we all don't want" (Dr Raymond, obstetrics and gynecology, expert interview participant)

Reports show that 69% of Nigerian women and about three-quarters of rural women deliver outside health facilities, without skilled attendants, and only 48% of the Rivers State women delivered in health facilities (Shiffman *et al*., 2006; RSMOH, 2010; Olusegun *et al*., 2012). The reduction of sepsis-induced deaths was an essential instrument for the reduction of maternal mortality rates in developed countries such as the United Kingdom (Costello *et al*., 2004), and further evidence suggests that the rate of sepsis increased with home deliveries in rural Sudan (Ahmed *et al*., 2013). Therefore, sepsis can be reduced and potentially eliminated if the women of childbearing age are encouraged to seek out adequate health care institutions during pregnancy. Also, their caregivers should also be educated on the importance of aseptic techniques, and the need for urgency in the detection and treatment of infections detected/treated, to increase the women's survival chances (Oye-Adeniran *et al*., 2014).

Most importantly, the experts noted that the women's health seeking behaviours were not to

be blamed solely for the acute sepsis influenced deaths. The health-care institutions are also responsible, due to lack of preparedness and neglect:

> *To be honest our government hospitals here are not doing well at all, even if women decide to not give birth at home, when they reach us here, there is simply nothing extra we can do except with the available resources we have here. Even the cleaners we have here are limited, with limited pay and motivation, how do we expect them to use the right chemicals and happily clean our labour rooms and surgical rooms efficiently to eliminate impurities and bacterias. (Dr Christain, obstetrics and gynecology, expert interview participant)*

This point was further validated by Okonofua *et al's*. (2012) assessment of 63 health facilities in Southern Nigeria. They assessed standard practices on infection control, and concluded that significant efforts are needed for adequate implementation of infection control protocols and promotion of clean delivery care. In low-income countries such as Nigeria, clean birth practices, in parallel with monitoring and active third stage management, may potentially prevent up to 23% of maternal death (Hundley *et al*., 2012), thereby, indicating the need for communicating the importance of quality checks and controls, with regards to service providers and their facilities.

The potential negative health influence of native/home births and utilisation of unskilled native midwives has been indicated. However, training of these native midwives has been advocated, in conjunction with an understanding of the principal mode of sepsis treatment, which is antibiotics (Friday *et al*., 2012; Cooke and Tahir, 2013). A number of the expert participants from the current study advocated for the usefulness of native midwives, because they play a significant role in the women's lives, this point was also suggested by several

authors (Okolocha *et al.*, 1998; Olusegun *et al.*, 2012; Cooke and Tahir, 2013). However, authors such as Harrison (2011), and Roost *et al.* (2004), questioned their importance, as they believed that these native midwives do more harm than good if they don't work in conjunction with hospitals. Harrison (2011) argued that the native midwives have little or no place in improving maternal health, as they are too old and conservative to adapt to modern healthcare methods. Also, they are mainly illiterate, and cannot keep reliable records of their practices.

On the opposing side, scholars such as Ana (2011), and Owolabi *et al.* (2014) argued that the native midwives have a valuable place in maternal health care. The increasing shortage of health-care workers in developing countries, especially in rural areas suggests the importance of native midwives training and inclusion (Ana, 2011). Despite the fact that some are illiterate and have no formal training, they are ubiquitous, easily accessible, and hold a high value in communities because they are knowledgeable about the traditions, culture and language of the women (Ana, 2011). Highlighting the use of native midwives in the community due to their cheap services, their cultural and traditional practices, a number of experts corroborated the importance of their inclusion, because trust and cultural habits are important factors influencing why women visit them. Professor Barney illustrates this in the quote below:

> *"Some traditions and practices we hear of are relatively harmless, however some are very detrimental to mother and baby, in some communities they carry out a ritual before women give birth and it is the traditional birth attendants that know how to carry these rituals not the hospital doctors, so you see that the native midwives do a 2 in 1 job hence the women trust them and believe that the gods of the land is with them after the ritual" (Professor Barney, obstetrics and*

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gynecology, expert interview participant)

The salient point drawn here by the experts and health providers is the need to communicate to the women the importance of service utilisation, and proper training of the native midwives. In 2005, in Cross River State of Nigeria, native midwives were helped to form an association, and it registered over 400 members who were trained by skilled personel, to submit audits of their activities, and help monitor fellow members (Ana, 2009, 2011). Although successes and failures of the exercise were not reported in the literature, native midwives' inclusion may prove vital in reducing maternal deaths (Ana, 2011).

If the suggestion regarding training native midwives is to be adopted, the educational method has to be tailored according to the capabilities of the target audience, because improper training may result in failure of the exercise. For example, the Ministry of Health in Guatemala offered training programmes to these women, but the programmes were unsuccessful due to their academic nature, and a deficiency in cultural competence (Roost *et al*., 2004). The issue of the women's patronisation of the native midwives, suggests that it may be beneficial to integrate and formally train them on the effectiveness of referrals and standard practices for patient care in Rivers State (WHO, 2003; Abodunrin *et al*., 2010; Ebuehi and Akintujoye, 2012; Owolabi *et al*., 2014).

4.1.1.1.2 Haemorrhage and obstructed labour

Experts in the current study confirmed that haemorrhage remains the most frequent cause of women dying in childbirth (see quote below). This condition is simply the excessive bleeding of a mother after childbirth and is defined as the loss of 500ml or more of blood from the women's genital tract after a vaginal delivery or of 1000ml after caesarian delivery in the second or third trimester (Kwast, 1991; Khan *et al*., 2006). A woman's risk of dying of

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haemorrhage in the developing world is 1 in 1000 deliveries, which is approximately 100 times higher than the rate of 1 in 100,000 seen in developed countries like the United Kingdom (Haeri *et al*., 2012):

> *"As we all know commonly, haemorrhage is a very major cause of maternal death, so yes you were right to include it in your diagram. And it is obvious, as we see this a lot in our hospitals, also you get plenty women coming in dead on arrival due to haemorrhage that was not managed properly by all these native midwives and their local traditional way of doing things. For example, some of the women who are already circumcised don't know that you need to reverse the procedure, or make sure a skilled birth attendant is with you during birth, to minimize and manage complications" (Dr Joy, obstetrics and gynecology, expert interview participant)*

In addition, the experts also highlighted the link between cultural/traditional practices such as female genital mutilation (FGM) and haemorrhage. FGM is a practice that is deeply rooted in culture, and several scholars have associated this action to a high maternal death rate (Paul, 1993; Marchie and Anyanwu, 2009; Lawani, 2014). There are 4 types of FGM: type 1 involves the removal of the prepuce with partial or full excision of the clitoris; type 2 involves removal of the clitoris and prepuce in addition with the partial or full removal of the labia minora; type 3 involves removal of part or all of the external genitalia and stitching of the vaginal opening (infibulation); and type 4 involves all other procedures, for example, pricking and piercing (Gruenbaum, 2001; Rouzi *et al*., 2001). FGM is identified as a risk factor for haemorrhage, and a reason for common early complication in circumcised pregnant women (Toubia, 1994; Dare *et al*., 2004; Mandara, 2004; Olusegun *et al*., 2012).

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The issue of culture and traditional practices are delicate topics as elicited from the experts (see quote below):

"Oh this issue of culture is one that is delicate, because this is something that they have learnt from their elders. I have come across numerous women that have been cut and I have seen the complications they go through, from loss of sexual feelings to difficulties during pregnancies. The annoying thing is that these were done when they were babies, so therefore it is these ignorant mothers we need to talk to and teach" (Dr Mike, obstetrics and gynaecology, expert interview participant)

Currently, studies on FGM are limited to categorising them in simple inventories of physical harm, due to the difficulty of designing studies to examine their health consequences, which jeopardises intervention efforts (MakhloufObermeyer, 2005; Lawani *et al*., 2014). In the mind of those who advocate for female circumcision, it indicates the marriageability of women, as it shows social control of their sexual pleasure (Toubia, 1994). However, opponents of this practice have emphasised its severity and danger, considering it a fundamental rights violation and urging governments to stop the practices if found (Althaus, 1997). The Nigerian Demographic Health Survey revealed that women with higher levels of education and wealth believe that female circumcision should be discontinued, unlike their poorer, less well-educated counterparts (NPC and ICF, 2014). Experts' conclusion was that FGM is a persistent cultural norm still prevalent in some patients:

"I don't know how we can stop such practices in these women and their communities, as it is an age old tradition that the older women have continuously sustained for decades. I personally don't see the benefits of it, only that it causes pain and it needs to be stopped, because even God will be angry at us for such

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inhumane actions" (Dr Morgan, obstetrics and gynecology, expert interview participant)

The practice is considered to be usually spearheaded by the matriarch [6] in the community/household hence indicating that there is a need for communication to the practitioners and other members of the community.

In addition to haemorrhage, FGM is a risk factor for obstructed labour due to adhesions (Paul, 1993; Marchie and Anyanwu, 2009; Olusegun et al., 2012; Lawani, 2014). Obstructed labour is an important issue because it may not only lead to maternal mortality but also to short and long-term disability (Neilson et al., 2003). This condition occurs when the presenting part of the foetus cannot come into the birth canal of the mother despite strong uterine contractions (Adeoye et al., 2014). With obstructed labour being one of the leading causes of maternal deaths, it is important to note that FGM can be reversed surgically, although the process cannot restore sensitivity to the tissue (Rymer, 2003; National Health Service, 2015). Perhaps if the reversal information is communicated to the stakeholders, it could potentially save lives.

Interestingly FGM has been reported to be mainly a cultural issue and not a religious issue (Toubia, 1995; El-Damanhoury, 2013). With the case study area being predominantly

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[6] Matriarch is a woman who leads other women, one that has survived Nigerian culture and usually placed on a high pedestal (Begum, 2006). Earlier discussion of Nigerian having a patriarchal society does not preclude this female influence, which may operate in part to address perceptions of what men want.

Christian, this denomination has unanimously agreed that FGM has no place in the sacred texts of Christianity (El-Damanhoury, 2013). However, it has been recognised that, although some Muslims, Christians, Animist and Jewish sects practice FGM, none of these religions require it, rather it is a cultural tradition supposedly preparing girls for womanhood (Toubia, 1995).

Gender issues and inequality arose as being linked to culture and tradition in the current study as evidenced by Professor Barney's quote below:

> *"Culture is something we hold dearly in this part of the world, compared to where you are studying (UK). From the days of our forefathers, the women take care of the home, while the men go out to provide as the head of the house and ultimately control both the home, the community and the affairs of the house. That is how we have grown up in this our country and I don't know when that notion will change" (Professor Barney, obstetrics and gynecology, expert interview participant)*

A major barrier to potential challenges to cultural norms such as FGM is the highly patriarchal[7] nature of Nigeria. Female circumcision is an integral cultural norm of a society where patriarchal authority and control of female sexuality and fertility are given (Althaus,

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[7] Patriarchy is a system of social differentiation and stratification on the basis of sex, where the men have authority over women and children, and ultimately are the head of the household (Ntoimo and Isiugo-Abanihe, 2013)

1997). Women have been discriminated against from infancy and this gender disparity exists to the disadvantage of the women as it affects their social status and access to quality services (Fatusi, 2004; Osubor *et al*., 2006). Intervention studies have, however, indicated that the higher a woman's socio-economic characteristics (e.g. wealth and education) the more averse her attitude is towards the continuation of harmful cultural norms and practices such as female circumcision (Oyefara, 2014). An implication of this for the current study is that for dangerous practices like FGM to be eradicated, gender social equality needs to be achieved and sustained, indicating that education may potentially adjust negative cultures (Amos and Adesola, 2014). Sadly, the Nigerian government has continuously failed to stop gender discrimination (Azuh, 2016), as evidenced by the recent failure of the Nigerian senate in passing the proposed gender and equal opportunity bill (BBC, 2016).

While patriarchy is a vital concept for feminist analysis, Walby (1989) reported that not all women are in subordinate positions, and that women's perceptions are shaped and affected by the constraints of patriarchal structures (Ntoimo and Isiugo-Abanihe, 2013). The implication is that these women may be able to initiate good health seeking habits if the hindrances within a highly patriarchal country are reduced. For example, changing discriminatory legislations which potentially weakens the influence of patriarchy should encourage women's empowerment to practicing good maternal health practices without the need for permission from husbands. This may however be a longer-term strategy, as it concerns beureaucracy and government system processes. The immediate strategy may be to utilise effective communication and education in informing these women on the usefulness of good health care seeking behaviour, within the current patriarchal system. Perhaps also might address the role of women in encouraging FGM and other practices.

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4.1.1.1.3 Unsafe abortion

Links have been established by experts in the study between the restrictive abortion laws and unsafe abortion in Rivers State (See quote below):

> *"This topic of maternal mortality has plenty issues, which can not be discussed in one day. Talking of abortion, most of our women will want to hide their pregnancy from their church members, boyfriends, or family, that you will see them visiting these quack people for abortions. Because when they come to us, we can't just remove the baby unless it is for medical urgent purposes. Afterwards they are forced to seeing these fake chemists and 'doctors' to remove the baby"*
>
> *(Dr Cyril, obstetrics and gynecology, expert interview participant)*

Nearly 40 women each minute undergo dangerous unsafe abortions in Nigeria, with the procedure performed most times under unhygienic conditions by untrained providers, also leading to post-abortion complications (Ibekwe, 2007; Ibrahim and Onwudiegwu, 2012; Hu *et al*., 2014). This finding is supported by the fact that 60% of unsafe abortions are carried out by unskilled providers e.g. in chemist shops (Ikeako *et al*., 2015). In Rivers State, a retrospective medico-legal coroner autopsy study revealed that 41.1% of the woman reviewed died from unsafe/illegal abortions (Obiorah and Amakiri, 2013). Perhaps their deaths may be due to the current abortion laws restriction in Nigeria, where it is only allowed when the mother's life is in danger (Adinma *et al*., 2012; Ubajaka *et al*., 2014). Due to the fear of being penalised, the women visit untrained service providers thereby endangering their lives.

Abortion remains a delicate topic as it involves several complex moral, religious and ethical dilemmas in the society. Studies investigating public perception of the abortion laws revealed that out of 396 undergraduate students (male and female) interviewed, the majority opposed

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the liberalisation of abortion laws, because, they felt, this will potentially increase women's promiscuity, sexually transmitted diseases and abortion rates (Orji *et al*., 2003). In another recent study, amongst 200 Southern Nigerian lawyers interviewed, it was shown that only 26% were in support of the legalisation of abortion (Ubajaka *et al*., 2014). However, attitudes towards the decriminalisation of abortion are empirically linked to a wide variety of variables, such as education and religious preference (Harris and Mills, 1985). Conducting abortions is understood by many Christians as morally evil because human life is to be respected and protected absolutely from the moment of conception (Ziebertz and Reindl, 2013). The implication of this to the predominantly Christian Rivers State women is that they would continue to be discreet in their pursuit of abortions if the country law and religion are against it.

Discussions have been initiated to address these strict abortion laws, but there is still a long way to go towards legislative reform (Hu *et al*., 2014; Leke, 2014). Post abortion complications, in turn, drain public heath care resources, because the cost of induced abortions is much lower than the cost of treating a post-abortion complication (Benson *et al*., 2012). Because of the delicate nature of the issue, without the government reconsideration of the abortion laws, the women may continue to carry out the procedure in a clandestine and unsafe manner (Benson *et al*., 2012). An implication of this knowledge for the current study indicates the importance of a two-way communication strategy as adopted in the methodology. The experts and policy makers may need to be informed about the detrimental effects of unsafe abortion for pressure to be brought to reform the law.

4.1.1.1.4 Pregnancy related hypertensive disorders

Experts in the study revealed that the causes and risk factors associated with these disorders

are unpredictable:

> *"This is a problematic cause of maternal death, as it is unpredictable who can develop it or not. The medical personel just has to follow routine when checking the pregnant woman to identify if the signs of this condition have started presenting itself" (Dr Morgan, obstetrics and gynecology, expert interview participant)*

However, a number of risk factors were identified, which include: smoking, drug and alcohol abuse, socio-economic level, diet, season, climate, maternal age, race, poor utilisation of antenatal service, absence of necessary equipment like sphygmomanometers, weight reduction, good control of chronic hypertension and reduced stress (Anorlu *et al*., 2005; Adamu *et al*., 2014; Singh *et al*., 2014). The most common hypertensive disorders in pregnancy are pre-eclampsia and eclampsia (PE/E) which are part of a spectrum of conditions associated with raised blood pressure during pregnancy and which potentially lead to maternal death if untreated (Duley, 2003; Okafor and Okezie, 2005). Pre-eclampsia has proven difficult to precisely and consistently identify, but the clinical scenario of eclampsia appears relatively straightforward, highlighting the need for proper and regular service utilisation.

A link was indicated (Figure 9) between poor service utilisation and PE/E because early detection of these conditions is paramount to complication prevention. For example, a high incidence of eclampsia was observed in a rural tertiary hospital in the Niger Delta region, where a majority of the women were recorded as not having registered for antenatal services (Igberase and Ebeigbe, 2006). Not surprisingly, with a low antenatal attendance, prenatal care, and lack of access to proper hospital care, the rate of eclampsia in Nigeria was reported to be 99/100 deliveries compared to figures seen in developing countries e.g. the United Kingdom

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of 2.7/10,000 (Knight, 2008; Ghulmiyyah and Sibai, 2012). This has been attributed to the fact that there is an absence of prenatal care and lack of access/utilisation of proper hospital care (Ghulmiyyah and Sibai, 2012). Using the mental model methodology in the current study should discover the critical reasons why women fail to utilise the facilities and provide recommendations to address these issues.

Evidence based strategies show that magnesium sulphate is an effective preventative and management drug for PE/E (Oguntunde *et al*., 2015). However, one major challenge the women face is that even those that attend the hospitals may be met with a shortage of staff or drugs (Tukur *et al*., 2007). Service providers should, therefore, improve their readiness to manage PE/E (Oguntunde *et al*., 2015). In addition, inducing labour has been advocated for to avoid PE/E complications (Bracken *et al*., 2014).

4.1.1.1.5 Indirect causes

The experts emphasised three main indirect causes, anaemia, ruptured uterus, and malaria (see Figure 9). A strong link has been identified between malnutrition and anaemia during pregnancy (Rush, 2000). This problem led to one of the key components of the 'Safe Motherhood Initiative' being the eradication of anaemia during pregnancy (Brabin *et al*., 2001). The demand for iron and vitamins in women during pregnancy is increased due to the physiological burden and dietary deficiencies which gives rise to anaemia (Idowu *et al*., 2005). Unfortunately, African women are more prone to the risk of becoming iron and micronutrient deficient (Oye-Adeniran *et al*., 2014), potentially increasing their vulnerability to any concurrent condition. Maternal anaemia, however mild, enhances the risk of life-threatening postpartum haemorrhage (Allen, 2000; Rogo *et al*., 2006).

Communication and education can influence the degree to which the women understand the

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importance of proper nutrition during pregnancy. Some studies have found that Nigerian women, especially rural dwellers (farmers and petty traders), did not recognise the magnitude of the issue, as they did not perceive anaemia as a priority health problem (Ejidokun, 2000; Ibrahim Isa *et al*., 2012). This was not only the case in rural areas, for example, in Rivers State; there was a high prevalence of iron and zinc deficiency reported in the urban pregnant women (Oguizu *et al*., 2015). These results revealed that women of different socio-economic status were lacking proper nutrients, thereby indicating the need for an education intervention (Oguizu *et al*., 2015).

An additional link between cultural food taboos and nutrient deficiency was expressed (Oye-Adeniran *et al*., 2014), because forbidding certain foods may deny healthy nutrients to the mother (Oni and Tukur, 2012). This issue contributes to the area of cultural impacts that can be detrimental to pregnant women's health (Chukuezi, 2010). For example, in the current study area, some cultures believe that women should avoid eating snails otherwise the baby eventually over salivates throughout their lifetime, and this was also reported in Ekwochi *et al*. (2016). Other examples exist such as mothers avoiding eggs to prevent the child becoming a thief, and avoidance of milk to stop the baby from growing up a weakling (Marchie and Anyanwu, 2009). However, some truth may exist to some of these food taboos. For instance, unpasteurised milk and soft cheeses (risk of listeria poisoning) is listed as foods to be avoided during pregnancy on the National Health Service, UK advisory website (National Health Service, 2015). This highlighted the importance to empower the women through education, equalities in rights and fundamental socio-economics factors, for them to be properly equipped and informed to make better health care decisions irrespective of the deep-rooted cultural norms present in the communities.

Malaria was another indirect cause of maternal death that was emphasised in the current study:

> *"In this our area, like you know, we are surrounded by water. With not enough fumigation or spraying of insecticides, this area is a prime breeding ground for mosquitoes. And with our pregnant women not understanding the implications of malaria to their condition, we see a lot of malaria influenced critical conditions being reported in our health centres. When you trace the source of the woman's problem, you will see that it started from a mosquito bite"* (Dr Raymond, obstetrics and gynecology, expert interview participant)

Rivers State is a riverine area, with mostly wetland characterised by brackish water swamps (Tobin-West and Asuquo, 2013). By virtue of the area of wetland and the longer rainy season, there is a significant presence of mosquitoes breeding, thereby leading to a higher malaria transmission (Amadi *et al*., 2011; Van Damme-Ostapowicz *et al*., 2014). Pregnant women are advised to take intermittent preventative treatment (IPT) of malaria, using two doses of sulphadoxamine-pyrimethanine (SP) (Falade *et al*., 2007). However, according to the 2013 NDHS survey, out of 285 women sampled in Rivers state, only 9.5% received any SP during an antenatal care visit (NPC and 1CF, 2014). The survey did not reveal why the other women did not receive the SP, but the figures clearly imply that there is a need for the women to be informed of the dangers of malaria during pregnancy, and also the health care practitioners should be sensitised about the pressing nature of the issue.

Finally, the other indirect cause was the ruptured uterus, a catastrophic obstetric complication, which is prevalent in developing countries like Nigeria where poor obstetric care abounds (Esike *et al*., 2011). Experts in the study linked uterine rupture to a well-known Rivers State

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practice called the 'native massage'. Some women visit their local midwives for a routine massage of their bellies, and in some cases, if the baby is believed to be in a non-natural position; an invasive process of turning the baby is carried out via the vagina. The condition of ruptured uterus is a problem requiring a proactive approach to prevent obstructed labour, through education and utilisation of antenatal services (Osaikhuwuomwan and Ande, 2011).

The current study's distinction between these medical causes and their possible social, economic and cultural links is vital to understanding the underlying issues of why maternal mortality persists in Nigeria. Because, once these root causes are teased out, it potentially enhances the effectiveness of evidence–based intervention. However, some cross-cutting variables influences the women's behaviour, and their individual ways of thinking, and these are discussed in the following section, with the aim highlighting factors that may potentially impede proper health-care seeking.

4.1.1.2 Individual perception

An individual's perception is derived from their understanding of the existing context of the issue, which they use to make interpretations and decisions concerning the topic. The variables contained within Figure 10 reveal influences to the women's way of thinking and making maternal health decisions.

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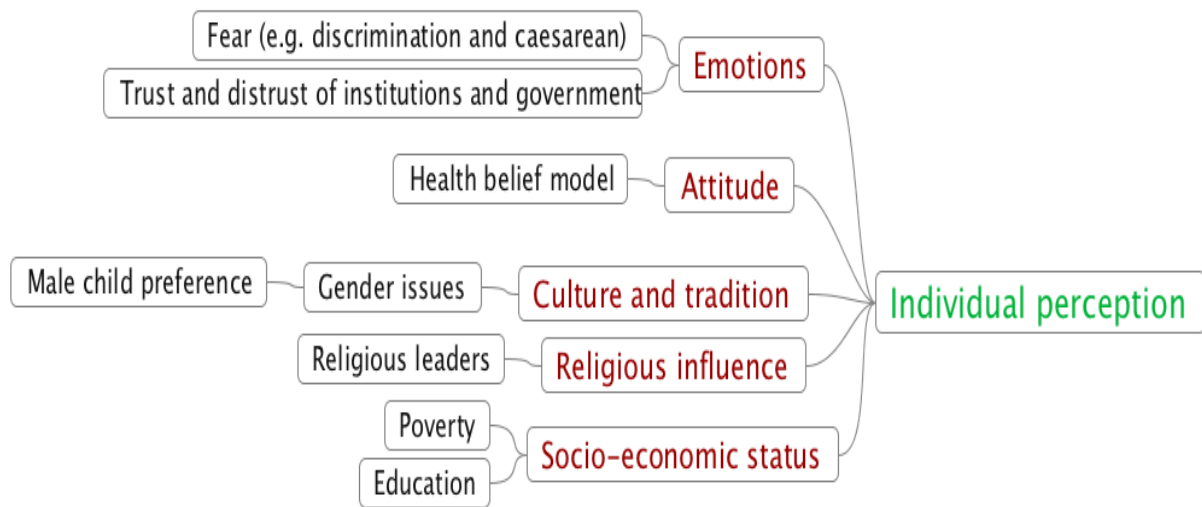
Figure 10: Sub sectional view of the expert mental model revealing influences to behaviour

4.1.1.2.1 Emotions

The 'emotions' node as included in the expert mental model (see Figure 10) is intended to capture the women's emotional processes and feelings. It was revealed as a neglected component, as the state and federal government and to an extent the health caregivers, ignore the emotions of the women (see quote below):

> *"Something of great importance which is usually neglected are the emotions of these young ladies, people's emotions push them to do things, for example, fear will push a woman to the church instead of the hospital, and it can also make them avoid the hospitals and choose a more caring native house to give birth"* *(Dr Mike, obstetrics and gynaecology, expert interview participant).*

Pregnancy and childbirth are usually supposed to be a thing of joy, evoking positive emotions (Durojaye, 2009). However, when a woman's life is lost during pregnancy, this evokes several negative emotions such as despair and confusion for the families (Obi *et al.*, 2009),

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perhaps, increasing the potential of an individual in making negative personal health care decisions (for example, the fear of death during hospital deliveries may push an individual to seek solace in traditionalists or religious places during pregnancy).

Emotions may further influence the women's perceptions towards those in positions of authority, which may potentially reflect in their maternity service utilisation. The central indicator of the public's underlying feeling about the government administration and provisions is based on their trust in institutions, perception of fairness, and trust in authority (Espinal *et al.*, 2006; Chen, 2013). Therefore, it can be implied that the women's trust in the government's capabilities and authority may influence their health care decision-making.

Trust comprises some essential components such as perceived competence (technical expertise), objectivity (bias), fairness (acknowledging all points of views), consistency (behaviour based on past experiences and previous communication efforts), and faith (perception of good will) (Renn and Levine, 1991). However, a lack in one component may be compensated by a surplus of goal attainment in another element (Renn and Levine, 1991). For example, this current study noted fear of discrimination as a potentially limiting factor to the women's hospital attendance (Etukudo and Inyang, 2014). Therefore, if this issue is addressed, and the women are met with a welcoming hospital staff and environment, it may be enough to encourage regular attendance irrespective of the institution failing in the other components of trust. It is important to capture the emotional part of a woman's decision-making, to enable understanding of her actions, and to subsequently enhance the effectiveness of a risk communication.

4.1.1.2.2 Attitude

To fully consider the maternal health actions and decisions of a woman, it is necessary to

encapsulate her working mental perspective of the issue at hand, in addition to influences on that decision, in order to possibly instill a behavioral change. The health belief model (see Figure 11) was used as an approach to explaining the Rivers State women's health-related behaviours, in an attempt to obtain an in-depth understanding of the influencing variables. This was achieved by engaging the women in a series of interviews that tease out factors considering their individual perception to the risk of maternal mortality:

"Health beliefs include an individual's perception of susceptibility to, and severity of, diseases or disorders as well as the perception of benefits of, and barriers to, taking action to prevent diseases or disorders "(Kim et al., 2012, p551)
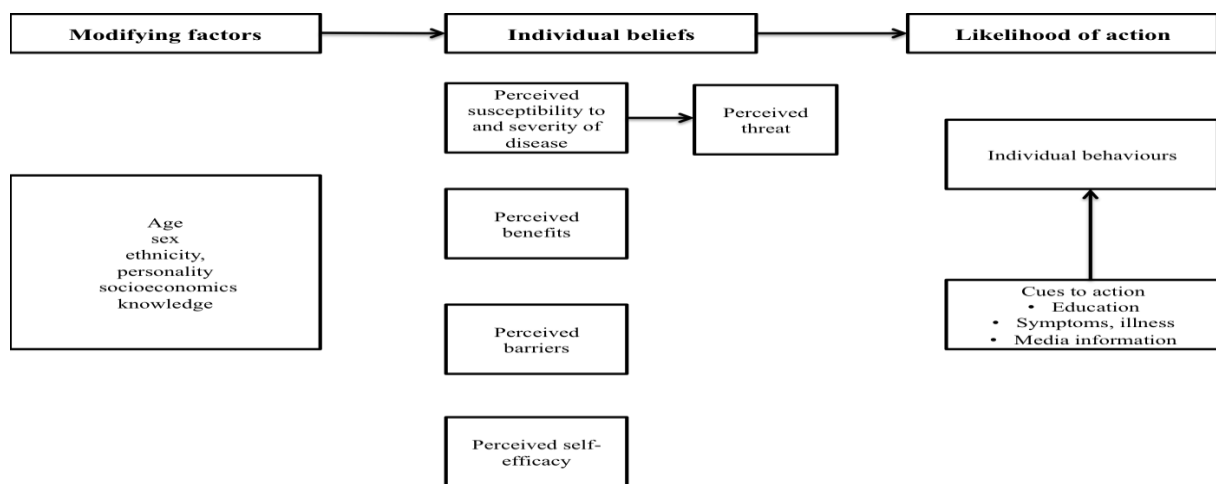
Figure 11: The health belief model (Champion and Skinner, 2008, p47)

The main key descriptors to the health belief model as applied to the Rivers State women of childbearing age as discussed as follows:

Perceived susceptibility: Every woman has her perception of the likelihood of experiencing a

condition that may adversely affect her health during pregnancy and childbirth. Perceived susceptibility refers to human subjective perception of the risk of contracting an illness; these feelings of personal vulnerability to a condition vary according to perceived severity (Jans and Becker, 1984).

Perceived severity: Feelings concerning the seriousness of contracting an illness vary from person to person; this factor includes the evaluation of both medical/clinical consequences and possible social consequences. (Jans and Becker, 1984). The combination of susceptibility and severity has been labelled as perceived threat (Strecher and Rosenstock, 1997).

Perceived benefits of taking action: This implies that a woman of childbearing age in Rivers State who is "sufficiently threatened" may not be expected to accept the recommended health advice/actions unless it is perceived as beneficial and efficacious. An individual's acceptance of susceptibility to a risk perceived to be serious produces a force leading to behaviour and health motivation (Strecher and Rosenstock, 1997). The course of action they take depends on their beliefs regarding the effectiveness of the various available actions in reducing the risk, and disease threats (Jans and Becker, 1984; Strecher and Rosenstock, 1997).

Barriers to taking actions: Actions towards getting better maternal health services may not take place, even though the women may believe that the benefits of taking action are useful. This is the potentially negative aspect of a particular health action that may act as an inhibiting factor to undertaking the recommended behaviour (Jans and Becker, 1984). The individuals carry out a kind of sub–conscious cost-benefit analysis, where the individuals weigh the expected effectiveness of the action against their perceptions that it may be dangerous, expensive, inconvenient, and so forth (Strecher and Rosenstock, 1997). All these characteristics may potentially lead the women away from taking the desired action for their

maternal health.

Cues to action: A woman's perception of the level of susceptibility and seriousness may provide the force required to act. The perceived benefits (minus barriers) to taking action provide the path to making good maternal health choices. However, the women may need a 'cue to action' to instigate a good health seeking behaviour. 'Cues to action' have not been significantly studied, but, they involve prompts and reminders to an individual to take actions consistent with an intention (Taylor *et al.,* 2006). These reminders may be internal or external, such as advertising, or personal communication from family members and health practitioners (Hochbaum *et al*., 1952; Taylor *et al*., 2006). In the case of the current study, it is vital to capture through interviews, the women's preferred cues to action, in addition to expert recommended ones, in the effort to improve the efficacy of this risk communication research. If these cues are culturally adapted to suit the Rivers States women's needs, this should potentially improve the effectiveness of a risk communication intervention. As discussed earlier, communication aimed at influencing behaviour through provision of 'nudges' perhaps utilising knowledge of such cues to action will be evaluated in Chapter 7.

Self-efficacy: the women of childbearing age must see themselves as competent enough to overcome the perceived barriers to taking action for behaviour change to be successful. Bandura introduced the self-efficacy component of the health belief model in 1977, defined as:

> *"The conviction that one can successfully execute the behaviour required to produce the outcome" (Bandura, 1977a, p79)*

The health belief model was seen as limited in the sense that it did not take into account

factors other than health beliefs that heavily influenced health behaviour practices (Hochbaum *et al*., 1952). These factors may include socioeconomic status, cultural factors and previous experiences. However, in later books and research (Stretcher and Rosenstock, 1997, Taylor *et al*., 2006, Champion and Skinner, 2008), these factors were included in the model, and termed 'other variables'. Stretcher and Rosenstock, (1997) reported these other variables as demographic and socioeconomic variables, which include age, race, ethnicity and socioeconomic status. The addition of these variables is an important component of the health belief model, as some of them may prove to have a causal link to actions for the individuals. For example, a Rivers State woman may have sound knowledge of her perceived susceptibility to sepsis; however, her socioeconomic status may prove to be a barrier to her benefiting from the government provided hospitals.

Bringing all the components together, the health belief model supposes that understanding the perceived susceptibility of the women to maternal mortality or related illnesses would help to evaluate the level of motivation needed for the woman to seek maternity service (Nwokocha, 2012). The perception of the individual can be modified by several factors, which could be the physical, social or the cultural environment, and both the perceptions of seriousness and susceptibility combine to form their individual perceived threat to the disease (Kim *et al*., 2012). If the perceived benefit of taking preventative actions to avoid maternal morbidity and death is viewed as greater than the perceived threat, the women are more likely to modify health-seeking behavior. The perception of a high gravity or seriousness of a given maternal situation should potentially make the women seek early emergency obstetric care and also patronage of facilities they perceive as adequate (Nwokocha, 2012). However, due to knowledge gaps or misconception, the women may perceive life-threatening condition as not

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being dangerous, hence increasing her chances of dying.

4.1.1.2.3 Socio-economic status

Expert discussion emphasised the empowerment of the women socio-economically, which may potentially lead to effective health decision-making behaviour (see illustrative quote):

> *"When you talk of socio-economic status or factors, this covers a lot of areas with regards to maternal mortality. In general, I will say that the better and higher the socio-economic status meaning finances, power and education of a woman, the higher her chances are to survive her pregnancy and live a fulfilled life"* (Mrs Sandra, midwifery, expert interview participant)

In Nigeria, there is a significant variation in the social and economic status of its citizenry (Burstein *et al*., 2015). These include income, education, nutrient deficiencies and strenuous activities (Fatusi 2004; Olusegun *et al*., 2012; British Council, 2012; Nwokocha, 2012). These socio-economic factors reflect the intertwining nature of the issues faced by women of childbearing age, indicating that human needs are often inter-related and interactive (Max-Neef, *et al*., 1992).

Poverty and education, as re-iterated by the experts in this study (see illustrative quote below) were two primary factors stated during the expert mental model creation (see Figure 10), According to the British Council Nigeria (2012), women in the poorest quintile are more likely to die in childbirth compared to their wealthy counterparts, further revealing that mothers with a low socio-economic status are at a higher risk of being malnourished and potentially subjected to infections, due to the unhygienic environments in which they seek health care.When an individual lacks the necessary basic needs for survival, the individual is

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termed as 'poor', and Nigeria has a worrisome rising profile of an impoverished citizenry, with more than half of its population living in poverty (Oshewolo, 2010):

> *"Poverty and education are the most pressing factors; there is a triangular link between education, poverty and disease. This triangle needs to be addressed properly before we can start to see proper progress with the issue of maternal mortality here"* (Dr Liam, obstetrics and gynaecology, expert interview participant)

The direct costs of a hospital visit and treatments due to obstetric complications may be implicated in the poor utilisation of facilities, as most Nigerians live below the poverty line (Adio and Onua, 2012). However, poverty has several common attributes, including but not limited to low income, the poor state of health and living conditions, low literacy and educational levels and political apathy (Shamaki *et al*., 2013). There have been several policies and programmes that aimed to alleviate poverty among the Nigerian people, but the results have been poor due to policy inconsistencies and endemic corruption (Olayiwola, 2014), which is beyond the scope of this study. Highlighting the link between poverty, education and maternal mortality may potentially explain the implications to healthcare decision-making and lead to an increase in awareness and communication to the women of childbearing age.

Furthermore, increasing the knowledge and educational level of the women has potential impacts on several aspects of their lives, from increased antenatal uptake and family planning to their ability to delay marriage for physical maturity, thereby potentially reducing chances of maternal death (Harrison, 1997; Fatusi, 2004; Igberase *et al*., 2009; British Council Nigeria, 2012). For instance, a Nigerian survey revealed that the more educated a woman is,

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the higher her antenatal uptake (British Council Nigeria, 2012; NPC and ICF, 2014), which is deemed vital for safe motherhood (Tobin *et al.*, 2014).

4.1.1.2.4 Religion

> *"Religion has been a very important factor in the fight against maternal death and I think we as experts are only just realising its major influence in impacting women's decision-making in pregnancy and all aspects of their lives. In this Rivers State there are churches on every corner and these pastors literally tell the women how to run their lives" (Dr Cyril, obstetrics and gynaecology, expert interview participant)*

With about 91% of the Nigerian population attending religious service and 95% praying regularly, Nigeria has been claimed to be the most religious country in the world (Chiluwa, 2008). There has been a rise in the attendance of spiritual churches and religious based organisations by women of childbearing age (Etuk *et al.*, 1999; Udoma *et al.*, 1999; Udoma *et al.*, 2008). These women are actively choosing to give birth in the religious houses. Sadly, the deliveries in these locations often lead to morbidity or mortality of the women than those that attend the hospitals (Etuk *et al.*, 1999). A maternal mortality rate of 978/100,000 births has been stated to be attributed to births taking place at these religious and spiritual places (Adanikin *et al.*, 2014). Religion holds a critical position in the women's lives, and has an important role in reproductive heath (Ali and Ushijima, 2005). Therefore, communication should be targeted at educating the women on the dangers of utilising such places for deliveries.

The experts in the study (see quote below) revealed that many patients believe that complications during pregnancy are due to spiritual influences and that at this stage, churches

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are the safest place for them. Other reasons for the utilisation of churches include protection against evil attacks, faith in God, a guarantee of good care, previous delivery in church, and lack of funds (Udoma *et al*., 2008). The firm influence of religion over the women has enabled an environment where the religious leaders have strong control and power over the women's health care decision:

> *Most of my patients will not let you touch them until they take permission from their pastors, the worst is when they need a caesarian section, and they need permission. Some say if they take permission from their pastors for the operation then they can avoid the stigma that goes with undergoing the procedure, just because they took permission from a higher authority and power" (Dr Harvey, obstetrics and gynaecology)*

Employing the assistance of pastors and religious leaders may be a valid and effective route to improving women's health care decision-making, via proper training and education of the willing leaders. The church has been suggested to be a particularly useful location for innovative/preventative health programmes and influence to maternal health utilisation (Olson *et al*., 1988; Gyimah *et al*., 2006). The experts in the current study corroborated this point evidenced by Dr Mike's quote below:

> *We need to engage these Pastors and faith based churches; otherwise we are facing a losing battle. Most especially in this our region where women depend on pastors' visions and prayers (Dr Mike, obstetrics and gynaecology, expert interview participant)*

The positive effects of partnerships between health programmes and faith-based

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organisations/churches have been documented (Kim *et al*., 2006; Duru *et al*., 2010; Rivera-Hernandez, 2015). However, such collaborations should be developed with socially and culturally relevant considerations (Webb *et al*., 2013). The mental models of the lay audience may vary about the relevance and influence of religion and pastors on their reproductive health decisions. As previously stated, one of the objectives of this research is to characterise the mental models of the women, and associate them with a culturally relevant recommendation for a risk communication protocol.

Some variables in the expert's mental models are beyond the health care decision-making process of the Rivers State women and can only be addressed by a different set of stakeholders (state and national governments).

4.1.1.3 State and National factors

Funding, as indicated in Figure 12, is a critical issue in the implementation of schemes, policies and general effectiveness of a health organisation.
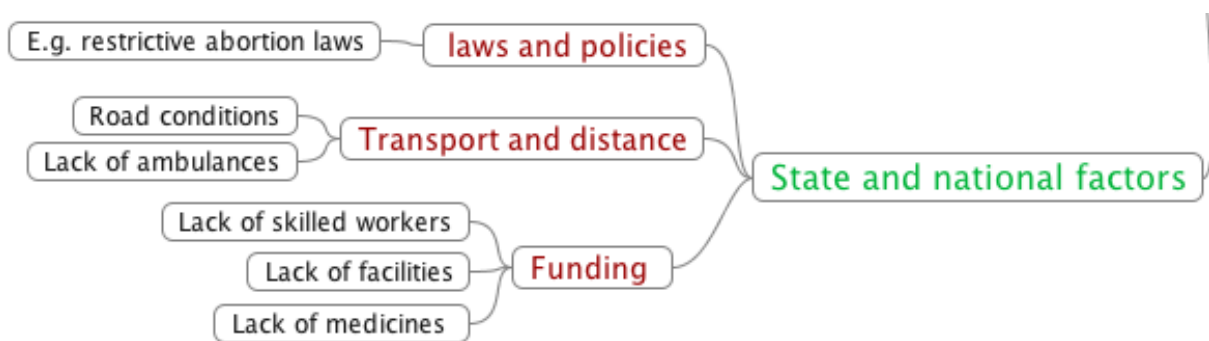
Figure 12: State and national influences on maternal mortality

Experts revealed that the health workers in Rivers State were always plagued with delayed salaries and lack of incentives for their jobs (see quote below):

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"For as long as I can remember, doctors, nurses and health care professionals in Nigeria are always fighting with the government and going on strikes. What can we do, when the government will owe you for over 6 months at a time, how do they expect people with this our job as the only source of income to eat? So things like this leads to a disgruntled workforce in the economy and this has a ripple effect on job performances" (Mrs Sandra, midwifery, expert interview participant)

The need to satisfy the staff is evident in the series of strike actions observed in the country by health workers, who expressed dissatisfaction with conditions of service and continue to go on strike to the detriment of their patients including pregnant women (Awosusi, 2010; Akinyemi and Atilola, 2013). A study by Ganihar (2006) focused upon organisation effectiveness and employee work life balance. It was found that where the organisation objectives were equitable with good work life balance practices, the more effective the organisation.

At the primary health care level, especially in the rural areas, there is a shortage of skilled workers, due to irregular salary payments, lack of incentives, and uneven salaries between levels of care. For a state's health system to work there has to be a balance to every one of the concerns and factors mentioned above. It is of little debate that to reduce maternal deaths, there is a need for the presence of skilled birth attendants, reliable transport, well-equipped facilities, and a functional referral system (Erim *et al*., 2012). However as stated by Miss Grace below, this is not the present situation in the State:

"As part of the SURE-P team, I have observed several limiting factors to our health system organisation, apart from the fact that our hospitals are not

equipped with skilled resources looking at the personnel and equipment provision. The fact that a government worker can be owed three months' salary is reason enough for a nurse or doctor not to be interested in coming to work and saving lives" (Miss Grace, public health intervention, expert interview participant)

The link between the presence of skilled birth attendants and maternal mortality has engendered some interventions through the strengthening of midwifery skills in Nigeria (Nyango *et al.*, 2010). For example, the Midwives Service Scheme launched in December 2009 with the aim of addressing the lack of human resource for health crisis (Abimbola *et al.*, 2012; Okoli *et al.*, 2012). However, most schemes and policies for maternal health have faced unsuccessful implementation and sustainability due to limited financing, capacity and lack of political will (Abimbola *et al.*, 2012; Cooke and Tahir, 2013). Although the introduction of the National Health Bill 2014 offered a glimmer of hope in the primary health care system, to date, implementation has not yielded efficient and visible results (MamaYe, 2015).

Transport availability has been suggested by the experts to indirectly, and directly influence the health status of the women (Green *et al.*, 2013; Wilson *et al.*, 2013). As stated by Dr John, there are no functioning ambulance systems in Rivers State:

"In this state I can categorically tell you that we have no good functioning emergency ambulance system, some private hospitals might have one van but really in a state as big as this we need several fleets of vans to reach all the women in need" (Dr John, obstetrics and gynaecology, expert interview participant)

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The shortages of conventional emergency medical transport mean that these women, both rural and urban, may not have timely access to emergency care, hence increasing their risk of death from obstetric complications (Wilson *et al*., 2013). Emergency medical care is needed to overcome the factors most commonly implicated in preventing maternal mortality (Adewole *et al*., 2012). Although some health centres claim to own ambulances, the ambulances are often dilapidated, or not available to convey emergency obstetric patients, but mainly used for logistics (Ordinioha and Brisibe, 2013).

Although it should be noted that infrastructural provisions in Nigeria cannot be addressed by risk communication, the policy makers and experts need to be informed about the specific problems faced by thier constituents. Most people in Nigeria live in rural areas (Ibok and Daniel, 2013). Walking is the primary mode of transportation for these women, even during labour, as it is tough for them to reach even relatively nearby health facilities as a result of a scarcity of vehicles and poor road conditions (Olayinka *et al*., 2014). This implies that provision of basic amenities such as proper roads and essential transport services may potentially reduce the maternal death rates, by easing problems such as high transportation cost for the women especially the rural dwellers. A study carried out by Ibok and Daniel (2013) in Akwa Ibom State (Southern Nigeria), investigated the impact of the new rural bridges and roads built, and showed that provision of these amenities reduced the cost of transportation and overall rural-urban drift.

Implications of the rural to urban drift by the citizens of Rivers State and Nigeria at large may create a general perception that staying in the rural areas may be detrimental to one's health. This perception may be fuelled by the obvious fact that there is clearly reduced accessibility to proper health care and services for the rural dwellers. Ajala *et al*. (2005) revealed that the

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available healthcare in rural areas was grossly inadequate, and the distribution illustrates severe inequalities. Rural to urban migration has several multifaceted and intertwining burdens such as population explosion in urban areas, an increase in housing challenges and congestion (Abdul-Azeez and Opoola, 2011). Therefore, just as the Akwa Ibom government has invested heavily in the amenities projects (Ibok and Daniel, 2013), it is advisable for the Rivers State government to follow suit, to ease the burden of cost, transportation and rural-urban inequalities in the state.

4.1.2 Mitigation

Figure 13 illustrates the various mitigation pathways, which could potentially lead to a drop in maternal mortality rate. Failure to implement these management strategies may lead to several delays in systems and processes, which eventually lead to maternal deaths.
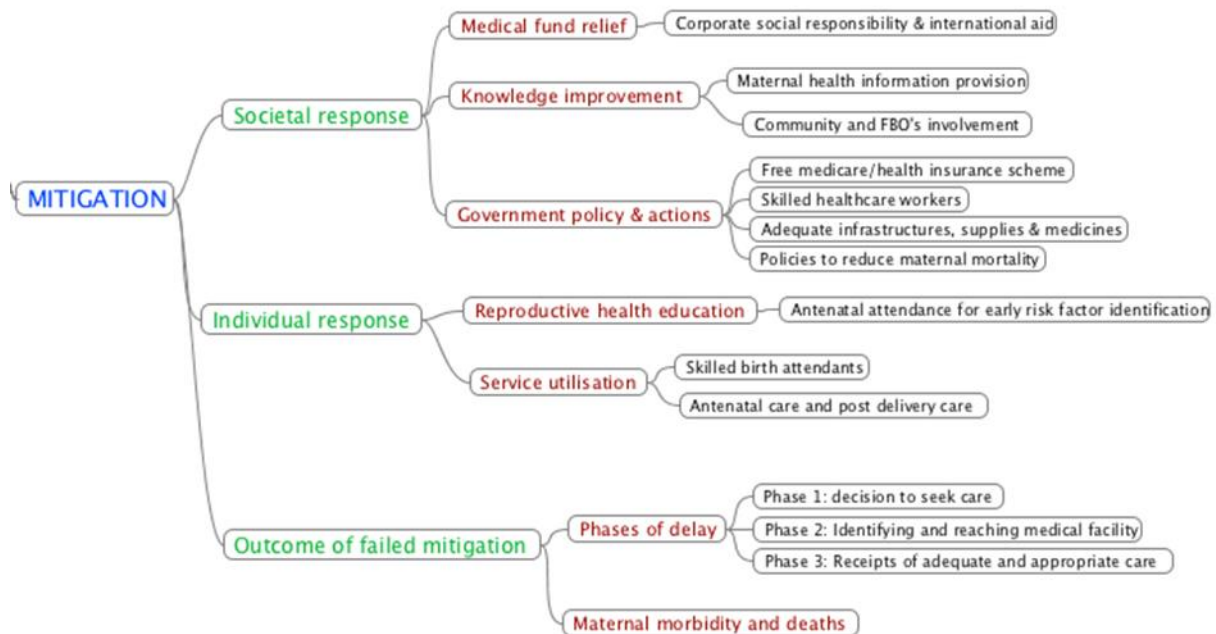
Figure 13: Mitigation efforts for maternal mortality

As illustrated by Miss Grace below, the experts noted that the persistently high rates of maternal deaths have influenced the government to introduce policies and interventions, starting from the 'Safe Motherhood Initiatives' to the recently signed National Health Bill 2014 (Okonofua and Shiffman, Fatusi, 2004; 2006; Bankole *et al.*, 2009; Mojekwu and Ibekwe, 2012):

> *"The world at large has reacted to the maternal mortality rate around, and Nigeria followed suit by introducing several policies. I will not say that our health care decision makers are not making a move to do what is right, but what i will say is that these moves are not created to be sustainable. Either there is no money to carry on the intervention or someone has eaten the money somewhere" (Miss Grace, public health intervention, expert interview participant)*

With poverty being identified as a critical factor associated with the low utilisation of maternal health care service (Okonofua *et al.*, 2011), several scholars (Witter *et al.*, 2009; Okonofua *et al.*, 2011) have advocated for free maternal health care. However, this has proved unsuccessful and unsustainable. Rivers State itself has examples of this, as experts in the current study have revealed that free services previously offered (Okonofua *et al.*, 2011) have been halted. For example:

> *"In the state now, all the free services have been stopped till we know what is happening in the government. There are no ministers yet in the country, or commissioners in the state so therefore the budget have not been released and implemented, also our state Governorship seat is under tribunal, so the state is at a standstill" (Dr Christain, obstetrics and gynecology, expert interview participant)*

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It may be interpreted that one of the central standing issues with the sustainability of the policies happens during a change of government, perhaps as a result of power struggle or a change in vision. Effects of the implementation of the free programmes and policies have not been recorded because participating states did not institute any means of monitoring the outcomes (Okonofua *et al*., 2011). However, reports show that in countries like Ghana where such fee exemption policies have been implemented, service utilisation was positively increased (Penfold *et al*., 2007; Witter *et al*., 2009). Ultimately the success and failure in reducing maternal deaths lie with the state government's willingness to prioritise the issue. Effectively prioritising fund management, monitor state and local authorities on the implementation of policies and finally adapt maternal health interventions to the varieties of localised contexts of women and community (Mojekwu and Ibekwe, 2012; Cooke and Tahir, 2013).

The experts in the current study advocated for the inclusion of relevant stakeholders like community and faith-based organisations as an additional measure of interventions. For instance, Dr Maureen talked about including traditional birth attendants, the women, and experts in dialogue, opening lines of communication:

> *"How do we put the traditional birth attendants, women and the experts in dialogue, how do we include them into the process, because they are such a key gatekeeper to the issue of maternal mortality and the TBA's for example, are more respected and have more knowledge of the localities of the women's environment, so therefore they also have something to offer in the reduction of maternal mortality" (Dr Maureen, maternal health expert, expert interview participant)*

An instance of stakeholder's inclusion was in the "Abiye initiative" pilot scheme carried out

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in Ondo State. The aim of the initiative was to save lives using mobile phones given to pregnant women, and in the case of emergencies, medical officers going on a motorcycle to the women's location with a first aid box (Mojekwu and Ibekwe, 2012; Oyeyemi, 2012). The managers of the initiative engaged community health extension workers and health rangers in the scheme. Before the scheme, the pilot health facility managed approximately 100 deliveries annually, but in the first full year of the project, more than 2,000 women delivered in health centres (Cooke and Tahir, 2013). However, despite the success of this pilot scheme, the programme, like other interventions, was limited by lack of funds (Alebiosu, 2014). The inclusion of the societal response mitigation category into the final expert mental model was necessary because it was interesting to explore if the women knew of the existence of these programmes and if they had access to them.

Lack of funding is a major impeding factor to the adequate mitigation of maternal mortality. However, several avenues exist for the potential fundraising for the health sector in Rivers State and Nigeria as a whole. Corporate social responsibility (CSR) is a practice in developing countries in which businesses are expected to meet some social obligations (Idemudia, 2007). The locus for this case study (Rivers State) is a major oil-producing region, the state's health sector, society and businesses may potentially benefit from the oil and gas companies (Uadiale and Fagbemi, 2012). These companies are known to be major players in leading CSR, however, the effectiveness of CSR initiatives by these firms are questioned as there are gaps between their stated intentions and the real world impact (Frynas, 2005). For example, there has been evidence that some multinational corporations (MNCse.g. Shell) provided schools, hospitals, and other social amenities in the Niger Delta region. However, these facilities have been abandoned and did not meet the needs of the communities they were

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meant to support (Amaeshi *et al.*, 2006). The implication of this is that the Nigerian government needs to make the MNC'S aware and more accountable for their CSR, as the general perception may be that home jurisdictions are powerless when it comes to the control of MNCs (Amao, 2008)

4.1.2.1 Outcome of failed mitigation

Mitigation of maternal mortality includes the provision of health information for the lay participants, in this case, the women of childbearing age. An essential component is the delivery of the health messages to the women. This could be achieved via different outlets or forms of subtle indicative clues (see section 2.4.2.1). If mitigation fails, this may lead to potentially catastrophic consequences such as maternal death. Blaming the women for their delay in seeking care from skilled personnel is going to be a single perspective measure, it is important to consider the issue of maternal mortality holistically. It is necessary to minimise the delays in getting adequate and appropriate emergency care in the event of complications (Doctor *et al.*, 2013), considering the fact that 75% of deaths can be prevented (Thaddeus and Maine, 1994). Delay is viewed in three phases (see Figure 14)

Natasha.C.Oyibo - August 2017
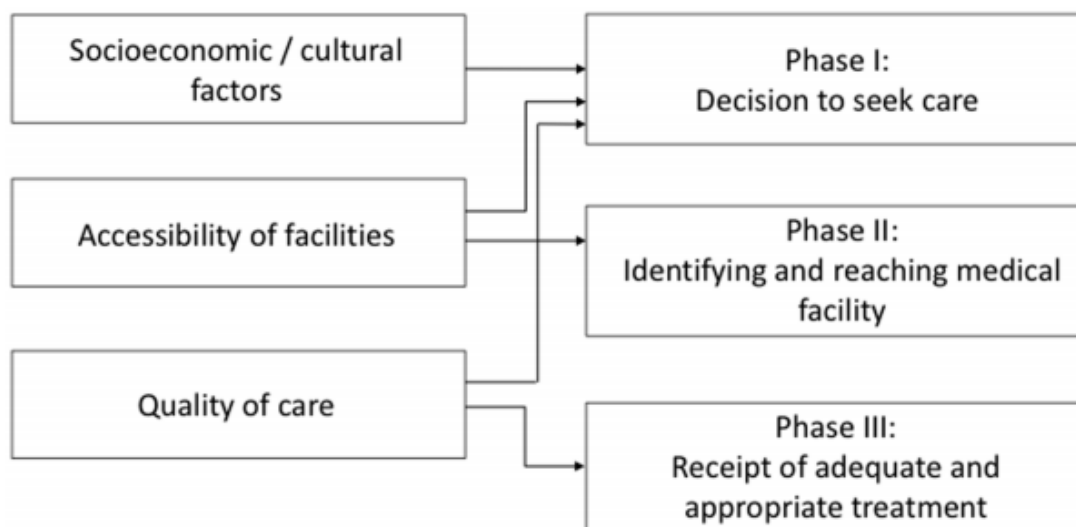
Figure 14: Three phases of delay to maternal health (Knight *et al*., 2013, p2)

Phase 1 delay involves barriers in seeking appropriate medical help for an obstetric emergency, for reasons such as costs, lack of recognition of an emergency, poor education, lack of access to information and gender inequality (Okonta *et al*., 2002; Hunt and De Mesquita, 2010). The women lack adequate knowledge about danger signs during pregnancy and labour (Abdella, 2010). For example, a study carried out in the South West area of Nigeria reported that many of the women would not perceive pregnancy-related risks as being too serious as they saw them as normal and to be expected during pregnancy (Ogujuyigbe and Liasu, 2007). This level of delay deals with the complexities of several categories of socio-cultural factors as shown in the expert mental model diagram (see Figure 16).

The experts (see illustrated quote below) felt that influence of community on the decision-making of the women was vital. Studies (Odimegwu *et al*., 2005; Lawoyin *et al*., 2007; Okigbo and Eze, 2015) have advocated the improvement of attitudes and knowledge of the individuals in the community, making them active stakeholders, thereby actively contributing to the reduction of this phase:

> *"Well, most of your socio-environmental factors listed in your model are closely related to the first phase of delay, in my opinion this delay needs to be aggressively addressed, and sometimes you find out that their husbands and mother in laws stop these women from seeking care, for reasons best known to them, they either turn to religion or alternative methods of treatment "(Dr Harvey, obstetrics and gynecology and midwifery, expert interview participants)*

Phase II involves delay in reaching care:

"This area this our Niger Delta terrain, our poor road networks, most people come in from rural areas, across water (Rivers), get to the hospital very late and most times those delay also affect the outcomes of their cases "(Dr Liam, obstetrics and gynaecology, expert interview participant)

As elicited from Dr Liam above, the delay in reaching appropriate facilities occurs for reasons of distance, infrastructure, communication and transport (Hunt and De Mesquita, 2010; Thorsen and Sundby, 2012; Cooke and Tahir, 2013). Rivers State indigenes have to live with the issue of bad roads, and inaccessible transportation. For example, Jaja and Agumagu (2008), reported that Rivers State has poorly maintained roads, resulting in a shortage of many commercial vehicles able to use the roads, thereby increasing the cost of transportation, leaving bicycles and motor-bikes as the principal source of movement. Implications of this phase of delay to the Rivers State women, especially the rural dwellers, are that, even if they had the zeal to utilise the health services provided, they just can-not physically get to the locations, hence leaving room for an adverse pregnancy outcome. The majority of the burden of the solution to this delay, however, may potentially lie in the hands of the State and Federal Government, by their provision of basic standard roads and amenities. So it may be essential to inform these decision makers of the plights faced by the women in their constituencies, to prevent maternal death due to this delay.

Phase III involves delay in receiving adequate quality care when a facility is reached because there are shortages of staff, electricity, water or medical supplies (Hunt and De Mesquita, 2010). This point was highlighted in the current study by one of the expert obstetrics and gynaecology doctors who spoke passionately on this issue:

"For example, when a woman pregnant or not is brought into this hospital in an

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emergency, it takes about three to five hours before she is attended to, and this will affect her outcome obviously" (Dr Liam, obstetrics and gynaecology, expert interview participant)

It is essential that trained personnel attend each birth during pregnancy, labour and the post partum period (WHO, 2005). However, as elicited from experts in the current study, this is not the case in River State, where there is a high prevalence of unskilled clinicians and inadequate hospital infrastructures. Irrespective of this, the State government still insists that there are adequate hospitals and provisions for its citizens, despite the RSMOH (2010) strategic development plan, which states:

"The primary and secondary health care systems are well developed and functional, though not optimally due to dilapidated infrastructure and under staffing" (RSMOH, 2010, p11)

It is easy to focus on the delay in receiving quality care from the perspective of the women's ability and will to seek quality care, so that the quality of the services they receive is sometimes neglected. There is a perception that the women are to blame, which is a convenient way of avoiding exposure of chronic under-resourcing of the public health service in Nigeria. Studies (Knight *et al*., 2013; Onah and Govender, 2014) have highlighted that the developing world still suffers from under-resourced facilities and sometimes the focus on Phase 1 (delay to seeking care) might conceal the fact that the health facilities are limited in equipment and skilled human resources.

4.1.3 Impact

Highlighting the impact of maternal mortality may potentially serve as a prerequisite for

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intervention and actions by policy makers, and any stakeholder with the power to effect change. The impact of maternal mortality has been illustrated across three major levels; the national, family and community levels (see Figure 15)
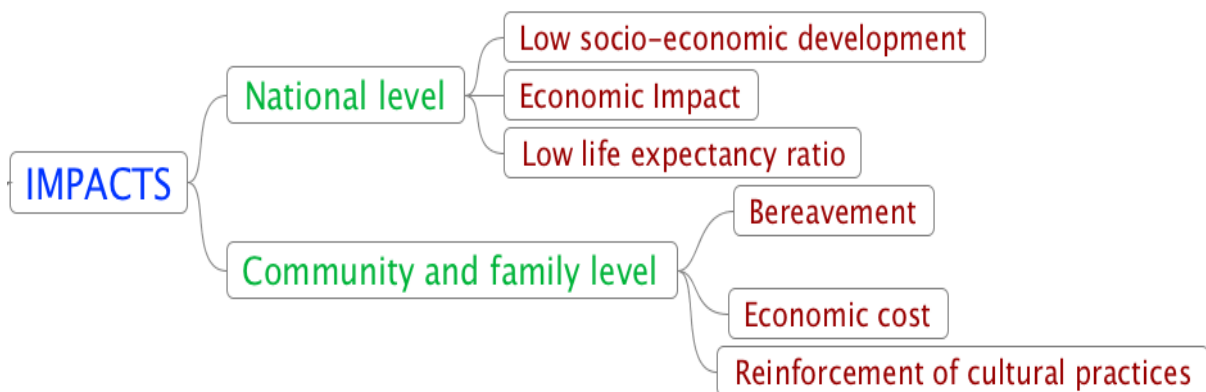
Figure 15: Sub sectional view of consequences of maternal mortality

At the national level, the effect of a high maternal mortality rate goes far beyond the physical pain/suffering and has been found to have a negative per capita impact on gross domestic product and socio-economic development (Kirigia *et al*., 2005). Nigeria has been shown to perform very poorly in all development indices, being among the 20 countries in the world with the widest gap between the affluent developed 'have' and the poor 'have-nots' developing countries (Igbuzor, 2006). Nigeria has one of the world's worst reproductive health indices, maybe leading to the low socio-economic development of the country (Adinma and Adinma, 2011). Health investments (e.g. birth controls) are thus not only advantageous to the women of childbearing age, but will help reduce the gap in health inequalities and gross domestic product (GDP) differences between Nigeria and other countries (Amiri and Gerdtham, 2013).

Nigeria is known to be one of the poorest nations in the world (Vincent and Kenneth, 2014),

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and with a corrupt government in place, the health system is limited, thereby leading to a high mortality trend in the country. However, Caldwell (1986) challenged the mortality paradigm, arguing that poor levels of mortality should not be the norm and always expected in poor countries with limited resources. In essence, Caldwell's challenge here was that, if political and social priorities changed, the hopes for poor countries would be raised in the mortality field (Caldwell, 1986; Shiffman, 2000).

The high maternal mortality rate in Nigeria has additional resource implications, as Dr John stated in the quote below:

> *"At the National level, there are several things that could be considered despite the obvious of reduction in GDP, there is the shift of resources to the setting up of motherless babies' homes, dropout rate of neglected kids with single male parent or no parent at all, and reduction in the workforce in establishments" (Dr John, obstetrics and gynaecology)*

There is also the issue of a shift of resources from other projects in the country to resolving issues such as setting up orphanages. When a mother dies, the socio-economic status of the family is highly compromised (Anderson *et al*., 2007). After maternal death, the family and surviving children are at a greater risk of facing poverty and neglect. In expressing this sentiment, one of the current study expert's states:

> *"At the family level, there are several points to be made regarding maternal death, the emotional pain / suffering, trauma of bereavement, reduction in household income, negative impacts on surviving members of family especially the vulnerable ones like the children and old parents" (Dr John, Obstetrics and*

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Gynaecology, expert interview participant).

Limitations, however, exist in assessing the effect of maternal death on the children, as this is not a subject that has been widely researched (Ronsman *et al.*, 2010; Buchwald *et al.*, 2011). This also was seen to be the case for the current study area. However, it is undeniable that the remaining families are faced with pain, and the children left behind to think about death with their sense of security affected (Buchwald *et al.*, 2011).

At the community level, the death of a woman during pregnancy may reinforce negative cultural and religious practices (see quote below):

"Maternal mortality can lead to the re-enforcement of negative cultural ideas about pregnancy related deaths, the fear may make some women relegate their minds to practice old traditions because their mothers survived childbirth" (Miss Sandra, midwife)

Especially if the women died while utilising modern health care services provided, the community may potentially lose trust in conventional medicines, and revert to negative cultural ideas.

4.2 Chapter summary

The expert mental model that emerged from the literature review and interviews is presented in Figure 16. To encapsulate all the components in one diagram, the mental model diagram shows the most generalised overview of the expert mental model structure. Arrows that connect the related nodes identify relationships and influence among the nodes. The node at the arrow's tail is recognised to exert some influence on the node at the arrow's head. The

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variables and components affecting maternal mortality in Nigeria that emerged reflect three main categories as shown in Figure 16.

Child bearing is a biological event, and in every part of the world, the process is the same regarding physiology. However, the manner whereby women experience their pregnancy and child bearing is socially and culturally constructed, by the perceptions and practices of the individual and society. The expert mental model of maternal mortality has evaluated the thinking and learning processes experts use to make maternal health decisions. This research reflects an overall negative mood with the experts about the issue in the case study area. They expressed disappointment with the existing government policies and interventions. However, there was an overall positive attitude towards this research, about the usefulness of the mental model approach. The information gathered from this phase of the methodology is useful for teasing out aspects that can be addressed by a risk communication, and if the entire risk elements are considered, it becomes apparent that different forms of stakeholder involvement should increase knowledge about maternal deaths and can lead to a mutually satisfactory outcome.

MATERNAL MORTALITY

IMPACTS

National level
- Low socio-economic development
- Economic Impact
- Low life expectancy ratio

Community and family level
- Bereavement
- Economic cost
- Reinforcement of cultural practices

CAUSES

Individual perception
- Emotions — Fear (e.g. discrimination and caesarean), Trust and distrust of institutions and government
- Attitude — Health belief model
- Culture and tradition — Gender issues (Male child preference)
- Religious influence — Religious leaders
- Socio-economic status — Poverty, Education

Clinical causes
- Sepsis — Poor hygiene (Native, home and church births; Inadequate health facilities)
- Obstructed labour and haemorrhage — Traditional practices e.g. FGM; Unskilled birth attendants
- Pre-eclampsia and eclampsia — Poor service utilisation
- Unsafe abortion — Unskilled medical practitioners; Poor family planning e.g. contraceptives
- Indirect causes
  - Anaemia — Malnutrition (Food taboos; Socio-economic constraints)
  - Malaria — Non usage of preventative measures; Self-medication
  - Ruptured uterus — Unskilled birth attendants; Native practices e.g. invasive abominal massages

State and national factors
- Laws and policies — E.g. restrictive abortion laws
- Transport and distance — Road conditions; Lack of ambulances
- Funding — Lack of skilled workers; Lack of facilities; Lack of medicines

MITIGATION

Societal response
- Medical fund relief — Corporate social responsibility & international aid
- Knowledge improvement — Maternal health information provision; Community and FBO's involvement
- Government policy & actions — Free medicare/health insurance scheme; Skilled healthcare workers; Adequate infrastructures, supplies & medicines; Policies to reduce maternal mortality

Individual response
- Reproductive health education — Antenatal attendance for early risk factor identification
- Service utilisation — Skilled birth attendants; Antenatal care & post delivery care

Outcome of failed mitigation
- Phases of delay — Phase 1: decision to seek care; Phase 2: Identifying and reaching medical facility; Phase 3: Receipts of adequate and appropriate care
- Maternal morbidity and deaths

Figure 16: Overview of the expert mental model

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Notes:

Blue ink: Indicates major categories

Green ink: Indicates sub categories

Red ink: Indicates components included in the sub categories

Black link: Indicates elements contained within the components

Abbreviations: FBO- faith based organisation, FGM- female genital mutilation.

The composite mental models illustrated in Figure 16 provides a context for the evaluation of womens knowledge and perception. The model aims at assisting individuals developing interventions and strategies to recognise the fact that there are diverse range of elements, which are interlinked in their relationships and influences. This study contributes to the literature on factors contributing to the high maternal mortality rates in Rivers State. The theoretical implications and practical advice to be derived from the expert mental model is discussed in Chapter 8. The next chapter explores the mental models of the women of childbearing age in the case study area.

5 LAY PARTICIPANT'S MENTAL MODEL

5.1 Lay mental models

This chapter addresses research question number 2: What are the different opinions that the Nigerian women possess about maternal health and maternal mortality? The chapter presents a detailed analysis and evaluation of the women's interviews, the key findings and themes derived from their ways of thinking. The outcome of this process is a core set of categories and subset of variables that characteristically define the women's perceptions. Thematic analysis (Braun and Clarke, 2006) was used to analyse the semi-structured interviews (see Section 3.2). The findings are supported using direct quotes from interview transcripts, which enabled a verbatim view of the women's concerns and perceptions. Each quote is identified in an anonymous coding system (Pseudonym, age, residential area, educational status, and employment status) and was included to demonstrate the variety of ways that participants expressed an underlying concept.

Table 5 summarises the demographic information from the semi-structured interviews carried out (See Appendix 10 for a comprehensive list of participants). There are four main categories of socio-demographic variables presented; these include the participants 'Age (years)', 'Education', 'Employment', and 'Residential area'.

Table 5: Demographic data from phase 2 semi-structured interviews

Parameter	Participants n=37 (%)
Age (years)	
25 or under	5 (13.5)
26-40	17 (45.9)
41-49	15 (40.5)
Education	
None	5 (13.5)
Primary	8 (21.6)
Secondary	13 (35.1)
First degree	6 (16.2)
Second degree	2 (5.4)
Vocational	1 (2.7)
Other	2 (5.4)
Employment	
Self employed	12 (32.4)
Employed	10 (27.0)
Unemployed	3 (8.1)
Job searching	4 (10.8)
Home maker	8 (21.6)
Residential area	
Urban	15 (40.5)
Rural	15 (40.5)
Sub-urban	7 (18.9)

All participants were aged between 15-49 years and were purposely sampled to represent a wide range in age, education, occupation and residential area. Choosing the sample population was not intended to be numerically representative of the case study area, but to reflect the possible diversity of opinions, beliefs, and experiences regarding the study topic. Religion was included as a variable, however with the predominantly Christian case study area, all the women in the sample were of a Christian background. In addition, the variations in the sample are aimed to develop categorical evaluation of the study findings, thereby highlighting preliminary links and potential causal associations between opinions and demography.

The women's interview data was transcribed verbatim using a Microsoft excel spread sheet, and segments of the interviewee texts addressing a succinct topic or collection of topics were coded (see section 3.2.3.4 for a detailed discussion).The codes revealing a pattern were refined and compressed into organising themes, which led to the identification of six key themes (see Figure 17– Figure 22). In addition, the interview data was further organised using the demographic variables presented in Table 5, thereby enabling an enhanced understanding of participants' responses and their demography.

Table 6 to Table 11 provide a synoptic account of the thoughts shared amongst the River State women, in a way that supports the detailed discussion of the themes as shown in the following subsections, for example, in relation to the code 'carelessness of hospital staff', the summary table show the number of women in the primary education category that gave insights on that topic. Provision of this synopsis supports the identification of beliefs and knowledge gaps among the experts and participants.These are discussed in detail in the forthcoming sections with the aid of interviewee's quotes for further clarification.To reiterate, the themes were

derived using the thematic analysis process as prescribed by Braun and Clarke (2006) (see 3.2.3.4). Any features from the transcripts that appeared insightful were identified as initial codes, following this, the codes were then grouped into organising themes which eventually led to the overaching theme (Braun and Clarke, 2006; Braun *et al*., 2014). The following part of the thesis discusses the findings, which emerged from the qualitative interviews of the women.

5.1.1 Theme 1: Religion

Pregnancy and religion are fundamentally intertwined in the lives of the women in this study; Figure 17 reveals segments of codes that have been refined into a theme, which highlights the women's belief in spiritual influences and evil attacks on pregnant women.

CODES	ORGANISING THEMES	THEMES
i. Belief in diabolic spiritual events and witchcrafts[1] ii. Belief that humans have powers to manipulate fellow humans into dying / having unsuccessful delivery (PHAROAHS) [1] iii. Preference to giving birth in church due to pastor's vision[2] iv. Pastor says it is the will of God for the woman to die at that point[2] v. Fasting during pregnancy on pastors orders[2]	i. Spiritual belief and witchraft[1] ii. Trust in religious places and leaders[2]	Religion

Figure 17: Conceptual codes revealing the emergence of religion theme (superscript numbers indicate codes expressing the same pattern)

All 37 women (see Table 6) expressed the influence of religion on a woman's maternal health. From the conception of the pregnancy to the successful delivery of the baby, women

have seen it to be controlled by supernatural powers. This may explain why women deliver in poor conditioned and unhygienic religious houses such as the one shown in Appendix 11 (see Figure 29 and Figure 30). In Nigeria, religion is a very important component of the citizen's lives with a mainly Christian South and an Islamic North (Holter, 2014). As applicable to the current study's participant, all the women were practicing Christains and held their religious beliefs firmly.

Table 6: Participant's responses organised by demographic variables

	Age			Education							Residential area			Employment				
	1	2	3	1	2	3	4	5	6	7	1	2	3	1	2	3	4	5
Total number women in each category (N =37)	5	17	15	5	8	13	6	2	1	2	15	7	15	12	10	3	4	8
Codes																		
Spiritual belief and witchcraft	5	17	15	5	8	13	6	2	1	2	15	7	15	12	10	3	4	8
Trust in religious places and leaders	3	11	10	4	6	9	3		1	1	8	5	11	9	8	1	2	4

Key:

Age: 25 or under (1), 26-40 (2), 41-49 (3)

Education: None (1), primary (2), secondary (3), first degree (4), second degree (5), vocational (6), other (7)

Residential area: Urban (1), Sub-Urban (2), Rural (3)

Employment: Self-employed (1), Employed (2), Unemployed (3), Job searching (4), Homemaker (5)

The women interviewed attributed complications during pregnancy and maternal mortality to the influence of evil forces, witches and wizards, as was the case of another study (Ogujuyigbe and Liasu, 2007). For example, Kelly expressed that:

"The evil forces and enemies they will want to kill you, because they feel that a pregnant woman is very weak in prayers and that's the right time to hit. That is

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why so many of us go to the church to give birth and pray instead of hospital

"(Kelly, 45 years old, urban, masters, employed)

Due to the fear of attack by evil forces, the women have advised themselves and future mothers to be vigilant in prayers and identify their "Pharaohs[8]" before it is too late (see quote below):

> *"The main thing I have told you that is why I want to hit the nail on the head they are bigger pharaohs in every of the family now, monitoring children of God not to stand, especially they have photographs, they know the one that is coming to be governor they know the one that tomorrow supposed to be a president they know because devil has its own eyes but God's eye superseded it's own eyes. They have microscope to find out what is in the womb but if you are strong in the Lord the devil will not work"* (Zoe, 42 years old, urban, secondary, self-employed)

This may provide some explanation to why so many (24 out of 37) of the women in the current study consider the church a safe haven for spiritual protection against evil characters such as Pharaohs and the handiworks of witches and wizards. It can be suggested that these women may prefer church deliveries because of the fear that has been instilled and inspired in them by the pastors. The religious leaders deliver messages that have supposedly been

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[8] Pharaohs: A bad character likened to the Pharaoh in the old testament that held the Israelite captive (Book of Exodus).

received from God, thereby leading the women to have little faith in Western medicine and practices provided in the government institutions (see quote below):

> *"To my own opinion, it is only God that can help someone, just like the doctors say we treat and God heals, they have no powers, all powers belongs to God. It is not in the hand of man to prevent, the only person that knows the right way to prevent something is God" (Justina, 41 years old, urban, graduate, self-employed)*

Literature from the expert mental model creation revealed that there is an indication that women have been patronising the churches and native delivery homes. The women mostly get referred reluctantly to hospitals in the case of serious obstetric complications (Udoma *et al*., 1999). As seen from the expert mental model (see Figure 16), poor service utilisation and unskilled birth attendants have been linked to several direct causes of maternal mortality. This trend has been noted to contribute largely to the high maternal death rates seen in Nigeria (Adanikin *et al*., 2014). In this case religious superstitions may not only stand to constrain the women's reproductive health behaviour, but can be potentially seen as an oppressing instrument on their health care seeking behaviours and practices (Gyimah *et al*., 2006). On the other hand, individual beliefs in spirits should not be seen from just the negative perspective, rather these spirits are also believed to have the powers for executing acts of benevolence (Njoh, 2006). Even though rationalists doubt the existence of spirits (Hurskainen, 2004), the power of belief cannot be underestimated. For example, Matthews and Clark (1999, p1) frequently observed the power that faith and religious commitment have in helping patients cope and eventually recover from illness.

The concept of spiritual influence and superstition was a major highlight of this theme of

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religion. Blumer (1969) suggests that individuals live in a world of objects and that their activities revolve around these objects, which may be as physical (as a chair) or may be imaginary. The nature of this object is constituted by the meaning it has for the person, and their reaction towards it. In the current study, the women attributed maternal deaths to imaginary objects such as spirits, and this potentially influenced their reactions and utilisation of health services. For example:

> *"Due to plenty vision that comes around, operation this and operation that, you go to the hospital you will be operated and do the operation and die, a lot of all these fearful threatening visions" (Ann, 40 years old, semi-urban, primary school, self employed)*

The prophetic spiritual visions instigated a fear of having caesarian operation in the participant, thereby potentially negatively influencing her health seeking behaviour. Caesarian sections (CSs) have been commonly practiced and accepted worldwide since the first recorded successful CS (Van Dongen *et al*., 2009), but it is still a great concern for obstetricians in Sub-Saharan Africa that there is still a strong aversion to the acceptance of the procedure (Awoyinka *et al*., 2006). It could be assumed that a highly educated woman would know the advantages of caesarian section as a life-saving means to a mother at delivery, but Onah (2002) showed that formal education alone does not increase the acceptance of pregnant women to caesarian sections, although as a single variable, it was significantly related to a more favourable attitude towards CS. This was also apparent in the current study:

> *"I know that eh CS is good to save a woman's life sometimes, but me I will not do it, I cannot let the doctor tear me open, my faith is too strong for that. I am a Child of God and it is not my portion" (Obuneke, 32 years old, Urban, Secondary*

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Employed)

The aversion to CS was identified in the current study despite the fact that about 64.8% of the women have formal education to at least secondary school level (Table 5). However, an increase in the trend of maternal demand for caesarian sections has been noted recently in the West African sub region, influenced by factors such as education and type of health facility (Okonkwo *et al*., 2012). Some other studies (Bello *et al*., 2011; Obuna *et al*., 2012; Mboho, 2013) are still reporting an aversion to the surgery, which in most cases leads to a high rate of emergency caesarian sections which is riskier than elective cases (Schindl *et al*., 2003).

5.1.2 Theme 2: Perception of decline in government's health provisions/responsibility

The key component of health systems has been identified as effective governance (Ciccone *et al*., 2014). However, Figure 18 reveals codes indicating that the women have a perception that the Nigerian government are failing in their responsibilities.

CODES	ORGANISING THEMES	THEMES

i. Build more health centres and extend intervention reach[1,2]
ii. Reduce awareness concentration in urban areas and reach out to rural areas[1]
iii. Preach messages on child spacing, family planning[1]
iv. Government should build trust with the women to improve acceptability of their interventions[2]
v. Educate nurses and attendants[2]
vi. Improve transportation services[2]

i. Women's need for an increase in awareness campaign[1]
ii. Government should commitments to building facilities and providing workers[2]

Perception of decline in government's health provisions/ responsibility

Figure 18: Conceptual codes revealing the emergence of theme 2 (perception of decline in government's health provisions/responsibility)[superscript numbers indicate codes expressing the same pattern]

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Over the past two decades, it has been observed that Nigeria has made some progress in the reduction of maternal mortality rates (Cooke and Tahir, 2013). However, the majority of the interviewees in this current study attributed the high rate of maternal death to the irresponsibility of the Nigerian government. As identified in the women's mental models, 32 women (Table 7) had a considerable degree of negative emotions (distrust) towards the government, as they felt that they had abandoned their citizens by not providing basic amenities.

Table 7: Responses organised by demographic variables

	Age			Education							Residential area			Employment				
	1	2	3	1	2	3	4	5	6	7	1	2	3	1	2	3	4	5
Total number women in each category (N = 37)	5	17	15	5	8	13	6	2	1	2	15	7	15	12	10	3	4	8
Codes																		
Women's need for information programmes	5	11	12	5	6	10	3	1	1	2	10	5	13	10	8	1	2	7
Governments commitment to improving hospitals, transport and poverty	5	15	12	5	8	12	4	1	1	1	12	7	13	11	6	1	4	10

Key:

Age: 25 or under (1), 26-40 (2), 41-49 (3)

Education: None (1), primary (2), secondary (3), first degree (4), second degree (5), vocational (6), other (7)

Residential area: Urban (1), Sub-Urban (2), Rural (3)

Employment: Self-employed (1), Employed (2), Unemployed (3), Job searching (4), Homemaker (5)

The interview excerpt below illustrates this distrust with the participant mentioning the lack of health centres, transportation and awareness as their major concerns:

"That the government should help us in bringing nearby health centres, clinics

where at least all these trained doctors who can take care of all these women will work, so they can assist them fine" (Rachael, 26 years old, rural, secondary school, homemaker)

This was also the stance of Rume who considers the unequal spread of health centres in the urban and rural communities:

" If they can build more health centres and then reach out more to the rural areas because it is more of the places where they have this maternal mortality it is mostly in the rural areas if they can reach out more into the rural areas and stop concentrating on the urban areas" (Rume, 27 years old, semi-urban, first degree, employed)

Nigeria is one of the countries in Sub-Saharan Africa that has adopted the method of decentralising both resources and responsibility for the delivery of basic health services to locally elected governments (Khemani, 2006). The local governments are responsible for the legislation, policy making, implementation and health care provision for every individual in the state (Achem and Agboghoroma, 2014). However, these health care providers have been seen by the women in this study to have failed in their duty to use their knowledge and resources for the reduction of suffering for patients, especially pregnant women (Lanre-Abass, 2008). The accounts of the current sample regarding the unavailability of health centres might seem surprising because according to the Strategic Health Development Plan document of the Rivers State government (RSMOH, 2010), there are 36 general hospitals across the 23 Local Government Areas, indicating that, with 1,402,749 women of child bearing age recorded in the state, there is one hospital available for about 38,965 women. However, the women may well be justified in their statements because it was also reported that these health centres are

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not at optimal function, and are plagued with dilapidated infrastructure and under staffing (RSMOH, 2010). The women suggested that the government needs to do more to provide adequate health care facilities for the citizens, in order to encourage their attendance and utilisation of maternity services.

Availability of such health infrastructure is just one component of the issue, the women also cited transportation as a barrier and the ambulance system has also been deemed ineffective in Nigeria. See illustrative quote below:

> *"I don't deliver for hospital. Because for night is the time my labour comes and begins to worry me too much and that time we no get motorcar, and no ambulance so is it in the night I will carry leg, me and my husband. My late husband, we carry leg walking and walking dey go and go the hospital for that night?" (Sarah, 39 years old, semi-urban, secondary school, unemployed)*

Evidence from this research and other studies (Olayinka *et al.,* 2014; Thomas and Taiwo, 2014) show that the provision of adequate knowledge of good maternal health practices (see illustrated quote below) and easily accessible and affordable health care services should increase utilisation by the women:

> *If you ask me wetin I suppose do when I get belle (get pregnant), I no know. So wetin you want make I do? I no go school, and I no get money to dey learn these thing, so I just dey there na. E good make the government dey send people to dey come our place, dey teach us small small things about wetin we suppose do when we get belle (Uche, 24 years old, rural, primary school, job searching)*

The findings from this study indicate that the government needs to improve adequate facility

coverage in the state, and this may potentially encourage the women to use the health facilities. In addition to hospital coverage, transport cost was discovered as an important barrier in limiting women's access (Etukudo and Ben, 2014). The women's usage of hospitals services offers several advantages; for example, paying attention to family planning advices offered in these locations is important because prevention of a woman getting pregnant is an effective form of primary prevention of maternal mortality (Campbell and Graham, 2006). Inadequacy and underutilisation of the healthcare system can be seen as an immediate cause of maternal death, especially because these services are needed by those in greater need (WHO, 2004, 2007; Olayinka *et al*., 2014). So measures such as service coverage expansion, increasing standards of care and health care providers are vital. However, these may be considered as expensive projects, so it is then advisable as an immediate strategy, to react with innovative low cost programmes such as those used in Rwanda for maternal death reduction (see 7.2.1 for a detailed discussion).

5.1.3 Theme 3: Compassion and skill of workers

Maternal health care usage and attendance of antenatal classes have been recognised as a major influence in improving a wide range of health outcomes for the pregnant woman and her infant (Dairo and Owoyokun, 2010; Moore *et al*., 2011; Dibaba *et al*., 2013; Omer *et al*., 2014). The lay participants have attributed the compassion and skill set of the health care workers as one of the reasons of health care underutilisation (see Figure 19).

CODES	ORGANISING THEMES	THEMES
i. Carelessness of doctors and nurses[1] ii. Lack of observation of new-born and mum frequently[1] iii. Lack of skilled nursing attendants[1] iv. Doctor out of reach, not easy to contact[1] v. Lack of human sympathy from nurses and non-chalant behaviour[2] vi. Nurses not practicing what they preach[2] vii. Nurse's treatment of women in labour not sympathetic[2] viii. Women visit health centres, but they are not well prepared for caesarean and private hospitals are unaffordable[3] ix. Rich patients treated better than poor patients[4]	i. Carelessness of hospital staff attitude[1] ii. Lack of support from staff[2] iii. Loose management of hospital (Skills and Expertise)[3] iv. Financial discrimination[4]	Compassion and skill of workers

Figure 19: Conceptual codes revealing the emergence of theme 3 (compassion and skills of workers) (superscript numbers indicate codes expressing the same pattern)

23 out of 37 (see Table 8) women who participated in the semi structured interview process spoke about the lack of adequately skilled workers present in the hospitals, and this skill deficiency is highlighted by the often-careless behaviours observed by patients. A skilled health care worker is an asset to the profession and institution, thereby enhancing the attractiveness of these centres to patients (Oyetunde and Ofi, 2013). The limited number of Nigerian skilled health workers especially in the rural areas, has been shown to have a negative impact on women's utilisation of the health care services provided (Abimbola *et al.*, 2012).

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Table 8: Number of responses, organised by participant demographics for theme 3

	Age			Education							Residential area			Employment				
	1	2	3	1	2	3	4	5	6	7	1	2	3	1	2	3	4	5
Total number women in each category (N = 37)	5	17	15	5	8	13	6	2	1	2	15	7	15	12	10	3	4	8
Codes																		
Carelessness of hospital staff	2	9	12	3	5	8	5	1		1	10	7	6	9	9	1		4
Lack of support from staff	2	7	11	3	4	6	5	1		1	6	4	10	8	9			3
Ineffective hospital management	1	5	5		1	3	5	1	1		6	4	1	5	4			2
Financial discrimination (bribes for clinical care)	3	11	4	5	5	3	3			2	5	2	11	8	5	1	2	2

Key:

Age: 25 or under (1), 26-40 (2), 41-49 (3)

Education: None (1), primary (2) secondary (3), first degree (4), second degree (5), vocational (6), other (7)

Residential area: Urban (1), Sub-Urban (2), Rural (3)

Employment: Self-employed (1), Employed (2), Unemployed (3) Job searching (4), Homemaker (5)

In the case of the women that attended the hospitals, 20 out of 37 women complained of inappropriate patient management. Some illustrative quotes for this perception were:

> *"You find the nurses shouting for someone and hallaring (screaming) when you are complaining that this is the way am feeling, the nurses would not care, they have this nonchalant attitude and don't know what they are doing, so it angers me" (Justina, 41 years old, urban, graduate, self-employed).*

Justina had an overall negative perception of the staff, in the hospital, and this may potentially limit her future service utilisation during pregnancy. In another instance:

> *"The doctors they have this nonchalant attitude towards pregnant women so that is why I don't like going to the hospital to deliver, nurses they insult people, they*

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don't know what they are doing and they do a lot of uncountable things that you can't imagine it is coming from a nurse so when they start these kind of things it angers me and that's why I don't like going to deliver in the hospital in the first place" (Nyeche, 32 years old, semi-urban, First degree, self-employed)

The attitude of health workers has been shown in previous studies (Diala *et al*., 2012; Olayinka *et al*., 2014) to be a limiting factor to the utilisation of health facilities. For example, pregnant women's usage of malaria prevention and treatment services provided by the government was highly constrained by perception of rude and unfriendly workers' attitude, although some understood the advantages of such services (Diala *et al*., 2012). In Rivers State, out of 112 women of childbearing age interviewed, 70.8% attributed their under-utilisation of health care facilities to an uncompassionate attitude of the staff (Moore *et al*., 2011). 18 women participating in the current study established a link between the attitude and compassion of the health workers and the socio-economic/financial status of the patient, which translates as their fear of financial discrimination in hospitals. For example:

"If you have your money you will be taken good care of because even the so called government facilities, hospitals they are very nonchalant in Nigeria, River States is not an exception they see government work as normal work but if you can afford a good private hospital of course they will not allow their workers to mess up nurses will sit up, they give you attention they take good care of you so you pay for it "(Ethel, 30 years old, urban, Masters, employed)

This perception that the richer the patient, the better the treatment and the poorer the patient the more lacking in compassion and nonchalant the nurse's attitude, is supported by earlier studies of antenatal care usage (Omer *et al*., 2014) and discrimination on financial grounds

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(Moyer *at al*., 2014). Financial discrimination against patients by nurses and midwives goes against the code of conduct stated in the "Nursing and Midwifery Council of Nigeria" Standard Practice Manual (NMCNigeria, 2015). It is also against their hypocratic oath and should be a reportable offence to the Nigerian General Medical Council. However, Oyetunde and Ofi, (2013) argued that the nurses in Nigeria have shown gaps and deficits in their knowledge and practice of these codes of conduct. There is a paucity of empirical evidence regarding how the code is policed. Nonetheless, a nurse with a sound knowledge of their code of conduct will remain an asset to the profession and institutions, and if this belief and compliance is lacking, their jobs suffer. Therefore, it may be necessary to re-familiarise these care givers with their codes of conduct and improve their skill sets.

Lack of empathy was another skill set issue that the women emphasised as a limiting factor to their utilisation of health services. Empathy is a major component in comprehensive nursing care, which in essence has a palliative and possibly healing effect on the patients (Kelley and Kelly, 2013; Baillie 2014). Research on the subject of attitude and compassion revealed that women delivered by native midwives have more positive control of delivery pain than their counterparts who were delivered by Western midwives (Oyira *et al*., 2015). The results revealed that 23 women attributed lack of skilled workers to the high number of maternal deaths in Rivers State, possibly potentially leading participants to taking a fatalistic attitude to their maternal health being as illustrated in the quote below:

> *"Some workers are good some are bad, it is just God because when giving birth there is a lot of complication there so what they will do is just be running up and down. So I just leave am for God" (Judy, 32 years old, urban, primary school, unemployed)*

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As revealed earlier, the women may leave their pregnancy health care well-being to the fate of a higher power. The issues surrounding the fatalistic attitude of the women are important. An understanding of the sources and barriers to their poor service utilisation is important for the prevention and management of obstetric complications and general maternal well-being. So, this highlights the need to encourage empathy and compassion from service providers, as negative attitude only increases the chances of an adverse pregnancy outcome. Further, it is essential to communicate the dire importance of service usage the women of child bearing age education to the women on ensuring that a skilled birth attendant is employed during delivery.

5.1.4 Theme 4: Influence of native midwives

A proportion of the interview participants expressed trust and belief in native midwives and their practices for the well-being of mother and child (see Figure 20).
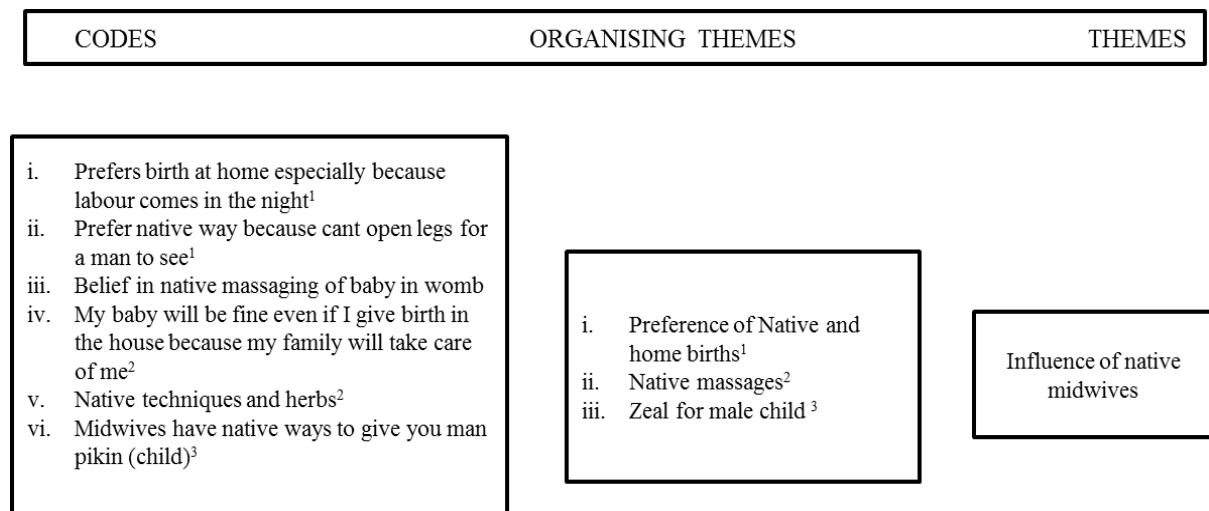
Figure 20: Conceptual codes revealing the emergence of theme 4 (Influence of native midwives) (superscript numbers indicate codes expressing the same pattern)

Some of the practices carried out by these native midwives are seen as risky to the mother and baby, as suggested by academic research, and supported by experts consulted in this study

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(see section 4.1.1.1.1). A study revealed the potentially harmful nature of the traditional health practices of untrained native midwives, where the deliveries may occur under unhygienic conditions and they apply a mixture of substances (ash oil, spices, herbs, and mud) to the baby's cord stump, which is highly risky to the baby (Obuekwe and Obuekwe, 2013). Native midwives give the pregnant women herbal medicines for the well-being of the pregnant women and their babies, although these herbs have not been researched scientifically for their potency, properties, toxicity and usage levels. Jane and Patricia remarked below:

"I like them (native midwives) I have seen a case where somebody was booked for operation and she ran to those local nurses, midwives so to say and they prepared herb for the woman when she took it after the drinking of the herb the pregnant woman was massaged by an Ijaw woman and the person never undergone any operation she delivered safely" (Jane, 41 years old, Rural, Secondary, Homemaker)

As Jane perceived it, the native midwife helped the woman avoid a caesarian section, with her herbs. In another instance:

"Hard work will make the baby turn every time so we need our local mothers in the community to help us massage and turn the baby around so that the baby will come out normally "(Patricia, 40 years old, no schooling, rural, home maker)

In addition to the herbs and medicines, a practice that was prominent in 20 of the women's interview data (Table 9) was the native massaging of the pregnant women's abdomen (as illustrated by Patricia's quote) for the general wellbeing of mother and baby. In some cases, these massages are done invasively to change the baby's positioning to a more 'favourable'

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one during deliveries. See quote below:

"In the native homes are spiritualist, they give herbs, they press people, they will use their hands in pressing peoples' stomachs like how doctors use thermometer/telescope to check people, the women use their hands to know the direction and how they will do to keep the shape of the baby, and the sex, so through all those thing at times when you look at it works" (Justina, 41 years old, urban, graduate, employed)

Table 9: Participants responses organised by demographics

	Age			Education							Residential area			Employment				
	1	2	3	1	2	3	4	5	6	7	1	2	3	1	2	3	4	5
Total number women in each category (N = 37)	5	17	15	5	8	13	6	2	1	2	15	7	15	12	10	3	4	8
Codes																		
Preference of native and home births	2	7	9	3	7	4	2		1	1	5	5	8	2	2	5	2	7
Native massage	3	9	8	3	7	5	1	1	1	2	6	5	9	6	5	1	1	7
Zeal for male child	1	5	9	4	5	5	1				3	10	2	9	2	2	1	1

Key:

Age: 25 or under (1), 26-40 (2), 41-49 (3)

Education: None (1), primary (2), secondary (3), first degree (4), second degree (5), vocational (6), other (7)

Residential area: Urban (1), Sub-Urban (2), Rural (3)

Employment: Self-employed (1), Employed (2), Unemployed (3), Job searching (4), Homemaker (5)

Further investigation into the nature of the native massage process showed that it bears a resemblance to a well established medical process called "external cephalic version" (ECV), to turn a breech baby in the womb. This procedure involves applying gentle pressure to the pregnant woman's abdomen, in order to turn the foetus either backwards or forward

somersault to achieve a vertex presentation (Rosman *et al*., 2014). However, women who underwent the ECV procedure during a breached pregnancy were at an increased risk for caesarian delivery, and instrumental vaginal delivery (Hundt *et al*., 2014; McCarthy *et al*., 2014). Native midwives may not possess the necessary skills or equipment to carry out such a procedure, so therefore once a pregnant mother is in a native home for such abdominal massages, they are potentially more prone to needing urgent caesarian section. This suggests that the Nigerian women, especially in rural areas may be at risk, since combining limiting factors (e.g. transport, lack of nearby hospitals) may potentially lead to death.

It has been established that the rate of maternal mortality is influenced by the fact that many of these deliveries occur without the attendance of doctors, midwives and nurses (Olusanya *et al*., 2011). Historical data from developed countries such as Sweden, England and Wales (De Brouwere *et al*., 1998) revealed that there was a marked decline in maternal deaths in parallel with the development of modern midwifery. In addition, there has been a clear negative correlation between skilled attendants at birth and maternal mortality rate (Stanton *et al*., 1997). This highlights the potential need for a clear communication message to the women about the possible dangers and implications of using the native route over the hospitals.

Another important concept arose when investigating the influence of native midwives, 15 out of the 37 women indicated the use of these service providers for increasing their chances of conceiving a male child. As Beyonce illustrated:

> *"The mama dem fit give you medicine wey you go drink, and then meet with your husband, make you born man child. You know say if you born man child, people go know say you no get problem, and you go get mouth for your husband compound"* (Beyonce, 43 years old, rural, no education, employed)

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As discussed in section 2.3.1.1, Nigeria has a highly patriarchal structure. The country places more importance to the male child than the female. Potentially skewing the minds of the women of child bearing age in believing that they have to continue trying by any means possible to conceive and bear a male child. Once a male child has been conceived, these women may believe that it was the handiwork of the native midwife, futher motivating her to use this now trusted source for delivery.

5.1.5 Theme 5: Lack of maternal health information

The provision of information on the prevention of maternal mortality may lead to a significant drop in the rates seen in Nigeria (Igberase *et al*., 2009). Figure 21 shows some codes revealing the need for the women to be educated on important maternal health issues.

CODES	ORGANISING THEMES	THEMES
i. Fear of caesarean and increased frequency of news of caesarean in hospital[1] ii. CS prevents you from giving birth 4-5 times[1] iii. Takes time for the wound to heal and for you to take in[1] iv. Unbelief in CS because parents did not go through it[1] v. CS kills more than natural birth[1] vi. Not heard about any government interventions[2] vii. Lack of adequate information to pregnant mothers and women[2] viii. No knowledge of why women die[2] ix. When ill just buy medicines from pharmacy[3] x. Malaria? Just report to the pharmacy for medicines[3]	i. Poor knowledge, leading to fear of caesarean[1] ii. Poor knowledge of maternal health education and programmes[2] iii. Self diagnosis and self medication[3]	Lack of maternal health information

Figure 21: Conceptual codes revealing the emergence of theme 5 (lack of maternal health information) (superscript numbers indicate codes expressing the same pattern)

Several studies have advocated a community participation and mobilisation approach to the prevention of maternal death (Igberase *et al*., 2009; Findley *et al*., 2014; Uneke *et al*., 2014). The participants' desire for information was revealed during the interviews, a participant from

this study said:

> *"The government need to create awareness not just in the township (urban) areas, they should move to the rural areas and come and tell us the bad things that happens during pregnancy and what we can do "(Blessing, 40 years old, rural, secondary school, self employed)*

Effective communications play a vital role in influencing informed choice of family planning and reproductive health behaviours (Oladeji, 2008). This component empowers individuals to exercise their right to good quality care, and empowers them to have good health seeking behaviours (Oladeji, 2008). For example, there are initial warning signs and symptoms associated with pre-eclampsia (Adamu *et al*., 2014), and so improved knowledge of this may increase the chances of the women's survival, as observations of these signs may cause the woman to seek immediate medical consultation.

One of the interviewees, Briana, identified that all the time, whenever any signs or feelings of illness presents itself, she assumes that it is malaria and self medicates:

> *"Sometimes if am feeling sick somehow, I just think its malaria because these days' mosquitoes are always biting me. So I just go to the chemist and buy malaria medicine and treat myself"* *(Briana, 35 years old, urban, secondary school, unemployed)*

When a person purchases and uses medicines without the knowledge of a physician either for diagnosis, treatment or prevention of diseases, this is referred to as the process of self-medication (Yusuff and Omarusehe, 2011). This may be pervasive and even recommended for treatment of minor diseases but due to the potential negative outcome of this practice in

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the context of maternal mortality, it should be reduced (Befekadu *et al*., 2014). 23 women in the current study (Table 10) admitted to self-diagnosis and medication, therefore urgent attention might be required to limit these potentially detrimental choices. These habits can be reduced through health education campaigns to encourage health facilities utilisation (Abasiubong *et al*., 2012; Babatunde *et al*., 2016). Nigeria has a major problem with regards to the increasing distribution and sale of dangerous counterfeit medicines (Kaur *et al*., 2015). Educating the women should not only reduce their reliance on self-medication from road side pharmacies, but it could improve their usage of hospital services and pharmacies which are believed to have authentic and approved drugs.

Table 10: Participant's responses, organised by demographics

	Age			Education							Residential area			Employment				
	1	2	3	1	2	3	4	5	6	7	1	2	3	1	2	3	4	5
Total number women in each category (N =37)	5	17	15	5	8	13	6	2	1	2	15	7	15	12	10	3	4	8
Codes																		
Poor knowledge leading to fear of caesarean	2	10	12	5	6	6	4		1	2	8	6	10	8	6	1	3	6
Poor maternal health education	5	9	10	5	6	6	2	2	1	2	8	6	10	7	8	1	2	6
Self diagnosis and medication	3	7	13	3	9	6	2	1	1	1	9	4	10	5	7	1	2	8

 Key:

Age: 25 or under (1), 26-40 (2), 41-49 (3)

Education: None (1), primary (2)' secondary (3), first degree (4), second degree (5), vocational (6), other (7)

Residential area: Urban (1), Sub-Urban (2), Rural (3)

Employment: Self-employed (1), Employed (2), Unemployed (3)' Job searching (4), Homemaker (5)

The need for health education is highlighted in this study, as the interviews reveal that the women had little knowledge of some of the major direct clinical conditions that cause maternal mortality. Only 6 of the women mentioning excessive bleeding (haemorrhage) some

mentioned the inability of the baby to come out (obstructed labour). Finally, the only other prominent clinical condition revealed was malaria (stated by 22 women) and this may be explained from the fact that malaria is prevalent in the case study area. Adeusi *et al*. (2014) stressed the urgency in the appropriate health education of the women by the government and non-governmental organisations, where the women should be informed about critical conditions relating to maternal health, to enable them to make informed health decisions regarding their health, and dispel the reliance on self-medication for them and their children.

5.1.6 Theme 6: Folklore, customs and tradition

Culture has been identified as having a direct and profound influence on the mother's health care behaviour (Evans, 2013). The interview participants expressed a wide variety of cultural beliefs concerning food, and folktales (Figure 22)
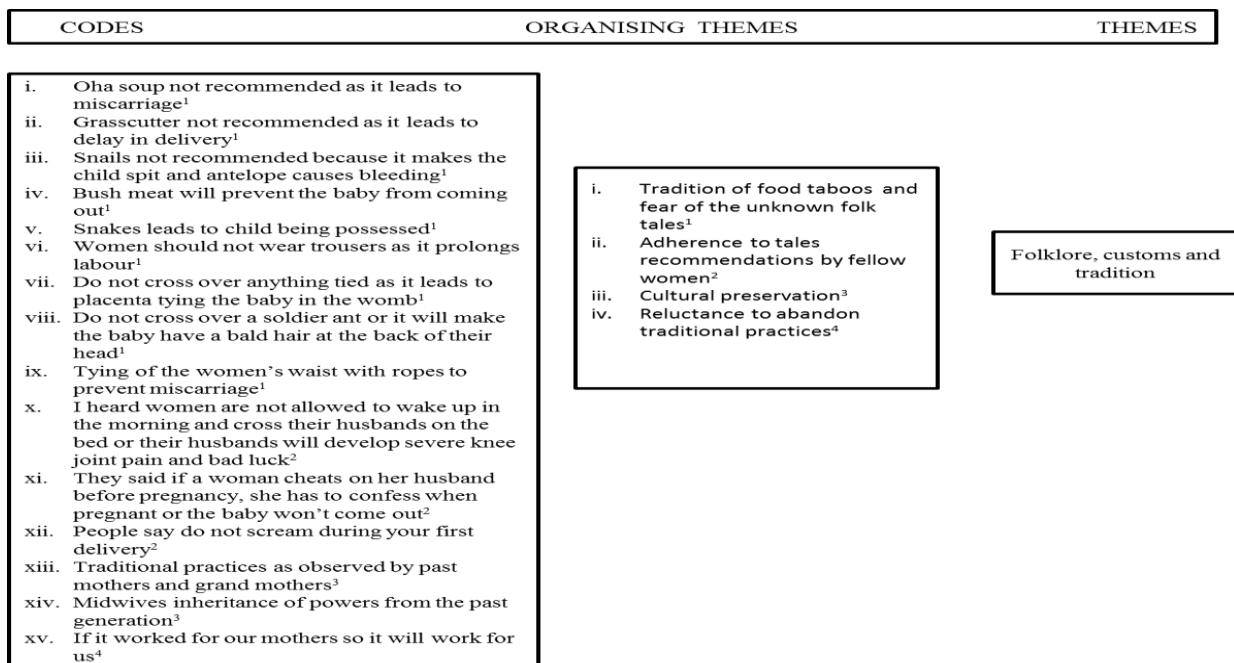
Figure 22: Conceptual codes revealing the emergence of folklore, customs and tradition theme (superscript numbers indicate codes expressing the same pattern)

Nigeria as a whole still has many folklore beliefs, which may lead to delay in the referral of complications to hospitals and negative health outcomes for pregnant women (Okafor, 2000). One set of such folklore concerns foods, which are to be avoided by the pregnant women because it is assumed or believed that they could be harmful to both mother and child, for example, 'Oha' or 'Ora' soup is a native Nigerian delicacy, which consists of Oha leaves (Pterocarpas mildraedii), Osa has indicated that it is a forbidden soup for pregnant women. Illustrative quotes are presented below:

"In my place they usually tell people don't eat. There's a soup they call oha soup. They say if you eat that soup you might have a miscarriage or something. Grass cutter also, one bush animal "(Osa, 24 years old, semi-urban, first degree, employed)

"My mother advice me not to eat snail that when you chop the snail the child will be bringing out saliva. If you are eating you should not bend your head because if you bend your head the thing will disturb the baby in you, those things" (Bridget, 45 years old, rural, secondary, employed)

20 women in the study (see Table 11) revealed that they had to take precautions regarding these food taboos in order to protect themselves and their unborn babies from physical and spiritual consequences.

Table 11: Participants responses organised by demographic variables

	Age			Education							Residential area			Employment				
	1	2	3	1	2	3	4	5	6	7	1	2	3	1	2	3	4	5
Total number women in each category (N = 37)	5	17	15	5	8	13	6	2	1	2	15	7	15	12	10	3	4	8
Codes																		
Tradition of food taboos and fear of folktales	3	7	10	2	6	9	2	1			7	5	8	8	3	1		8
Adherence to recommendation by fellow women	2	5	4	3	4	1	1		1	1	3	3	5	3	4	1	1	2
Cultural preservation	2	3	6	4	2	3	1		1		2	1	8	3	4	1		3
Reluctance to abandon traditional practices	2	3	6	4	2	3	1		1		2	1	8	3	4	1		3

Key:

Age: 25 or under (1), 26-40 (2), 41-49 (3)

Education: None (1), primary (2), secondary (3), first degree (4), second degree (5), vocational (6), other (7)

Residential area: Urban (1), Sub-Urban (2), Rural (3)

Employment: Self-employed (1), Employed (2), Unemployed (3), Job searching (4), Homemaker (5)

In Rivers State, there are different types of food taboos passed down from generation to generation amongst the people of the community, and some of these are specifically prescribed to the pregnant women for their physical and spiritual health. As elicited from the experts in the current study, these food taboos may be depriving the pregnant women of certain vitamins and minerals, and this may be associated with some clinical conditions, for example, iron deficiency and anaemia. Poor nutrition may cause anaemia, which in turn decreases the chance of the mother surviving obstetric haemorrhage (McCarthy and Maine, 1992). However, avoidance of certain foods may be as a result of necessity, for example, in regions with no facilities for caesarian section, or lacking skilled birth attendants, certain foods are restricted from pregnant women, to avoid large babies and difficult labour process for the mother (Nichter and Nichter, 1989; Hutter, 1996; Lefeber and Voorhoever, 1997; Darmstadt et al., 2008). The validity of such claims has not been reported in this research,

however, these practices can be detrimental to the new born, as they present with low birth weights (Darmstadt *et al.*, 2008).

Conversely, some interview participants made recommendations as to what pregnant women are expected to consume during pregnancy:

> *"What you will understand there is that there is no food a pregnant women will not eat so you know your body like some people that will know that there womb is big or small so whether you eat small or you, definitely the baby will cover the size of your womb so now what you will do is for you to help yourself and your baby just to eat light food, the light food I mean is fruits, lot of vegetables, snail, periwinkle such foods, don't eat starch food, just eat small" (Orji, 32 years old, urban, first degree, employed)*

Since traditional beliefs and practices have been known to contribute negatively to the maternal health outcome of pregnant women (Chiwuzie and Okolocha, 2001). The prevalence of these food taboos was tested in the phase 3 confirmatory questionnaires.

Some interview participants expressed reluctance to change their perceptions on the modernisation of the pregnancy and birthing process, because they believed that the ways of their ancestors were better and more life saving. The practices and knowledge from previous generations play a major role in the health seeking behaviour of these women as illustrated in the quote below from Nancy:

> *"So many of our home midwives have inherited the gift from their mothers, so we trust them to treat us, just like our mothers have been surviving in the past the same way "(Nancy, 29 years old, rural, primary, homemaker)*

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11 out of 37 women in the study expressed their trust in the old ways, and traditions of their ancestors, hence a reluctance to abandon traditional practices. It has been advocated that societies endeavour to change some of these traditional practices in order to improve the maternal survival rate during pregnancy (WHO, 2004). However, women have been known to be major players in the innovation and transmission of culture over time, they ensure that there is no radical break with the past and that the process of change is gradual (Okonjo, 1975). The women's need to preserve culture may also be seen as an act of "wilful blindness":

> *"Wilful blindness happens when a person chooses not to address information because it may either challenge his/her thinking or require him/her to take a particular action" (Faith, 2013, p7)*

Some of the women in the current study may have exhibited some form of wilful blindness, through avoiding their opportunity for knowledge and responsibility to be informed (Heffernan, 2011). For example, Brenda acknowledged the rumours of the negativity surrounding female circumcision, however she did not show any intent to research or get more knowledge of the potential negative outcomes of this practice on her baby, but instead decided to continue with tradition:

> *"Anytime I deliver I always take my child to my village for circumcision, even though I hear it is not good for the child, my mama do am to us so I go do am to my child, is that not how it happens "(Brenda, 35 years old, semi-urban, secondary, homemaker)*

The worldview and behaviour patterns of the women are embodied in their culture and

traditions (Falola 2001), with individuals occasionally being led into disbelieving the evidence of their own eyes. One of the ways of tackling this perceived reluctance might be through more effective health leadership (Halligan, 2013). The key strengths in leadership are instilling positive change in the audience (Arroliga *et al*., 2014). Identification of the barriers to health service utilisation is important in initiating a transition of the women's health care choices from a traditional one to an informed individualistic behaviour.

5.2 Chapter summary

The focus of this chapter was on eliciting the women's knowledge concerning maternal mortality. Reduction in maternal death has remained a major challenge to the public health profession. Effective interventions can only be provided with the right information and the knowledge of the right ways to strategise and communicate such messages. This chapter has revealed knowledge and perceptions elicited from women of childbearing age about maternal mortality. The key themes identified, further support the need for intervention to incorporate the needs of the women since a risk communication will be more effective if the varying underlying causes and influences are known.

This study has shown some key dimensions of the perception of the women, which will further inform identification of gaps and misconceptions between the women's and expert's knowledge, to serve as the major component in a targeted risk communication instrument. Distinctive characteristics in the women's mental models were identified, and this has enabled the emergence of six key themes. The next chapter uses the information gathered from the analysis of the expert's and participant's mental models, to estimate prevalence of this information in a much larger sample of the women. The estimates of the frequency of beliefs, knowledge gaps and misconceptions identified are important to aid development of key risk

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messages for risk communication.

6 ESTIMATING PREVALENCE OF EXPERT-LAY KNOWLEDGE DIFFERENCES

6.1 Introduction

This chapter responds to research question number 3: What differences in opinion about maternal mortality exist between the experts and participants? This question was answered through the identification of beliefs, knowledge gaps and misconceptions between the women and the experts. Identifiable differences between the experts' mental models presented in Chapter 4, and the womens' mental models as presented in Chapter 5 were used to characterise how women may think differently to the experts when considering health care decision-making and the issue of maternal mortality at large. This analysis has been structured to reflect the three broad categories of the risk (causes, mitigation, and impact) identified in chapter 4.

The outcome of the interview analysis (see chapter 5) was a core subset of components that characteristically defines the women's ways of thinking. The lay participants' mental models that emerged from the coding and analysis is illustrated in Figure 23 below, utilising the expert mental model diagram as a framework.

Figure 23: Overview of mental model diagram with lay participants' views

Notes:

Blue ink: Indicates major categories

Green ink: Indicates sub categories

Red ink: Indicates components included in the sub categories

Black link: Indicates elements contained within the components

Abbreviations: FBO- faith based organisation, FGM- female genital mutilation.

Items in **bold** signify codes mentioned by the lay participants within the expert mental model framework

Items in *italics*: indicates new concept not included in the expert mental model framework.

+ve symbol indicates a positive notion

-ve symbol indicated a negative notion

A significant finding, illustrated in the diagram overview presented in Figure 23, was the absence of influence arrows between the nodes and variables. Analysis of the interview data revealed the emergence of these components; however, the women failed to exhibit knowledge of vital links and causal relationships between their ideas and maternal mortality. For example, a participant mentioned malaria as a cause of maternal death, but failed to identify that non-usage of correct prophylaxis measures potentially leads to malaria and eventually maternal mortality.

The components are further identified as either generally negative (-) or positive (+), for example, the women had a positive notion concerning native massage by traditional birth attendants, and they did not see this as a potentially harmful practice. A negative notion was observed when the women mentioned the concepts of lack of facilities and skilled health workers. Recognition of these distinctive thought processes and how they serve as barriers to the reduction of maternal death is an important consideration when deducing risk messages.

A comparison of the expert and participant mental models highlighted the following gaps, misconceptions and general points of interests (see Table 12). The mental models represented in Figure 23 revealed a general overview of the maternal health situation, although, the information shown on Table 12 focused on the aspect that concerned decision-making, with the purpose of identifying important information needed to inform a risk communication. For instance, the components contained within the 'impacts' category were not included, as it is a societal measure that does not really form part of the risk communication survey and falls outside the scope of this study.

Table 12: Development and justification of themes used in the prevalence survey of women participants knowledge, attitude and behaviour.

CAUSES

Component	Gaps in women's knowledge	Misconception of women	Additional points of interest emerging from women interviews
Individual perception			
Hospital discrimination			Emerged from the semi-structured interviews. Need to estimate how widespread.
Fear of C/S		This fear may have been evoked via incorrect reasoning. Considering the fact that this is a potentially lifesaving option in childbirth, it is important to test these misconceptions for future corrections.	
Level of trust			May increase skepticism

towards government			towards government messages and interventions.
Male child preference			If true, would mean pressure for additional pregnancy, this increases risk.
Older generation survived pregnancy more than current		Maternal mortality rates are falling. This preconceived notion may be potentially dangerous as it may prevent endorsement and usage of western medicines and services.	
Cultural preservation		The need to preserve culture may encourage dangerous practices.	
Poverty			The women were very passionate about these two factors, so it will be important to get substantial statistical results on the prevalence of this belief, and demographic data for expert attention.
Education			
Influence of religion		Majority of maternal deaths are physically preventable, religion may serves as a barrier to proper practices, if the belief that spiritual forces influences maternal death is prevalent.	
Clinical causes and their socio-economic links			
Direct and indirect clinical causes	The women had very little knowledge about the clinical		

	causes		
Self-medication		Potentially dangerous practice that may lead to death if conditions remain untreated.	
Native, home and church births		These locations are potentially dangerous due to factors such as hygiene, and unexpected complications that require intervention from skilled healthcare practitioners. It is important to test the prevalence in women who believe in utilizing the locations.	
Inadequate and ill-equipped health facilities			If the women believe that facilities are ill-equipped or unavailable, they may underestimate the importance of utilising services.
Traditional practices (e.g. FGM)			Cultural influences may lead to potentially dangerous practices.
Unskilled birth attendants		Many of the women expressed trust in the practices of native midwives. However, the fact that they have been referred by fellow women, does not guarantee their skill or success rate. So it was necessary to test the prevalence of this level of belief in their practices such as native massage.	
Family planning e.g contraceptives	The women did not identify the need for proper family planning.		
Non usage of preventative	As prevalent as malaria is in the		

measures (e.g. malaria prophylaxis)	state, the women failed to recognize the importance of anti-malaria measures.		
Food taboos			Extent of food taboos needed to be explored as nutrition is an important aspect of safe motherhood.
Unskilled medical practitioners			The prevalence of the beliefs that the state health care workers are not capable, may impede service utilisation.
State and national factors			
Lack of medicine, facilities, and skilled workers			Evidence indicating perception of the absence of amenities is needed for evidence-based policy making and state spending, as may reduce uptake.
Road conditions and distance			Evidence indicating the influence of such amenities is also needed for evidence-based policy making and state spending

MITIGATION

Component	Gaps	Misconceptions	General belief
Societal and individual response			
Information provision			Women desire for maternal health education

			will be evaluated
Infrastructure and supplies			Place of birth, attitude and perception of provisions will be evaluated.
Birth attendants			Perception of potential changes to the role of native midwives will be explored.

The mapping concentrated on those aspects that refer to women's knowledge, attitude and behaviour that may be potentially addressed by improved risk communication. This comparison of the expert and women's mental models thus reveals findings that were used in aiding the formation of categories for the construction of the structured questionnaire (see Appendix 4), to test prevalence in a much larger sample of the women. Identification of the extent of the potential barriers to an effective risk communication that may impede broader lay acceptance to necessary behavioural and attitudinal changes, was carried out in this phase of the mental models approach. Addressing these barriers will potentially improve the women's chances of surviving pregnancy by enhancing their level of acceptance to important health messages.

Table 13 represents the socio-demographic characteristics of the questionnaire respondents. These features include the residential area, employment status, educational background, and age, which will aid in revealing potential relationships and associations between the participant's responses and their socio-demography. Rivers State has a female population of 2,525,690, and it was shown from the Nigeria Demographic and Health Survey (NDHS)

(2008), that there was a 95% literacy rate of the female population, and this reflects in the research sample population, as over 90% of the respondents had some form of education. Also, the NDHS (2008), reported that 65.6% of the Rivers State women in employment, also fairly reflected in Table 13, as about 74.5% of the sample population was employed or self-employed.

Table 13: Demographic data of phase 3 participants (structured questionnaire survey)

Variable	Respondent number (N=228) (Frequency (%)
Age	
25 or under	55 (24.1)
26 – 40 years	135 (59.2)
41 – 49 years	38 (16.7)
Residential area	
Urban	81 (35.5)
Sub – Urban	54 (23.7)
Rural	93 (40.8)
Employment status	
Employed	94 (41.2)
Self- employed	76 (33.3)
Unemployed	27 (11.8)

Home makers	26 (11.4)
Student	5 (2.2)
Retired	0 (0)
Educational status	
No education	9 (3.9)
Primary	8 (3.5)
Secondary	72 (31.6)
First degree	100 (43.9)
Second degree	29 (12.7)
Other	10 (4.4)

The structured questionnaire was administered to 250 women that fit into the study inclusion criteria, with a 91% response rate, 228 were used for analysis. The remaining 22 questionnaires were disregarded as some had incomplete or partially completed demographic surveys. The version of the questionnaire used in the study consisted of 29 items, which measured knowledge prevalence, gaps in knowledge and misconceptions (shown in appendix 4). It is important to note that all the information identified from the mental models comparison were encompassed within the six key themes, for example, "fear of witchcraft" fell within theme 1: religion. The measurement was carried out using a five-point Likert rating that ranges from "strongly agree" [1] to "strongly disagree" [5] as explained in section 3.2.

Using SPSS version 21, Chi-Square cross-tabular analysis was performed for the data collected. This statistical analytic method was chosen mainly due to the categorical nature of

the variables of interest and its effectiveness in testing significant associations. Descriptive analyses of the women's responses are presented in Table 14, 15, 17, 19, 21 and 23 below. Chi-Square calculations were used to test for associations[9], with the significance level set at .05. Cramer's V to verify the strength from 0 (no association) to 1 (perfect association) was also adopted, to analyse significant result and most critically, identify meaningful patterns (Dytham, 2011). Cohen's standard for cross-tabular effect size was employed to reveal the stongest links, the effect size range from a value of 0.1 and below being considered weak, 0.3-0.4 moderate and 0.5 and above strong (Cohen, 1992). Pearson's Chi-square results were presented for each test of association, however in some cases where the data set was too small to meet the sample size assumption of the Chi-square test, the maximum likelihood ratio Chi-square was reported (Field, 2013; McHugh, 2013). These tests were performed to understand if the women's response were linked to their demographic status. For example if a woman if of the opinion that a church birth is safer than a hospital birth, the Chi-Suare test reveals if there is a significant association between her response and demographic information she has provided. If indeed there is a significant association, the Cramer's V indicates the strength of that relationship.

Comparison of the expert and women's mental models revealed findings that were utilised in aiding the formation of categories for the construction of the structured questionnaire (see

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[9] Associations ia any statistical relationship, whether causal or not between variables (Dytham, 2011)

Appendix 4), to test prevalence in a much larger sample of the women. The following sections provide the rationale for the development of the set of questions. This is followed by a dissection of the statistical output for each question, the concepts being investigated, and a discussion of the results derived from the questions contained within each particular theme.

6.1.1 Quantitative findings

THEME 1: RELIGION (Q 1-4)

Rationale

It is necessary to test the prevalence of the influence of religion and religious leaders, as these are major factors that may impact on the women's utilisation of health services

Variables/concepts from mental models comparison supporting the rationale

Church births, fear of witchcraft, and religion/religious leaders.

Descriptive summary of the participant's responses to the questions asked within theme 1 is shown in Table 14 below. The data presented reveals the frequency and percentage of respondents in conjunction with the responses given for each question.

Table 14: Respondents answers to question 1-4

Question	Strongly agree (%)	Agree (%)	Neither (%)	Disagree (%)	Strongly disagree (%)
Question 1: I believe it is safer to give birth in the church than in the hospital					
Q1	12 (5.3)	81 (35.5)	4 (1.8%)	111 (48.7)	20 (8.8)
Question 2: I believe that many women die during childbirth as a result of witchcraft					
Q2	15 (6.6)	105 (45.7)	23 (10.1)	38 (16.7)	47 (20.6)
Question 3: I think the pastor is more important to a pregnant woman than the doctor					
Q3	9 (2.9)	76 (33.3)	19 (8.3)	97 (42.5)	27 (11.8)
Question 4: I need the pastor's permission before agreeing to undergo a caesarian section					
Q4	15 (6.6)	27 (11.8)	14 (6.1)	93 (40.8)	79 (34.6)

Discussion of question 1-4

Religion and religious institutions have played a significant role in the lives of human beings, and have been involved in the shaping of values and beliefs within individuals and families (Chattopadhyah, 2007). Findings from phases 1 and 2 of the current study have indicated the potential interplay and interrelationship between religion and health in the lives of the women, emphasising that religion is an essential element in Nigerian culture (Holter, 2014). Responses from question 2 (I believe that many women die during childbirth as a result of witchcraft) show that the majority of the women believed in the power that witchcraft plays in the death of a mother during pregnancy. The hypothesis to test is that the beliefs in witchcraft and mystical causes of death would be the lowest amongst the more educated people and highest among the least educated people (Akighir, 1982). However, this was not the case with

the respondents in the current study. The influence of spiritual forces and phenomena in the lives of the women was derived as a major point from the qualitative interview findings.

Question 2 involved estimating the prevalence of the belief in the powers of witchcraft and maternal death. The responses revealed that over half of the participants (n=120) agreed, while 85 out of 228 women disagreed. Testing for association showed that there were some significant associations (see Table 15) between the demographic variables and the women's responses. However, Cramer's V indicated the strongest strength of associations in the age variable. The majority of women who agreed to the question were within the 26-40 age brackets (108 out of 120 women). Interestingly, the results revealed a moderate Cramer's V value (0.3) for the education variable, indicating that education potentially does not have a strong impact on the spiritual belief of the women. In addition, Cramer's V result for the age variable may begin to suggest a prime target age group for a risk communication message.

Table 15: Chi-Square (Pearson/Likelihood ratio*) and Cramer's V analysis of associations (q1-4)

Demography	Education (Chi-square, df= 20, Cramer's V)	Area (Chi-square, df = 8, Cramer's V)	Age (Chi-square, df = 12, Cramer's V)	Employment (Chi-square, df =16, Cramer's V)
Q1	289.1* (**0.5**)	340.6* (**0.8**)	207.5* (**0.5**)	229.2* (**0.5**)
Results indicate that there were significant associations between the responses to Q1 and the demographic variables. Cramer's V further reveal a high strength of association between all the variables, with education showing the highest strength (0.8).				

Q2	137.4* (0.3)	107.1 (0.4)	164.1 (**0.6**)	282.4* (0.4)
Results indicate that there were significant associations between the responses to Q2 and the demographic variables. Cramer's V further reveal a high strength of association between the age variable and responses.				
Q3	187.4* (0.4)	184.9 (**0.6**)	133.1 (0.4)	165.2* (0.3)
Results indicate that there were significant associations between the responses to Q3 and the demographic variables. Cramer's V further reveal a high strength of association between the education variable and responses.				
Q4	181.1* (0.4)	90.2 (0.4)	93.2 (0.4)	222.8* (0.4)
Results indicate that there were significant associations between the responses to Q4 and the demographic variables. Cramer's V further reveal a low strength of association between the variables and responses.				

Table shows the Chi-Square values, and * denotes that the likelihood ratio has been reported. Statistically significant P value <0.05.

Bold has been used to highlight the most significant Cramer's value (V 0.5 and >0.5) associations

Irrespective of the women's educational status, they believed in the influence of witchcraft. The belief in occult forces is something that is deep rooted in many African societies irrespective of their socioeconomic background and status (Kohnert, 1999). For example, ethnographic studies in a South-South region (Ibibio) of Nigeria revealed that the belief in witchcraft was a serious factor in explaining why people ignore modern health care facilities (Ajala and Ubong, 2010). Witchcraft and its influences may potentially be seen to establish a set of attitudes and relations between individuals in a community, thereby forming a woman's

perceptions of how to act and react during pregnancy.

The women's belief in witchcraft and its potential to cause harm may possibly lead a woman to place a higher relevance on the pastor rather than the doctor with regards to her maternal health. This measure of importance between the pastors and physicians to the women was tested in question 3 (I think the pastor is more important to a pregnant woman than the doctor), and results revealed a mixed reaction. Although a majority of the women considered the doctor as more important (124 out of 228), a significant number indicated that the pastors were more important (86 out of 228). Upon further analysis, it was revealed that there was a strong strength of association (V=0.6) between the residential area variable and participant's responses (see Table 15). The rural women (n=76 out of 93) being the majority that agreed and urban (n=62 out of 81)/ sub-urban (n=47 out of 54) disagreeing. Adanakin *et al.* (2014) revealed that out of 397 antenatal attendees in South-West Nigeria, 70.8% felt it was important for the hospital workers to consider their spiritual needs, with 64.7% desiring collaboration between the pastors and hospital staff while in labour. Analysis of the educational status of the respondents showed that the agreed and disagreed sample pool contained a mixed educational background. Therefore, it can be suggested that education is not a significant factor, and does not eliminate the entrenched belief in the influence of witchcraft or spiritual forces. This is potentially reinforcing the initial conclusion drawn from question 2, highlighting that education may not be a barrier to religion and influence of religious leaders.

Interestingly, question 1 (I believe it is safer to give birth in the church than in the hospital)

shows that some women think the church is a more secure delivery place than hospitals, perhaps for the religious leader to help ward off evil forces and witchcraft. Further probing into why this was the case revealed that the individuals making such a decision were the least educated. The results show that the majority of the women with an "agree" response were individuals with only a secondary or below education (n=77 out of 89). Conversely, the majority with a first-degree and second-degree education (n= 109) gave a "disagree" response, potentially suggesting that the more educated a woman is, the lower her opinion of church birth being safer than hospital births. People with more formal education might be expected to make better health decisions, as they are likely to possess more knowledge about other possible reasons for maternal deaths. Education, therefore, was found in the current study to be significantly associated with the women's health care seeking behaviour and their choices of a place of delivery as was also established by Osubor *et al*. (2006). There was also the case of the rural/urban strength of association (V=0.8). More rural women (n=93 out of 93) agreed to the question, compared to the urban women who disagreed (n=77 out of 81). Finally, a strong association was also observed between responses and the age (V=0.5) and employment (V=0.5) variables. Results revealed that a majority of the much older women of 41- 49 years (34 out of 38) agreed to question one compared to the younger women (131 out of 190). However, there remain 55 out of 190 younger women (age 40 and below) who consider the church a safe place to give birth compared to the hospitals. These results may start indicating the need to create targeted messages to bridge the knowledge gap between the different women within their various life conditions, as responses clearly differ by demography.

One potentially encouraging response derived was in question 4 (I need the pastor's permission before agreeing to undergo a caesarian section), where the overwhelming majority of the respondents decided that they did not need the pastor's permission for the operation. The expert interviews (Phase 1) suggested that some patients required permission from pastors before giving consent to a caesarian section, to the potential detriment of their health. Continuing the investigation on the potential influence of pastors as a hindering factor to women's acceptance of this possible lifesaving procedure, question 4 (I need the pastor's permission before agreeing to undergo a caesarian section) was formulated. The majority response was 'disagree' (n=172), but some women (n=42) agreed to the question. Although the Chi-square test revealed significant associations between the demographic variables, the Cramer's V did not indicate a strong association. Further reasons as to why the experts observed a fear of caesarian section amongst the Rivers State women were probed in the subsequent questions.

A number of women from the current study indicated their awareness of the need to allow the doctors to carry out a caesarian section, if neccessary, without the pastor's permission. This finding supports the study by Igberase *et al.* (2009), where a majority of their test subjects (349 women) in the Niger Delta region agreed that one or more form of delay at a critical moment could be responsible for maternal death. The knowledge that education is not a likely factor in the influence of one's spiritual beliefs brings to question the criticality of the involvement of religious concerns and needs of the women into the fight against maternal mortality. Although a woman's socio-economic status can be seen to influence her decision of choice of delivery place, religion, as shown above transcends the different demographic

variables. Nigerian women desire consideration of their spirituality during pregnancy and childbirth, as they see such actions as an incentive for the improvement of healthcare services (Widmer *et al*., 2011; Adanikin *et al*., 2014). Such conclusion draws out the potentally important roles of pastors and other religious leaders as a significant message channel for a risk communication (see section 7.2.1).

THEME 2: PERCEPTION OF DECLINE IN GOVERNMENT'S HEALTH PROVISIONS/RESPONSIBILITY (Q 5-10)

Rationale

A majority of the women blamed maternal deaths on the government, and this perception may hinder service utilisation.

Variables/concepts from mental models comparison supporting the rationale

Trust and distrust in government/institutions, transport and distance, poverty, lack of facilities, lack of skilled workers

Table 16 below gives the descriptive summary of the data presented revealing the frequency and percentage of respondents in conjunction with the responses for each question.

Table 16: Participants responses to question 5-11

Question	Strongly agree (%)	Agree (%)	Neither (%)	Disagree (%)	Strongly disagree (%)
Question 5: I think the government is largely responsible for the high number of women dying during childbirth					
Q5	12 (5.3)	135 (59.2)	10 (4.4)	48 (21.1	23 (10.1)
Question 6: I trust the government's capability in taking care of pregnant women					
Q6	19(8.3)	63 (27.6)	51 (22.4)	90 (39.5)	5 (2.2)
Question 7: If there was a better transport system, I think more women would give birth in the hospitals					
Q7	29 (12.7)	120 (52.6)	37 (16.2)	33 (14.5)	9 (3.9)
Question 8: I believe poverty is a major cause of women dying during pregnancy					
Q8	14 (6.1)	121 (53.1)	7 (3.1)	67 (29.4)	19 (8.3)
Question 9: I believe there are enough hospitals around my area					
Q9	26 (11.4)	109 (47.8)	16 (7.0)	70 (30.7)	7 (3.1)
Q10: I believe that the government is doing enough to help pregnant women					
Q10	15 (6.6)	58 (25.4)	34 (14.9)	103 (45.2)	18 (7.9)
Question 11: I believe that the hospitals are well equipped to handle pregnant women					
Q11	21 (9.2)	32 (14.0)	16 (7.0)	148 (64.9)	11 (4.8)

Discussion of question 5-11

The Nigerian National Primary Health Care system was launched in 1988 and, as a collaborative movement of the three tiers of the government, it is expected to be people oriented and strive to promote independence and develop local capabilities (Adeyemo, 2005). However, the respondents revealed their disappointment in the services the government has

offered its citizens, and they now mainly blame the government for the high number of women dying during childbirth (see responses from question 5 (I think the government is largely responsible for the large numbers of women dying during childbirth)). A majority of the women (n=147) agreed that the government is primarily responsible for maternal deaths. 71 out of 228 women disagreed with this statement. Chi-square test (see Table 17), showed associations between the responses and demographic variables, with the strongest revealed with the residential area (Cramer's V=0.5). The majority of women who agreed were from the rural areas compared to their urban and sub-urban counterparts who disagreed with this question (40 out of 54). This result corroborates conclusions indicating that the rural population are the most underserved by the Government (Sofolahan-Oladeinde *et al*., 2015; Strasser *et al*., 2016).

Table 17: Chi-Square (Pearson/Likelihood ratio*) and Cramer's V analysis of associations (q5-11)

Demography	Education (Chi-square, df= 20, Cramer's V)	Area (Chi-square, df = 8, Cramer's V)	Age (Chi-square, df = 12, Cramer's V)	Employment (Chi-square, df =16, Cramer's V)
Q5	191.0* (0.4)	160.4* (**0.5**)	104.7* (0.3)	227.5* (0.4)
Results indicate that there were significant associations between the responses to Q5 and the demographic variables. Cramers V further reveal a high strength of association between the area variable and responses.				
Q6	246.3* (**0.5**)	122.8 (**0.5**)	73.0* (0.3)	169.5* (0.4)

Results indicate that there were significant associations between the responses to Q6 and the demographic variables. Cramer's V further reveal high strength of associations between the education and age variable and responses.				
Q7	207.1* (0.4)	129.3 (**0.5**)	40.3 (0.3)	153.2* (0.3)
Results indicate that there were significant associations between the responses to Q7 and the demographic variables. Cramer's V further reveal a high strength of association between the area variable and responses.				
Q8	138.2* (0.3)	131.9* (**0.5**)	91.0 (0.4)	114.2* (0.3)
Results indicate that there were significant associations between the responses to Q8 and the demographic variables. Cramer's V further reveal a high strength of association between the area variable and responses.				
Q9	193.8 (0.4)	113.3 (0.4)	123.6* (0.4)	232.5* (0.4)
Results indicate that there were significant associations between the responses to Q9 and the demographic variables. Cramer's V further reveal no high strength of association between the variables and responses.				
Q10	153.1*(0.4)	78.7 (0.4)	100.9 (0.4)	279.2 (**0.5**)
Results indicate that there were significant associations between the responses to Q10 and the demographic variables. Cramer's V further reveal a high strength of association between the employment variable and responses.				
Q11	157.5* (0.4)	108.1* (0.4)	58.3* (0.3)	169.3* (0.3)
Results indicate that there were significant associations between the responses to Q10 and the demographic variables. Cramer's V further reveal no high strength of association between the variables and responses				

Table shows the Chi-Square values, and * denotes that the likelihood ratio has been reported. Statistically significant P value <0.05.

Bold has been used to highlight the most significant Cramer's value (V 0.5 and >0.5) associations

Up until the year 2000, maternal mortality remained a neglected issue and received no significant attention in Nigeria (Shiffman, 2007), but the government has implemented several policies to tackle the problem of maternal death. However, they have mostly proved unsustainable, due to a corrupt government, and change of administration, priorities and agendas. This failure to make a significant impact in the fight against maternal deaths has led to mixed reactions from the women on the government's abilities to make any impact (see question 6: I trust the government's capability in taking care of pregnant women). A number of women (n = 95) did not believe in the government's capabilities in respect to care for expectant mothers. However, the remainder of the sample had a very mixed reaction to this question, with 82 out of 228 women exhibiting a level of trust, and 51 out of 228 neither agreeing nor disagreeing. Chi-square analysis (see Table 17) showed that the demographic variables that had the strongest strengths of association with the women's responses were the education (V=0.5) and the residential area (v=0.5) categories.This same trend of opinion was revealed when the women were asked question 10 (I believe that the government is doing enough to help pregnant women). The majority of the women (121 out of 228) disagreed with this question.

A major defect in health service organisation in Nigeria is the gross inequity in access especially between urban and rural dwellers, and the wealthy and poor (Okeke and Okeibunor, 2010). The Nigerian government can start reducing maternal mortality effectively

only if it is made a national political priority (Shiffman and Okonofua, 2007). The year 2015 welcomed a new government into Nigeria, with President Muhammadu Buhari making several pledges to the people, amongst which included 'guarantee financial sustainability to the health sector and minimum basic health care for all' (Green, 2016). However, experts in this current study and outside the study (Green, 2016) are not convinced that these pledges will be fulfilled, considering that previous presidential promises (e.g. National Health Act) have not been implemented.

The respondents attributed a lack of transportation and poverty as contributing factors to the underutilisation of health services. Question 8 (I believe poverty is a major cause of women dying during pregnancy) reveals that 135 women out of 228 agreed that poverty is one of the main causes of maternal death, while 86 women disagreed with this position. Chi-square and Cramer's V analysis between demographic variables and responses revealed that the strongest association was observed in the residential area category (V=0.5). Some women from each type of area agreed, while the majority of women that disagreed were the urban women (n=62). The same trend was observed in the participants' responses from question 7 (If there was a better transport system, I think more women would give birth in the hospitals), therefore potentially indicating that women from poor rural areas are those in greater need for interventions, as the majority of them attributed maternal death to lack of finances.

Evidence from question 9 (I believe there are enough hospitals around my area) revealed that there are considered to be enough hospitals within the state with 135 out of 228 women agreeing that there were enough hospitals in their area, while 77 out of 228 women disagreed

to the question. The Cramer's V analysis does not indicate strong associations with any of the demographic variables. The vital question to ask here is why the women do not attend these hospitals if they felt there were enough hospitals around their areas. With the limited transportation services and large-scale poverty, it is perhaps unsurprising that health services are being underutilised. These factors contribute to the type 1 (failure to seek timely medical treatment) and type 2 (difficulty in reaching medical facilities e.g. transportation) delay, which accounts for about 40% and 20% respectively of total maternal deaths in Nigeria (Omo-Aghoja *et al*., 2010). If significant strides are to be achieved in the reduction of the maternal mortality rate, these phases of delay have to be addressed, by measures such as improving medical ambulance services in the country and providing completely free or subsidised health care to reduce the burden of out of pocket spending (Cooke and Tahir, 2013). The measures outlined above may not be viable in the present time due to financial requirements, it is therefore imperative that cost effective ways be employed in reducing maternal deaths. Methods such as provision of important risk messages to empower the women in efficient decision-making, as advocated for in the current study, for example, by encouraging alternative means of transport.

If risk communication practitioners are to encourage the women to seek skilled birth attendants, the condition of the hospitals and their ability to deliver quality care must be addressed. Question 11 (I believe that the hospitals are well equipped to handle pregnant women) asked about the quality of the hospitals provided and shows that a majority of the respondents felt that the hospitals were ill-equipped to handle pregnant women and their needs efficiently. The fact that the majority of the women (158 out of 228) thought that the

hospitals were not well-equipped may potentially be a contributing factor to the under-utilisation of the health services provided. Several studies (Chiwuzie and Okolocha, 2001; Igberase *et al*., 2009; Moore *et al*., 2011), concentrate on the patient-side delays in the "three delay model" as discussed in Chapter 4. However, focusing on the patient side can conceal the flaws and the inefficiencies in many health facilities (Knight *et al*., 2013). For the health professionals to do their jobs in a safe and effective manner, they must be provided with the necessary skills, and provision of adequate and essential supplies of basic materials to deal with obstetric complications (WHO, 2006). The results in this subsection suggests that to address the high maternal death rate in Nigeria, the negative perception the women have concerning the government and its facilities has to be addressed. Chapter 7 provides detailed discussion on how the challenges within this theme may be addressed, using cost effective and sustainable methods. As a longer-term strategy and recommendation, the supply side barriers (service providers) have to be involved, in order to encourage effective health service utilisation.

THEME 3: COMPASSION AND SKILL OF WORKERS (Q 12-14)

Rationale

It is important to test the prevalence of the women's perceptions of the health workers, as nurses and caregivers are key recipients of patients in hospitals. It is vital to understand if they hinder service utilisation.

Variables/concepts from mental models comparison supporting the rationale

Carelessness of workers, Nurses attitude.

Table 18 shows a descriptive summary of the responses to the questions asked within theme three.

Table 18: Respondents answers to question 12-14

Question	Strongly agree (%)	Agree (%)	Neither (%)	Disagree (%)	Strongly disagree (%)
Question 12: I believe women die during childbirth frequently because of the carelessness of medical staff					
Q 12	35 (15.3)	106 (46.5)	31 (13.6)	52 (22.8)	4 (1.8)
Question 13: I think the attitude of the nurses discourages women from attending hospitals					
Q 13	37 (16.2)	83 (36.4)	39 (17.1)	61 (26.8)	8 (3.5)
Question 14: I believe that maternity clinics are affordable					
Q 14	15 (6.6)	114 (50.0)	20 (8.8)	70 (30.7)	9 (3.9)

Discussion of question 12-14

The process of childbirth can be risky and life threatening if undertaken in non-conducive conditions. As a critical intervention for the reduction of maternal mortality, the presence of a skilled birth attendant at the time of delivery has been highly advocated (Adewemimo *et al*., 2014; Anastasi *et al*., 2015). However, several authors (Sule *et al*., 2008; Fagbamigbe and Idemudia, 2015; Ossai and Uzochukwu, 2015; Lim and Ojo, 2016) have indicated poor quality care, inadequate resources and poor attitude of health workers as a barrier to maternal health service utilisation. Responses to question 12 (I believe women die during childbirth

frequently because of the carelessness of medical staff) revealed that the majority (141 out of 228) of the respondents blame the carelessness of the medical staff at health facilities for the death of the women during childbirth. Chi-square analysis (see Table 19) revealed some significant associations with the demographic variables, with the Cramer's V showing that education (V=0.5) and the residential area (V=0.5) had the strongest association. The results revealed that the most educated women agreed to the position, compared to the least educated women, possibly because the least educated women were mostly rural dwellers, who do not use health facilities and therefore cannot judge the performance of medical staff. In contrast, phase 2 of the current study revealed that one of the factors that limit service utilisation within the rural dwellers is their perceived lack of faith in the hospitals and their workers.

Table 19: Chi-Square (Pearson/Likelihood ratio*) and Cramer's V analysis of associations (q12-14)

Demography	Education (Chi-square, df= 20, Cramer's V)	Area (Chi-square, df = 8, Cramer's V)	Age (Chi-square, df = 12, Cramer's V)	Employment (Chi-square, df =16, Cramer's V)
Q12	228.9* (**0.5**)	116.4 (**0.5**)	61.4 (0.3)	145.0* (0.3)
Results indicate that there were significant associations between the responses to Q12 and the demographic variables. Cramer's V further reveal a high strength of association between education and area variables and responses.				
Q13	211.6* (0.4)	110.8 (0.4)	107.5 (0.4)	238.8* (0.4)

Results indicate that there were significant associations between the responses to Q13 and the demographic variables. Cramer's V further reveal no high strength of association between the variable and responses.				
Q14	185.3* (**0.5**)	96.8* (0.4)	76.7* (0.3)	185.5* (0.4)
Results indicate that there were significant associations between the responses to Q14 and the demographic variables. Cramer's V further reveal a high strength of association between the education variable and responses.				

Table shows the Chi-Square values, and * denotes that the likelihood ratio has been reported. Statistically significant P value <0.05.

Bold has been used to highlight the most significant Cramer's value (V 0.5 and >0.5) associations.

The findings from Chapter 5 revealed that empathy was one of the skills the women wanted to see in their care providers, especially the nurses because these are the individuals they see and relate to more frequently in the hospitals. This finding was confirmed by over half of the questionnaire respondents (n=120), when asked question 13 (I think the attitude of the nurses discourages women from attending hospitals). The respondents agreed that the position of the nurses discourages women from using hospitals. Perhaps the poor staff attitude may have contributed to the records of poor performance of the primary health care system in Nigeria (Obembe *et al*., 2014), further discouraging women from trusting and using such facilities. It was therefore recommended that the health care workers be retrained on the core principles of interpersonal communication (Inyang and Doubrapade, 2016).

In a study of Nigerian nurses, undertaken by Olayinya *et al.* (2013), stress was identified as one of the reasons for carelessness in the nursing profession, and nurses cited lack of

incentives/promotion and reduced salaries as causes of stress. Above all, it is imperative that the issue of compassionate care be brought to the forefront of maternal health care, to give the women a level of control of the process and outcome, and ensure a healthcare experience that is both respectful and empowering (Kennedy, 2000; Hall, 2013). There is an urgent need for communication of these critical complaints to the relevant stakeholders (e.g. the Nigerian Nursing and Midwifery Council), to ensure they intensify their commitments to achieving the Sustainable Development Goals with regards to maternal health in Nigeria.

From the qualitative findings, the women argued that the "free" maternity clinic services that were provided by the government were not actually free, expressing that they needed to provide bought tokens for these services. It was pointed out that the nurses had started using this process to extort money from the women. Although responses from question 14 (I believe that maternity clinics are affordable, revealed that the majority of the respondents believe maternity clinics are accessible, a strongly significant association was found among the least educated women, who were the ones that found the clinics unaffordable. Among the 79 women who disagreed, the majority of them had a secondary education and below, and they may be considered as the poorest women in the study sample. Okonofua *et al.* (2011) advocated for free maternal and child health care in Nigeria, and although some states including Rivers State have exhibited their interest in providing and implementing free health care for pregnant women, many of the women in the qualitative interview phase stated that these services were not actually free. These informal and 'under the table payments' or bribes to the health service providers can jeopardise the attempts by the government to improve equity and access to care targeted at the poor (Onwujekwe *et al.*, 2010).

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Rationale

Avoidable native practices may potentially lead to maternal death. Also, it is necessary to test the women's preferences of a place of delivery, and to identify women more prone to poor health seeking behaviour.

Variables/concepts from mental models comparison supporting the rationale

Native massage, native/home births, training of native midwives and the quest for a male child

Table 20 below gives a summary of the responses to the questions asked within theme four.

Table 20: Respondents answers to question 15-18

Question	Strongly agree (%)	Agree (%)	Neither (%)	Disagree (%)	Strongly disagree (%)
Question 15: I believe in pregnancy massage by local maternity helpers					
Q15	19 (8.3)	94 (41.2)	23 (10.1)	68 (29.8)	24 (10.5)
Question 16: I believe home births are better than hospital births					
Q16	4 (1.8)	3 (1.3)	16 (7.0)	104 (45.6)	101 (44.3)
Question 17: I believe the local maternity helpers should be properly trained and qualified to the government approved standards					
Q17	87 (38.2)	111 (48.7)	7 (3.1)	13 (5.7)	10 (4.4)
Question 18: I believe a woman should keep trying for a baby till she gets a male child					
Q18	8 (3.5)	20 (8.8)	16 (7.0)	85 (37.3)	99 (43.4)

Discussion of question 15-18

The importance of native midwives (not clinically trained) in the lives of the Rivers State women has been established from the qualitative findings, and one service they offer is the massaging of the woman's belly for the 'good' of the mother and child. Although there is a paucity of studies reporting on the advantages or disadvantages of this procedure in Nigeria, it was noted during Phase 2 data collection of the current study that it was a prominent method amongst the women (see section 5.1.4), while from the expert interviews, it was deemed as an unsafe and unregulated practice that may lead to maternal death. Responses from question 15 (I believe in pregnancy massage by local maternity helpers) indicated that a majority of the respondents (113 out of 228) believed in the use of these native midwives for massages. Chi-square cross-tabular analysis was carried out (see Table 21) and the Cramer's V test revealed that the strength of association was greater in the education (V=0.6) and residential area (V=0.5) variables. Further probing revealed that the majority of the women that agreed had a secondary education or below (n=85 out of 89), with a small minority having a first degree or above (n=28 out of 129). The results also revealed that a majority of the women (over 55%) living in the rural area (n=65 out of 93) agreed with the question compared to women living in the urban and sub-urban areas. These results indicate that the educational level and the residential area of a woman have an impact on the uptake of harmful traditional practices such as the native massage of a pregnant woman's stomach. Another salient point here is that these midwives are found outside of the normal hospital and are generally untrained indicating the potential dangers of patronising them

Table 21: Chi-Square (Pearson/Likelihood ratio*) and Cramer's V analysis of associations (q15-18)

Demography	Education (Chi-square, df= 20, Cramer's V)	Area (Chi-square, df = 8, Cramer's V)	Age (Chi-square, df = 12, Cramer's V)	Employment (Chi-square, df =16, Cramer's V)
Q15	305.1* (**0.6**)	138.6 (**0.5**)	71.0 (0.3)	162.2* (0.3)
Results indicate that there were significant associations between the responses to Q15 and the demographic variables. Cramer's V further reveal a high strength of association between education and area variables and responses.				
Q16	186.7* (**0.5**)	115.2* (0.4)	76.0* (0.3)	154.6 (0.3)
Results indicate that there were significant associations between the responses to Q16 and the demographic variables. Cramer's V further reveal high strength of association between the education variable and responses.				
Q17	268.6* (**0.7**)	178.5* (**0.5**)	74.5* (0.3)	124.1*(0.3)
Results indicate that there were significant associations between the responses to Q17 and the demographic variables. Cramer's V further reveal a high strength of association between education and area variables and responses.				
Q18	202.3* (**0.5**)	113.9* (0.4)	75.9* (0.3)	174.8* (0.4)
Results indicate that there were significant associations between the responses to Q18 and the demographic variables. Cramer's V further reveal a high strength of association between the education variable and responses.				

Table shows the Chi-Square values, and * denotes that the likelihood ratio has been reported. Statistically significant P value <0.05.

Bold has been used to highlight the most significant Cramer's value (V 0.5 and >0.5) associations

Native midwives have been known to give some bizarre and sometimes risky treatments to pregnant women; however, they continue to remain a formidable rival to the government-approved hospitals (Cox, 1963; Ebuehi and Akintujoye, 2012; Adeniran *et al*., 2015). The women have shown positive responses to the native midwives, and their inclusion in the form of training and certification may be advised for the reduction of the maternal death rates. With the woman believing in local pregnancy massage (see question 15), it was important to estimate the women's perception towards training of these native midwives using question 17 (I believe the local maternity helpers should be properly trained, and qualified to the government approved standards). The great majority of the women (n=198 out of 228) recognised the need and importance of training. Further statistical analysis indicated some significant associations, with education (V=0.7) and area (V=0.5). It was revealed that 117 out of the 198 women who agreed, had a first degree or masters' degree, and lived in the urban/suburban region, indicating that the higher the education of the women, the more positive their response was to question 17, potentially concluding that the highly educated women recognised the importance of updating and upgrading the midwife's skill set.

However, the roles of these native midwives within pregnancy and childbirth remains contested within public health (Owolabi *et al*., 2014). A systematic review (Sibley *et al*., 2012) carried out on the effects of trained native midwives compared to untrained ones identified just one study where a comparison of this manner was made. The research concluded that native midwives training may increase referral rates to orthodox hospitals, reduce still and neonatal and maternal deaths; however, the evidence was of a limited quality due to the little confidence interval that included both benefits and harm of using the native

services (Sibley *et al*., 2012). The process of training native midwives and considering them legal and approved varies across the globe, for example, they are officially recognised in countries such as Pakistan (Islam and Malik, 2001), while some countries have banned them (Owolabi *et al*., 2014), and some others have rescinded such bans in the midst of worsening health indicators (Masina, 2011). Since there is a paucity of research on the impact rate and effectiveness of training native midwives (Bergstrom and Goodburn, 2000), the critical point to consider based on the findings, is how best to use these trusted women, in reducing maternal deaths. In addition to improving their knowledge/skills, this could be achieved by communicating to them the importance of a functioning referral system (Abodunrin *et al*., 2010), and for their patients to ultimately have skilled birth attendants at the point of delivery. The WHO and other scholars (Koblinsky, 2003; Ekabua *et al*., 2011; WHO, 2014) have maintained that the reduction of maternal mortality rate is significantly achieved by the presence of a skilled birth attendant at the time of delivery. A functional referral system between these women and the hospitals may be significant to the reduction of maternal deaths especially among the rural dwellers.

It could be suggested that, based on the analysis of the survey data, that the respondents would like a mix of both the traditional medicinal procedures and formal medicine process. Traditional medicine is the oldest form of health care, and a traditional healer is a person who is recognised by the community where s/he lives as a competent health care provider using methods based on social, cultural and religious practice (Chukwudi, 2014). Responses from question 17 indicated that the women wanted the native midwives to be trained, which may potentially integrate them into the conventional health care system and improve

accountability in the way they operate. The uses of traditional medicine and native midwives may have something to offer in saving lives, if, they are properly integrated and blended into the orthodox medical practice (Isola, 2013). Furthermore, it is clear that the native midwives play a significant role during pregnancy and birth when it concerns cultural competence, empathy/compassion, consolation, spiritual, traditional and psychosocial support (Bergstrom and Goodburn, 2001; Ebuehi and Akintujoye, 2012).

Turning now to the evidence from question 16 (I believe home births are better than hospital births), almost all of the women (205 out of 228) believed that hospital births are better than home births. This poses a question in comparison to question 1 where the respondent's views on church births being better than hospital births were split, with 93 out of 228 women believing that the church is better than the hospital for delivery. Are the women regarding home births and church births as two different entities? Perhaps this may be because the church has been deemed to have spiritual backing under the pastor's supervision, whereas an individual's home has no religious backing, as it has been revealed that the majority believe that home births are not the best option.

Finally, the patriarchal nature of Nigeria places greater importance on the male child, and this, in turn, may influence the women's need to keep trying for a male child. Evidence shows that the multiparity of a woman increases her chances of dying during pregnancy, primarily since only when a woman is pregnant, has she exposed herself to the risk of dying during pregnancy. Question 18 (I believe a woman should keep trying for a baby till she gets a male child) was asked regarding the importance of a female continuously trying for a male child.

184 out of 228 women (over 80%) disagreed with this position, potentially revealing signs of resistance to the perceived higher significance and value placed on a male child. However, it should be noted that the patriarchal nature of the country puts more power and control in the men as decision makers, and in some cases, they decide when the women get pregnant (Asiyanbola, 2005; Makama, 2013).

THEME 5: LACK OF MATERNAL HEALTH INFORMATION

Rationale

Information is key to making an effective decision. For example, it is vital to determine if the majority of the women believe in self-medication and if yes, a recommendation could be made to limit any dangerous practices especially during pregnancy to prevent wrong diagnosis and medication.

Variables/concepts from mental models comparison supporting the rationale

Self –medication, fear of caesarean section (CS), perception that CS kills more than natural births, inadequate maternal healthcare knowledge.

Table 22 below gives a summary of the responses to the questions asked within theme four

Table 22: Respondents answers to question 19-24

Question	Strongly agree (%)	Agree (%)	Neither (%)	Disagree (%)	Strongly disagree (%)
Question 19: I believe that if a pregnant woman feels sick she should go and buy tablets at the pharmacy to treat herself instead of going to the hospital					
Q19	18 (7.8)	77 (33.4)	28 (12.3)	78 (34.2)	27 (11.8)
Question 20: I believe pregnant women should say no to giving birth by operation					
Q20	19 (8.3)	75 (32.9)	27 (11.7)	81 (35.5)	26 (11.4)
Question 21: I believe more women die during caesarian sections than natural births					
Q21	43 (18.9)	87 (38.2)	44 (19.3)	49 (21.5)	5 (2.2)
Question 22: I know that the government has programmes to help pregnant women					
Q22	34 (14.9)	65 (28.5)	26 (11.4)	94 (41.2)	9 (3.9)
Question 23: I think more education programmes by the government will reduce maternal mortality					
Q23	65 (28.5)	145 (63.6)	8 (3.5)	7 (3.1)	3 (1.3)
Question 24: I believe that if the community as a whole is educated about death in pregnancy many women will go to hospitals to deliver					
Q24	104 (45.6)	107 (46.9)	6 (2.6)	3 (1.3)	8 (3.5)

Discussion of question 19-24

Education remains a major contributor to the fight against maternal mortality. Question 19 (I believe that if a pregnant woman feels sick she should go and buy tablets at the pharmacy to treat herself instead of going to the hospital) tested the women's perception about the practice of self-medication. The responses show that the results were split between agreeing (n=94) and disagree (n=105), with the majority choosing to disagree with the question. Chi-square analysis revealed some significant associations between the demographic variables and participant's responses (see Table 23); education (V=0.5) and area (V=0.7) were the strongest. Most of the women that agreed with the question had secondary education or below

(78 out of 94), while the others were a mix of other educational status. This potentially indicates that education has an influence on the health decision-making of the women. Furthermore, it was also revealed that out of the women who agreed with self-medication, 67 out 94 were based in the rural areas.

Table 23: Chi-Square (Pearson/Likelihood ratio*) and Cramer's V analysis of associations (q19-24)

Demography	Education (Chi-square, df= 20, Cramer's V)	Area (Chi-square, df = 8, Cramer's V)	Age (Chi-square, df = 12, Cramer's V)	Employment (Chi-square, df =16, Cramer's V)
Q19	271.1* (**0.5**)	204.3 (**0.7**)	114.7 (0.4)	220.2* (0.4)
Results indicate that there were significant associations between the responses to Q19 and the demographic variables. Cramer's V further reveal a high strength of association between education and area variables and responses.				
Q20	271.1* (**0.5**)	204.3 (**0.6**)	114.7 (0.4)	220.2 (0.4)
Results indicate that there were significant associations between the responses to Q20 and the demographic variables. Cramer's V further reveal high strength of association between the education, and area variables and responses.				
Q21	137.8* (0.3)	109.8 (**0.5**)	119.9* (0.4)	375.5* (0.4)
Results indicate that there were significant associations between the responses to Q21 and the demographic variables. Cramer's V further reveal a high strength of association between area variable and responses.				
Q22	307.8* (0.5)	193.6 (**0.6**)	87.0 (0.4)	205.3* (0.4)

Results indicate that there were significant associations between the responses to Q22 and the demographic variables. Cramer's V further reveal a high strength of association between area variable and responses.				
Q23	188.7* (**0.5**)	116.0* (0.4)	45.5* (0.2)	81.0* (0.2)
Results indicate that there were significant associations between the responses to Q23 and the demographic variables. Cramer's V further reveal a high strength of association between education variable and responses.				
Q24	199.8* (**0.5**)	121.8* (0.4)	69.6* (0.3)	132.2* (0.3)
Results indicate that there were significant associations between the responses to Q24 and the demographic variables. Cramer's V further reveal a high strength of association between the education variable and responses.				

Table shows the Chi-Square values, and * denotes that the likelihood ratio has been reported. Statistically significant P value <0.05.

Bold has been used to highlight the most significant Cramer's value (V 0.5 and >0.5) associations.

The issue of self-medication has been a burgeoning problem in Nigeria (Fadare and Tamuno, 2011; Abasiubong *et al*., 2012). The current study revealed that there was a strong association between education and the participant's responses. The women with a higher education disagreed more with the practice of self-medication. This finding concurs with Afolabi (2009), who also noted that there was a positive correlation between education and obtaining medication from hospitals rather than local sellers. Further confirming this, from the current study's Phase 2 qualitative findings, Briana (see quote below), who was a secondary school certificate holder, encouraged the practice, which has been said to be more common in malaria endemic areas such as Rivers State (Akanbi *et al*., 2005):

"Sometimes if am feeling sick somehow, I just think its malaria because these days mosquitoes are always biting me. So I just go to the chemist and buy malaria medicine and treat myself "(Briana, 35 years old, urban, secondary school, unemployed)

In a study carried out in the Southern region of Nigeria, out of 518 pregnant women assessed, 72.4% were shown to indulge in one form of self-medication or the other, despite the potential for adverse impact on pregnancy (Abasiubong *et al*., 2012). So, it can be suggested that there is a need for proper education of the women on the potential and immediate dangers of this practice, or education on what to use or avoid during pregncy (e.g malaria prophylaxis medicine).

The importance of education in maternal health decision-making is further emphasised in the measure of acceptance of the women to a potential life-saving procedure such as caesarian section (C/S). In response to question 20 (I believe pregnant women should say no to giving birth by operation), there was a mixed result, with 94 out of 228 women agreeing and 107 women disagreeing. Chi-square analysis shows a statistically significant association with the demographic variables (see Table 23), with the residential area (V=0.6) and education (V= 0.5) showing the highest strengths. The results indicated that the rural and least educated women believe that women should refuse caesarian sections. The majority of women that agreed consisted of all the women with a secondary school education or below. The respondents were further given the opportunity to give reasons why women should refuse caesarian sections, and their responses are shown in Box 1 below:

She should trust in the Lord for a breakthrough

Because it can damage the womb

Because it leads to death

The woman should only say yes if she has tried her best to push till the last minute

Operation makes women stomach big

God said we will deliver like the Hebrew women

Because life has no duplicate

So that their babies will live

Because it was never in existence in the olden days

It takes a living woman to tell the story of her child

It is a disgrace to give birth by C-section

It is an abomination in the sight of God

It is very risky to both mother and baby, something can happen

When you are above 40years, old say no or you will not survive

You can die from excess bleeding

Some doctors don't know how to do it

Some doctors give women wrong and bad information

Box 1: Reasons for refusing caesarian sections

These comments are listed in Box 1 above to illustrate the diversity of opinions among the Rivers State women of childbearing age, and echo a number of the themes that have already been discussed. They could be usefull in informing the framing of risk communication messages.

Although a large proportion of the women disagreed with refusing the operation, results indicated that education was a factor in this choice. Perhaps the women who agreed to CS saw the procedure as a life and death matter. In the study by Sunday-Adeoye and Kalu (2011),

perception of C/S in the antenatal clients was measured, and it was discovered that the number of women who were not favourably disposed to the procedure was significant. Although, a majority (81.2% of 277 clients) pointed out that they would only accept the procedure if their life or the baby's life was in danger. The aversion to C/S by some proportion (130 out of 228) of the women may have been reinforced by negative perception either created by culture, belief and societal influence (Sunday-Adeoye and Kalu, 2011). It has been discovered in the current study and another (Onah, 2002) that formal education as a single variable was significantly related to a favourable attitude to C/S. However, Onah (2002) found out that formal education ceased to be linked when belief about the procedures was taken into account in their study. So irrespective of the impact formal education has on the attitudes regarding the process, correcting misconceptions and belief is critical in changing perceptions and behaviour.

In response to question 21 (I believe more women die during caesarian sections than natural births), the majority (n=130) of the respondents agreed with the position that they thought that more women die during caesarian sections, with 54 out of 228 women disagreeing. Statistical analysis (see Table 23) shows there are significant associations between the demographic variables and participant's responses. However, the Cramer's V indicates a strong association with the area variable. Results show that the majority of the women who agreed resided in the suburban and rural areas (104 out of 130). By this reasoning, being prevalent in the less urban areas, it can be suggested that they are influenced by factors such as poverty, communal relations and power. These results highlight the need for the womens' education and awareness regarding the procedure and its potential advantages.

The expert mental model revealed that there were some interventions available for pregnant women. However, in response to question 22 (I know that the government has programmes to help pregnant women), out of the 228 respondents, 99 of them knew about some programmes that existed, but 103 did not know of the existence of any programmes. Chi-square analysis revealed that there were significant associations with responses and demographic variables; with Cramer's V indicating that the area (V=0.6) and education (V= 0.5) variables showed the highest level of association. The respondents who had no knowledge of such programmes consisted majorly of women in the rural areas (81 out of 103 (over 78%)), compared to their urban counterparts. Out of the 99 women who knew of the existence of such programmes, 89 of them (over 89%) had a first degree and above. These participants were further asked to list the programmes that they knew about, this list is shown below (see Box 2):

Please name the programme you know below:

Save life

Free medical care for pregnant ones in some places

Health centres

Antenatal care and expanded programme on immunization

Box 2: Existing maternal health programmes

Responses to question 23 (I think more education programmes by the government will reduce maternal mortality) revealed that almost all the women are aware of their need for more education about pregnancy and survival (210 out of 228 women agreed). In addition, question

24 (I believe that if the community as a whole is educated about death in pregnancy many women will go to hospitals to deliver) sought to understand if the women were of the opinion that educating the community will increase service utilisation. The overwhelming majority (211 out of 228) agreed to this. At this point in the research, it was advantageous to use this opportunity to determine where and how the women would like to receive such knowledge and information about their maternal well-being. They were asked the following:

If you wanted to know more about pregnancy and childbirth, where would you look for information? Please write all such places on the line below

Their responses are listed in Box 3 below:

Government hospitals and government approved private hospitals

Doctors and native midwives

Dedicated pregnancy website that they will publicise information

Television and newspapers

Door to door information

Community regular information meeting

Women's town hall meetings

Church

Pharmacy

Seminars

Television programmes

One on one communication with women in their market stalls (Market place)

Box 3: Potential avenues for message dissemination

The number of antenatal care visits has been associated with a reduced amount of maternal mortality, and importantly, identifying the presence of pre-existing illnesses was significantly

related to increased maternal deaths (Godefay *et al*., 2015). Therefore, based on this finding, it could be suggested that making the women aware of vital information such as the aforementioned items, could reduce maternal mortality rates by empowering them at an individual level with the right life-saving tools.

THEME 6: FOLKLORE CUSTOMS AND TRADITIONS (Q25-29)

Rationale

1) Culture is a significant influence on the women's health seeking behaviours, and it was necessary to assess the frequency of the women's misconceptions of some beliefs identified.

2) Cultural rules such as FGM and food taboos potentially lead indirectly or directly to maternal death. Therefore, estimation of prevalence of these beliefs highlights areas for future risk communication

Variables/concepts from mental models comparison supporting the rationale

Older generation of pregnant women survived more than current generation, need for health education of community, cultural preservation (Perceptions on the need to preserve tradition and its rules), and food taboos

Table 24 gives a descriptive summary of the responses to questions asked within the theme 6

Table 24: Respondents answers to question 25-29

Question	Strongly agree (%)	Agree (%)	Neither (%)	Disagree (%)	Strongly disagree (%)
Question 25: I believe pregnant women should stick with the birth practices/ways of their others/ancestors					
Q25	4 (1.8)	73 (32.0)	26 (11.4)	95 (41.7)	30 (13.2)
Question 26: I believe that the older generation survived pregnancy/childbirth more than the present generation					
Q26	22 (9.6)	87 (38.2)	26 (11.4)	74 (32.5)	19 (8.3)
Question 27: I believe pregnant women should avoid caesarian section because their mothers survived childbirth without it					
Q27	16 (7.0)	77 (33.8)	12 (5.3)	99 (43.4)	24 (10.5)
Question 28: I believe pregnant women should strictly obey the cultural belief set out by the older generation (for example: female circumcision)					
Q28	9 (3.9)	24 (10.5)	30 (13.2)	113 (49.6)	52 (22.8)
Question 29: I believe pregnant women should avoid eating certain foods					
Q29	42 (18.4)	121 (53.1)	19 (8.3)	27 (11.8)	19 (8.3)

Discussion of question 25-29

In a developing country such as Nigeria, a woman's social value is strongly linked to her production of children (Seeman, 2014). In especially low resource settings, a rich collection of cultural practices and beliefs pervades, especially for the perinatal period of a woman (Raman *et al*., 2016). Theme 6 of the current study surrounds the women's culture and the confidence they have in relation to the ancient practices of their mothers. Although question 25 (I believe pregnant women should stick with the birth practices/ways of their

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others/ancestors), showed that a majority of the women (125 out of 228) believed that they should not follow the birth practices of their mothers, Chi-Square analysis (see Table 25) revealed that 'Education' (V=0.6) and 'area' (V=0.5) had the strongest Cramer's V strength of association. Further probing into education, indicated that the majority of the women that agreed had secondary education or below (n=54 out of 77), and conversely, the majority of those that disagreed had a first degree (n=71) or above. Analysis by residential area indicated that the majority of the women who agreed (n=69 out of 77) were rural residents. The statistical analysis highlights that a significant proportion of the least educated and rural women did not share this perception.

Table 25: Chi-Square (Pearson/Likelihood ratio*) and Cramer's V analysis of associations (q25-29)

Demography	Education (Chi-square, df= 20, Cramer's V)	Area (Chi-square, df = 8, Cramer's V)	Age (Chi-square, df = 12, Cramer's V)	Employment (Chi-square, df =16, Cramer's V)
Q25	196.9* (**0.5**)	131.1 (**0.5**)	102.5* (0.4)	153.9* (0.3)
Results indicate that there were significant associations between the responses to Q25 and the demographic variables. Cramer's V further reveal a high strength of association between education and area variables and responses.				
Q26	189.9* (0.4)	116.9 (**0.5**)	82.2 (0.4)	204.4* (0.4)
Results indicate that there were significant associations between the responses to Q26 and the demographic variables. Cramer's V further reveal high strength of association between the area variable and responses.				

Q27	213.1* (0.4)	174.6 (**0.6**)	142.2 (**0.5**)	200.6* (0.4)
Results indicate that there were significant associations between the responses to Q27 and the demographic variables. Cramer's V further reveal a high strength of association between the area and age variables and responses.				
Q28	247.9* (0.4)	138.1 (**0.6**)	46.9 (0.3)	145.5* (0.3)
Results indicate that there were significant associations between the responses to Q28 and the demographic variables. Cramer's V further reveal a high strength of association between area variable and responses.				
Q29	210.2* (0.4)	133.2 (0.4)	51.9* (0.2)	129.8* (0.3)
Results indicate that there were significant associations between the responses to Q29 and the demographic variables. Cramer's V further reveal no high strength of association between the variables responses.				

Table shows the Chi-Square values, and * denotes that the likelihood ratio has been reported. Statistically significant P value <0.05.

Bold has been used to highlight the most significant Cramer's value (V 0.5 and >0.5) associations

This result also reflects the fact that more rural women also believed that the older generation survived pregnancy more than the present age as shown in question 26 (I believe that the older generation survived pregnancy/childbirth more than the present generation). These beliefs may be based on social interactions with the community. As Blumer (1969) highlighted, individuals tend to be influenced by relation with each other and in these interactions, beliefs are transferred and shared. As emphasised by Raman *et al*. (2016), these women's stance on cultural preservation of their mother's ways has led to tensions and resistance to change. On the same line of thought about cultural preservation, further probing

into if the women were rejecting caesarean section because their mothers rejected it, was carried out using question 27 (I believe pregnant women should avoid caesarian section because their mothers survived childbirth without it). Encouragingly, 123 out of 228 women disagreed with this position. However, 93 women agreed. Statistical analysis revealed that the residential area and age variable had the strongest strength of association with the responses. Cramer's V analysis reavealed a strong strength of V=0.6, with the majority of the women that agreed living in the rural areas (n=77), and the majority that disagreed living in the urban (n=63) and sub-urban (n=45) regions. Considering the age variable, the majority of women that agreed with this position were the women from the 26-40-age category, potentially indicating a prime target group for messages. Any risk communication should express to the women the trends in the maternal mortality rate, as revealed in Table 2, as the death rate in Nigeria has slowly been on a decreasing pattern. The critical point therein is that public health planners should consider culture as a critical matter for the delivery of important culturally adapted messages, considering the fact that majority of these beliefs are emanating from deeply culturally influenced rural women.

While their social interactions may influence the women, their individual underlying knowledge and belief systems are vital parts of their worldview (Ko, 2007), and this in turn also influences their health care decision-making. The mostly positive response to question 24 (I believe that if the community as a whole is educated about death in pregnancy many women will go to hospitals to deliver) potentially indicated the acceptability of the women to educational programmes and interventions. The responses are encouraging as this indicates the potential for risk communication messages to make an impact on the individual risk

attitude of the women concerning the usage of skilled birth attendants during pregnancy.

Another aspect of culture concerns the existence of folklore, which includes cultural beliefs and dietary restrictions; they have been referenced as negative influences on the women's maternal heath outcome (Elegbe and Ojefeitimi, 1984). However, some folk practices including dietary restrictions have also been cited as having a positive effect on the maternal health outcome of the women (Okafor, 2000). For example, women are seen to have recovered fast from previous pregnancies, in preparation for future pregnancies, following adherence to intensive nutritional care for the women after delivery in anticipation for an "outing" ceremony (an occasion where the woman introduces her baby to the village officially) in the community (Etuk *et al*., 2005).

To estimate prevalence of such beliefs, question 28 (I believe pregnant women should strictly obey the cultural belief set out by the older generation (for example: female circumcision) was presented to the women. 165 out of 228 women disagreed that women should obey these cultural beliefs while 33 women agreed. Chi-square statistical analysis revealed residential area (Cramer's V=0.6) had a strong association with the responses. Further probing revealed that all the women who agreed were from the rural area (33 out of 33).

The women were given the opportunity to list the beliefs, and these are as follow (see Box 4):

Pregnant women should take root to put the baby in normal position

Deliver in the local herbalist home

Avoid the village masquerade of you will miscarry

Do not go out on a market day with another pregnant woman

You must name your child's baby before delivery or you die

You must go to the village massager to press your belly

Pregnant women should not bend excessively

Those that give birth in hospitals are weak women

Deliver your first child in the house or village so that your ancestors will protect your baby

Female genital circumcision

Caesarian section is a taboo and taking drugs make delivery difficult

Don't wear tight trouser or skirt if not it will delay labour

Box 4: Cultural beliefs and rules within the communities.

The beliefs listed above were compiled from the women's responses to the survey, and the compilation of these details should enable the identification of the rules from the most dangerous to the least dangerous ones, to create a targeted culturally adapted risk communication. The responses to question 28 (I believe pregnant women should strictly obey the cultural belief set out by the older generation (for example, female circumcision) revealed that a majority of the women felt that the cultural beliefs of the older generation should not be strictly obeyed. Perhaps the majority of women disagreed to question 28 because the subject of female circumcision was highlighted in the question. However, with the rise of the feminist views in this new century, the women are becoming more resilient to the constraints of folklore and cultural beliefs. As mentioned earlier in the current study, these cultural beliefs can sometimes act as an instrument of oppression to the women. Although the struggle

against women's marginalisation and oppression may differ across continents, the battle to challenge inequality is ubiquitous, with more achievement seen in the developed countries than the developing world (Sule, 2014). However, these women and their feminist views may face heavy criticism, as their opinion against constraining cultural rules and beliefs are attributed to a symptom of their lack of respect for culture (Narayan, 2013).

In response to question 29 (I believe pregnant women should avoid eating certain foods) a majority of the women (n=163 out of 228) thought that pregnant women should avoid eating certain foods for the health of both mother and baby to avert physical and spiritual attacks.

The women were asked to list such foods, and they were compiled as shown below (see Box 5):

A lot of beef
Avoid eggs
Do not drink cold water
Fatty foods and sugary food
Strong alcoholic drinks and oily foods
Carbohydrate
Coffee
Cheese
Fish and milk
Liver
Don't eat draw soup, oha and pepper soup
Avoid much protein
Avoid cholesterol
Beans

Box 5: Suggested list of foods pregnant women should avoid

(D'Adamo, 1994), implying that what a culture may consider as forbidden foods, another culture may see it as a delicacy and may be potentially beneficial for the mother and child's wellbeing. Therefore, as suggested by Ekwochi *et al*. (2016), during antenatal care visits and education interventions, discussions around food taboos and nutrition, in general, should be considered with the women to help reduce traditional beliefs about certain foods and encourage proper nutrition.

6.2 Chapter summary

Process of analysis began with the comparison of the expert mental model (Chapter 4) and the women's mental models (Chapter 5). In addition, the qualitative findings also informed the construction of the structured survey questionnaire that was administered to 228 women of childbearing age in Rivers State. The socio-demographic variables of the questionnaire respondents reflected that of the population of the case study area, Rivers State. Upon collection and collation of the questionnaire result, the data was analysed using SPSS analytical software, and this analysis revealed the frequency of beliefs, misconceptions and knowledge elicited by the women. This will be very useful in the deduction of risk messages for the creation of an effective risk communication protocol. Moving onto the next chapter, the research findings from Phases 1 to 3 will be discussed with the aim of identifying possible risk strategies that will enable effective dissemination of the recommended messages. This will be followed by a consideration of the limitations of the findings, implications, advice and a conclusion.

7 STRATEGIES FOR COMMUNICATING THE RISK OF MATERNAL MORTALITY

Ultimately, it is the women of childbearing age who must decide upon which communication messages and expert advice will best serve their requirements and is most beneficial. The following subsection illustrates the summary of the critical information gaps and misconceptions, which will be evaluated in addition to potential methods for risk communication to overcome them. As a reminder, semi-structured interviews (phase 2) were carried out on 37 women of childbearing ages, thematic analysis of the data collected led to the derivation of themes. Comparison carried out on the expert and participant's mental models revealed a number of gaps, misconceptions and key reasoning that are important for the reduction of maternal deaths.

The elements identified were further tested in a much larger sample (228 women) to estimate the frequency of prevalence (phase 3). Table 26 to Table 31 present an evaluation of the risk communication issues that emerged from the womens perceptions. The tables are organised around the questions posed in the prevalence survey, since this adds demographic analysis to the themes identified in the interviews.

7.1 Key risk communication messages and possible dissemination strategies

Presentations of the information are according to the themes identified in the project, followed by communication recommendations and evaluation of possible dissemination routes

Theme 1: Religion

According to the findings in this study (see Table 26), religion is a strong influence in the

women's decision-making process concerning their maternal health care.

Table 26: Findings from the religion theme 1

Themes	Findings	Emergent insights for Risk communication (RC)
Religion		
Question 1: I believe it is safer to give birth in the church than in the hospital	There was a sample split in responses. The sample split according to 'education': A significant difference was recorded. Least educated agreed, and more educated disagreed Sample split according to 'job': A significant difference was reported with majority of unemployed women accepting and employed/self-employed disagreed The sample split according to 'age': A significant difference was reported where the majority of the oldest set of women (41-49 years) believed in church birth compared to hospital Sample split according to 'area': More women who resided in the rural areas agreed to this question compared to their counterparts.	Any RC required should target the specific sub-sets that agreed that church is safer. The rural groups of low socio-economic status and educational level are prime target. The results revealed from the age variable may also be an opportunity to develop a specific approach for older religious women (41-49).
Question 2: I believe that many women die during childbirth as a result of witchcraft	The majority (120 out of 228) of women agreed Sample split according to 'age': A significant difference in responses was identified with the 26-40 age group agreeing	The belief in spiritual influence as a cause of maternal mortality is prevalent in the women's responses irrespective of their socio-economic situation. However, a RC may be designed to address this concern primarily at the women aged 26-40.
Question 3: I think the	The majority of the women disagreed.	Religious leaders have

pastor is more important to a pregnant woman than the doctor	However, the responses sample split showed a mixed educational background in agree and disagree response. Sample division according to 'area': A significant difference was indicated, with more rural women agreeing and sub/urban disagreeing	some influence on the women's health care choice, with particular influence over the women living in the rural areas
Question 4: I need the pastor's permission before agreeing to undergo a caesarian section	The majority disagreed (172 out of 228)	The experts' model that predicted that permission is frequently sought is not supported. The role of pastors is further discussed in section 7.2.1

Based on the findings, the following recommendations may be suggested for an effective risk communication:

Key message 1: It is necessary to inform women about the physical nature of the clinical causes of maternal mortality and practical methods of prevention, to limit their dependencies on spiritual reasoning on why women die during this vulnerable period and to reduce their determinist mode of thinking.

Key message 2: A communication message should be relayed to the women about the dangers of utilising the churches for childbirth instead of hospitals.

Target audience: Women with a low socio-economic status, residing in the rural areas. Most communication to the women between the ages of 41-49 years old should include the dangers of church births over hospital.

Key message 3: Communication messages are needed to relay the fact that witchcraft is not the major causes of maternal death.

Target audience: These messages may need to be addresses to all the women in Rivers State; however, the evidence revealed that it should mainly be targeted at the women between ages 26-40 years.

The women's perception of spiritual influence on pregnancy/childbirth presents a considerable challenge to the design of an effective risk communication strategy for overcoming religious influence over health care decision-making. Significant proportions of births occur in religious houses and churches, and an MMR of 978/100,000 live births has been quoted to emerge from these places (Adanakin *et al*., 2014). With such reported proportions, the use of quantitative information in risk communication may be needed to increase the public concern over the consequences of utilising such places, and the risks they may face.

However, the rural women and least educated women with limited literacy skills may not assimilate such messages efficiently (Houts *et al*., 2006). It may be therefore advisable to demystify the whole process of pregnancy and maternal death, by informing the women about the physical nature of the disease and conditions leading to maternal mortality by qualitative means. If these women are educated on this physical aspect of maternal health, they are informed that they have control and the ability to choose how to take preventative actions. For instance, when a woman goes to deliver in religious houses, they are exposed to unhygienic circumstances, which in turn can lead to the contraction of an infection in the genital tract after delivery, potentially leading to death (Chavan *et al*., 2016). The aforementioned scenario reveals how the women's decision, combined with the services chosen, may contribute to an

adverse outcome.

These messages however, have to be relayed through trusted channels such as the leaders of the religious and faith based venues (see section 7.2.1 for detailed discussions). Using the trust the women have in the pastors to aid transmission of messages may lead to a significant improvement in the women's health care decision-making. A paucity of research on religion based interventions, its application, potential downsides and alternatives has been reported (Jabbour and Fouad, 2004), and especially in Nigeria. However, the current study has revealed the women's perception of the role of religion in pregnancy, and the vital point to note here is the importance of demystifying the thought that adverse outcomes during pregnancy are a spiritual occurrence. It is important to emphasise that, while the spirituality may bring benefits to many aspects of life, there is an important physical component to pregnancy and childbirth. Maternal mortality can be due to some of the women's physical activities and decision-making, such as non-clinical service utilisation.

Lessons can be learnt from the Drake *et al*. (2010) church-based intervention to promote informed decision-making among African American men, with regards to prostrate cancer screening. They used pastors to recruit 73 participants for interventions, which was administered by an African American health educator.The intervention included the use of a 'Road Map' (see Figure 24), which was essentially like a decision tree that showed the potential consequences of an individuals decision to forgo or undergo screening.
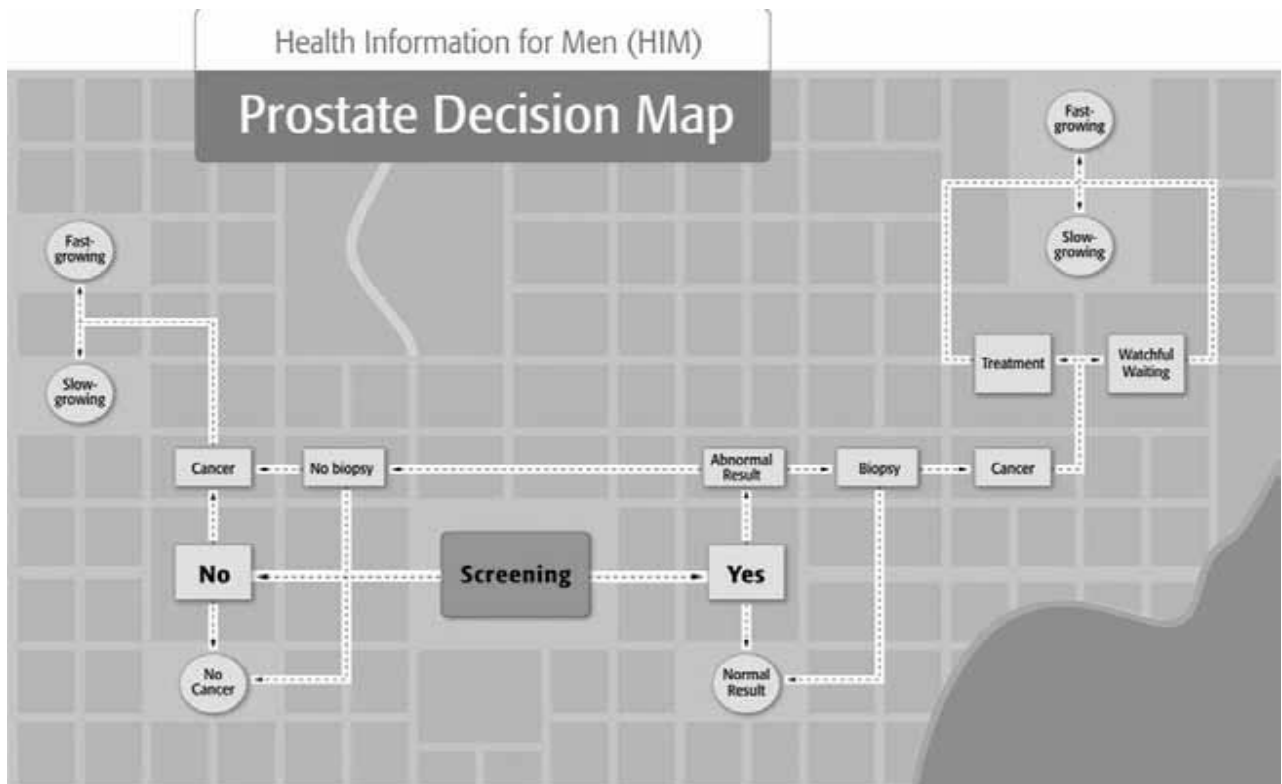
Figure 24: Prostrate cancer decision map (Drake *et al*., 2010,p2)

Post intervention measurement showed a significant increase in prostrate cancer screening knowledge and self-efficacy. This communication strategy may also be employed in Rivers State, where 'trusted' leaders could recruit the women. Recruitment of churches and participants may follow the approach as prescribed by Campbell *et al*. (2007):

- Identification of potential churches by different means (e.g. sending letters to pastors or conducting presentations during local ministerial organisation meetings)

- Contact a member to act as a liaison to church leadership (e.g. church secretary or deacon or pastor) depending on denomination and church size.

- Health professional makes contact and ask initial screening questions to determine

potential eligibility and interest.

- Sign a letter of agreement between all parties, describing roles and responsibilities of all sides. This agreement should acknowledge the voluntary nature of the partnership and provide room for dissolution if needed.

- Financial incentives in the form of a donation to the church may be helpful in recruitment and retention of participants. Incentives like t-shirts and gift cards etc. can be given to members, in addition to food during focus groups and training.

Finally, a similar educational tool such as the one used in Figure 24 can be designed and executed (see Figure 25 for sample decision tree).
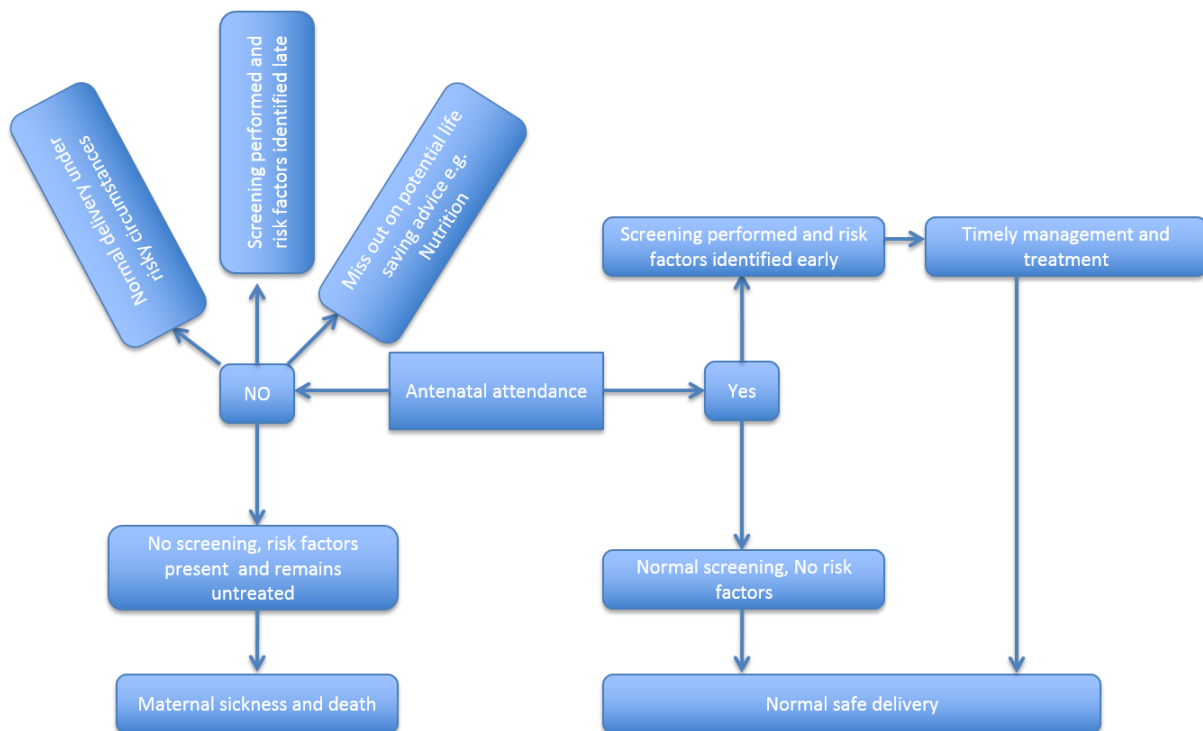
Figure 25: Sample decision tree map for antenatal attendance

From the exemplified decision map shown in Figure 25 the women can use information about the benefits and deficite of each potential course of action, the consequences associated with the advantages and disadvantages of those decisions.During such communication, the women should receive guidance and clarification on the relevant options of antenatal care centres available to them.

Theme 2: Perception of decline in government's health provision/ responsibility

Discrimination between the rich and the poor was noted in this study. In fact, there were some genuine causes, and these include actual medical expense, road and transport, the attitude of staff etc. The findings from Table 27 below reveal the apparent disparities between the health care provisions of the rural and the urban women. For example, the sample was split between the rural women stating that transport was a hindrance to their accessing clinical service utilisation compared to the urban women.

Table 27: Findings from theme 2 (Perception of decline in government's health provison/responsibility)

Themes	Findings	Emergent insights for risk communication (RC)
Perception of decline in government's health provision/ responsibility		
Question 5: I think the government is largely responsible for the high number of women dying during childbirth	The majority agreed, significant differences were recorded in sample split Sample split by 'area': Majority of the rural women were recorded in the agreed pool	The government seems as more to blame than the pastors or native midwives or personal action. This was observed during the interviews, and may reflect helplessness or apathy.

		The government were blamed for lack of effectively equipped facilities, hence hospitals becomes unaffordable, etc.
Question 6: I trust the government's capability in taking care of pregnant women	Responses were mixed, with the majority of women disagreeing. The sample split by area showed the strongest strength of association, with the rural women disagreeing more	The government has lost the trust of the women. RC interventions are needed to improve trust, and this may translate in increased service utilisation.
Question 7: If there was a better transport system, I think more women would give birth in the hospitals	Majority of the women agreed that transportation was a hindering factor to service utilisation. Sample split according to 'area': More women from rural area disagreed compared to urban/ semi urban women	Transportation, poverty and equipped health infrastructure are hindering factors to service utilisation. However, women should be advised to try and make appropriate arrangement for transportation and skilled care during pregnancy (e.g borrowing/renting a neigbours car) and perhaps paying in kind (e.g with food produce from farming).
Question 8: I believe poverty is a major cause of women dying during pregnancy	Majority of the women agreed Sample split according to 'area': More women in the rural areas agreed, and vice versa	
Question 9: I believe there are enough hospitals around my area	Majority of the women agreed, however a significant number of the rural women disagreed.	There are reportedly enough hospitals. Perhaps the women do not patronise these institutions because of their unreliability? If so, the image of hospitals in Rivers State needs rebranding. However, the current study also revealed some barriers hindering the women from attending the clinics in the present state.

		In addition, the rural women tended to disagree that the hospitals were enough. Suggesting that if the government can not afford expensive hospitals at the present, low cost measures such as providing mobile clinics for hard to reach rural areas may be suggested.
Question 10: I believe that the government is doing enough to help pregnant women	Majority of the women disagreed (121 out of 228 (53%))	If most women believe the government does not have concern for them, it may then be difficult to trust their advices concerning health. Thereby unintentionally standing as a barrier to important risk messages.
Question 11: I believe that the hospitals are well equipped to handle pregnant women	Majority of the women disagreed that the hospitals provided were well equipped	Following the findings from question 9, these hospitals are unfortunately reported as ill-equipped

Considering that this is a communication project, and the issues of infrastructure provision/repair go beyond the scope of the project, the following recommendation has been made for the women in dealing with the present situation.

Key message: Women should recognise the limitations the government faces with regards to limited resources, a corrupt system and lack of effective leadership. Ultimately, the women should select an affordable pregnancy and delivery route, which if possible includes the presence of a skilled birth attendant.

Target audience: Mainly women in the rural areas. However, all the Rivers State women expressed distrust in the government, its provisions, and capabilities to actually protect their

lives.

The women have a general perception that maternal mortality is mainly attributed to the government's lack of care, and provisions. Concluding from the worries about the government expressed by the women, the participants may be advised to understand the limitations of expertise, resources, endemic corruption, militancy, political unrest, and lack of time, which are hindering practical maternal health problem solving in Rivers State. Risk communication to tackle issues that may arise within this theme (e.g infrastructural problems) must stress the fact making proper health care decisions during pregnancy cannot be comparable to the adverse outcome possible (maternal death). Employing a skilled health care provider during the process is the most effective option to reduce chances of catastrophic outcomes.

The Nigerian government introduced the Midwives Service Scheme in 2009, where between 2012-2014, a total of 3,158 midwives were deployed to primary health care clinics in rural and underserved communities, of which the South-South zone of Nigeria (including Rivers State) was allocated 506 midwives (Okoli *et al*., 2016). Although the programme has suffered from limitations such as inadequate funding, lack of drugs and supplies, the scheme has also faced a barrier from the women themselves, who believed that the services were unnecessary (Okeke *et al*., 2015). To encourage the reduction of maternal death, it is important to inform the women of the importance of skilled birth attendants and the criticality of positive decision-making. Communication messages to the women should be that they should locate the government approved midwife closest to them and register as far in advance of the birth as

possible.

It is important to consider the way these messages would be disseminated to the women. Evidence from the current study suggests that the women had a perception that the government is not interested, and lacks the capabilities to take care of their well-being. This thinking may present a challenge to the implementation of risk communication encouraging usage of skilled birth attendants. Therefore, it is important to design a strategy that will assist in overcoming this pubic apathy towards the government and its provisions. Plans that include the use of native midwives that are already trusted opinion leader within the community may be advised in this case (see section 7.2.1 for a detailed discussion). Some individuals in the villages may be vital points of information flow, and using community members may increase the trustworthiness of the message and improve the acceptance rate. For example, using community-led video education methods to relay messages about maternal health may prove a useful approach to explore. This was used successfully on the women in rural Uttar Pradesh (India), which led to the frontline health workers testifying that the video films make it easy to explain maternal health messages, and attract women to meetings (Kumar *et al.*, 2015). The important point here was the simplicity of the filmmaking, where the production process only needed a camera, an umbrella, a remote microphone, a paper copy storyboard and inclusion of the women of the community as the actors. This model may be applied in the case study area where using the women as actors will increase a sense of trust and interest from the target audience for these vital messages.

Two main issues arise when observing the successes seen in community-led interventions

(Rath *et al*., 2010; Kumar *et al*., 2015). Firstly, the women do not trust the government, so perhaps the government cannot implement the approch. To address the first concern, using trusted community members could be a useful approach, as indicated in the findings. The intervention may follow examples such as those reported in Rath *et al*. (2010) who evaluated a community mobilisation intervention (the Ekjut trial process). The procedure included participatory learning and an action cycle with women groups to improve maternal and newborn health outcomes. The salient points drawn out from the paper were the importance of scaling interventions to account for local context, and the usage of trained local facilitators who, although not health educators, were trained to discuss health issues during pregnancy and childbirth. In the current study context, since the government is not a trusted body for women, the use of local trusted members such as women leaders and village heads is highly recommended.

The second issue concerns the reports about the facilities being ill equipped. Before advising women to go and utilise such places, it is important to ensure that these locations are sufficiently equipped or trust will be lost. The key messages to the women have been derived from a position of sustainability, practicality and relevance to the current situation. For instance, the women stated that there were enough hospitals in their respective locations. However, these hospitals were not well equipped. The state of these facilities may be assumed to be one of the factors impeding their usage. There is clearly a structural problem in Rivers State regarding service and infrastructural provisions. The non-governmental organisations (NGO's) and any intervening body need to stress continually the importance of well-equipped hospitals to the governments.

In this study, it was discovered that the attitude of the health care workers played a significant role in the women's health care decision-making (see Table 28).

Table 28: Findings from theme 3 (compassion and skill of workers)

Themes	Findings	Emergent insights for risk communication (RC)
Compassion and skill of workers		
Question 12: I believe women die during childbirth frequently because of the carelessness of medical staff	Majority of the women agreed Sample split according to 'education': majority of women that agreed were more educated Sample split according to 'area': a majority of the women that disagreed were from the rural areas	Risk communication surrounding the workers attitude and their skills should be implemented, and this was discussed in section 7.2.1. However, the women should be encouraged to attend facilities, with the assurance that they come first. And the empowerment that they can report workers indiscretions to authorities.
Question 13: I think the attitude of the nurses discourages women from attending hospitals	Majority of women agreed.	
Question 14: I believe that maternity clinics are affordable (Nurses, bribes and tokens)	Majority of the women agreed Sample split according to 'education': majority of the women that disagreed were the least educated	Although a number of women agreed, the least educated ones believed that it was unaffordable. Perhabs due to the fact that they were the women with a low socio-economic status with no job,or empowerment to say no to any discriminatory practices practiced by the nurses

The following advice is recommended to potentially overcome the issues faced within this

theme:

Key messages: Communication messages are required to change the perception of the women regarding the disturbing images they possess concerning the nurses. These women should not be discouraged by health workers attitude as the survival of the mother and child is paramount. Furthermore, the women should be informed that the health workers have a statutory and ethical obligation to help.

Target audience: General Rivers State women, however, more concentration should be aimed at women residing in the rural areas

The consequence of the poor attitude of the nurses towards the women leads to a discouragement of the women from utilising health services provided. So, therefore, it is paramount that nurses' behaviors towards the women improve (see section 7.2.1 for further discussion). Risk communication strategies can be used to improve behavior, with regards to the acceptability of health care workers and hospitals by the women. Lessons can be learnt from the Bangladesh Women's Health Coalition where their mission is to provide quality women friendly health services. They operate on a participatory management style where the staff has a voice, and this in turn engenders responsiveness to and communication with clients (Kay *et al*., 1991; Fonn and Xaba, 2001). Ultimately, the management of staff behaviour lies with the relevant authorities, the paramount message to relay to the women is the need to consider their health irrespective of workers' attitude, and inform the women of their ability to report staff to the relevant authorities if required. If this capability exists, it will make a difference; otherwise, risk communications may fail.

A further recommendation emanating from the findings, is that incentivisation could be considered alongside health campaigns for hospital utilisation. For example, Ghana carried out a birth registration campaign, which included incentivisation (an increase of free registration from 21 days to 1 year without a fine), and intensive public education that included the utilisation of community health workers. These programmes resulted in a substantial rise in birth registration rate over the campaign period (Fagernas and Odame, 2015). Therefore, the Rivers State women may be engaged in a form of incentivised programme where they are possibly rewarded with free baby starter packs, or something of value upon registration and attendance of antenatal classes immediately pregnancy is noticed. If their perceived benefit (e.g., free baby starter packs) outweighs the perceived barrier (nurses' attitude) to hospital utilisation, they may be more inclined to use these services. This could improve the current levels of skilled birth care attendants present in the Nigerian womens childbirth processes, thereby increasing the women's overall survival outcome.

Theme 4: Influence of native midwives

The influence of native midwives in the community should not be underestimated as revealed in Table 29. Their power in the state stems from their in-depth knowledge of age-old traditions and practices (including pregnancy massage), deemed important to mother and child by the women. Inter and intra group interaction between the women and women groups can possibly lead to community influence on health decision-making. Sharing the right information among fellow women is important. Based on the study's findings, the following risk communication messages may be recommended:

Table 29: Findings from theme 4 (Influence of native midwives)

Themes	Findings	Emergent insights for risk communication (RC)
Influence of native midwives		
Question 15: I believe in pregnancy massage by local maternity helpers	Majority of women agreed The sample split according to 'education': Majority of the women that agreed were the least educated Sample split according to 'area': Majority of the women that agreed were in the rural area	The native health practice (Native massage) is a trusted practice amongst the women. RC should expose the potential dangers of such practices, and mostly target the least educated and rural women.
Question 16: I believe home births are better than hospital births	Majority of the women disagreed	Encouragingly, the women disliked homebirths, however RC is needed to inform the women that the births at church are as dangerous as home births, and births carried out without a skilled birth attendants.
Question 17: I believe the local maternity helpers should be properly trained and qualified to the government approved standards	Majority of the women agreed Sample split according to 'education': Majority of the women that agreed were the most educated Sample split according to 'area' : Majority of the women that agreed were in the rural area	The recommendation of training of these native midwives suggests the importance of including them in the maternal health system processes of the state. It has also teased out their use as message channels for communication.
Question 18: I believe a woman should keep trying for a baby till she gets a male child	Majority of the women disagreed The sample split according to 'education: Majority of women that disagreed was the most educated.	Women recognise the need to stop trying to conceive just for a male child; however, majority of rural women disagreed

Key message 1: Invasive native massage is potentially dangerous to baby and mother.

Therefore, message includes avoidance of unskilled native midwives and rejection of invasive traditional practices from these women, as they can be detrimental to the baby and mother.

Key message 2: The importance of using skilled birth attendants should be stressed over native providers.

Target audience: Communication messages should be targeted at the least educated women, mostly living in the rural areas.

Key message 3: It is important to relay the potential dangers of multiparity caused by the quest for a male child in a patriarchal society.

Target audience: Most especially amongst the least educated women mostly living in less urban areas.

In the current study, it was discovered that the Rivers State women enjoyed indulging in massages from the native midwives. However, experts from the current study have revealed that they consider this a dangerous practice. As Akani (2015) stated during his inaugural lecture at the University of Port-Harcourt, Rivers State, native midwives do not observe all the 'Don'ts' in maternity care. This includes 'Do not perform versio/forcing the baby's lie to any plane or dimension without respect to the location of the placenta' (Akani, 2015). With the evidence indicating the acceptance of practices such as native massages, it is critical to relay to the women the potentially negative outcomes that may arise from such practices by unskilled native midwives.

The extent to which an intervention is exhibited and implemented should be within the confines of satisfying the human right legal aspect. The issue of maternal mortality should also be recognised as a matter of human rights (Wise, 2007, Durojaye, 2009). These women can-not be forced to stop patronising these native midwives, therefore the concept of "Nudge' (see section 2.4.2.1 for a detailed discussion) remains a potential route for the dissemination of messages as a recommendation for the current study:

> *The concept of nudge matters for the moral evaluation of actions and policies because it is designed to pick up efficacious influences that preserve freedom of choice" (Saghai, 2013, p487).*

The nudging theory builds upon psychological and sociology literature, to explain how environment shapes and constrains behaviour, it has been accepted by policy makers, particularly in the UK (Goodwin, 2012).

However, critics of nudge tactics argue that it violates the promotion of ideas such as empowerment, freedom and fairness (Goodwin, 2012). Conversely, Cohen (2013) contended that so far as nudging occurs under ethical conditions, it offers a new paradigm for informed consent. The question here should not, however, be whether nudging tactics are acceptable or not, but instead how they may potentially be better employed to improve informed consent and public policy (Brooks, 2013). An example of the use of nudge tactics was in the attempt of the Philadelphia authorities to improve road safety. They painted inexpensive fake speed bumps (Figure 26) on the roads and found that the average velocity reduced from 38 to 23 miles per hour (Oullier *et al.*, 2010).

Figure 26 : Philadelphia fake speed bumps (http://inudgeyou.com/archives/504)

In another instance, to reduce childhood obesity, the National Football League in America, launched a successful NFL PLAY60 youth health and fitness campaign. This was done to encourage kids to be more active and healthy (Tan, 2013). It was reported that among their promotion mix, they included prompts/nudges such as the one in Figure 27. The salient point here to note was the simplicity and easily understood format.

Figure 27: NFL PLAY60 poster campaign (Tan, 2013)

Nudge may be used for the creation of subtle conceptual clues, in the form of advertisements, posters and leaflets. Figure 28 (exemplified nudge poster) depicts an example of a nudge health leaflet/poster, which may be considered relatively easy to understand by the women.

Figure 28: Sample potential nudge picture communicating benefits of hospital attendance (http://www.msf.org.uk/maternal-health)

Health promotion posters/leaflets have also been used as a strategy for health education in several areas, for example, a study was carried out on whether the target audience read and remembered doctor's waiting room posters. It was discovered that out of 319 patients, 82% noticed the posters, and 95% were reported to have read them (Hawthorne and Ward, 1994).

The relevance of native midwives, however, can-not be neglected. The women advocated for training and the inclusion of these native midwives to government approved standards,

thereby revealing the potential of using these women as message channels to the women of childbearing age. For example, a community campaign was carried out in Haiti, where native midwives were trained to teach mothers on how to replace using unhygienic substances with the application of chlorhexidine use for neonates' cords daily (Walsh *et al*., 2015). Out of 169 mothers participating, 99% followed the directions, indicating a high level of acceptability for chlorhexidine use. Lessons can be learnt in this example of the potential use of these native midwives when trained and used as communication channels on maternal health practices. They can be used as advisory channels to women on the risks associated with multiparity; in addition, to other proper maternity advices. If this is done effectively, the native midwives will find their role and trust enhanced.

Theme 5: Lack of maternal health information

It is the central premise of this study that provision of critical information to the women of childbearing age should significantly contribute to their effective healthcare decision-making. As deduced from Table 30, several pieces of information need to be relayed to the women.

Table 30: Findings from theme 5 (Lack of maternal health information)

Themes	Findings	Emergent insights for Risk communication (RC)
Lack of maternal health information		
Question 19: I believe that if a pregnant woman feels sick she should go and buy tablets at the pharmacy to treat herself instead of going to the	Majority of the women disagreed Sample split according to 'education': majority of women that agreed were the least educated. Sample split according to 'area': the	Self-medication is a relatively accepted practice, influenced by educational status. These prescriptions are likely to be wrong, as the women

hospital	majority of the women that agreed were in the rural area	are not trained to differentiate symptoms.
Question 20: I believe pregnant women should say no to giving birth by operation	Majority of the women disagreed Sample split according to 'education': majority of women that agreed were the least educated. Sample split according to 'area': the majority of the women that agreed were in the rural area	Fear of C-section prevalent in the women with low socio-economic status. RC is required to inform these women of the life saving potential of this procedure.
Question 21: I believe more women die during caesarian sections than natural births	Majority of the women agreed Sample split according to 'area': Majority of the women that agreed were in the sub-urban and rural area	If the belief that C-section kills more than natural births are continuously prevalent in the women. It potentially reduces the acceptability of the procedure.
Question 22: I know that the government has programmes to help pregnant women	Majority of the women disagreed The sample split according to 'education': a majority of women that disagreed were the least educated. Sample split according to 'area': the majority of the women that disagreed were in the rural area	Lack of knowledge on any interventions. New education and communication interventions are needed, and the existing programmes should be made more accessible to the women.
Question 23: I think more education programmes by the government will reduce maternal mortality	Majority of the women agreed	These questions basically indicate the women's need for information. They desire to be empowered with information that could reduce the maternal death rate seen in the state.
Question 24: I believe that if the community as a whole is educated about death in pregnancy many women will go to hospitals to deliver	Majority of the women agreed	

Following these findings, the following recomendations may be made:

Key message 1: Women should be told of the potential dangers of self-medication, as this can be a dangerous practice to mother and child if misused.

Target audience: The least educated women, who can be found in greater numbers in the less urban areas.

Key message 2: Positive life-saving potential of C-sections. This procedure should be accepted if suggested by the doctor as a life-saving option.

Target audience: The least educated women residing in the rural and sub-urban areas.

Key message 3: Communicate existing maternal health programmes to women.

Target audience: The women resident in the rural areas.

Possessing knowledge is a critical aspect of health care decision-making. However, the current study revealed that a number of the women lacked life-saving maternal health knowledge (e.g., importance of C-section if needed), and felt the need for education programmes. Regarding the aspect of the acceptability of C-sections, a counselling and education approach to communication may be suggested as a strategy. For example, in a controlled trial of pretest education approaches to enhance informed decision-making for BRCA1 gene testing, Lerman *et al*. (1997) reported that a standard teaching approach is effective in improving knowledge. However, a reasoned evaluation of the positive and negative approach to alternative decisions was also needed. So in communicating to the women, it may be advised that these two methods be adopted. The women should be educated

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about the benefits and consequences of the procedure, to lead to informed decision-making. If the woman is already a registered patient at the hospital, counselling can be done during antenatal classes or a one on one with the attending doctor. On the other hand, the evidence from the current study shows that the women who had the most resistance to the procedure are the less educated women living in rural areas. In this case, education and counselling can potentially be effected by the gatekeeper channels as discussed in section 7.2.1.

In tackling the other risk communication challenges found within this theme, health promotion strategies can potentially be effective in the relay of messages. These include getting the women to attend hospitals at the sign of sickness, reducing self-medication, and improving general maternal health knowledge. Traditionally, health promotions dictate that in the case where a risk is identified, there is the introduction of a campaign where a one-way message is introduced to the target audience. However, the efficacy of such campaigns remains in question. This is because they fail to develop evidence-based materials using health communication or behavioural theories such as the health belief model where components such as perceived barriers, threats and cues to action were included (Glanz and Bishop, 2010; Glassman *et al.*, 2013). Accordingly, the current study has focussed on identification of knowledge gaps and misconceptions to bridge the information break between the Rivers State women of childbearing age and experts, for any communication to be effective.

A campaign against high-risk drinking among college students (Glassman *et al.*, 2010) implemented extensive formative research to design prevention materials for the intervention.

It was discovered that the students were more concerned with social consequences associated with overconsumption of alcohol than physical health effects and this led to the development of the "less is more" campaign which proved more effective than more direct abstinence campaigns (Glassman *et al*., 2010). A lesson learnt from Glassman's study above was the concept of "preservation of freedom of choice", as the students were said to have adamantly rejected the abstinence campaign. Implications of this lesson to the current study are that the future risk communication may utilise insights from the mental models of the women, their motive of why they were not utilising skilled birth attendants, their need for information etc. and finally how to help them. The women's trusts for native midwives, and pastors are important, and message should be directed at a particular point and not seem to attack their freedom of choice.

On the pathway to practical ways of improving maternal knowledge, lessons can be learnt from the Gumi *et al*. (1997) study. A successful community education research to encourage the use of emergency obstetrics services and improve maternal health knowledge was carried out in Kebbi State, Nigeria (Gumi *et al*., 1997). They used educational materials that included pictures on cardboard, revealing basic facts about the five top obstetric complications, pregnancy and reproduction. Illustrations regarding complications were collected on one sheet and created into a poster. Their primary purpose was to increase awareness of potential complications and to promote the message that the women should report to the clinics immediately, upon observations of these signs. These educational materials were presented in three different languages common to that region (English, Hausa and Ajami), and the study reported an increase in awareness of obstetric complications. To improve maternal health

knowledge especially amongst the least educated and rural dwellers, the messages are required to be simple, evidence based and in the most easily understood language of the target audience to improve effectivity.

Theme 6: Folklore, customs and tradition

Deductions made from the findings in Table 31 show that the customary practices and knowledge from previous generations are considered to play a role in the health-seeking behaviour of the women.

Table 31: Findings from theme 6 (folklore, customs and tradition)

Themes	Findings	Emergent insights for risk communication (RC)
Folklore, customs and tradition		
Question 25: I believe pregnant women should stick with the birth practices/ways of their others/ancestors	Majority of the women disagree Sample split according to 'education' The more educated women disagreed and vice versa Sample split according to 'area': Majority of the women that agreed were in the rural area	Belief that the older generation of women survived pregnancy more than the present generation which may limit possibly limit the acceptance of new modern medicines and procedures such as caesarian sections.
Question 26: I believe that the older generation survived pregnancy/childbirth more than the present generation	Majority of the women agreed Sample split by ' area': Majority of women that agreed were from the rural area	
Question 27: I believe pregnant women should	Majority of women disagreed	

avoid caesarian section because their mothers survived childbirth without it	Sample split by 'age': Majority of women that agreed were within the 26-40 age bracket Sample split by 'area': Majority of women that disagreed live in the urban area.	
Question 28: I believe pregnant women should strictly obey the cultural belief set out by the older generation (for example: female circumcision)	Majority of women disagreed Sample split by 'area': Majority of women that disagreed live in the urban area.	Cultural beliefs and traditions are strong influences particularly amongst the rural dwellers. These strict rules possibly encourage barbaric practices such as FGM
Question 29: I believe pregnant women should avoid eating certain foods	Majority of women agreed	Food taboos and rules exists, but it is important to inform the women on the importance of proper nutrition during pregnancy

Cultural beliefs and traditions as revealed in the study, have been observed as having some influence in some women's practices during pregnancy.

Following these findings, the following recomendations may be made:

Key message 1: Expectant mother's survival rate has increased over the decades with the introduction of modern conventional medicines, so hospital attendance should be accepted and not feared. Maternal mortality rates over the years indicate that more women died in the past than present; therefore, it is not a fact that more women die in the current times than in the past. The key is to relay to the women the trends and figures of maternal deaths over the years to change their perception and improve trust in conventional medicines and procedures.

Target audience: All the women of childbearing ages in Rivers State. Most especially the women aged 26-40, residing in the rural areas.

Key message 2: Majority of the women agreed that certain foods should be avoided during pregnancy. However, it is important to ensure the women know the importance of nutrition during pregnancy, to avoid cases such as anaemia.

Target audience: General Rivers State women.

Key message 3: Cultural rules such as female genital mutilation are a dangerous practice that should be stopped

Target audience: Women residing in rural areas

A community participatory approach has been popularly suggested to enable a broad and efficient dissemination of either communication or product interventions (Marston *et al*., 2013), especially when cultural relevance and sensitivity are critical. For instance, for the successful improvement of health service coverage and health outcomes, Bangladesh, adopted the rapid expansion and usage of community health workers for the implementation of interventions such as door to door delivery of contraceptives and vaccinations (Arifeen *et al*., 2013). In another example, in Kenya, joint dialogue between the community members and service providers led to improvements in some indicators. These included childbirth in a health facility (41% at intervention sites vs. 23% in control sited, p=0.000) (Kaseje *et al*., 2009). Learning from these successful cases could be adopted. Community engagement such as those mentioned above and the Jamkhed Project in rural India are recommended strategies for maternal mortality reduction in this study. The Jamkhed project involved bringing villages together to form farmers' clubs, which eventually grew into women's development

organisations, thereby empowering the women to make an impact on their health situation (Rosato *et al*., 2008; Vardhan *et al*., 2015). Successes from such approach saw the decline in infant mortality rate (from 176 to 19 per 1000 births) and a birth rate from 40 to 20 per 1000.

The Jamkhed model where the individuals in a community are empowered to take health care into their hands has been emulated and there has been a reported sustainable impact on the wellbeing of the poor and underserved (Vardhan *et al*., 2015). Therefore, such models can be copied and important messages such as the consequences of FGM, importance of proper nutrition and successes in maternal survival rate can be relayed to the women. The Rivers State community model can include a mobile health team, community health care workers and a primary health care facility (for referrals), potentially to empower the women to create an impact on the maternal death rate in Rivers State.

General gaps

Any risk communication utilising the above strategies should include the important gaps in knowledge that exists in the women of child bearing age (see Table 12), these include :

Key message 1: The importance of malaria prophylaxis measures, considering the fact that Rivers State is located in the Riverine region of Nigeria and prone of mosquito breeding.

Key message 2: The importance of proper family planning and birth control measures.

Key message 3: The existence of a diverse range of direct and indirect clinical causes of maternal mortality.

The knowledge gaps that may limit effective maternal health practices and decision-making have been listed above. Utilising these messages in a risk communication protocol will potentially produce significant improvements in the womens' knowledge about their maternal health.

7.2 Dialogue with health care professionals

The Mental Model Approach methodology was originally created for a one-way message from experts to target audience. However, in the research process of the current study, it was observed that there was a need to get the voices of the target audience heard. A number of valuable insights arose during the data collection and analysis, and this is discussed in the following sub-sections. A health care professional in the context of this study is suggested to be any professional person with interests and experience in the maternal health sector and well-being of the women of childbearing age (e.g doctors, decision makers, health promotionists, midwives, nurses etc.). Ultimately, the success of strategies and interventions lies in the acceptability and practice of the target groups.

7.2.1 Paying attention to lay participants needs and interests and using trusted community members for risk communication

The government plays an influential role in the lives of the Rivers State women as observed from the current study, and the women blamed the government for the majority of their maternal woes and the poor record of maternal mortality in the country. Studies have continually reported the lack of political will to implement maternal health policies as a major contributory factor to maternal deaths (Shiffman, 2007; Cooke and Tahir, 2013). However,

the Rivers State women have revealed that provision of essential necessary public amenities such as transport and infrastructure are vital to their service utilisation and the fight against maternal mortality.

Upon consideration of the individual and community as change agents, it was evident that the poor socio-economic status of the women contributed heavily to their choice of health care decision-making. Nothwithstanding the previous advice about using the mental model as a tool, and for overcoming communication barriers, there are vital lessons from the only Sub-Saharan African country (Rwanda) who achieved the MDG5 before the deadline. It has been claimed that Rwanda's progress was attributed largely to their significant health care spending (Farmer *et al*., 2013). This included their utilisation of a community based health insurance scheme to improve maternal and child health services among the vulnerable population (WHO and UNICEF, 2014). Implications of this are that the Nigerian government need to prioritise health care, starting from the primary and community level, to achieve the Sustainable Development Goals concerning maternal health, and build trust between the government and its citizens. This, however, is a longer-term strategy, which requires funds, and may be hindered by several factors such as change in government, endemic corruption and lack of political will. It is vital to seek out low cost, practical ways to empower the women to reduce adverse outcomes. Considering the case of Rwanda, it can be deduced that as a low cost strategy, they prioritised community involvement as a strategy; they allowed villages to choose three individuals to serve as community health workers, who are then trained and included in programme interventions (Alkema *et al*., 2016). One salient point here is that they used trusted members of the community as action/change agents in their

interventions.

An area of major consideration should be the best ways of disseminating the key messages recommended in the current study. The best messages will not be efficient if inappropriate channels are chosen for the message design and transmission (Witte *et al.*, 2001). Utilising trusted members of the community involves the incorporation of native midwives into the health care system, as welcomed by the Rivers State women. Findings indicate that the women had a level of trust for these native midwives and their practices. Expert's interviews in Chapter 4 highlighted the importance of these native midwives, as they are such a key "gatekeeper" of maternal health and practices in the community. The term "gatekeeper" refers to:

> *An individual who has the power to make a decision allowing some item to enter*
>
> *or not enter a particular channel" (Gross, 1967.p9)*

Studies have reported the use and effectiveness of the employment of gatekeepers to save money and coordinate the medical care system efficiently (Martin *et al.*, 1989). The gatekeeper concept has been given much attention as a means of improving information dissemination in science and technology (Persson, 1981). The current study makes a straightforward and practical point of using native midwives as gatekeepers for information dissemination and intervention implementation. It is important to avoid the misconceptions that since these native midwives do not go through the conventional education system; they have no role to play in encouraging proper health seeking behaviours. On the other hand, the issue of the gatekeeper liability has been pointed out, and lack of sufficient evidence to prove

their effectiveness (Sibley *et al*., 2009). Irrespective of this criticism, the current study's recommendation about the inclusion of native midwives was advocated in other research, scholars have called for the improvement of holistic training programmes which includes monitoring and supervision of these women (Imogie *et al*., 2002; Ray and Salihu, 2004; Ofili and Okojie, 2005).

The policy makers and healthcare managers are therefore encouraged to include these native midwives, implement and monitor their training, to set goals such as an efficient and timely referral rate by these women to the hospitals. Findings from the Jokhio *et al*., (2005) intervention involved training these women in Pakistan. They recruited any native midwife that performed at least one delivery in the district into the training, and they used picture cards containing advice on ante, intra and post-partum methods for a clean delivery, usage of disposable delivery kit, timely referral to emergency obstetrical care and newborn care. Also, the midwives were instructed to register all pregnant women, and inform the health workers of any pregnant woman in their care. It was discovered that this training process significantly reduced perinatal mortality by about 30% in the intervention group, and a similar reduction was seen in maternal mortality; however, it was not statistically significant. The salient point to note here was that training the native midwives' made a difference to the norm. The native midwives' inclusion and training should potentially discourage bad practices, enable message dissemination to the hard to reach women, and ultimately reduce maternal mortality.

Another interesting and insightful phenomenon observed in this research was the powerful influence of religion spanning across all the women irrespective of their socio-economic

status. The women tended to think that spiritual forces had a strong link to the death of women during childbirth, therefore the backing of the religious leaders was important to them. Consequently, this research advocates for facilitation processes that can be employed to include the religious leaders in any maternal health interventions. At the same time, while the inclusion of these leaders in the intervention processes has been advocated in this study, some barriers may be anticipated. For example, Markens *et al*. (2002) reported that the pastors in their church-based intervention studies made it clear that the church's participation should not rest on their personal active involvement otherwise such interventions would not be pursued. This issue was corrected in their study by recruiting and training church members to serve as coordinators. Another theme that presented as a potential weakness to church based health promotion was that the pastors were suspicious of outsiders and their motives (Markens *et al*., 2002; Campbell *et al*., 2007). Therefore, the issue of overburden and building trusting relationships between outsiders and the church body has to be addressed, if these religious leaders are to be employed in communication strategies in Rivers State,

It was revealed in the study that the uncompassionate, arrogant and uncaring attitude of the nurses presented as a barrier to service utilisation, it is interesting to note that an approach to this type of problem is being dealt with in the National Health Service London by just changing introductory habits between experts and patients. An example of this is the 'Hello, my name is…' practice which was started to counter the impersonal practice that some clinicians had of processing and not discussing care with the patient. This campaign was initiated with the main aim of improving patient's experience of healthcare, and putting compassionate practice at the heart of health care delivery (Granger, 2013; Kmietowicz,

2015). However, it has been debated if such campaigns are good enough to initiate widespread cultural and social change required in health care utilisation (Hardy, 2015). Irrespective of this, an audit carried out by Kuet and Stapleton (2014) revealed that implementation of the campaign significantly improved patient satisfaction. The adoption of such approaches to health care in Rivers State may potentially inspire the necessary behavioural change needed to encourage and increase service utilisation

In addition to the compiled advice above, comparison of the expert and lay participant mental models indicated that some professionals might underestimate the emotional component of why the women make certain health care decisions. In this study, the 'emotional intelligence' element that has been revealed is interesting, and could contribute to the findings. Particularly to the experts who may not understand the perception of the women concerning the despicable behaviour of some hospital clinicians. This finding highlights the need to address the women's emotional component during communication efforts, to reduce the first line of the defensive block the women may possess toward experts and their messages. Anxiety and fear are natural reactions to some of the challenges of pregnancy, and so perhaps reassurance is needed from the healthcare givers. For instance, a memo in the form of posters or patient handling guide videos or books titled "Nurse's attitude leads to maternal death" could be sent out to all necessary institutions and expert stakeholders for potential change implementation in the practice of the health care providers. Reform in the Nigerian health sector is suggested, to include service user involvement, for the improvement of the relationship between the women and their healthcare providers. This will potentially alleviate patient concerns, mostly making the women happier to attend and utilise hospital services.

7.2.2 Risk communication timing

It is vital for any maternal health risk communication to stress the importance of timing to the target audience. Precrisis or prodromal signs/stage begins as a symptom of issues emerge, so if these warning signs are not recognised and attended to, the likelihood of a negative event occurring increases (Venette, 2008). For example, excessive vomiting/nausea, severe headaches, and protein in the urine are some of the symptoms that a pregnant woman is developing pre-eclampsia. These symptoms could become worse, and the woman may eventually be diagnosed with eclampsia, if the woman does not take the appropriate medication. The scenario above demonstrated the importance of timing between risk and a potential crisis (maternal deaths).

The UK National Health Service has recommended that ideally, a woman should contact her health care provider no later than the 10th week of pregnancy (NHS, 2016). An early meeting between the pregnant woman and her antenatal care service provider is recommended, in order to identify risk factors, and prevent future complications that may arise. For example, the prenatal diagnosis of certain conditions such as Down's syndrome is possible preferably by the 16th week and no later than 20weeks (Simpson and Walker 1980). In areas such as the rural regions with less educated and more superstitious women, the example mentioned above may be seen as challenging, because they may not understand the risks of complicated conditions such as Down's syndrome to the baby. However, the message here should be that the timely use of formal health services, antenatal care (first trimester), during pregnancy, and delivery has an influence on the survival of the woman and baby (Adjiwanou and LeGrand, 2014). Also, it has been reported that the timely initiation of prenatal care is associated with

the future attendance of the full regimen of prescribed antenatal visits (Hagey *et al*., 2014)

 As much as it is important to stress timing to the women of childbearing age, it is also vital to consider risk communication timing in the aspect of defining moments for the message making. Relaying important maternal health messages could begin from secondary school sex education, right before these young adolescent girls get pregnant. These messages could include the importance of early registration pre-birth and potential negative outcomes of poor reproductive health choices. The school system could be employed as an important, timely risk communication engine. Worldwide, 16-19-year-old women were reported to have accounted for 16 million births, and 95% of them occurred in low and middle income countries (Lloyd, 2005; Chandra-Mouli *et al*., 2013). Therefore, to overcome adolescent pregnancy and its consequences, the WHO developed guidelines addressing six areas which include: preventing early pregnancy through sexuality education, increasing education opportunities and economic and social support programmes; use of contraception; preventing early marriage; increasing use of prenatal care childbirth and post partum care; preventing unsafe abortion and reducing coerced sex (WHO, 2011; Chandra-Mouli *et al*., 2013). The salient point here is the importance of implementing these messages at the defining points where future patterns of adult health are established, to avert future negative implications (Orji and Esimai, 2003). Interestingly, in 2002, Nigeria pledged to carry out a national school-based comprehensive sexuality education (CSE) programme but, although efforts have been made, the pledge is plagued by some weaknesses. These include strong religious and cultural beliefs, change in governmental heads which in turn affect sustainability of policies, implementation capacity and commitment (Huaynoca *et al*., 2014). The decision makers are

further encouraged to continue on this path of CSE, despite the limitations, as a sustainable long-term strategy to curbing maternal mortality. Finally, it is also worthwhile to note that teenage pregnancies mainly occur in rural areas where early marriages are commonly practised (Achema *et al*., 2015). The following section will further discuss the implications of the Urban –Rural divide as observed in the current study.

7.2.3 Urban –Rural divide

In the current study, the type of women most underserved by the limited government programmes and provisions available were clearly the women with low socioeconomic status, living in rural regions. They tended to be mainly helpless, due to their depth of poverty and lack of basic amenities. They were also more culturally oriented, more likely to place cultural practices and beliefs highly. On the other hand, there were the women of high socioeconomic status, who tended to think more analytically, with a majority of them concerned about the skills of the nurses and government education programmes.

More than one decade after the launch of the Safe Motherhood Initiative, the burden of maternal mortality still takes a heavier toll in the rural dwellers compared to their urban counterparts (Ugwuoke *et al*., 2015). This is most likely because of their reported underutilisation of skilled birth attendants during pregnancy and delivery. The rural women often seem invisible, they have limited access to infrastructural development, low education and income levels (Ugwuoke *et al*., 2015). The effectiveness of risk communication interventions should equally depend on the focus on the issue of the rural dwellers otherwise they may have limited effect if they don't tender to the needs of the underserved population.

The principal means of survival for these rural women are farming and agriculture (Fabiyi and Akande, 2015). If these risk messages are to be efficient, the women have to be empowered to make effective decisions especially those requiring finance (e.g., hospital registration, transport to infrastructure and healthy diets). To reduce the women's poverty level, some states in Nigeria have implemented poverty alleviation through agriculture. Bello and Ashimolowo (2014) reported that the women who participated in the agricultural empowerment projects in Ogun State, Nigeria stated that such programmess had a positive impact on their balanced emotion, income, business expansion, and access to credit facilities. There are limited reports about any of such programmes in Rivers State. However, Nlerum *et al*. (2012) reported that the majority of the rural women in Eleme community (Rivers State) stated that they had no access to agricultural information and technologies (e.g., such as poultry production, snail rearing etc). However, the few respondents who had had access to information reported that this raised their farm productivity level (Nlerum *et al*., 2012). Implications of this example are that using less expensive empowerment techniques such as transferring agricultural technology knowledge may potentially increase the productivity of women farmers in Rivers State, thereby, placing them in a better position financially to support proper health care decision-making.

Education and residential area were other influencing factors in the women's choice of health care provider, their choice on the decision to self-medicate or not, the fear of caesarean section and their general health care seeking behaviour. Studies have shown that women's formal education is the most potent tool for the reduction of the Nigerian maternal mortality rate (Igberase, 2009; Moore *et al*., 2011; British Council, 2012). Unfortunately, some studies

have also reported that the Nigerian economy since its independence in 1960 has marginalised the benefits of education (Ikeako *et al.*, 2006). Since most women with low socio-economic backgrounds can not afford to get a proper education, the potential key is in the stimulation of these women to attend health facilities by relaying critical risk communication messages recommended in this study and using the proposed risk communication strategies. If communication is successful, to ensure that these women continue proper health care practices, the services and facilities should be made equally accessible and affordable (Oye-Adeniran, 2014). Dissemination of evidence-based messages should potentially lead to an improved behavioural change, for effective decision-making. During the data collection, the women advocated for the following routes as being the most efficient method for message dissemination, to enable ease of the suggested risk communication strategies discussed around each theme above, (see Box 6 below):

Hospitals, doctors and midwives (14 urban, 3 Rural, 4 semi-urban)

Dedicated pregnancy website that will be publicised (8 urban)

Television and newspapers (15 urban, 3 rural and 5 Semi-urban)

Door to door information (13 rural and 2 semi-urban)

Women's/community town hall meetings (10 rural and 4 semi urban)

Church (32 women)

Pharmacies (8 urban women)

Seminars (6 urban)

One on one communication with the ladies in marketstalls (9 Rural, 4 semi-urban, 5 urban)

Box 6: Potential methods for effective message dissemination

For each suggested route, the number of women from different demographic backgrounds has been indicated. This indicates the potentially effective routes for message dissemination for the different women.

Utilising the most effective routes for message dissemination has the potential of increasing the chances for the messages to be heard and assimilated. Furthermore, as a matter of priority, and to reiterate, these messages are required to be culturally sensitive, and would be expected to be transmitted in the most commonly used language of the intended audience for ease of understanding and adoptation (see section 2.4.1).

Summary of risk messages for key stakeholders

Opening lines of communication with the expert stakeholders is a critical step in achieving a successful risk communication for the reduction of maternal mortality. Key messages are summarised below for each identified expert group:

Government and policy makers:

Key message 1: There is a significant urban-rural divide in Rivers State; it is therefore necessary to increase political commitment in the fight against maternal death. Transport and infrastructure are key components leading to the high rate of maternal deaths, especially in the rural regions. The improvement of these components may potentially lead to increased service utilisation.

Key message 2: Early risk communication messages should be disseminated to the younger generation of women (adolescents) to prevent future maternal deaths.

Key message 3: Poverty remains a strong limiting factor to female empowerements. Agriculture is one of the biggest sources of livelihood for poor women, so the government

should encourage the women by providing low cost solutions (e.g effective farming and storage techniques) for the women, to improve productivity.

Healthcare managers

Key message 1: Improving attitudes in hospitals and health care establishments. Nurses and other health care staff should be trained to put compassionate care at the forefront of service provision to encourage health service utilisation. For example starting with the 'hello my name is .. ' approach.

Key message 2: Involvement of community health workers. Using gatekeepers and trusted members of the communities, as action/change agents are potential viable routes for encouraging service utilisation. The results from this thesis clearly reveals that the traditional birth attendants are trusted gate keepers in the communities, hence , they should be included as action/change agents.

Professional bodies and nurses/midwives:

Key message: That the professional bodies have a duty of care to patients and should not deny care based upon inability to pay a token or bribe. Promote / revise the nursing code of practice to include compassionate care.

Faith based religious leaders :

Key message 1: Pastors and leaders in faith based organisations ahould be informed about the

importance of the presence of skilled birth attendants during pregnancy and time of delivery.

Key message 2: It is important to note that the message is not of total neglect for spirituality and religious institutions, but for the inclusion of proper maternal health advices concerning service utilisation, during pastoral counselling and sermons.

Health promoters:

Key message: Further consideration of means of health promotion, which could be extended to include a variety of media, including leaflets and poster as well as government adverts on radio and TV.

Women / Women's community groups:

Key message: Seek help and information as soon as possible. Involve health care professionals in community education and form a 'help' process amongst the female community members.

7.3 Chapter summary

This chapter focused on capturing the key risk messages to be disseminated to the Rivers State women of child-bearing age and experts. This was done with the aim of bridging the knowledge gap between these two participant groups, with the aim of potentially leading to more informed and empowered stakeholders. The next chapter discusses the implications of this study to practice and research, gives recommendations for future research, and most

importantly, answers the four main research questions.

8 SUMMARY, CONTRIBUTIONS AND CONCLUSIONS

8.1 Research findings

The over arching aim in this study was

> To better understand the factors leading to a high rate of maternal mortality
>
> in Nigeria. It was carried out with the intent of finding better ways to engage
>
> the major stakeholders in a constructive process to achieve a mutual
>
> understanding of the issue and lead to better communication to combat

8.1.1 A unique model for understanding maternal health decision-making

In order to better achieve the main research aim, this study first asked the following research question, "What do different experts engaged in maternal health consider when analysing the risk of maternal mortality?" In response to this question, the study has produced a unique model of the thought process experts use to make their decisions about maternal health. The first expert mental model incorporated a large body of literature into a single mental model that was refined and clarified through expert consultations. Despite being derived from a focus on a single state (River State) in Nigeria, the framework of the model may be sufficiently general to serve as a starting point for assessing maternal mortality in other states of Nigeria. However, the cultural and religious relevance has to be taken into account when generalising the model into, for example, the Muslim Northern states of Nigeria. Nonetheless, the general process of pregnancy and childbirth remains the same biologically for every woman irrespective of location, therefore the model illustrated here may be considered appropriate for the whole country and other Sub-Saharan countries. Moreover, the process of

capturing the components in the expert mental model was started at a generalised level before the addition of state-specific issues.

The development of the expert mental model served as a basis for the lay participant mental model framework with regards to the development of prompts and interview guidelines, which enabled the comparison of the two mental models to reveal significant findings for a future risk communication. The reduction of maternal mortality is not merely a matter of provision of good obstetric care by midwives and doctors. As revealed by the expert mental model, maternal death reduction is a challenging task, which involves an interplay and network of multiple factors and stakeholders, requiring national, individual and community interventions rather than just facility-based interventions. These responses require actions that go beyond the provision of hospitals, to training and collaboration with native midwives, family planning, outreach and health promotion (Barnett *et al*., 2005).

The expert mental model of maternal health professionals' decision-making reflects the current state of knowledge of the issue and provides an explanatory framework for understanding the issue. The major direct and indirect clinical causes of maternal mortality are in fact linked to several socio-economic/cultural circumstances. These conditions are related to the variables affecting the lay participant's way of thinking and reacting when making maternal health decisions. The mitigation routes of maternal death via the different multifaceted means has been illustrated in the model, and in accordance with the scope of this study, a number of components needed to form part of a risk communication have been extracted.

8.1.2 Advancement of understanding of the knowledge of lay participants

To investigate how the women, make their health care decisions including service utilisation and general maternal health practices, the second research question asked, "What are the different ways of thinking that the Nigerian women possess about maternal health and maternal mortality?" In response, the analysis of the women's semi-structured interviews (Phase 2 of MMA) revealed six key themes prevalent amongst the women's mental models. The topics included religion, negative perception of government's health provision, compassion and skill of healthcare workers, influence of native midwives, poor awareness/lack of information, and folklore, customs and traditions. Critical variables were observed within each of the different themes, which enabled comparison with the expert's ways of thinking.

The research clearly showed the Rivers State women's modes of thinking regarding health care decision-making and preferences. However, it was observed that the women did not establish causal links to the variables mentioned. For example, a woman stated that malaria causes maternal death. However, she does not explain that the incorrect usage of preventative measures (e.g., mosquito nets and anti-malaria medicines) can lead to malaria infection and may eventually result in maternal mortality. This feature was seen to be lacking in the women's explanations during the interviews. Not fully understanding causality between social/cultural/economic causes and clinical causes may hinder the women's perceived susceptibility and severity of their situations, thereby leading to carefree healthcare decision-making. By revealing this key feature, this research emphasises the need for a broad middle ground where lay people and experts communicate, potentially leading to efficient and

strategically employed health care decision-making among the stakeholders. Findings from this research suggest that the women's different mental constructs may create barriers to risk communication.

In particular, this research identified communication barriers that were emanating from the women as a result of religious practices (influence of religious leaders and prophecies), economic conditions (poverty influences educational status, which may lead to bad decision-making), and individual mental models. The study proceeded on to seeking explanations for causality between the womens' ways of thinking and socio-demographic characteristics, in addition to the estimation of prevalence of beliefs, misconceptions and gaps in knowledge between experts and the women.

8.1.3 Comparison of expert- lay participant's mental models and estimating prevalence of beliefs and misconceptions for effective risk communication

The third and fourth research questions addressed the identification of key messages to be relayed to the women, and the potentially appropriate strategies to utilise during message dissemination. The third research question asked, "What differences in ways of thinking about maternal mortality exists between the experts and lay participants?" Identification of these differences enabled a better understanding of how experts make decisions about maternal health in comparison to the laywomen. In analysing the comparison between the expert and women's mental models, this information was used in the development of a structured questionnaire to estimate the prevalence of beliefs/knowledge/misconceptions in a broad cross-section of the target audience. This research indicated that vital risk messages are

needed to be relayed to women (see Chapter 7 for detailed results and discussion). Firsly the following important gaps emerged during data analysis:

General gaps

Key message 1: The importance of malaria prophylaxis measures, considering the fact that Rivers State is located in the Riverine region of Nigeria and prone of mosquito breeding.

Key message 2: The importance of proper family planning and birth control measures.

Key message 3: The existence of a diverse range of direct and indirect clinical causes of maternal mortality.

These were followed by key messages illustrated according to the themes (see Chapter 7). The themes and key messages are re-stated here in discussion of the contribution of this research to the community in Rivers State, Nigeria, though with possible value in other similar situations

Religion (Theme 1)

- Key message 1: It is necessary to inform women about the physical nature of the clinical causes of maternal mortality and practical methods of prevention, too limit their dependencies on spiritual reasoning to why women die during this vulnerable period and reduce their determinist mode of thinking.

- Key message 2: A communication message should be relayed to the women about the dangers of utilising the churches for childbirth instead of hospitals.

- Key message 3: Communication messages are needed to relay the fact that witchcraft is not the major causes of maternal death.

Pastors and other religious heads can be important gatekeeper figure. they can help deliver messages if they can be recruited as they are very trusted.

Perception of decline in government's health provision/ responsibility (Theme 2)

- Key message: Women should recognise the limitations the government faces with regards to limited resources, a corrupt system and lack of effective leadership. Ultimately, the women should select an affordable pregnancy and delivery route, which if possible includes the presence of a skilled birth attendant.

Compassion and skill of workers (Theme 3)

- Key message: Communication messages are required to change the perception of the women regarding the disturbing images they possess concerning the nurses. These women should not be discouraged by health workers attitude as the survival of the mother and child is paramount. The women should also be informed that the health workers have a statutory and ethical obligation to help.

Influence of native midwives (Theme 4)

- Key message 1: Invasive native massage is potentially dangerous to baby and mother. Therefore, message includes avoidance of unskilled native midwives and rejection of invasive traditional practices such as native massages from these women, as they can

be detrimental to the baby and mother.

- Key message 2: The importance of using skilled birth attendance should be stressed over native providers, although the latter may become skilled in 21st century healthcare and be trusted conveyors of the message.

- Key message 3: It is important to relay the potential dangers of multiparity caused by the quest for a male child in a patriarchal society.

Lack of maternal health information (Theme 5)

- Key message 1: Women should be told of the potential dangers of self-medication, as this can be a dangerous practice to mother and child if misused.

- Key message 2: Positive life-saving potential of C-sections. This procedure should be accepted if suggested by the doctor as a life-saving option.

- Key message 3: Communicate existing maternal health programs to women.

Folklore, customs and tradition (Theme 6)

- Key message 1: Expectant mother's survival rate has increased over the decades with the introduction of modern conventional medicines, so hospital attendance should be accepted and not feared. Maternal mortality rates over the years indicate that more women died in the past than present; therefore, it is not a fact that more women die in the current times than in the past. The key message is to relay to the women the trends and figures of maternal deaths over the years to change their perception and improve trust in conventional medicines and procedures.

- Key message 2: The majority of the women agreed that certain foods should be avoided during pregnancy. However, it is important to ensure the women know the importance of nutrition during pregnancy, to avoid cases such as anaemia.

- Key message 3: Cultural rules such as female genital mutilation is a dangerous practice that should be stopped.

General gaps in knowledge

- Key message 1: The importance of malaria prophylaxis measures, considering the fact that Rivers State is located in the Riverine region of Nigeria and prone of mosquito breeding.

- Key message 2: The importance of proper family planning and birth control measures.

- Key message 3: The existence of a diverse range of direct and indirect clinical causes of maternal mortality.

The summary above shows the key messages identified in this study. In addition to the compiled information for the lay participants, important messages were discussed for consideration by the health care professionals and decision makers (see 7.2 for detailed discussion).

The fourth research question asked: How will the information be disseminated? Answering this question led to the exploration and recommendation of risk communication strategies that will enable bridging of the knowledge gap, correcting misconceptions and instilling behavioural changes in the target audience (see Chapter 7 for detailed results and discussion).

8.2 Contributions of this research

This section presents the implications of the current study findings for practice and research relevant to the issue of maternal mortality in Nigeria.

8.2.1 Contribution to practice

Firstly, this study demonstrates that many of the Rivers State women of childbearing age that participated in the current study had a critical need for information regarding the causes and solutions of maternal mortality. For example, witchcraft was believed to be a significant influence on the death of a woman, and obstetric complications which led to deaths were considered to be an act of God/spiritual influences. The women's utilisation of religious houses and native midwives will continue to be a persistent occurrence in the state because a majority of the women believe in spiritual influence to maternal deaths, unless education of these women on the potential negative outcomes of their health care decision-making succeeds.

Based on this, it would be detrimental to ignore the influence of the native and religious systems. Since some women accept this practice of patronising these infrastructures for childbirth, it is recommended that the leaders of such establishments are carefully monitored, and their practices supervised by appointed principal monitoring agencies, until a time when the use of such facilities would be drastically reduced. However, there is a need to separate the role of native midwives from the spiritual churches, as studies have shown that developing and improving the skills of the women has an impact on the rate of maternal death in rural communities. This could be achieved either by increasing the portion of institution-based

childbirth (Jiang *et al.*, 2016) or as a means to relay vital messages (Walsh *et al.*, 2015). Consequently, there is a need for the government intervention to train the native midwives, and enforce strict operation guidelines for the religious houses.

Finally, the findings of the study indicated that education was an important influence on the lifestyle and behaviour of the women. For example, fear of caesarian was less prevalent in the highly educated women, compared to their rural counterparts. These findings imply that it is important to improve the women's educational opportunities; however, this may be a long-term solution, so it is necessary for a targeted risk communication intervention to be produced. Utilising the learning and messages obtained from this study, a targeted risk communication protocol could be created to instil behavioural changes in specific areas such as health service utilisation and proper maternal health practices.

8.2.2 Contribution to research

The findings from this study add to the body of literature on how women of childbearing age in Rivers State and experts on maternal health, think concerning maternal mortality. Community-wide studies in Rivers State regarding this issue have not typically distinguished between these two groups of stakeholders. What this study has done is to remove the women and community members from their role as passive audiences of health messages, and placed them to be active agents in the derivation of critical messages needed for positive behavioural changes. In particular, some of the findings from this study are notable for their consistency with other case studies that engage in qualitative interviews regarding proper service utilisation. For example, the issue surrounding the poor attitude of health workers as

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hindrances to patient hospital use, has been reported by some scholars (Olayinka *et al.*, 2014; Fagbamigbe and Idemudia, 2015).

This methodology is the first known application of the mental model approach to the maternal health field. The mental model can be defined as:

> *Pre-existing mental constructs through which people decipher information and understand the environment, and which they use to solve the problems they face (Otto-Banaszak, 2011, p218)*

The mental model approach is an effective risk communication methodology for the comparison of expert and lay knowledge of a particular risk. The differences gained are used to serve as a basis for the development of a risk communication protocol, to bridge the knowledge gap, and correct misconceptions (Morgan *et al.*, 2002). This research has adopted the mental model approach to evaluate stakeholders' way of thinking about maternal mortality. However, in applying this methodology, it is important to note that the risk of interest involves many subjective views and worldviews, and there are several underlying causes at play. Despite the fact that maternal mortality has been an issue spanning decades in Nigeria, decisions must be made in an expedient manner taking into account the wide-ranging perceptions about how the problem should be solved. Accordingly, the application of this methodology in this study may serve as a basis for the achievement of a two-way form of communication, rather than the one-way form as prescribed by the original mental model construct. As prescribed by Morgan *et al.* (2002), the methodology was structured to relay information to the lay target audience. However, as an important necessity, it was adapted to

become a two-way approach, as it was vital to include key messages necessary to improve maternal survival rate for the experts. The findings from this research have endeavoured to elicit knowledge from different stakeholder perspectives, hence providing recommendations and implications of findings for practice.

To summarise, the methodological strategy to use the Mental Model Approach in this study has effectively introduced an important change, which moves the approach from a one way (experts only) to a two way (experts views and forwarding of patients views). This forms a major contribution to practice for this study, to be further disseminated.

8.2.3 Directions for future research and sustainable agendas

Infrastructural change is expensive, however, women are good communicators and often have real social and support networks; some female related charitable organisations could be encouraged to take a lead in debate on the issue of MM and effective promotion of good maternal health practices. Even as the NGOs and other advocates begin to make the type of changes based on this study's recommendations, using methods such as the provision of a telephone hotline for maternal help could be introduced to the women. By giving the numbers of key maternal contacts to the women for advice, this potentially puts the power in the hands of the citizens to quickly seek out information and help.

Nigeria can be considered to be an emerging nation that will result hopefully in future investment in public sector infrastructure for, health, welfare and transportation. The Goldman Sachs economist Lord Jim O'Neil in the early 2000s, coined the term 'BRICs' (Brazil, Russia, India and China) describing emerging economies. He believed that Nigeria

could be one of the largest economies by the year 2050, thereby including it in his 'MINT' (Mexico, Indonesia, Nigeria and Turkey) countries of the main emerging nations (Lunn and Harari, 2014). Nigeria has vibrancy and energy; its people are natural communicators across different languages and sub-cultures. Technology in the form of mobile communications (cell phone technology) is commonly available in the country, and so the use of technology and social networking (e.g. Facebook usage) is a reality that could be exploited.

Maintaining sustainability of the agenda in the country means keeping this research alive; as a result, this research and its findings has been presented at several conferences via oral and poster presentations. Furthermore, a segment of the results from this study has been published (Oyibo et al., 2016), and other papers are in preparation to add to the body of research knowledge for the reduction of maternal mortality in Nigeria.

Following the need for expansion of the study, the following recommendations are proposed for future research.

- Examining other neighbouring states surrounding Rivers State, extending the analysis to women from other states, which would further expand transferability of the knowledge to decision makers and policy enforcers.

- Investigations surrounding the faith-based organisations and spiritual churches, in order to explore how they influence the women to give birth in such places rather than hospitals.

8.3 Strengths and limitations of the study

One of the inherent strengths of this study is that it helped in the understanding of inter-relationships between different stakeholder groups on the issue of maternal mortality. The study facilitated a detailed understanding of the problem, as a reduction in maternal death rate will potentially be at a steady downward rate with a mutual corporation within all the stakeholders involved.

The development and study of an actual risk communication campaign would yield significant results and may confirm some of the findings and assumptions of this research. Therefore, a large-scale pre and post test design for the understanding and assimilation of the research advice and its effects would have been advantageous. However, where significant resources are available, this may be considered as an area of immediate future research.

Despite the limitation of not testing the findings, the results of the research have implications for practice, which are related to the maternal well-being of the women of childbearing age in Nigeria. Besides, the results of the study will be useful in highlighting the on-going concerns of the mothers, their practices and beliefs, and barriers to their proper health seeking behaviours. These results will provide the healthcare professionals and decision makers with invaluable information for the creation of holistic health interventions

8.4 Conclusion

Recruiting a diverse group of stakeholders to engage in constructive forms of analysis and knowledge elicitation on the issue of maternal mortality was a challenging task. The current

study has revealed that there are many relevant variables in the ways these different stakeholders think and respond to the issue. This thesis sought to better explain the factors leading to a high rate of maternal mortality, with the intent of finding improved ways to engage the stakeholders on the issue, hence potentially breaking communication barriers that tend to constrain effective applications of interventions.

This is the first known application of the mental model approach to the issue of maternal mortality in Rivers State, Nigeria and Africa as a whole. This approach has supported the development of an illustrative mental model of interconnected components that reveals what people think about maternal mortality and the thought process included in their health care decisions. The mental models of the women in this research contribute toward the need for empirical research on the perceptions and the understanding of why women make poor health care utilisation decisions.

While the framework is inherently complex due to the level of intertwining components and interplay of factors and stakeholders involved, it is consistent with existing social and behavioural theories and coherent to the target audience. By combining a large body of existing knowledge in a single, unified model, it may serve as an important tool for recognising components that should be considered within maternal health risk communication interventions. Application of the mental model to the women of childbearing age in Rivers State reveals that they apply different ways of thinking, which can be examined by looking at the various categories of the model, and considering which area they place their focus. To help comprehend and prioritise areas to focus interventions, the expert and women's mental

models were compared for differences in knowledge, the prevalence of beliefs and identification of gaps and misconceptions. Recognition of all these distinctive perceptions is a major step when preparing public health interventions.

While several existing maternal health interventions are based on the expert knowledge and recommendations, this research suggests that the health care professionals involved in the design of interventions should include communication with the target audience for increased effectiveness. In this thesis, the use of a community based mobilisation /participation approach has been presented as a possible alternative technique for allowing a diverse group of stakeholders to work constructively to address the issue of maternal mortality. The research also points towards communication barriers that may reduce the effectiveness of existing interventions. For example, it was identified that the Rivers State women barely had any idea about the existence of policies and programmes useful to their maternal health.

Another significant discovery was the religious barrier to risk communication. Even the highly educated women tended to have an implicit faith and belief in these churches and their leaders. The majority of the women oriented their thinking towards believing that spiritual forces have the ability to cause maternal deaths. This implies that many women may have a fatalistic attitude, supplemented by reverence and obedience to the religious leaders. This can certainly be addressed through improved dialogue with the religious community.

Concerning the mental models, it suggested that the communication barriers and knowledge gaps could be breached, by a collaborative and more participatory effort among all the stakeholders for a more efficient risk communication. Maternal death reduction efforts are in

danger as long as the strategy preparation and intervention formation come from only one dominant group/stakeholder. It, therefore, is only logical that emphasis is placed on the development and implementation of policies and programmes, informed by interested parties that can function to facilitate effective risk communication.

However, it should be noted that not every decision requires the input of all the stakeholders. An example is the introduction of the recently signed "Violence against Persons (prohibition) Bill 2015" (Nnamuchi, 2015). If the cultural gatekeepers of the communities were required to decide on the passage of the law, they might have voted no, for the sake of tradition and heritage preservation. Therefore, in such instances, it makes sense to exclude them. The main outcome of this thesis indicates that people think about maternal mortality in different ways; the women are willing to participate in the fight against maternal mortality. Communication barriers that lead to a division and eventual negligence of the women's views and needs must be overcome, as this is the most important way in which risk communication interventions may be effective.

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10 APPENDICES

1: PARTICIPANT INFORMATION SHEET

<u>Title of project</u>: Risk Communication as a Strategy to Combating Maternal Mortality: A case study in Rivers State, Nigeria.

You are being invited to take part in this research study. Before you decide, it is important for you to understand why the research is being done and what it entails. Please listen carefully as I read the following information. If you wish to ask for more information, please feel free to interrupt me. Take time to decide whether or not you wish to take part in the research.

What is the purpose of this study?

The purpose of the study is to explore the knowledge of my target audience (women of child bearing age) the information you will give in the interviews will be used to improve and develop interventions in maternal health care.

Why were you chosen?

You have been chosen in order to gain an understanding from your own perspective on the issues relating to maternal mortality in your community and private lives.

Do i have to participate?

No you don't have to participate, however it is going to be beneficial to the outcome of this research for you to participate.

What will happen to me if I take part in the research?

If you decide to take part, I will contact you for your interview, and discuss the study in detail with you. If you say yes to the interviews, a date and time for the interview will be arranged with you.

What are the possible risks to me of taking part in the research?

Your interviews if published will be on a confidential basis, and your views will be respected. You do not need to answer any questions that you do not want to and the interview can be stopped if you want.

What are the possible benefits of taking part?

I cannot promise to help you but the information I get might help to improve the rate of women dying in the community.

What if there is a problem?

If you have any concern about any aspect of this study, you should ask to speak with me and i will address any questions you have.

What will happen to the results of the research?

Your interviews and answers will be used to develop the final thesis of my research and the outcome of the research will provide useful information for maternal health progression in Rivers state. It will also form a baseline data for subsequent research on maternal mortality in Rivers state, Nigeria. In addition, the results may be published in journal. All the women who take part in the study will not be identified in the publications.

Chapter 10: APPENDICES

2: DEMOGRAPHIC QUESTIONNAIRE

1) What is your age?

☐   ☐   ☐   ☐
   25 or under   26-40   41-49   50 or older

In what year were you born?   [_____]

2) What is your gender?

☐   ☐
Male   Female

3) What is your primary language?   [_____]

☐   ☐   ☐
  English   Pidgin   Other

4) What is the highest level of education you have completed?

☐
  No schooling completed

☐
Primary school

☐
Secondary school

☐
First degree Bachelors'

☐
Second degree Masters

☐
Doctoral degree

☐ Other [_____]

5) What is your religion?

☐ Christian ☐ Muslim ☐ traditional worshipper ☐ other [_____]

6) What is your current marital status?

☐ Single ☐ Married ☐ Divorced ☐ Separated ☐ Widowed ☐ Would rather not say

7) Which of the following best describes the area you live in?

☐ Urban ☐ Sub urban ☐ Rural

8) What is your current employment status?

☐ Employed ☐ Self-employed ☐ Unemployed ☐ Home maker

☐ Student ☐ Retired ☐ Other [_____]

9) How many children do you have?
[_____]

10) How many of these children did you give birth to in the hospital?

[_____]

11) What is the name of your tribe? [_____]

12) Has anybody died due to a pregnancy related cause in your family?

☐ Yes   ☐ No

3: Prompts and phase 2 interview Guide

Basic prompts

Can you tell me more?

Anything else ----don't worry about whether it's right, just tell me what comes to mind

Can you explain why

Introductory question

What can you tell me about childbirth and women dying during pregnancy?

-Causes and traditional beliefs

In your community what are the cultural beliefs /popular traditional beliefs surrounding pregnancy.

-Maternity services utilisation challenges

Interview should cover this topic and why women do not use services provided for them

Risk management (Interventions and strategies)

Where have you heard about things that can be done about managing the risks

Have you heard about any government or private programs to deal with these risks?

Impact of maternal mortality

Risk communication

Is there anyway someone can learn more about the risk of maternal mortality and how it affects them

Where do you obtain most of your information at present?

Is this information enough?

What kind of information do you need or would you like to have?

How would you prefer this information to be given to you?

Reducing risks and solutions

If somebody finds out that they are in a risky situation with regards to their pregnancy, what can they do about it?

How effective are the measures that you are mentioning for reducing and controlling the risks? And do they always work well?

Is there anything about maternal death I have not asked that you would like to say

4: STRUCTURED QUESTIONNAIRE (PHASE 3)

1) I believe it is safer to give birth in the church than in the hospital.

2) I believe that many women die during childbirth as a result of witchcraft.

3) I think the pastor is more important to a pregnant woman than the doctor.

4) I need the pastor's permission before agreeing to undergo a caesarian section

5) I think the government is largely responsible for the high number of women dying during childbirth.

6) I trust the government's capability in taking care of pregnant women

7) If there was a better transport system, I think more women would give birth in the hospitals

8) I believe poverty is a major cause of women dying during pregnancy

9) I believe there are enough hospitals around my area

10) I believe the government is doing enough to help pregnant women

11) I believe that the hospitals are well equipped to handle pregnant women

12) I believe women die during childbirth frequently because of the carelessness of medical staff

13) I think the attitude of the nurses discourages women from attending hospitals

14) I believe that maternity clinics are affordable

15) I believe in pregnancy massage by local maternity helpers

16) I believe home births are better than hospital births

17) I believe the local maternity helpers should be properly trained and qualified to the government approved standards.

18) I believe a woman should keep trying for a baby till she gets a male child

19) I believe that if a pregnant woman feels sick she should go and buy tablets at the pharmacy to treat herself instead of going to the hospital

20) I believe pregnant women should say no to giving birth by operation

Please say why (Write on the line below)

……………………………………………………………………………………..

21) I believe more women die during caesarian sections than natural births

22) I know that the government has programmes to help pregnant women

Please name the programme you know below

………………………………………………………………………………………….

23) I think more education programmes by the government will reduce maternal mortality

24) I believe pregnant women should stick with the birth practices/ways of their mothers/ancestors?

25) I believe that if the community as a whole is educated about death in pregnancy, many more women will go to hospitals to deliver

26) I believe that the older generation survived pregnancy more than the present generation

27) I believe that pregnant women should avoid caesarian section because their mothers survived childbirth without it

28) I believe pregnant women should strictly obey the cultural belief set out by the older

generation (for example: female circumcision)

Please give an example of such cultural rules and belief below

……………………………………………………………………………………….

29) I believe that pregnant women should avoid eating certain foods

Please give examples of such foods.

……………………………………………………………………………………….

5: ETHICAL APPROVAL LETTER

School of Health and Social Sciences Hendon Campus The Burroughs Hendon NW4 4BT

To: Natasha.C.Oyibo

Date: 01/06/12

Dear Natasha Re: 947

'Risk communication as a strategy to combat maternal mortality in Nigeria: A case study in Rivers State'

Thank you for the above application which was presented to the Natural Sciences Ethics sub-Committee. On behalf of the committee, I am pleased to give your project its final approval. Please note that the committee must be informed if any changes in the protocol need to be made at any stage. I wish you all the very best with your project. The committee will be delighted to receive a copy of the final report.

Yours sincerely

Adam Choonara

Chair of the Natural Sciences Ethics sub-Committee

6: INDIRECT CAUSES OF MATERNAL MORTALITY IN RIVERS STATE

HIV/AIDS

Domestic abuse

Anaesthetic death

Cardiovascular conditions

Mental illness and psychiatric disorders

Diabetes

Respiratory conditions

Ectopic pregnancy

Embolism

Malaria

Anaemia

Ruptured uterus

7: EVOLUTION OF HEALTH POLICIES REGARDING WOMEN'S HEALTH IN NIGERIA (BRITISH COUNCIL, 2012, P38)

The National Health Policy 1988, which adopted the Primary Health Care approach.
This was revised in 2004 to provide a link to New Partnerships Strategy (NEEDS). For African Development (NEPAD), the Millennium Development Goals, and the National Economic Empowerment Development

↓

The National Policy on Population for Development, Unity, Progress and Self Reliance, developed by the National Population Commission in1998.

↓

The National Reproductive Health Policy and Strategy 2001, which aimed to reduce peri- and neo-natal morbidity by 30%.

↓

The National HIV/AIDS and PMTCT (Preventing mother to child transmission) Policy and Strategic Plan 2003, which provided an integrated approach to addressing transmission of the HIV virus from mother to child, among other measures.

↓

The National Guidelines for Women's Health, developed in 2002 by the Government with help from UNICEF to establish services friendly to women.

↓

The National Strategic Framework and Plan for Vesico-Vaginal Fistula, developed by the Federal Government in 2005

↓

The road map for accelerating achievement of the MDGs that cover maternal and newborn health, 2006. This set out priorities and strategies for reducing infant and maternal mortality.

↓

The National Health Promotion Policy, developed by the Ministry of Health in 2006.

↓

The Policy on the Health and Development of Adolescents and Young People in Nigeria, 2007. This aimed to reduce by 50% unwanted pregnancies and marriages among people younger than 18, and by 75% maternal mortality among young women.

↓

The National Health Bill, proposing the introduction of a National Health Insurance Scheme (decreed in 1999, implemented in 2005).

↓

An Integrated Maternal Newborn and Child Health Strategy, developed by the Ministry of Health in 2007. It sought to build synergy among the many programmes designed to reduce maternal, neonatal and child mortality in Nigeria.

8: EXAMPLE OF A TRANSCRIBED INTERVIEW

PROMPTS	Interview 0 (Mrs J)	
Analysis		
A) Initial Introductory questions (General knowledge of MM)	What can you tell me about child birth and women dying during pregnancy	What i have to say about maternal mortality and concerning children dying during childbirth, i will say it is as a result of, to my own opinion what i have seen so far during the days of my pregnancy, i can say it is as a result of the carelessness of the doctors or nurses as i will say. More especially like for instance when i say carelessness of a nurses ehmm from my own experience so far, when i am in labour i was going to the hospital right from the beginning, attending the antenatal all through but at the end of the time when i want to have my child , i went to the hospital i reported to the doctor , i told the doctor that this the experience I am having, as my first issue i explained to the doctor and the doctor was taking care of me and the nurses were taking care of me . Reaching when i am in proper labour, i went to the doctor and said this is the experience am having, the doctor looked at me and said its labour, he admitted me then i stayed there. I was there in the hospital, and the labour pain was coming up. At a time when i had my child, after a day or more of having my child, i found out that after some mins or hours , my child begin to change colour and my child could no more breathe normally, then i called the nurses and told them i don't like the way my child is behaving because my child started running temperature. At the end of the time the nurses that were in charge came up, carried my child and started doing things i don't know and they want to call the doctor. Not knowing that they did not call the doctor, but all they did was take the child downstairs and began pumping the child. So when my	Emerging codes Carelessness of doctors and nurses a)Lack of regular observation of mother and new born. b)Lack of skilled nurses and doctor Inaccessibility of doctor

husband came and saw the nurses what they were doing, my husband asked what exactly they were doing , they said they are trying to see if the child can cry. Then he asked why can't you call the doctor, and then they said the doctor was not around and that they are trying the doctors number but could not reach him. So my husband went to the doctor's house to report and bring him to the hospital, when he came, the doctor said the condition was serious, so they went to the paediatrician as the doctor admitted he knows nothing about children.

Medical causes Do you go for Antenatal? And give birth in the hospital Yes/No If no why		
You mentioned antenatal		
Thoughts toward general antenatal care services and current infrastructure provided	What i think of the general experience is that when the nurses are giving us lecture about antenatal care, those things they are telling us they are supposed to practice it, not only to educate us on what to do and at the end they are not practicing it, you find the nurses shouting for someone and hallaring when you are complaining that this is the way am feeling, the nurses would not care. Even when you are complaining that you want to deliver and push, the nurses will not agree, they will say hold it oh hold it oh, the Nurse will halla (shout) at me if you born in this place , they will just tell you to hold it, and the more you continue to hold it, the	Nurses not practicing what they preach Lack of care from nurses

	child will be pushing you to push , and you will tell them that i want to push but the nurses will not agree , they will say come let us go to theatre begging you not to deliver there or they will get sacked. If you don't have experience before you know it, you will deliver and your child will die. They are causing the problem.	First time mothers' syndrome
		Hospital hierarchy and management issues
Adequacy of current general antenatal care	The information they give to us is not adequate enough	Lack of adequate info
Can you tell me the different places you know most of your fellow women go to give birth in your community	I will say some women normally go to native women houses where they normally deliver them, some of them that cannot be able to afford paying for the antenatal bill in some of the private hospital, they go to native women in their houses to deliver, some of them go there to register and some of the lucky ones deliver safely	a)Women's use of native homes b) Insufficient funds for antenatal bill
Okay so you mentioned that these women go to native homes, in your opinion are these native homes safe? And why do women go there	Sometimes they are safe and sometimes they are not safe. Why I said the native homes are safe is that some of them add it to prayers, they will say they believe God, when they say that, At times it works for them and sometimes some people die, that is one thing that makes the women loose	Belief in safety of native homes when prayers are included

		their lives	
B) Beliefs (Cultural, religious and traditional beliefs) and Food taboos	Can you mention some of the beliefs you know	I know that some of the belief there is that, you know these days things are horrible in Africa, more especially Africa , let me take for instance in Rivers State , there are so many diabolic spiritual things happening , if somebody wants to give birth, you will find out that some people will go and do one concoction or ritual or something before you give birth, some people will like to manipulate you, they will not allow you to deliver when you are supposed to deliver , they will do all types of diabolic things so that somebody will not deliver , and based on that the women now started thinking twice to go to the hospital, when you tell them to go to the hospital, they say they will not go that they will rather stay in the church to deliver, you find out that most of all these women that deliver you in the native homes are spiritualist, they give herbs, they press people, they will use their hands in pressing peoples stomachs like how doctors use thermometer/telescope to check people , the women use their hands to know the direction and how they will do to keep the shape of the baby and the sex, so through all those thing at times when you look at it, it works, and that makes the women go there, and that ,makes some women may go there and die too, sometimes the women require operations and they will not let you due to their inability to perform the operation, that when the time reaches you will deliver. Thereby leading to death.	A) belief in diabolic spiritual events . B) Beliefs that humans have powers to manipulate fellow humans into dying

Women s preference to giving birth in churches

Massaging of pregnant women's stomachs |

You mentioned that some native women can do their jobs better than the others, how will the women know the difference	What i mean by there are different levels and specialist, are those ones that add God and their Christianity and believe in God. like I earlier said about the diabolic things happening during pregnancy. Some people believe that with God they can scale through, even if you go to the doctor, they will direct you to do operation, everything operation. Some women like me are scared of operations. So when they see where they see a native woman that is a Christian and knows how to do their jobs that she will offer prayers for you and you will deliver, so many of them believe that. And because what you will be hearing these days is operation, we no longer hear about women delivering safely naturally like that, just operation. And it scares a lot of people, and so many women in their religious house get prophesies that if you go to deliver this child in the hospital, they will tell you to do operation and when you do operation, you will die, when they tell you that they have infused fear in your body thereby making the women refuse doctors advise. Then the women go back to the church to pray for them, and in the church after prayers some deliver safely and some die.	Frequency of news of caesarian operations leads to fear Prophesies preventing caesarian section
Food taboos	No not heard about anything	
Knowledge of government interventions	Not heard of any interventions	No

C) Impact and Solutions	What to do to stop women from dying during pregnancies (on govt /womens part)	To my own opinion, it is only God that can help someone, just like the doctors say we treat and God heals, they have no powers, all powers belongs to God .It is not in the hand of man to prevent, the only person that knows the right way to prevent something is God	God is the solution
	Women in trouble should		
	Ways of obtaining information on MM	In the hospital you can get educated there during antenatal you will learn the measures to take, risk and benefits	In Hospitals
	What kind of information would you like to hear	I want them to tell me what to do so that when women get to labour, they will not have such problems again, it is not a good thing that happy expectant women go in and die, so i want to experts to educate us on what to do to not hear that kind of news. It is sad news and we are not happy over it	Experts education on what to do to prevent MM
	Has anyone died from pregnancy and why	Yes, my elder sister, it was a very sad day and left a son, it was a placenta problem and nurse carelessness. they were both alive, but everyone was running around before you know it, they said the placenta has changed colour .	Problem with placenta changing colour
D) OTHER	Any other opinions and suggestions	What i will say is that the doctors should be able to talk to their nurses because the way the nurses treat the women when they are in labour is not good, they will be shouting for the pregnant women even when they are in labour, the doctors	a)Nurses treatment of women in labour not sympathetic b)Hospital

		should be able to see and inspect what the nurses are doing.	management

9: QUESTIONS TO ASK TO CHECK MODEL'S CLARITY (FISCHHOFF *ET AL.*, 2006)

Node review

Complete the following for each node:

1. Name of variable (or vector of related variables)
2. Possible values of the variable(s)
3. Possible procedures for measuring variable
4. Methods for measuring variables

Single link review

Complete the following for each link:

1. Names of nodes involved.
2. Simple statement of the link (e.g., **X** causes **Y** because; **X** is a good indicator of **Y** because).
3. If there are multiple variables at a node, does this simple statement hold for each combination of variables? (If not, consider partitioning the variables into separate nodes.)
4 Source and strength of claim for link. (Use dashed lines for speculative links or ones whose existence is in dispute.)
5. (optional) Strategies for studying link.
6. (optional) Strategies for affecting link.

Multiple link review

Complete for each link:

1. Does it go into a node that also has only one link going out? (If so, the intermediate node could be eliminated, unless having it provides a useful reminder of the connection between the nodes that it separates.)
2. Does it have the same input and output arrows as another link? (If so, consider combining them or representing that area in the influence diagram as a single topic in a higher-order [simpler] model.)
3. Is it part of a circular chain of links? (If so, identify the time dependency among the links—or group the chain in a single node, with its own internal dynamics.)

Overall model review

1. Are critical endpoints easily identifiable?
2. Would connecting any pair of unconnected nodes add predictive value?
3. Is there feedback from the endpoints to the initial conditions (indicating temporal dynamics)?
4. Are there important "index variables" that affect many model values, within the basic structure (e.g., gender: for a disease with different expressions for men and women)?

10: DETAILED LIST OF LAY PARTICIPANTS (PHASE 2)

PSEUDONYM	AGE	EDUCATION	AREA	EMPLOYMENT
1 Uche	25 or under	Primary	Rural	Job searching
2 Julie	25 or under	None	Rural	Job searching
3 Yvonne	25 or under	Secondary	Urban	Home maker
4 Sandra	25 or under	Primary	Rural	Self-employed
5 Mabel	25 or under	Other	Urban	Employed
6 Nyeche	26-40	First degree	Semi-Urban	Self-employed
7 Ethel	26-40	Second degree	Urban	Employed
8 Judy	26-40	Primary	Urban	Unemployed
9 Ann	26-40	Primary	Semi-Urban	Self-employed
10 Obunneke	26-40	Secondary	Urban	Employed
11 Osa	26-40	First degree	Semi-Urban	Employed
12 Orji	26-40	First degree	Urban	Employed

13 Patricia	26-40	None	Rural	Home maker
14 Blessing	26-40	Secondary	Rural	Self-employed
15 Briana	26-40	Secondary	Urban	Unemployed
16 Rachael	26-40	Secondary	Rural	Home maker
17 Rume	26-40	First degree	Semi-Urban	Employed
18 Sarah	26-40	Secondary	Semi-Urban	Unemployed
19Nancy	26-40	Primary	Rural	Home maker
20 Brenda	26-40	Secondary	Semi-Urban	Home maker
21 Chika	26-40	Secondary	Urban	Self-employed
22 Stella	26-40	First degree	Urban	Self-employed
23 Justina	41-49	First degree	Urban	Self-employed
24 Kelly	41-49	Second degree	Urban	Employed
25 Zoe	41-49	Secondary	Urban	Self-employed
26 Bridget	41-49	Secondary	Rural	Employed

27 Azuka	41-49	Primary	Rural	Home maker
28 Chioma	41-49	Other	Urban	Employed
29 Joy	41-49	None	Rural	Self-employed
30 Peace	41-49	Secondary	Urban	Job searching
31 Beyonce	41-49	None	Rural	Employed
32 Sade	41-49	Vocational	Urban	Home maker
33 Molade	41-49	Primary	Rural	Self-employed
34 Prisca	41-49	Secondary	Semi-Urban	Self-employed
35 Latasha	41-49	None	Rural	Job searching
36 Jane	41-49	Secondary	Rural	Home maker
37 Divine	41-49	Primary	Rural	Self-employed

11: PHOTOS OF DELIVERY AND POST DELIVERY ROOM IN A RELIGIOUS HOUSE

Figure 29: Delivery room of a religious house

Figure 30: Post delivery recovery room in the religious house