

POTENTIAL IMPLICATIONS OF CLIMATE CHANGE FOR THE ACHIEVEMENT  
OF THE MILLENNIUM DEVELOPMENT GOAL 5, IN THE GAMBIA, WEST  
AFRICA

By

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This research project title *The Implications of Climate Change on the Achievement of the Millennium Development Goal 5 in The Gambia, West Africa* has been examined and approved for the Department of Geography, and it completes the requirements for Geography 4526.0: Honours Research Project.

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## **ABSTRACT**

### **POTENTIAL IMPLICATIONS OF CLIMATE CHANGE FOR THE ACHIEVEMENT OF THE MILLENIUM DEVELOPMENT GOAL 5, IN THE GAMBIA, WEST AFRICA**

by Amanda Bartel

The purpose of this thesis was to explore the relationship between climate change and the achievement of the MDG 5; to reduce maternal mortality by three-quarters and provide universal reproductive health care by 2015. Data was obtained through on-site interviews with Gambians and analyzed for patterns and trends between interviewees. This study includes a detailed discussion of the current information regarding climate change and human health, a description of The Gambia as the study area, and a thorough examination of comments made by Gambians. The results of this study concluded that there is a connection between climate change and general weather changes and maternal health as it can directly decrease the access that women have to health care in rural 'up country' Gambia. However, though this is an important aspect of health care and needs to be addressed in order to reach MDG goals there are other factors that are having a bigger impact on The Gambia's inability to reduce maternal mortality and provide universal reproductive care. These factors include: transport and movement, diet, poverty, seasonal job restraints, and gender issues.

March 28, 2013

## **ACKNOWLEDGEMENTS**

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## **Chapter 1**

### **INTRODUCTION AND LITERATURE REVIEW**

#### **1.1 Introduction**

In 2007 the Government of The Gambia released a report called the “National Adaptation Programme of Action” (NAPA). This report addressed the rising concerns of climate change across The Gambia. As a developing country it is possible that climate change will have systemic impacts on both the physical and human environments. While scholarly and scientific research has begun to delve into its impacts on the physical environment, little research has been done on how the human environment will be impacted.

Developing countries have particular problems in relation to vulnerability to climate change, where women and children are highly marginalized and have a more difficult time adapting to changes in their lives. This is why it is important to anticipate the potential impacts of climate change on this group in order to mitigate their impacts and develop contingency plans for the future.

### 1.1.1 History of the Millennium Development Goals

In 2000 at the Millennium Summit held in New York City, 8 Millennium Development Goals (Table 1) were adopted by 189 nations in the Millennium Declaration. These nations had a vision for a future “...world with less poverty, hunger and disease, greater survival prospects for mothers and their infants, better-education children, equal opportunities for women, and a healthier environment...” (Homer, Hanna, & McMichael, 2009, p. 606).

<b>Table 1: Millennium Development Goals</b>	
<b>GOAL</b>	<b>TARGET</b>
Goal 1: Eradicate extreme poverty and hunger	<b>1.A:</b> Halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day <b>1.B:</b> Achieve full and productive employment and decent work for all, including women and young people <b>1.C:</b> Halve, between 1990 and 2015, the proportion of people who suffer from hunger
Goal 2: Achieve Universal Primary Education	<b>2.A:</b> Ensure that by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary school.
Goal 3: Promote gender equality and empower women	<b>3.A:</b> Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015
Goal 4: Reduce child mortality	<b>4.A:</b> Reduce by two third, between 1990 and 2015, the under-five mortality rate
<b>Goal 5: Improve maternal health</b>	<b>5.A: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio</b> <b>5.B: Achieve universal access to reproductive health</b>
Goal 6: Combat HIV/AIDS, Malaria and other diseases	<b>6.A:</b> have halted by 2015 and begun to reverse the spread of HIV/AIDS <b>6.B:</b> Achieve, by 2010 universal access to

Goal 6: Combat HIV/AIDS, Malaria and other diseases	<p><b>6.A:</b> have halted by 2015 and begun to reverse the spread of HIV/AIDS</p> <p><b>6.B:</b> Achieve, by 2010 universal access to treatment for HIV/AIDS for all those who need it</p> <p><b>6.C:</b> Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases</p>
Goal 7: Ensure environmental sustainability	<p><b>7.A:</b> Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources</p> <p><b>7.B:</b> Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss</p> <p><b>7.C:</b> Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation</p>
Goal 8: Develop a global partnership for development	<p><b>8.A:</b> Develop further an open, rule-based, predictable, non-discriminatory trading and financial system</p> <p><b>8.B:</b> Address the special needs of least developed countries</p> <p><b>8.C:</b> Address the special needs of landlocked developing countries and small island developing States</p> <p><b>8.D:</b> Deal comprehensively with the debt problems of developing countries</p> <p><b>8.E:</b> In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries</p> <p><b>8.F:</b> In cooperation with the private sector, make available benefits of new</p>

Source: United Nations, n.d. [http://www.un.org/millenniumgoals/11\\_MDG%20Report\\_EN.pdf](http://www.un.org/millenniumgoals/11_MDG%20Report_EN.pdf)

The deadline to reach these goals was 2015. Unfortunately it is unlikely that these goals will be completed globally by 2015, although progress has been made in some countries. For example, in Nicaragua the hunger rate has been reduced by more than half the 1991 rate (Goal 1), Kenya increased enrollment by 2 million primary pupils (Goal 2), in its 2008 election Rwanda elected a 56% majority of women into its parliament (Goal 3), in Bangladesh the under-five mortality rate has been reduced by 50% since 1990 (Goal 4),

contraceptive prevalence doubled in Malawi since 1992 (Goal 5), Cambodia reversed the spread of HIV (Goal 6), Costa Rica saved 730 km<sup>2</sup> of forests between 1999 and 2005 (Goal 7), and the prices of generic medicines were lowered to less than twice the international reference price in India (Goal 7)(United Nations, n.d.).

#### 2.1.1 Focus on MDG 5

In Shaw's (2006) article entitled "Women's right to health and the Millennium Development Goals: Promoting partnerships to improve access" points out the intricacy of the MDG goals and women's health, commenting that "...all eight goals are clearly intertwined with the lives and health of women..." (p. 208). The goal that is most intrinsically linked to women is Goal 5: Improve Maternal Health, which has two targets, (1) reduce by three-quarters, between 1990 and 2015, the maternal mortality rate (MMR) and (2) achieve, by 2015, universal access to reproductive health.

#### 3.1.1 MDG 5 in Africa

Across the continent of Africa the MDG 5 is far from close to being achieved. In 2009 the United Nations reported that the global rate of maternal deaths had only decreased from 480 per 100,000 births in 1990 to 450 in 2005. Even more dramatically Homer *et al* (2009) state that "[e]very year, an estimated 536,000 women and girls die as a result of complications during pregnancy, childbirth or the six weeks following birth" and 99% occur in developing countries (2009, p. 606).

In 2009 the MDG Report made by the United Nations Economic Commission for Africa cited the 2005 estimate of maternal mortality as "...900 deaths per 100, 000 live births for SSA"(sub-Saharan Africa) and that "...SSA [had] made the least progress globally in reducing the MMR between 1990 and 2005"(p. 26-27). Then in 2011 the United Nations produced a report further stating that although there has been significant progress the target is still far off. Based on the data from 2008 the rate of maternal deaths per 100,000 live births had declined to 640, still a significant number considering that the rate in developed countries is a mere 17(United Nations, 2011, p. 28).

#### 4.1.1 MDG 5 Health Initiatives in The Gambia, West Africa

The Republic of The Gambia issued an MDG Status Report in 2009 to update The Gambia's progress on the goals. In 2007 the government indicated its desire to make maternal and reproductive health a priority by declaring free Reproductive and Child Health Services for all Gambians (Republic of The Gambia, 2009, p. 37). Later the Health Strategic Plan (2010-2014) indicated its mission to:

- Promote and protect the health of the population by providing a comprehensive healthcare package in partnership with all relevant stakeholders
- Ensure high coverage and affordable essential healthcare services
- Ensure a reduction of maternal and infant morbidity and mortality

(Source: Republic of The Gambia, 2009, p. 37)

To achieve these goals the 'Health to Wealth' health policy of 2007-2020 laid out three strategies:

- Improve the provision of an access to quality maternal, child and newborn care including emergency obstetric (EOC) and family planning services countrywide.
- Increase awareness on sexual and reproductive health issues
- Promote partnership and co-ordination among stakeholders

(Source: Republic of The Gambia, 2009, p. 37)

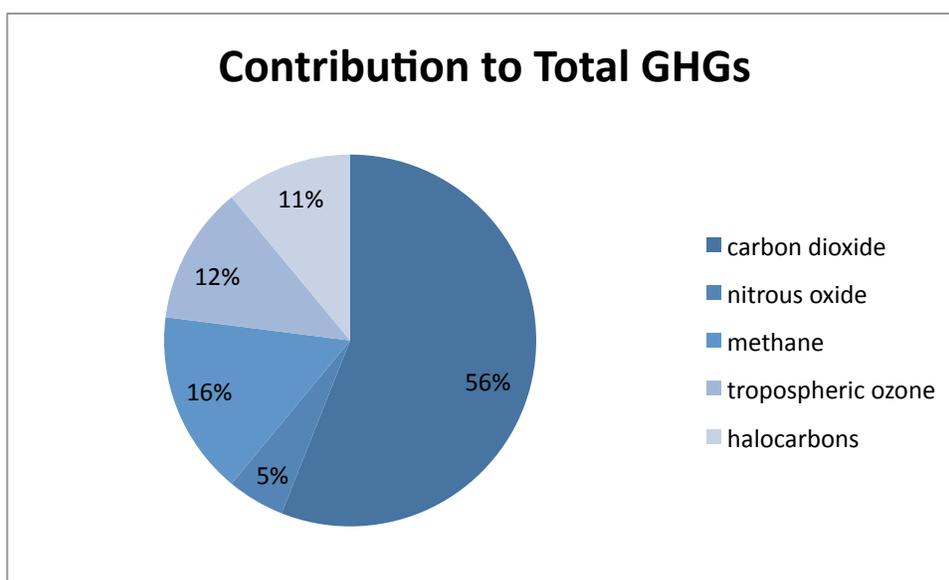
Clearly health has become a priority for the Gambian government. Throughout The Gambia 225 public and private facilities form a network of health facilities. The Republic of The Gambia MDG Status Report 2009 indicates that because of nationwide maternal health services the MMR “...has over the years declined significantly from 1,050 to 730 per 100,000 live births between 1990 and 2001 and further reduced to 556 per 100,000 in 2006” (p. 37). However although this reduction is significant, The Gambia still has one of the highest MMR’s in sub-Saharan Africa. It must be noted that this data is based on self-reported government estimates because The Gambia lacks official data on maternal mortality.

### **2.1 Global Climate Change**

Climate Change is not simply a regional or continental phenomenon, it occurs on a global scale. Despite the fact that the majority of climate change gases are produced by developed countries it is developing countries that are hardest hit. Thus many authors have set out to explain how changing global patterns of climate will affect developing regions.

### 5.1.1 Climate Change Science

Mark Twain said, “Climate is what we expect; weather is what we get” (In Bloom, 2010, p. 3). Climate is the long-term average of weather conditions, such as minimum and maximum temperatures, precipitation, and wind speed. The greenhouse effect is a natural process, what is not natural is that fossil fuel emissions have “...augmented the greenhouse effect in the lower atmosphere” (Ahern & McMichael, 2002, p. 150). Contributions of greenhouse gases are made by different percentages of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), tropospheric ozone (O<sub>3</sub>) and halocarbons, including CFCs (Dow & Downing, 2011, p. 35).



**Fig. 1: Contribution to Global Greenhouse Gases**

Graph adapted from: Dow, K., & Downing, T.E., 2011

An unnatural greenhouse effect occurs because of an increase in the atmospheric concentration of carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons. Al

Gore in *The Inconvenient Truth* put it most simply; this thickening of the atmosphere “...traps a lot of the infrared radiation that would otherwise escape the atmosphere and continue out to the universe. As a result, the temperature of the Earth’s atmosphere – and oceans – is getting dangerously warmer” (Gore, 2006, p. 27). In fact, in the mid-19<sup>th</sup> century the concentration of carbon dioxide in the atmosphere was about 270 parts per million, but “[n]ow it’s at 387 parts per million – higher than at any point in the past 650,000 years and rising at more than about 2 parts per million annually”(Homer-Dixon & Garrison, 2009, p. 15).

#### 6.1.1 Climate Change Projections for West Africa

Climate change models for West Africa continue to become more precise and accurate, however, to-date they predict a wide range of climate possibilities. In fact, “[t]here is no consensus among the studies as to whether climate change during this century will favor more frequent Sahel droughts or rainier summers” (Druyan & Fulakeza, 2012, p. 56).

In their article “Climate change scenarios for dryland West Africa, 1990-2050” van der Born et al (2004) use two GCM’s (General Circulation Model): GFDL and Max Planck (MPI-GCM), to draw climate change predictions for West Africa in combination with Baseline A and Baseline C.

<b>Table 2: Circulation Models</b>		
Baseline A (medium population and medium economic growth)	In combination with:	Results:
	GFDL GCM	<ul style="list-style-type: none"> <li>• Lower temperature increase</li> <li>• Precipitation – no decreasing trend</li> <li>• No shift in vegetation or aridity</li> </ul>
	MPI GCM	<ul style="list-style-type: none"> <li>• CO<sub>2</sub> concentration 550 ppmv</li> <li>• Temperature increase – 1.5 to 2.5°C</li> <li>• Precipitation decrease – 100 to 400 mm yr<sup>-1</sup></li> <li>• Vegetation zone shift towards the south</li> <li>• Aridity shift to the south</li> </ul>
Baseline C (medium population and high economic growth)	In combination with:	Results:
	MPI GCM	<ul style="list-style-type: none"> <li>• Temperature increase 0.5° higher than Baseline A</li> <li>• Stronger precipitation decrease</li> <li>• Similar aridity</li> </ul>

Table adapted from: van der Born et al, 2004

### 3.1 Climate Change and Human Health

Health Canada defines human health as “a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity” (Sequin & Berry, 2008, p. 6). Health is strongly connected to a variety of factors, which include: social and

economic factors, health services, education and literacy, biology and genetic endowment, gender and culture, the physical environment, as well as climate” (Sequin & Berry, 2008, p. 6).

<b>Table 3: Climate Change and Health Impacts</b>		
Health Impact Categories	Climate-related Causes	Projected/Possible Health Effects
Temperature Extremes	<ul style="list-style-type: none"> <li>• More frequent and severe heat waves</li> <li>• Overall warmer weather</li> </ul>	<ul style="list-style-type: none"> <li>• Heat-related illnesses and deaths</li> <li>• Respiratory and cardiovascular disorders</li> </ul>
Extreme weather events and natural hazards	<ul style="list-style-type: none"> <li>• More frequent types of severe weather</li> <li>• Heavy rains causing floods</li> <li>• Rising sea levels and coastal instability</li> <li>• Increased drought in some areas, affecting water supplies and agricultural production</li> <li>• Social and economic changes</li> </ul>	<ul style="list-style-type: none"> <li>• Death, injury and illness from violent storms, floods, etc.</li> <li>• Health impacts due to food or water shortages</li> <li>• Illnesses related to drinking water contamination</li> <li>• Effects of displacement of populations and crowding in emergency shelters</li> <li>• Indirect health impacts from ecological changes, infrastructure damages and interruptions in health services</li> </ul>
Contamination of food and water	<ul style="list-style-type: none"> <li>• Contamination of drinking water by run-off from heavy rainfall</li> </ul>	<ul style="list-style-type: none"> <li>• Outbreaks of strains of micro-organisms such as E. coli, Cryptosporidium, Giardia, S. typhi (typhoid), amoebas and other water-borne pathogens</li> <li>• Food-borne illnesses</li> <li>• Other diarrhoeal and</li> </ul>

		intestinal diseases
Infectious diseases, transmitted by insects, ticks and rodents	<ul style="list-style-type: none"> <li>• Faster maturation in pathogens within insect vectors</li> <li>• Longer disease transmission season</li> </ul>	<ul style="list-style-type: none"> <li>• Increased incidence of vector-borne infections, such as malaria (CITE)</li> </ul>

Table Source adapted and modified from: *Health Canada Report* by Seguin & Berry, 2008, p. 7

In recent years there has been more focus on the social and cultural impacts of climate change, particularly in the area of health. For a long time the interaction between human health and climate change has been out of the scope of policy-makers, but recently there has been a call to researchers to study these impacts because

“[b]ased on WHO’s partial estimate of climate change health impacts in the year 2000 an estimated 200,000 deaths currently occur each year in the world’s low-income countries from a subset of climate-sensitive health outcomes – crop failure and malnutrition, diarrhoeal disease, malaria and flooding (McMichael, 2009, p.123).

M. M. Hedger from the UK Environment Agency (2003) comments that,

“[i]t can be expected that the most vulnerable groups will suffer the most: the old and young, the poor, particularly those not on adequate nutritional levels, and the infirm. Health impacts are expected generally to be adverse, notably in the developing world. Changes in the frequency and intensity of the extremes of cold, heat, flood, and drought will have knock-off effects on mortality, morbidity, and population displacement, and adverse effects on food production and on fresh water available and quality, increasing the risks of infectious disease epidemics, particularly in developing countries”(p. 890).

Climate change will affect human health through direct and indirect effects. Ahern and McMichael (2002) break down this distinction. Direct health effects include

“...changes in mortality and morbidity from an altered pattern of exposure to thermal extremes, the respiratory health consequences of increased exposures to photochemical pollutants and aeroallergens, and the physical hazards of the increased occurrence...of storms, floods or droughts. Intensified rainfall, with flooding, can overwhelm urban wastewater and sewer systems, leading to contamination of drinking water supplies...” (p. 150).

Whereas indirect health effects include “...alterations in the geographical range (latitude and altitude) and seasonality of certain vector-borne infectious diseases such as malaria, dengue fever, schistosomiasis, leishmaniasis and Lyme disease” (Ahern & McMichael, 2002, p. 151). These indirect and direct effects impact rural communities through “...large scale deforestation and resource stripping [that] has led to devastating soil erosion, water shortages, and contamination” (Tarantola, 2009) creating health risks “...because of insufficient resources and a lack of attention” (Commonwealth Secretariat, 2009, p. 5).

#### 7.1.1 Climate Change and Maternal Health

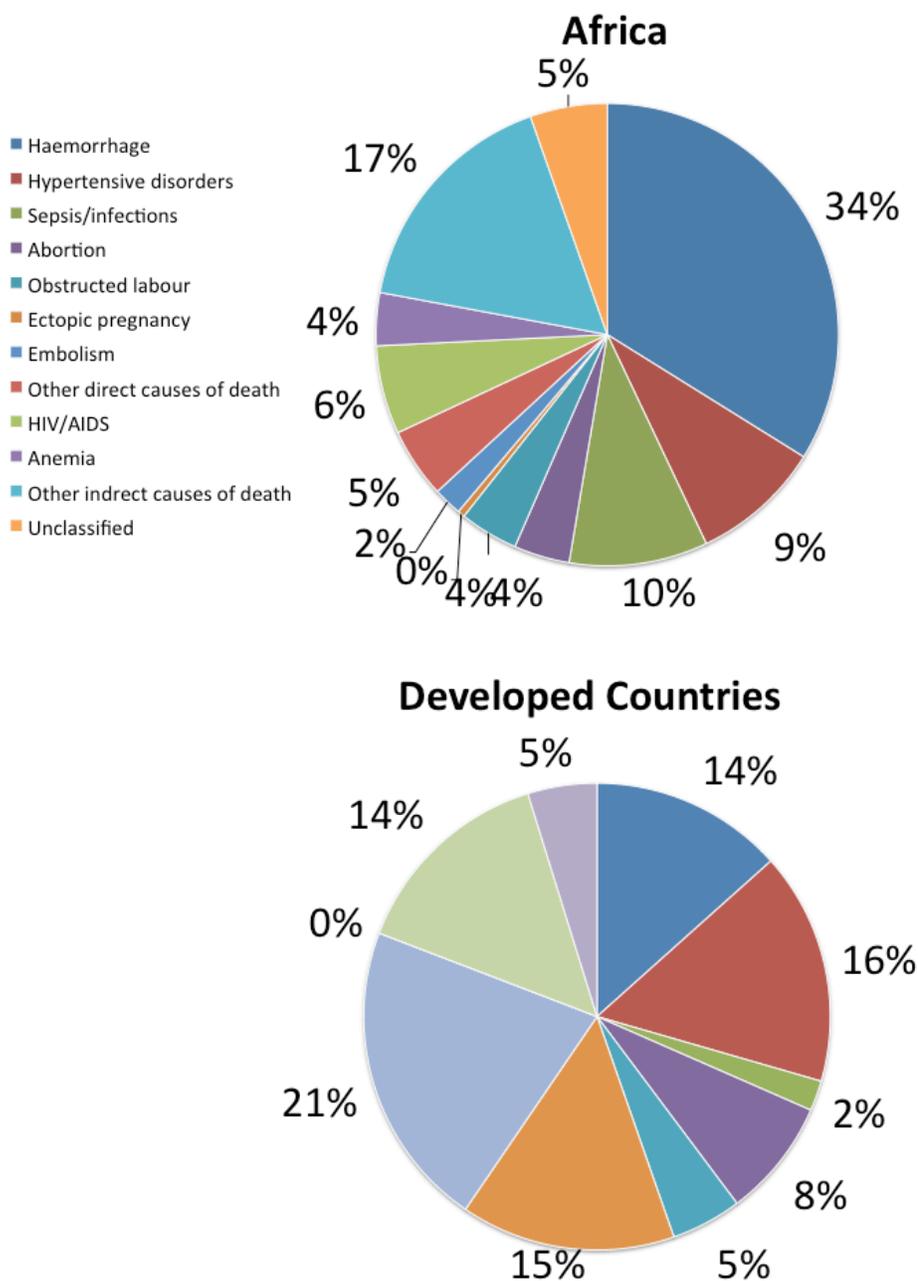
In their 2011 article on “Water, climate change, and maternal and newborn health”, Watt and Chamberlain pioneered the research call to action by stating that “[t]here is a clear need for research on the complexity of the relationships between climate change, water, and maternal and newborn health...” and that “[r]esearchers must not assume that climate change and water-related health issues are not gender neutral,

especially in relation to maternal and newborn health”(p. 495). Rao and Buckley (2011) add that “[b]oth history and recent experience have shown that when conditions are harsh and resources scarce, the poor and groups marginalized by more than poverty – women, the young, the elderly, indigenous populations and other minorities – are most vulnerable”(p. 356). Climate change will impact marginalized women in particular because these women are highly dependent on the natural resources of their environments. This dependency increases vulnerability to climate change and undermines the MDGs, such as Goal 5 (Rao & Buckley, 2011, p. 357). As mentioned before Goal 5 is focused on maternal health, particularly the reduction of maternal mortality and it is clear from the literature that this increased vulnerability can lead to increased mortality and morbidity. Kavita Ramdas puts it best “[t]he gender inequalities that define [women’s] lives prior to a disaster are really what put them at such a greatly increased risk after a disaster.” (*as cited in* Republic of The Gambia, 2009, p. 2).

#### **4.1 Trends Global Maternal Mortality Rates**

Globally, the maternal mortality rate (MMR) is defined by the World Health Organization (2012) as, “...the number of maternal deaths in a population divided by the number of live births [and] depicts the risk of maternal death relative to the number of live births” (p. 5). A pregnancy-related death is defined as, “...any death during pregnancy, childbirth, or the postpartum period even if it is due to accidental or incidental causes” (WHO, 2012, p. 4). Obstetric deaths may occur during pregnancy, delivery, and postpartum and are separated into two categories, direct and indirect deaths. Direct causes are a result of complications during the entire pregnancy, including postpartum, from

“...interventions, omissions, incorrect treatment...haemorrhage, pre-eclampsia/eclampsia, or those due to complications of anesthesia or caesarean section” (WHO, 2012, p.4). Figure 2 compares the primary and secondary direct causes of maternal mortality between Africa and the developing world. Indirect causes of death stem from a previous underlying diseases or a disease occurring during pregnancy, such as malaria (WHO, 2012, p. 4).



**Fig. 2: Causes of Maternal Mortality in Africa**

Source: Khan et al, 2006, 1069.

In their comprehensive document “Trends in maternal mortality: 1990-2010” the WHO (2012) reports that “[d]eveloping countries account for 99% (284 000) of the global maternal deaths, the majority of which are in sub-Saharan Africa (162 000)..” and that

“[t]he MMR in developing regions was 15 times higher than in developed regions...”(p. 22). There is obviously a large disparity between the developed and developing world (Table 4).

<b>Region</b>	<b>MMR<sup>a</sup></b>	<b>Number of maternal deaths<sup>a</sup></b>	<b>Lifetime risk of maternal death,<sup>a</sup> 1 in:</b>
World	210	287 000	180
Developed regions <sup>b</sup>	16	2200	3800
Developing regions	240	284 000	150
Northern Africa <sup>c</sup>	78	2800	470
Sub-Saharan Africa <sup>d</sup>	500	162 000	39
Eastern Asia <sup>e</sup>	37	6400	1700
Eastern Asia excluding China	45	400	1500
Southern Asia <sup>f</sup>	220	82 000	160
Southern Asia excluding India	240	28 000	140
South-eastern Asia <sup>g</sup>	150	17 000	290
Western Asia <sup>h</sup>	71	3500	430
Caucasus and Central Asia <sup>i</sup>	46	750	850
Latin America and the Caribbean	80	8800	520
Latin America	72	7400	580
Caribbean	190	1400	220
Oceania	200	510	130

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

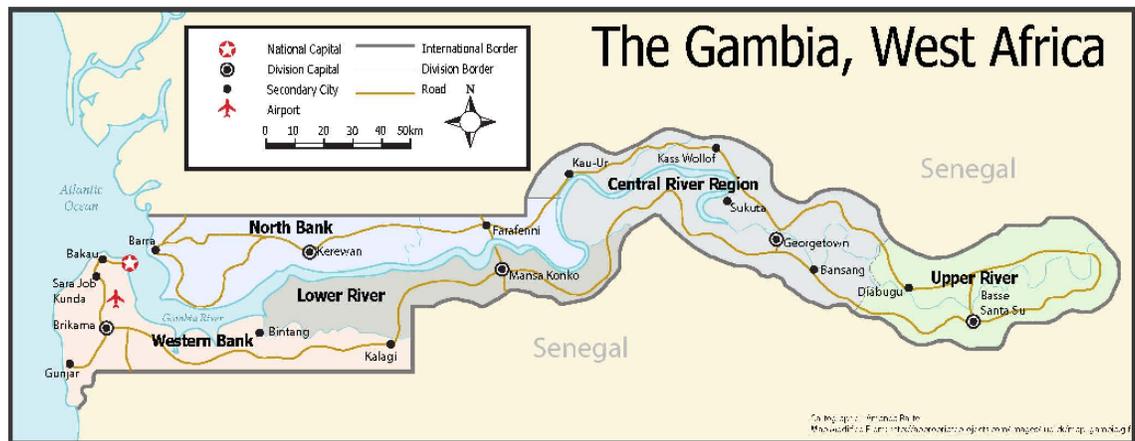
b, c, d, e, f, g, h, i: see appendix A

Table Source Modified from: WHO. (2010). *Trends Maternal Mortality: 1990 to 2008*, p. 43

### 8.1.1 Maternal Health in The Gambia

In their article “Maternal mortality in rural Gambia: levels, causes and contributing factors” Walraven *et al* (2000) attempt to distinguish why maternal mortality is so high in

The Gambia. They note that it is difficult to delineate the causes because “[m]uch of the information about maternal mortality in developing countries is based on hospital data, which...are a poor reflection of the extent of the situation in the community”(p. 603). The authors used a maternal mortality questionnaire that incorporated a verbal autopsy administered by the author and experienced field worker to interview one or more persons who were present during the illness and subsequent death of 74 women, 18 of whom were considered “maternal”, in the town of Farafenni (Walraven *et al* 2000, p. 606-607). The results of these interviews indicated that “...there has been a major reduction in maternal mortality in this part of rural Gambia over the last 15-20 years...” possibly due to “...a combination of increased availability of essential obstetric care, improved transport, and increased communication” (Walraven *et al*, 2000, p. 607). Unfortunately, the level of maternal mortality in this area is still 50 times higher than North America and western and Northern Europe (Walraven *et al*, 2000). In another study Cham *et al* (2005) reviewed 42 cases of maternal deaths and applied a verbal autopsy to 32 of the cases to “...describe the socio-cultural and health service factors associated with maternal deaths in rural Gambia”(p. 1). This study focused on the Central and Upper River Divisions in which there are 17 medical facilities including one providing emergency obstetrics care (Cham *et al*, 2005, p. 2).



**Fig. 3: The Gambia country divisions**

Map Source Modified From: [http://appropriateprojects.com/images/rudick/map\\_gambia.gif](http://appropriateprojects.com/images/rudick/map_gambia.gif)

The results of this study indicate that a number of factors including: a delay in deciding to seek care, underestimation of the severity of the complication, cultural belief, experience with the health care system, delay in reaching an appropriate medical facility, lack of transportation, prolonged transportation, seeking care at more than one medical facility, and a delay in receiving prompt and appropriate care after reaching the hospital, all contributed to the maternal mortality rate (Cham *et al*, 2005, p. 3-5).

## **Chapter 2**

### **STUDY AREA**

#### **5.1 Introduction to The Gambia**

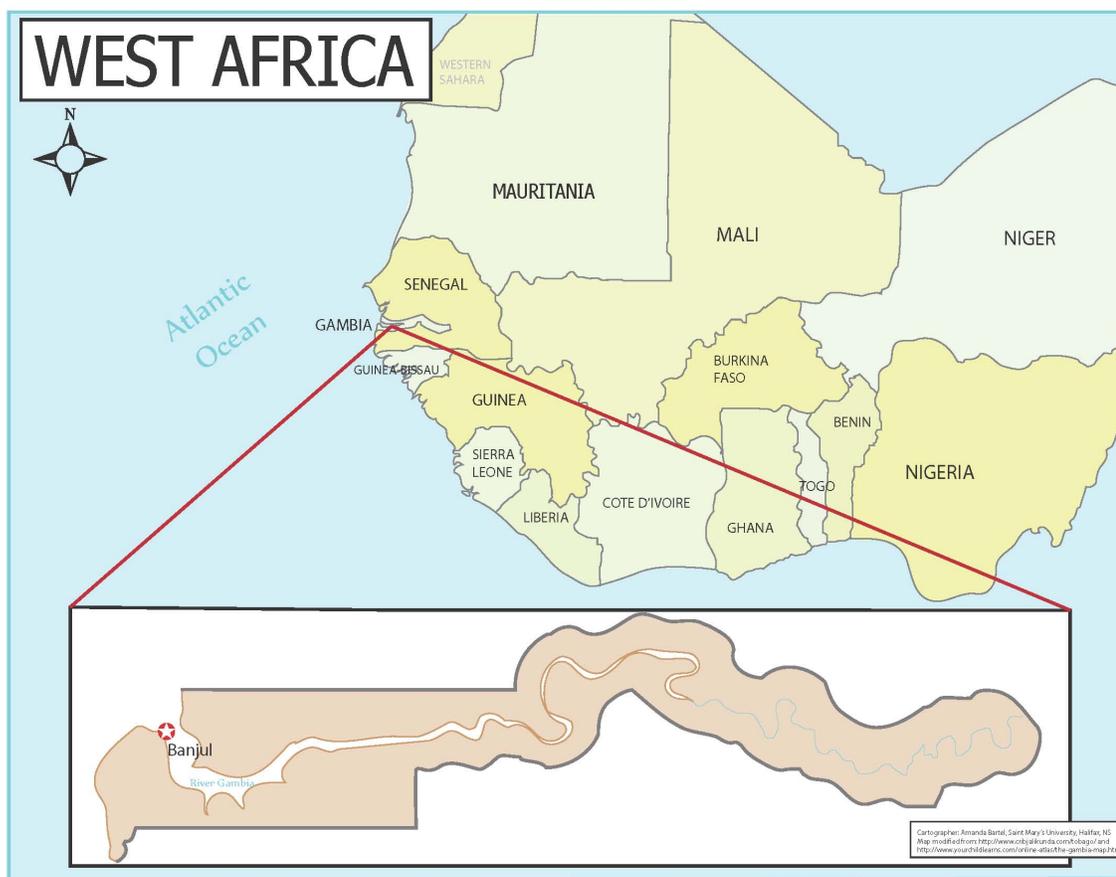
To understand the connections between climate and culture in The Gambia it is important to know a little about the history of The Gambia. The history of The Gambia impacted how the country was settled along the River Gambia creating a network of rural communities, rather than a nucleus of population around a few specific city or town centres. The effect of this dispersal of population is that movements can become restricted, especially in situations where there have been extreme weather events and villages can be a great distance from hospitals or healthcare centres.

In 1816 a coastal trading settlement was established called Bathurst (now Banjul) and by the end of the 19<sup>th</sup> century the British held firm control over a small territory called the Republic of The Gambia (Europa, 2010, p. 529). However, before that this tiny land area passed through many hands: part of the Ghanaian empire in the 5<sup>th</sup> to 8<sup>th</sup> centuries, then part of the kingdom of Songhai, and then part of the Mali empire during the 13<sup>th</sup> century (Commonwealth, 2012). It wasn't until 1965 that The Gambia gained independence from the British becoming a part of the British Commonwealth. After a bloodless coup in

1994, which disposed President Jawara, an election was held in 1996 electing Yahya Jammeh President of The Gambia, a position he holds up to the present (Commonwealth, 2012).

### **6.1 Physical Geography of West Africa**

Of the 54 independent countries on the continent of Africa 15-18 of those make up West Africa. The core countries include: Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo. According to the UNDP and Lye (2002) West Africa also includes Mauritania, Chad and Cameroon (UNDP, n.d.). In total these countries cover an area of approximately 8.4 million km<sup>2</sup> and is home to approximately 250 million people (Hiraldo, 2011, p.4). The landscape of the region is very diverse, varying from desert landscape in the north and tropical landscapes in the south (African Cultural Center, n.d.).



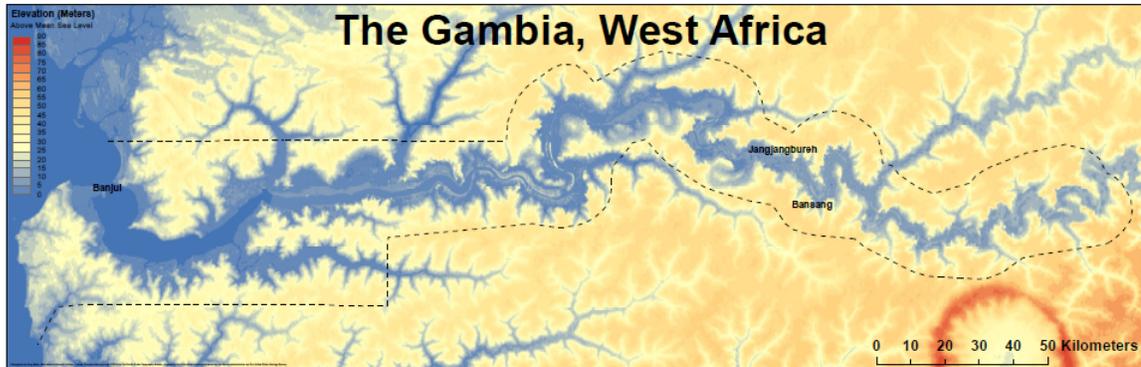
**Fig. 4: Countries of West Africa**

Map Modified From: <http://www.cribjalikunad.com/tobago/> and <http://www.yourchildlearns.com/online-atlas/the-gambia-map.htm>

#### 9.1.1 Physical Geography of The Gambia

Along the northern coast of West Africa lie the countries of Senegal, and The Gambia. The country of The Gambia is situated around the River Gambia, which is the primary reason behind the country's long, narrow shape. The entire country is 350 km long from east to west and at the most 48 km wide, but on average about 24 km wide, the River Gambia running through the whole country (Binns, Dixon, & El, 2012 & Europa, 2010, p. 529). The total land area of the country is 10,690 km<sup>2</sup> "...making it the smallest country in mainland Africa" (Government of The Gambia, 2007, p. 6). The elevation of

The Gambia varies very little with most of the country, especially the coastal areas, being very close to sea level.



**Fig. 5: The Gambia Elevation Map**

Map used with permission by Greg Baker Saint Mary's University, Halifax, Canada.

Map Source: Elevation data captured 02/2010 by the Shuttle Radar Topography Mission, provided by the United States National Aeronautics and Space Administration and the United States Geology Survey.

The capital city of The Gambia, Banjul, is only 1 m above sea level (Commonwealth, 2012). At the east end of the country the highest elevation is below 55 m (Government of The Gambia, 2007, p. 8). The country is divided into 6 different regions, also known as Local Government Areas (LGA): Greater Banjul Regions (made up of 2 zones: Banjul Municipality and Kanifing Municipality), North Bank Region, Western Region, Lower River Region, Central River Region, Upper River Region. Each of these regions has a main city that is referred to as the division headquarters.

<b>Table 5: Local Government Areas</b>							
Region – LGA	Division Headquarters	Land Area		Population		Households	
		Sq. km	% Total	Count	% Total	Count	% Total
Greater Banjul	Banjul Municipality	12	0.1	35,061	2.6	6,853	4.4
	Kanifing Municipality	76	0.7	322,735	23.7	49,015	31.1
WR	Brikama	1,764	16.5	389,594	28.6	45,138	28.7
LRR	Mansakanko	1,618	15.1	72,167	5.3	8,432	5.4
NB	Kerewan	2,255	21.1	172,835	12.7	18,241	11.6
CRR	Kuntaur	1,467	13.7	78,491	5.8	7,103	4.5
	Janjanbureh	1,428	13.4	107,212	7.9	10,113	6.4
URR	Basse	2,070	19.4	182,586	13.4	12,592	7.9
The Gambia		10,690	100	1,360,681	100	157,487	100

Table Source Modified from: Gambia Bureau of Statistics, 2003, p. 4.

This study focuses on two villages in the Central River Region, Bansang and Janjangbureh. The entire country is equally divided between forest and arable land (40% each).

### **Fig. 6: Central River Region**

Map Source Modified from: [http://appropriateprojects.com/images/rudick/map\\_gambia.gif](http://appropriateprojects.com/images/rudick/map_gambia.gif)

#### **7.1 Central River Region (CRR)**

This study was conducted in the rural, upcountry towns of Bansang and Janjangbureh as well as the areas surrounding them in the Central River Region of The Gambia, West Africa (Figure 6). The Central River Region is made of up 2,895 km<sup>2</sup> land and is the largest Local Government Area. This LGA is occasionally considered to be split into two LGAs; the CRD North whose headquarters is Kuntaur, and the CRD South whose headquarters is Janjangbureh (Columbia University, 2008). The CRR consists of 10 districts and Bansang and Janjangbureh are both found in the district Fuladu West.

The banks of the CRR host mangroves that graduate into “freshwater riverine forest and thicket”(Government of The Gambia, 2007, p. 25). The North Bank is dominated by agricultural and fallow land converted from savannah woodland and the South bank dominated by agricultural land carved into savannah woodland. East of Janjangbureh (Georgetown) the land “...area is enclosed by rocky hills” (Commonwealth, 2012).

Janjangbureh is found on a small island accessible by bridge or ferry between the north and south banks of the river. Janjanbureh is a tourist spot, popular with bird watchers. The town lies 300 km upriver from Banjul and has a population of 3,223 (Columbia University, 2008). Bansang is found on the south bank of the River Gambia, 303 km upriver from the capital city of Banjul (Britannica, 2013). The population of Bansang as of 2003 was 6,966 (Britannica, 2013). Though Janjanbureh was the unofficial ‘upcountry’ capital until the 1960s, that honor has been passed onto Bansang because of the inaccessibility of Janjanbureh to the rest of the country (Columbia University, 2008). The largest hospital away from the capital is found here in Bansang, Bansang Hospital.

### **8.1 Climate of West Africa**

West Africa is not covered by one climatic zone, but by many: humid, sub-tropical humid, sub-tropical dry, semi-arid, arid. However, these regions can be generalized into two distinct cycles of weather patterns. The north in the arid and semi-arid zones there is one dry and one wet season because of the influences of the Sahara and Sahel, but in the south where it is more humid there are two dry seasons and two rainy seasons due to the

influence of the Gulf of Guinea. The dry and rainy seasons experience distinct weather patterns, which vary widely in precipitation while the temperature remains somewhat constant, high throughout the whole year, which are highly influenced by the West African Monsoon.

#### 10.1.1 West African Monsoon

Weather in West Africa is strongly influenced by the West African Monsoon (WAM). The West African Monsoon is a wind system that blows northeasterly during the cooler months and southwesterly during the warmer months between 9° and 20° N (Britannica, 2013). From July-September (JAS) the WAM winds blow north of the Gulf of Guinea bringing moist air and increased rainfall over West Africa. From January-March the winds blow southward over the Sahara bringing dry, hot winds (known as the Harmattan) and decreased rainfall (Britannica, 2013).

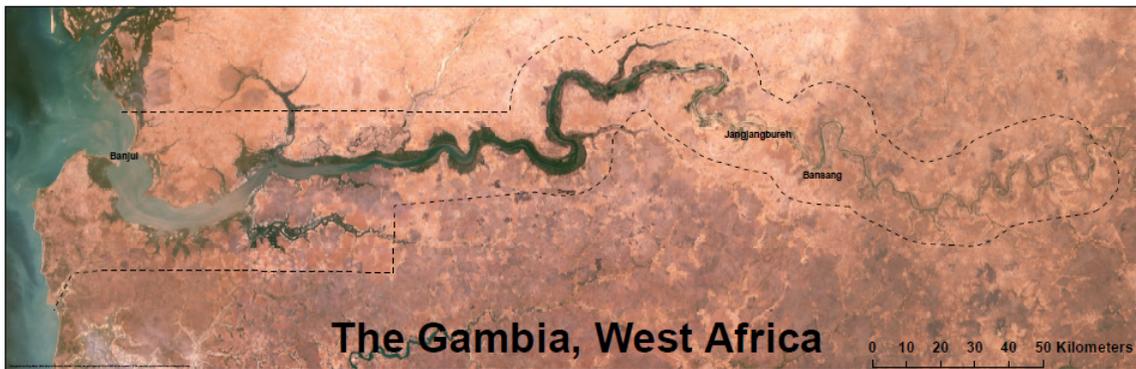
#### 11.1.1 Climate Change Projections – West Africa

Climate change projections are scenarios that could possibly happen, nothing is completely certain, and because of this there are a wide range of rainfall predictions for West Africa and The Gambia. Most projections estimate that rainfall could decrease by 0.5-40% by 2025 (ICUN, 2004). The Gambia, in particular the Sahel desert region, has already experienced a marked decline in rainfall. However, according to The Gambian government NAPA report over the past 60 years two trends have emerged in the rainy season: the southward drift of the rainfall contours and absolute increase in rainfall (Government of The Gambia, 2007, p. 11 & 13). At the 800mm contour rainfall

displayed at distinct southwardly movement trend during the July-August-September (JAS) rainfall with a 36% to 93% decrease. Using data from two towns, one on the coast Yundum and the other up country (Basse) the NAPA report show a 0.67°C and 0.40°C increase, respectively. Though models indicate that drought will be the widespread effect of climate change research has indicated that instead climate change will result in an increase in extreme weather events, such as rainfall that leads to flooding due to warming of the oceans and rising air temperature (Le Treut *et al*, 2007). Simply put, there will be less frequent, more intense rainfall that "...may lead to more frequent water quality problems" (The Government of The Gambia, 2009, p. 18). However, it is more likely that this region will be stuck in a pattern of recurrent drought.

### **9.1 River Gambia**

The River Gambia is a tidal inlet. It extends 1,130 km from its mouth at the Atlantic Ocean in The Gambia into the Fouta Djallon, North Guinea (Columbia Encyclopedia, 2011). The land around the river is made up of "...mangrove swamps, marshes and woodland areas..." (Murray, 1982, p.133) and can be navigated at the way to Janjangbureh, 280 km upstream (Access Gambia, 2013). Senegal and Guinea can be accessed by the Gambia River. The river has two different zones, freshwater and estuarine, because it is a tidal inlet with continental origins. Saltwater intrudes up the river "...180 km in the rainy season to 250 km in the dry season" (Global Environmental Facility, 2012).



**Fig. 7: The Gambia River**

Map used with permission by: Greg Baker, Saint Mary's University, Halifax, NS

Map Imagery captured 02-04/2003 by the Landsat 7 ETM, provided by the United States Geological Survey.

### **10.1 Adverse Health Effects of Climate Change**

The NAPA report indicates that there are direct climate change impacts on health. The impacts from climate change of health come from heat stress and flooding. Heat stress is a relatively new phenomenon that could result in "...irrational behavioural responses such as unprotected out-door cooling could increase the incidence of malaria, dengue and yellow fever" (Government of The Gambia, 2007, p. 19). According to the report the impacts of flooding include: drowning and risk of injury and this author would like to suggest that another impact is the restriction of natural movements, which in a medical emergency can lead to medical complications resulting in death, in this case of the mother and/or child.

### **11.1 Demography of The Gambia**

As of 2003 the census revealed that the population of The Gambia was 1,364,507 and it was almost equally divided between males and females, 687,781 and 676,726 respectively. The UN estimates that in 2010 of those individuals, 737,000 were between

the ages of 0-14, 964,000 between the ages of 15-64, and 50,000 over the age of 65.

Other important health statistics of The Gambia:

<b>Table 6: Health and welfare statistics</b>	
Total Fertility Rate (children per woman, 2010)	4.9
Under-5 mortality rate (per 1,000 live births, 2010)	98
Physicians (per 1,000 head, 2010)	0
Hospital beds (per 1,000 head, 2005)	1
Life expectancy at birth (years)	58

Table Sources: <http://databank.worldbank.org/ddp/home.do?Step=3&id=4> and [http://www.unicef.org/infobycountry/gambia\\_statistics.html](http://www.unicef.org/infobycountry/gambia_statistics.html)

Largely an agrarian country most citizens live in the small towns west of the capital city Banjul that have less than 500 people (Republic of The Gambia, 2009, p. 9). The NAPA report states that “[o]nly four big towns in the rural countryside; Barra-Kunama, Farafenni, Soma, and Basse have more than 10,000 residents”(Republic of The Gambia, 2009p.9). In the Central River Region the majority of the population is rural and the population density is under the country average of 128 per km<sup>2</sup>, at between 75-100 people per km<sup>2</sup>.

#### 12.1.1 Medical Facilities in the CRR

Medical facilities in The Gambia are built on 3 levels: primary, secondary, and tertiary. *Primary level* facilities are “...points of entry...”(Synergy International, n.d., p. 6) into the healthcare system. These facilities are found in Primary Health Care (PHC) and key villages, trekking stations are apart of this level. These villages have a population of over 400. This type of health care centers around the government training of a Village

Health Worker and a Traditional Birth Attendant (TBA). The TBA is responsible for assisting in home births and referring at risk women to the local health centre. *Secondary level* is quite chaotic and comprised as many different types facilities, including Major health centres (MaHC), Minor health centres (MiHC), and dispensaries. Within The Gambia there are: "...7 main government-run/private health care centres, 12 smaller centres, and 19 pharmacies, with each providing in-patient and out-patient treatment"(Access Gambia, 2013), comprised of a team of doctors, nurses and other staff on the secondary level. Finally on the *tertiary level* the 4 main referral hospitals are found: APRC General Hospital Farafenni, Bansang Hospital, Royal Victoria Teaching Hospital, and Sulayman Junkung General Hospital (these are operated by the government), the Medical Research council, some private and NGO-run clinics. The main referral hospital is the Royal Victoria Teaching Hospital in Banjul.

Level	Facility Type	Number	Location
Primary	Trekking Stations	47	Various
Secondary	Major Health Centre	1	Kuntaur
	Minor Health Centre	2	Kaur
			Kudang
	Dispensaries	5	Janjanbureh
			Brikamaba
			Sami Karantaba
			Dankunku
		Chamen	
Teritary	Hospital	1	Bansang

Table Source Modified from: Synergy International, n.d.

As mentioned above of the 3 main referral hospitals found in The Gambia, one is found in the CRR; Bansang Hospital. This hospital has a specific catchment area surrounding it

in which it provides general health care needs to the population that falls within this area. In a report made by Synergy International titled “Health Mapping - Final Report” it is reported that there are “[o]ver 345,000 people are in Bansang Hospital catchment area, one –third of Gambia’s population”, yet the hospital only has 135 beds (Synergy International, n.d., p.22). Of course outside of the catchment area around the hospital there are many more men, women, and children that need health care. At Bansang Hospital the maternity clinic, not the birthing centre, is only open on specific days at specific times, usually one day a week. This may seem odd, but the reason for this is that on the other days of the week the doctors and nurses are part of trekking teams. In the CRR there are 47 trekking stations (Synergy International, n.d., p.41), each with its own smaller catchment area. These trekking teams operate on the primary level of health care and have a schedule of visiting specific communities, each one day a month. On these treks the medical team provides “...health education; antenatal, postnatal care; infant welfare care; [&] sometimes, dental services (Synergy International, n.d., p.30). Trekking stations are very simple, usually a mud hut with a roof and are erected by the community.

## **Chapter 3**

### **METHODOLOGY**

#### **12.1 Introduction**

The purpose of this research was to ask Gambians to describe and comment on maternal health, climate changes, and to investigate if climate change would negatively impact The Gambia's ability to achieve the Millennium Development Goal 5, particularly climatic impacts on women's movements during pregnancy and childbirth. Part of this inquiry involving asking if anyone had noticed any historical changes in climate and whether or not women and their families were making lifestyle changes to accommodate different climatic situations, both positive and negative.

#### **13.1 Data Collection Method**

The primary method of data collection for this research paper was on-site, informal, scripted interviews in and around two towns in The Gambia, West Africa. The two towns in which interviews were conducted were Bansang and Janjangbureh. The

secondary method of collection was an in-depth review of the past and current literature on climate change and human health, focusing on maternal health.

The men and women we interviewed were randomly selected. For the first set of interviews we visited the Bansang Hospital in Bansang where we obtained approval to talk to women in the maternal ward and also a maternity doctor on shift. The second set of interviews was held in a small compound just outside of Bansang. This interview involved a traditional birth attendant whom we found by inquiring through community members. The third set of interviews was held with two maternity nurses from the Bansang Hospital at Bitou's Paradise Lodge in Bansang. The fourth and fifth sets of interviews were held at the St. Lazarus Clinic in Fulabantang, outside Janjangbureh. The fourth involved the head nurse of the clinic and the fifth with a traditional birth attendant that was waiting at the clinic. The sixth and last set of interviews was the most random and informal, it was held on the side of the road in Fulabantang after we noticed that a group of women was congregated together.

The statistics for this project were primarily based on a publication called *The Gambia: Atlas of 2003 Population and Housing Census* by The Gambia Bureau of Statistics (GBoS), Banjul, The Gambia. The bureau describes this census as "...part of efforts to increase our understanding of the living conditions of Gambia's population as a basis for action to better provide for their well-being" (Gambia Bureau of Statistics, 2003, p.viii).

In addition on-site permission was obtained from the proper authorities at the Bansang Hospital by the researcher to interview the doctor. Permission was granted on the understanding that this was not medical research, but research interested in social issues. Based on this criterion it met the REB rules and regulations of The Gambia and we were able to proceed.

#### **14.1 Ethics Approval**

Approval for this research project was obtained through the Research Ethics Board at Saint Mary's University and granted on December 5, 2012. Approval for this project was granted on the condition that confidentiality was maintained between the translator, Kebba Suso, and interviewees and that anyone who agreed to participate gave verbal and/or written consent. In the end we found that we were unable to obtain written consent from participants because of language and literacy barriers. However, detailed knowledge of what their participate would involve, i.e. what types of questions would be asked and what the purpose of the interview was, was given before any interviewing began. Interviewing did not begin until verbal permission was given by the participants for the principle investigator, Amanda Bartel, as well as the faculty supervisor, Dr. Cathy Conrad, to ask questions.

#### **15.1 Structure of Interviews**

The interviews were conducted around a specific, Research Ethics Board approved, selection of questions. These questions focuses on two areas, climate change and maternal health (Appendix B), but importance was given to questions that sought to

integrate these two areas together in order to achieve a more well-rounded picture of the impacts, or lack of impacts, of climate change on maternal health. In some instances we did find it necessary to modify questions in order to facilitate better understanding of what was being asked and/or to clarify a question or answer.

### **16.1 Translations, transcripts, confidentiality, and anonymity**

Interviews were translated into English from various tribal languages: Mandinka, Fula, & Jola, by a Gambian who speaks all of these languages fluently and who is a staff member of the Nova Scotia-Gambia Association (NSGA); Kebba Suso. Information from the interviews was gathered through voice recording and note-taking. Authenticity of study information was facilitated through the duplication of notes; Amanda Bartel and Dr. Cathy Conrad took notes simultaneously. Typed transcripts were made of the recorded interviews.

Transcripts, voice-recordings, and notes were kept in a secure location on the Saint Mary's University campus in hard-copy and soft-copy and can be made available upon request. The USB containing the electronic information was backed up periodically to eliminate loss of data. Data will be kept for 1 year post-study and then destroyed November 2013 through deletion and/or shredding.

The anonymity of the participants was maintained through the use of pseudonyms and the generalization of any data that could personally identify a specific participant in the final report.

### 17.1 Participants

Participants for this study were selected based on a particular criterion. Though this study largely focused on maternal women; women who were pregnant or had been previously pregnant, a larger cross-section of the maternal health community was sought through interviews with health care professionals, such as doctors, nurses, and traditional birth attendants. Participants were required to be over the age of 18. Participants were found in communities around Bansang and Janjangbureh and at local hospitals and clinics.



**Fig. 8:** Interviewing women at the Bansang Hospital



**Fig. 8A:** Interview with a traditional birth attendant outside the town of Bansang



**Fig. 8B:** Location of interview – birthing hut and residence of the traditional birth attendant, Bansang

Source: Personal Photographs

### 18.1 Results Methodology

As data for this research paper was derived from on-site interviews and not through a rigorous scientific experiment it is important to indicate how the researcher will determine how the results will be interpreted. As mentioned above the results for this

paper will be taken from transcribed interviews and an in-depth literature review. Due to anecdotal nature of performing interviews, even when there is a formal set of questions that the interviewer is following, it would be easy to mold the results in the researchers favour. Therefore, prior to the delineation of the results the method of interpretation must be defined.

The primary method of interpretation was to look for patterns and direct connections between climate change and maternal health as mentioned by the men and women who were interviewed by analyzing the frequency of similar comments. By considering the frequency of responses a clear picture will emerge of the issues and concerns that are on the minds of Gambians. From this picture applicable recommendations could be made regarding the future of the study of climate change and maternal health as well as any particular concern that appears to arise frequently.

## **Chapter 4**

### **RESULTS**

#### **19.1 Introduction**

The purpose of this chapter is to outline the results of the interviews. These results were analyzed by looking for patterns and recurring themes. It will become apparent in this section that although climate and climate change does and will impact the achievement of the MDG 5, there are far greater concerns pressing on the minds of Gambians in this region. The results that were received are indicative of a particular rural region of The Gambia and therefore cannot be applied to the whole of the country. It is entirely possible that a Gambian woman in Banjul or the Upper River Region could have completely different maternal experiences. However, this does not reduce the importance of this study. It is naïve to believe that one health care plan can be applied across an entire country, especially one like The Gambia where there are large disparities between the urban and rural population in regards to socioeconomic and physical factors.

#### **20.1 Health Care in the Central River Region**

Before embarking on my mission to interview Gambians in the CRR about the connections between climate change and maternal health my basic understanding of the

health care situation in The Gambia and the CRR was a list of hospitals and their locations, as well as many assumptions about the level of care available. However, that picture was incomplete. Through the interviews, especially those from men and women involved in the pre-natal, antenatal, and post-natal care, a broader and more comprehensive picture emerged. The most important revelation was that healthcare is free, as noted in the Literature Review, for the mother and child as long as they are still in a breastfeeding relationship or until the child turns 5. The second was that every Gambian is given a yellow health card that indicates where they receive their care. This card restricts them to receiving health care from a particular facility unless they are referred by a health professional to another. A maternity doctor in Bansang described it like this, *“the ministry they do everything that is possible for this mother. That is why any child who is under five you don’t pay, any mother, any antenatal mother, anything [sic] you don’t pay, it’s all free of charge. This antenatal care that we are giving them is free of charge, anything that is about antenatal is free of charge and under five...”*

This situation is best illustrated by the account of one woman that we encountered.

**Case Study 1** \*all names have been changed to protect anonymity

Awa\* is an 18 year old Gambian mother who has come to the Bansang Hospital from another catchment area. Recently her compound burned down and all of her family’s medical documents were destroyed in the fire. She has come to the Bansang Hospital to receive care for her infant son because he is very sick and she is very worried that she cannot wait for the next trekking clinic to come to her village. However, the doctors are refusing to give her the documentation that she requires because if she receives her medical papers from the Bansang Hospital she will only be eligible to receive care there and in the future if another member of her family is ill and needs care they will not be able to get care at their village trekking station; they will have to journey to the Bansang Hospital. Therefore the doctor wants her to go back to her village and get her documents there, so that in the future she will not have to make this long journey again. Unfortunately, it appears that it will be almost another month before the trekking team is scheduled to come to her village.

Another important aspect of the healthcare in The Gambia are the Traditional Birth Attendants (TBA). TBAs are a very important part at the primary health care level and would be more aptly names ‘traditional midwives’ because they “...assist women in childbirth...provide care at puberty, during pregnancy, labour, [during the] postnatal period and give advice about childcare”(Nyanzi, *et al.*, 2007, p.44). It is also important to note that TBAs did not come into existence with the establishment of the national health policy in 1978, but were already acting informally within their communities. Upon the adoption of the national health plan the government invested in training particular individuals to be TBAs within their communities. Most villages have at least one, if not two, TBAs, so that in the event that one of the TBAs is busy assisting in a birth or travelling to a hospital with a woman in labour there is another TBA available.

### Case Study 2

Mariama\* has been a Traditional Birth Attendant in her community outside Bansang. She became an official TBA 7 years ago although she remarks that “...*the first time they were just doing it without being, getting any other training from [the] medical side. It is just now that the Minister of Health has put them on board so that they have additional training...*”. Mariama became a birth attendant through selection and not through inheritance. She was concerned that her village did not have any primary health care so she approached the ‘health office’ and explained the situation. A while later the Ministry of Health sent workers to recruit and train women in her community as TBAs. She was not chosen; another woman was selected, but unfortunately “*she was not having the confidence in herself and she, her first attempt to deliver somebody, the lady fainted, so she was scared of the whole situation and she withdrew...*” so the villagers asked Mariama to step in and fill the position. Mariama went, got the training she needed and loves her job.

### 13.1.1 Characteristics of Respondents

In total nine interviews were made, but 19 people were involved in the interviews. The ages of the interviewees spanned decades, the youngest was 18 and the oldest approximately 70. It should be noted that many Gambians do not know their exact age due to lack of records and because they perceive time differently than North Americans. Where North Americans specify each year as having 12 months, Gambians often indicate the passage of time by indicating specific events, such as a major flood or a rather bad drought, each of which could last longer or shorter than 12 months. This means that for many of the older Gambians interviewed they were only able to give an approximation of their age. The range of categories of people also covered a wide range, including: pregnant women and mothers, nurses, traditional birth attendants, doctors, and men. There were 15 female respondents and 5 male respondents (Table 9).

Interview #	ID	Gender	# of respondents	Category	Age
1	Woman A	F	4	Pregnant Woman	18
	Woman B	F		Mother	18
	Woman C	F		Mother	n/a
	Woman D	F		Mother	26
2	Man A	M	2	Doctor	≈ 30
	Man B	M		Doctor's Assistant	≈ 40
3	Woman E	F	1	Traditional Birth Attendant	50-60
4	Woman F	F	2	Nurse	≈ 25
	Woman G	F		Nurse	≈ 25
5	Woman H	F	2	Head Nurse	≈ 35

	Woman J	F		Teacher	≈ 30
6	Woman K	F	1	Traditional Birth Attendant	≈ 70
7	Woman L	F	5	Mother	
	Woman M	F		Mother	
	Woman N	F		Mother	
	Woman O	F		Pregnant Woman	
	Man C	M		Man	≈ 35
8	Man D	M	1	Man	30
9	Man E	M	1	Man	30
Total:					
9 interviews		14 F 5 M	19		

### 21.1 Study Limitations

As a representation of “up-country” Gambia this cross-section is sufficient; it is quite accurate in representing the types of men and women who live in this area. As the study was restricted to 19 individuals it is not as precise as it could have been if more people, both men and women were involved. This cross-section was also able to provide information from both “regular” people and those professionally involved in health care realm and this helped to paint a clearer, more detailed, and representative picture of what is actually happening in these areas. One major limitation was the researchers’ own time restrictions, as this research was under-taken concurrently with a water education that I was helping to implement. This meant that interview time was restricted to specific times and days, which further limited the number of people that I was able to interview.

## 22.1 Patterns

Through analysis of the results of the interviews there were two particular areas of concern; physical and social, where similar responses were made. The respondents discussed the physical effects of climate change (and weather) on maternal health, but also on the social impacts of their cultural and societal beliefs on their movements within the health care system. Within the physical realm it was noted that multiple answers were made about: specific changes in weather patterns, transport and movement issues, flooding, and diet. From Table 10 it is noted that within the physical realm the more frequent responses were about transport and movement issues (8), while specific changes in weather, flooding, and diet were all mentioned in 5 interviews. Within the social realm similar responses were made about: poverty (4), seasonal job restraints (7), and gender issues (5). Similar to the physical realm one response was significantly greater than the others; in this case seven interviewees included responses about seasonal restraints.

Response	Frequency	Interview #	Realm
a. Specific changes in weather patterns	5	1,3,5,6,7	Physical
b. Transport and movement issues	8	1,2,3,4,5,6,7	Physical
c. Flooding	5	1,3,5,6,7	Physical
e. Diet	5	1,4,5,7,9	Physical
d. Poverty	4	1,2,3,4	Social
f. Seasonal restraints	7	1,2,3,4,5,6,9	Social
g. Gender issues	5	1,2,6,7,8,9	Social

\* 9 interviews were conducted with a total of 19 respondents. Frequency of responses was calculated upon how many interviews (not interviewees) a factor was mentioned in, thus frequency is calculated out of 9.

14.1.1 **Physical - Weather changes, transport and movement issues, flooding, diet**

*Weather and climate changes*

In response to the question as to whether they had noticed any particular changes in the weather from their childhood to the present, many respondents indicated the same changes to the historic general climate patterns. In childhood years there was a lot of rain, but that was followed by a significant drought that lasted for a few years. However, multiple respondents noted that in the past year the weather seems to be returning to normal, where there is enough rain for their crops.

*“...when they were young [they] used to have rain, a lot of rain, but the past years that rain is a problem...maybe those days are coming back” (Woman A via translator)*

*“...when she was a child there was more rain than now, but everyone is saying this two year the rain is coming back...especially this year they lost a lot of crops due to the heavy rain” (Woman K via translator)*

*“...it start getting dry before two years [ago] ...people suffer a lot of drought...” (Woman K via translator)*

*“[I] noticed something on the rainfall. When [we] were young [we] used to have a lot of rain, but a couple of years, let’s say years back, later, it change. [We] experienced droughts and other things like you know [we] do not have enough rain in the rice fields and when [I] was young there were areas that were even [sic] to cross because of the rain, but now those areas get dry, so but the past 2 years, like years, this rainy season that we have in past, and the year before the rains, the rains, there is a sign of rains coming back like especially [we] have good rainfall” (Woman E via translator).*

*“...two year that rainfall changed but the past year, one could say the past 10, 15 more years [ago] ...they do not have enough rain for their crops” (Woman E via translator)*

*“...before they used to have a lot of rain but it came less the last maybe 10 years or so. So it’s just between these two years that we are, we are getting more rain” (Woman H via translator)*

There was also an indication that although weather patterns seem to be returning to “normal”; the rain is happening at the same time as it was in the past, yet the rainy season is rainier and the dry season is dryer, thus the amount of rain is “normal”, instead of being well-spaced over the season when it does rain the rain is more intense.

*“...when it come like drought, like last year, they mean the beginning of the rainy season like it rain and it didn’t rain for like maybe a month or two months and the crops started dying, so it’s just the end of the rainy season that they had a lot of rain” (Woman H via translator)*

*“...this year with the present situation we have a lot of water, but it is also some disadvantages that is some of the crops get spoiled because of the heavy rainfall” (Woman B via translator)*

*“...it’s not like one day thing. It’s like when there is heavy rainy today maybe after two or three days there is another heavy rain and that means the flood is continuing” (Woman B via translator)*

### *Transport and movement*

Almost all of the interviews included a discussion about transport and movement to get to hospitals, health clinics, or traditional birth attendants. Three factors in particular impacted a person's level of mobility, (1) restricted movement due to weather, such as flooding, (2) the ability to obtain transport, which was often restricted its cost, and (3) the distance from highway to access transport.

#### (1) Restrictions due to weather:

*"...the rainy season...there are a lot of challenges if it is raining hard you cannot come out and walk and go to the hospital and also if your road is not, maybe there is a lot of water on the road your...you can only wait until the rain stops..." (Woman A via translator)*

*[On trekking stations team's ability to get to stations] "Sometimes when there is heavy rainfall some of the roads they are blocked, so they are blocked and the only option would be to use another way around" (Man A via translator)*

*"...if there is heavy rain...a pregnant woman coming to her house she has a challenge and also for her if she has the information, for her [the TBA] to go is a challenge because you need a raincoat or you need a flashlight..." (Woman K via translator)*

#### (2) Ability to obtain transport:

This factor is strongly connected with the problems surrounding gender issues, which will be discussed in the section about social realm responses.

*“...try to come to the road on the highway and look for transport, which is also a challenge because sometimes it takes time before you have the transport to transport the pregnant woman to Bansang...” (Woman K via translator)*

(3) Distance to transport:

*“...if you are lucky to be on the highway or if your village is on the highway you might get transport to come, but if you are off the road you either walk or through donkey cart or any other means of transport, but for them they have to wake up early in the morning to walk the distance to get there” (Woman D via translator)*

*“...some people live far from the hospital so when they get any problem maybe because of the distance and the stress on go to the hospital sometimes they die before they can get to the hospital” (Woman D via translator)*

### *Flooding*

Responses from above in regards to restrictions to transport and movement due to weather are closely connected with weather (see other quotes under *Transport and Movement*). When the road floods it impacts women’s ability to get to the hospital and also for the trekking stations to get to the villages. The trekking teams ability to get the villages is particularly important to address because each village is only serviced once during the month, thus the community members will have to wait another month for the health team to arrive or embark on long trips to regional hospitals to obtain healthcare in the interim.

Flooding also has a great impact on crops and houses. The main food crop grown in The Gambia is rice, which have shallow roots, this means that in the event of flooding the plants are easily uprooted and destroyed. The lose of a crop further impacts diet, due to the reduction in food stores for the dry season and poverty, due to the loss of income from the sale of the crops. It appeared in the interviews that this past year many interviewees had been impacted by severe flooding, destroying crops and homes.

*“...they have experienced flood this year...she suffered a lot because of her rice field, almost half of it have been washed away...a lot of people lost their houses too, like this woman she lost her chicken and everything else just washed away” (Woman C via translator)*

*“...it’s not like a one day thing. It’s like when there heavy rain today maybe two or three days there is another heavy rain and that means the flood is continuing” (Woman C via translator)*

*“...[floods] affects your income because what happens is that some of them rely on they get their income from what they grow, so they lost some of their crops which means they will suffer in the dry season” (Woman A via translator)*

*“...floods can mean in different ways it can be, be positive, it can be negative because it all comes to heavy rainfall and then rain, when they have good rain season you know the advantage there is that their rice fields they have because this you know...[but] if there is*

*not enough rain those who are having their rice on the highland cannot, it gets dry easily, so their crops suffer, but if there is enough rain that means, they are, they also even if it cause flood in the town whereby people houses will fall...so the heavy rain can have advantage and disadvantage...” (Woman E via translator)*

*“...the women in town they suffer because their rice has all been washed away” and  
“...this year there was a lot of floods some lost their houses and their crops in the fields”  
(Woman K via translator)*

### *Diet*

As mentioned above diet is closely linked to weather because most families depend on a subsistence diet and do not have the ability to purchase food in the event that their crops are destroyed or even to add nutrients to their diets even if the crops are not destroyed. Many of the women interviewed indicated a weak diet, mostly containing starches such as rice or cereal and also groundnuts.

*“...the diet they eat is so poor...” (Woman D via translator)*

*“They can’t afford it, so that’s poor diet...[I]f you want to improve on this situation of maternal health you must be able to look at an areas where you try to promote better diets...” (Man E via translator)*

*“...they face a lot of challenges, but the most common ones are like poverty...and the diet they eat...” (Woman H via translator)*

### 15.1.1 Social - Poverty, seasonal job restraints, gender issues

#### *Poverty*

Although this social factor appears to be the same as the physical factor “diet”, it is not, though they are closely related. Most families rely on an income achieved from their agricultural work. While diet is a physical factor because it is clearly limited by the scope of the plants that have the ability to be grown in this region, poverty is a result of the socioeconomic struggle of men and women in The Gambia to sustain a living for their families, both in food stores and other household expenses.

*“...there are a lot of challenges but according to her what she feel the main cause could be poverty because as a pregnant woman you have somebody, it’s like an extra mouth that means that you have somebody to feed...” (Woman D via translator)*

*“...poverty contributes a lot for the women around here because when you are pregnant you need good food to eat...” (Woman D via translator)*

*“...they face a lot of challenges, but the most common ones are like, poverty...” (Woman H via translator)*

Poverty is also intrinsically linked to a woman’s ability to access transport to the hospital. Many women cannot access transport, such as a taxi or a donkey cart because there is no extra money available.

*“...your movement like if you want to go to the hospital and all that you are distance you are far from the hospital and then you cannot afford even if there’s transport like you live on the highway most men need to pay your fares...” (Woman D via translator)*

*“...poverty is number one. Some of [sic] are still at the fireplace [?] they find it difficult to come to health facilities because they do not have fares to come over...” (Woman G)*

The extent of poverty is explained well by this comment from a traditional birth attendant:

*“...the affordability is the problem because a 100 (3 CAD) dalasis when you think of it, it’s just like 2 litres of gas for the taxi driver, he hardly, what he makes there is 20-25 dalasis (0.60-0.75 CAD) or so buying the gas, filling it, it’s just poverty, just say the affordability is a problem (Woman E via translator)*

### **Case Study 3**

Fatou became a traditional birth attendant about 7 years ago and she believes her age to be between 50-60 years old, although her wizened eyes and weathered face suggest she is closer to 70. She loves her job, but finds that it can interfere with her ability to make a living from her work in the rice fields. During the rainy season every woman is busy in the fields planting and harvesting. Sometimes in the mornings as she prepares to go to work she will be called upon by the community to attend to a woman in labour. Fatou will leave her work in the field to attend to her charge, but there is no one to pick-up her work and when she is able to return to the field she will find that all the other women are far ahead of her in the field and she cannot catch up. She describes a particular day where she needed some money:

*“...there was a particular day she wanted to go and harvest some of her crops to go and sell because she needed money, but she, on her way to do that they had to call her...she was on her way to the field to harvest and then go to [city name] to sell her crop they had to call her because this girl was in labour so she has to stop that day and she wanted to use that money to do other things...” (via translator)*

The impacts of poverty are particularly poignant for traditional birth attendants to deal with because they receive no compensation for the work they do, even though they are trained by the government, any compensation they do receive comes from the families, usually as a bar of soap or a piece of cloth.

*“...she doesn't have any pay the only thing that her ( . . . ) is, even at the hospital what happens when they take a pregnant woman there and she deliver they buy, you buy three soap...you use one for the woman like cleaning her stuff and the like and the other two that is left is always given to the nurse...”(Woman E via translator)*

*“When she delivers somebody here they will buy two soap for her and give it to her and some women they give her maybe 25 dalasis (0.75 CAD) for her time and other things but there is no pay, but...some families are generous, some will even think that 25 is even small, they might buy a piece of cloth and add it on top, like a dress for her...”(Woman E via translator)*

### *Seasonal Restraints*

As alluded to in the previous sections (*Diet and Poverty*) women in The Gambia are actively involved in the planting and harvesting of crops, most often rice or groundnuts. As noted in Study Area ‘up-country’ Gambia experiences two seasons each named by the predominant weather during that time, rainy season and dry season. This means that work in the fields can only occur in rainy season because in the dry season there is little rain for growth and the heat dries the air and soil. This distinction between seasons strongly determines what work the woman can do and imparts strict seasonal

restraints on them. Many of the woman commented on two particular effects of these seasonal restraints. The first is that they prefer to have their babies in the dry season because the workload is very heavy and it is easier to provide food in the rainy season.

*“...they prefer you have the baby in the dry season then in the rainy season” (Woman D via translator)*

*“...the dry season is better for them...because the rainy season maybe the support you have in the dry season to help you look after the baby you know...you will get more help during the dry season because they are less busy in the farms, but in the rainy season everybody will go to the field and leave you alone...” (Woman A via translator)*

*“...obviously want to deliver during the dry season because in the rainy season there are a lot of challenges” (Woman H via translator)*

The second is that if their crops are destroyed in the rainy season because of floods there is little chance that they will be recoup these loses during the dry season when they will most likely participate in gardening for their family.

*“...you know it affects their income because what happens is that some of them rely on, they get their income from what they grow so they lost some of their crops which means they suffer in the dry season” (Man C via translator)*

Overall there was a general consensus that the challenges are greater in the rainy season.

Other impacts mentioned were having to leave the field because you were in labour, lack of food during the dry season, and the greater chance of getting malaria in the rainy season.

*“...when they are pregnant here they don't have enough rest because they have to be doing their domestic work...they have their own fields to cultivate...[Y]our commitment to your maybe farm or to your rice field...they give priority to go look after their crops...because there is nobody to help you so you either go and take care of it rather than stay home and have some rest or maybe go to the hospital...” (Woman E via translator)*

*“...in the rainy season the pregnant women also have other commitments like they have their rice fields...they have nobody to help them...but in the dry season it is a different story because there is less activity...” (Woman E via translator)*

*“...even when it is not the rainy season the sun is too hot to walk...” (Woman H via translator)*

*“...it's more in the rainy season than in the dry season, more problems at that time” (Woman K via translator)*

### *Gender Issues*

One unexpected outcome of the interviews was that quite a few Gambians interviewed were concerned with gender issues as they related to maternal health. In The Gambia, gender roles are very traditional and this can create significant gender stereotypes that impair a pregnant woman's ability to access the healthcare that is available because:

(1) Men control the money in the family and are therefore responsible to provide the money for fares to the hospital;

*“...men need to pay your fares to go to the hospital...” (Woman D via translator)*

*“...when they talk to their husbands they don't give them fare to come...” (Man A)*

*“some [women] will complain to you and tell you that is what they want to do, but remember when they go into labour they need some support, they need some support from then men, the men will not support them” (Man A)*

(2) Men believe pregnancy is exclusively the woman's problem and do not support them;

*“...the number [one] challenge is lack of men support. The men they are not supporting their women, most especially for some of the antenatal that we meet...” (Man A)*

*“...when you come in [to give health education] only the mothers will be present, so you give them health talks when they go some of the men are very powerful and they don't want to hear anything the mother says (. . .). We are being driven by our traditional culture, so the man, a woman will not say something that the men will not hear...” (Man A)*

*“All [men] can do is have them pregnated and then just you are, you are having nothing to do with it. If she is going through labour you will be sleeping or will you be doing other things so you won't be there to give your support or any other thing. And also when she is like sick during pregnancy you know some men don't even bother helping you go to*

*the health centre and that they will tell you, 'Here is the fare. Now you go.' They won't be there for you...' (Woman K via translator)*

and (3) the majority of the workload falls on the shoulders of the women;

*"Lack of awareness because it will be difficult to because what they, sometimes tend to see they want to perceive it as in an Islamic way that when it comes to tradition making the woman has little to say or no. Right? When it comes to childbearing issue women have nothing to say only men will determine...[If] you look at what a woman is contributing to the welfare of the home in times of pains, in time of school fees, in time of making them get the basic things they needs, the woman is doing like 95%. The other 5% is for the men. So, that's a big margin between men and women in time of trying to do things" (Man E via translator).*

A maternity doctor at the Bansang Hospital remarked that these factors were impacted by the tradition of polygamy and a lack of education related to maternal healthcare on the part of the men who often will only bring women to the hospital or health centre when they themselves need to be seen by the doctor. Case Study 5 is a good example of this situation.

#### **Case Study 4**

A maternity doctor at the Bansang Hospital remarked that one day he saw a man and a woman in the clinic. The man had come in because he contracted syphilis and at the time had brought his pregnant wife who was very close the delivering, in with him. Upon seeing the woman the maternity doctor strongly cautioned the man that because his wife was very short there was a strong possibility that when she went into labour she would not be able to deliver without a cesarean section because her pelvis was no wide enough. To this advice the man objected and replied "Look my former wife had four home deliveries...and who it this?"

In the end the woman perished because when she went into labour the husband would not bring her to the hospital and due to CPD (cephalopelvic disproportion) was not able to deliver the baby and began hemorrhaging. Her health was further compounded by the

fact that she had severe anemia.

## **Chapter 5**

### **CONCLUSION**

#### **23.1 Introduction**

At this point it would be helpful to restate that the thesis of research was to explore the possibility that climate change would negatively impact The Gambia's ability to achieve the Millennium Development Goal 5, which is to (1) reduce by three-quarters, between 1990-2015, the MMR and (2) achieve, by 2015 universal access to reproductive health.

As noted in Chapter 4: Results, there are physical limitations that prevent Gambian women from accessing healthcare in the CRR. These physical limitations include: specific changes in weather patterns, flooding, diet, and transport and movement issues relative to seasonal restraints. It was strongly indicated that the two greatest factors were transport and movement issues and flooding, which are highly correlated. Out of those two factors flooding is directly related to climate. Almost every interviewee remarked that the climate change patterns had indeed changed since their childhood. This change has resulted in weather patterns of less frequent, but more intense rainfall. This pattern is

consistent with the predictions of climate change projections for West Africa. The impact of these weather patterns is the increase in flooding events, which directly impacts both pregnant women's movements across the landscape of rural Gambia and also the doctor's movements. Flooding strongly decreases the accessibility of healthcare in the CRR, in both directions that it flows. Another factor that was mentioned, but not as strongly emphasized, was the impact of heat on movement. As rain becomes more concentrated and less frequent its effect of cooling will not be as common. Heat can be a deterrent to travel for women in labour, causing them to make the choice to stay home and give birth rather than travel through the heat to a hospital. Though it is difficult to numerically quantify the impact on the reduction of the MMR, qualitatively women, doctors, and traditional birth attendants noted that the inability of pregnant women and doctors to access and provide maternity care because of climate change has already resulted in death in the rural CRR. This restriction of movement because of weather effects impedes the MDG 5's goal to provide universal access to reproductive healthcare. Without support during extreme weather events to be able to access healthcare it is unlikely that the MMR will be reduced by three-quarters by 2015 and even more unlikely that the goal to provide universal access to reproductive health across the CRR will be achieved.

Although the research supported the hypothesis of this project and there was general consensus that long-term changes in weather patterns are occurring in rural Gambia and that the effects that they are causing, less frequent, but more intense rain, is currently restricting women's movements and their ability to access healthcare, especially in emergency situations such as labour, this causal link between climate change and the

inability of the country to achieve the MDG 5 is not what is on the forefront of rural Gambians minds. It became evident in our conversations that there was another factor that was having a stronger influence on the accessibility of healthcare than changing weather patterns. That factor was the lack of support that the women were receiving from men, a traditional perspective on the division of labour and responsibility between genders. The doctor we met with at the Bansang Hospital put it most succinctly, *“...looking at what has been done for these mothers most everything is free of charge. I see no reason why they are still these problems. Where, where, where are the problems coming from, it’s lack of men support...”* and *“...to be quite honest we are using more than 10 ways of communicating to these people...but the thing is that is the male problem is the attitude, male egos, Gambians main problem is attitude”*. This lack of support is preventing women from accessing transport to and from hospitals and health centres, it continues to place the burden of labour heavily on the shoulders of women, and traps them in the centre of a cycle of poverty. Thus both the physical and especially the social realm hold great influence over the achievement of the MDG 5.

Earlier in the Literature Review it was noted that some progress was being made to achieve each of the Millennium Development Goals in other countries. This literary research seemed to suggest that there were great strides being made, but a brief examination of the results of this research indicates that the ability to achieve these goals is not as simple as parachuting into countries of need hospitals, medical professionals, or Westernized health programs. The root of the problem lies deep in the social and cultural traditions of the people who live in places, like the Central River Region. Traditional

gender roles are just that, traditional. These traditions can perhaps be tracked back to the inception of social and cultural communities and as such they are not easily changed because those involved do not see them as lifestyle choices, but as normal. Thus in order to address the question of how to reduce the maternal mortality rate in rural Gambia and provide universal reproductive health in order to achieve the MDG 5 both physical and social factors must be explored equally. While physical factors tend to be easier to address, the root of the issue lies in social factors that require persistent, long-term commitment to empowering Gambians to consider such aspects as the attitude of men towards pregnancy and women in their culture. It is not a question of changing Gambians because we know the answers but rather on our part understanding the traditional culture surrounding maternal health and support and encouraging the development of a holistic educational perspective indicating the climatic impacts of global climate change on their region and on how social conventions can compound these climatic impacts on maternal health.

#### **24.1 Recommendations**

*“...[N]o woman can succeed without a man and no man can succeed with a woman and whatever...we are doing, we should all collectively do” (Man D)*

I would like to propose a number of ideas in relation to how to address both the physical impacts of climate change on maternal health and the social impacts on women’s ability to access maternal healthcare, stressing that the social impacts need to be addressed before there can be any change in the physical impacts. As was indicated by

the Bansang doctor, for the most part maternal health is available and free to pregnant and breastfeeding women, but both physical and social factors limit their ability to access this care. These recommendations will be focused through an NGO that is already at work within The Gambia, providing relevant education through Gambians, to Gambians about HIV/AIDS, malaria, life skills, and water; The Nova-Scotia Gambia Association (NSGA).

The Nova-Scotia Gambia Association is an NGO with two offices. The head office located in Halifax, Canada and a field office in Kanifing, The Gambia, West Africa. The NSGA was founded in 1985 by Burris Devanney and brings Canadians and West Africans together to "...build healthy communities in The Gambia" (NSGA, 2012) through programs such as: Malaria Education, HIV/AIDS & Life Skills, and Water Education.

I would suggest three avenues of change that could benefit the biggest adverse social factors in pregnant women's ability to access maternal healthcare: (1) creation of peer health education about gender issues in rural Gambia, (2) community health film nights that emphasis discussion on gender, and (3) targeted education initiatives for men, especially teenagers.

#### *Peer Health Education*

It would be naive to implement education programs to men whose wives are pregnant now. Due to the traditional nature of gender roles in Gambian communities it

would not be helpful to try and change men, and women, whose opinions and views have already been established. Monumental change begins in childhood where new ideas can percolate and develop into maturity. Peer health education brings education into the classrooms of Gambian children to start conversations. It gets kids re-thinking gender roles, educates them about alternatives, promotes discussion amongst them as peers and also within their families. Peer Health Education is taken very seriously by teens because it empowers students to take places of leadership among their peers, this role is a coveted role in schools.

### *Community Film Nights*

Community cinema happens when the NSGA brings an educational film into one of the many small communities in The Gambia. It is not uncommon for the majority of the village to attend these films. Each film is made by Gambians, for Gambians and after the film is shown NSGA workers encourage community discussion about the film and the message that it was portraying. One of the most effective strategies of the community cinema nights is that it gathers together men and women of all ages and allows them to enter into discussion about relevant issues without gender, culture, and/or ages barriers. At the community film night that the author attended approximately 300 Gambians of all ages attended and the discussion afterwards involved perspectives from both men and women, as well as younger and older Gambians.

### *Education for Men*

As mentioned above any sort of education needs to start with children and teenagers. There is a general lack of understanding about a woman's increased risk of dying when they are forced to give birth without medical attention and how a hard workload, such as working in the rice fields during the rainy season can lead to complications, which in turn could lead to the death of the child or mother if they are not able to access healthcare. It appeared in our interviews that the younger generations are beginning to question the prevalence of these gender roles and it would be helpful to send forward thinking men out to talk to boys and other men who are or will become fathers, so that they can speak man-to-man and not feel that their beliefs are being judged or disrespected, but instead that they are being consulted to affect change within their communities.

These three initiatives are the beginnings of changing attitudes about maternal health. Work on adjusting the perceptions in the social realm needs to occur before work on the physical realm can begin. This is because of how pervasiveness of poverty across the whole country at an individual, local, regional, and country level. Not only are individual Gambians struggling with poverty, the government also struggles with a lack of resources which impacts their ability to develop essential infrastructure, such as paved roads, taxi services for those seeking healthcare, and the creation of permanent clinics in areas that are far from the hospital.

## **25.1 Summary**

This study set out to investigate the possible implications of climate change on maternal health, particularly on the achievement of the Millennium Development Goal 5, and discovered that climate change is already having an impact on the achievement of this goal. Women's movements to and from health care centres are impeded by weather events such as heavy rainfall that results in flooding or heat that is too hot to walk in. However, there is another factor that is having a far greater impact on the achievement of the MDG 5 and this is the lack of support that women receive from male partners in order to access healthcare in The Gambia. This strict traditionally gendered healthcare landscape creates barriers, such as a woman's inability to pay for transport to the hospital, that directly impact the MDG 5 when women are unable to get to the healthcare centres and cannot receive the care that they need, which can result in death.

Upon completion and review of this research it became clear that more investigation needs to be done into the complex world of maternal health, particularly in developing countries. This concerns not only where maternal health is connected with the physical environment, but also into the gendering of maternal spaces and the resulting restrictions and limitations.

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## APPENDIX A

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

<sup>b</sup>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, 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.

<sup>c</sup>Algeria, Egypt, Libya, Morocco, Tunisia

<sup>d</sup>Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape 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, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Togo, Uganda, United Republic of Tanzania, Zambia, Zimbabwe

<sup>e</sup>China, Democratic People's Republic of Korea, Mongolia, Republic of Korea

<sup>f</sup>Afghanistan, Bangladesh, Bhutan, India, Iran (Islamic Republic of), Maldives, Nepal, Pakistan, Sri Lanka

<sup>g</sup>Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, Viet Nam

<sup>h</sup>Bahrain, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Turkey, United Arab Emirates, West Bank and Gaza Strip (territory), Yemen

<sup>i</sup>Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan

## APPENDIX B

**Table 8: Interview Questions**

**CLIMATE CHANGE HISTORY:**

1. Have you noticed any changes in the seasons since your childhood?
2. Have you experienced a drought recently? (Refer back to events)
3. What has the rainfall been like since you were a child?
4. Have you experienced a flood recently?
5. Have you and your family experienced a food shortage because of drought recently?
6. Has your livelihood been impacted by a flood in the last couple seasons?
7. Have you ever contracted malaria during a pregnancy?
8. Where do you get your drinking water from?
9. Do you consider your drinking water to be 'safe'?
10. What part of The Gambia are you from?
11. What do you work at during the day?

**MATERNAL HISTORY QUESTIONS:**

12. How old are you?
13. How many children do you have?
14. How often did you visit someone who takes care of your health needs?
15. Do you feel that you were well taken care of by health professionals while you were pregnant?
16. How far is it from your home to a health professional?
17. How did you get to the 'hospital'?
18. Have you lost any babies in the past?
19. Where will you deliver your baby?
20. Have you had any deliveries at home?
21. If so, was there anyone in attendance to help you deliver? (midwife, traditional birth attendant)
22. Have you ever had anything bad happen to you while you were pregnant, like bleeding or fainting? If so, did you end up losing your or baby?
23. How bad would your bleeding or sickness have to get for you to go to see a health

professional

24. Did you have any complications during the birth process?

25. Have you known anyone who died during pregnancy or childbirth?

**FOLLOW-UP QUESTIONS**

26. Do you hope that your baby will be born in the rainy or dry season?

27. Has there ever been a time where you couldn't get to the hospital because of rain/weather/flooding?

28. What do you think are the biggest challenges for pregnant women in The Gambia?

29. Are changes in the rainy or dry season making it more challenging or does it have no effect?

30. Are the rainy season challenges the same as in the past?