ตัวแปรทางเศรษฐกิจและสังคมที่มีผลกระทบต่ออัตรา การตายของทารกแรกเกิดในเมืองมันโรเวีย
ประเทศไลบีเรีย

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SOCIO-ECONOMIC DETERMINANTS OF INFANT MORTALITY IN

MONROVIA, LIBERIA

MR. DOMINIC FORNATI TOGBA

A Thesis Submitted in Partial Fulfillment of the Requirements

for the Degree of Master of Science Program in Health Economics and Health Care Management

Faculty of Economics

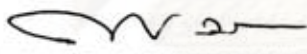Chulalongkorn University

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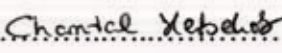|	
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Field of Study	Health Economics and Health Care Management
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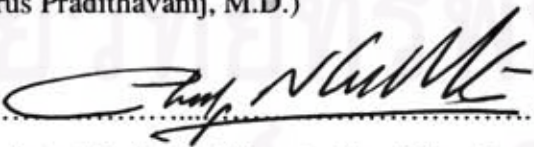
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โดมินิคมอร์นาทิที่อกบา: ตัวแปรทางเศรษฐกิจและสังคมที่มีผลกระทบต่ออัตราการตายของ ทารกแรกเกิดในเมืองมันโรเวียประเทศไลบีเรีย (SOCIO – ECONOMIC DETERMINANTS OF INFANT MORTALITY IN MONROVIA, LIBERIA) อ.ที่ปรึกษา: คร. ชันทาล แฮร์เบอร์ โฮลส์, 85 หน้า.

การศึกษาครั้งนี้เป็นการศึกษาแบบพรรณาโดยใช้ข้อมูลภาคตัดขวางและแบ่งขอบเขตพื้นที่ทางการ ศึกษาตามหลักภูมิศาสตร์ของเมืองมันโรเวีย ประเทศไลบีเลีย ซึ่งสามารถแบ่งออกเป็นสี่ส่วน คือ เกาะบัสซอ ครือดเมืองซิงกอร์เมืองมันโรเวียกลางและเมืองแอร์ฟิวส์เพื่อศึกษาตัวแปรทางเศรษฐกิจและสังคมที่มี ผลกระทบต่ออัตราการตายของทารกแรกเกิดในสตรีซึ่งอยู่ในวัยเจริญพันธุ์และใช้การเลือกตัวอย่างแบบชั้นภูมิ จำนวน 400 ตัวอย่าง

ผลการศึกษาครั้งนี้พบว่าอายุของแม่ทารกในการเข้าสู่บริการทางสาธารณสุขการเกิดโดยธรรมชาตินอก โรงพยาบาลการปฏิบัติตามประเพณีและวัฒนธรรมดั้งเดิมภาวะการหย่าร้างของแม่ทารก   และภาวะทุ โภชนาการและการให้นมแม่แก่ทารกมีนัยสำคัญทางสถิติในการกำหนดอัตราการตายของทารกใน   เมือง มันโรเวียประเทศไลบีเลียนอกจากนั้นอัตราการตายของทารกมีความสัมพันธ์ในทิศทางเดียวกันกับการเข้าสู่ บริการทางสาธารณสุขการเกิดโดยธรรมชาตินอกโรงพยาบาล   อายุของแม่ทารก   ช่วงระยะเวลาการเกิดของ ทารก   ภาวะทุโภชนาการและการให้นมแม่แก่ทารก   การปฏิบัติตามประเพณีและวัฒนธรรมดั้งเดิมและ ภาวะการหย่าร้างของแม่ทารก   ในทางตรงกันข้ามผลการศึกษาพบว่าอัตราการตายของทารกมีความสัมพันธ์ใน ทิศทางตรงกันข้ามกับสภาพที่อยู่อาศัย การเข้าถึงน้ำดื่มที่ปลอดภัยและสาธารณูปโภค ความยากจน และระดับ การศึกษา ในขณะที่ผลการศึกษาด้วยวิธีกำลังสองน้อยที่สุดพบว่าเมื่อกำหนดให้ปัจจัยความยากจนเป็นตัวแปร ตามแล้ว   สภาพที่อยู่อาศัยภาวะทุโภชนาการและการให้นมแม่แก่ทารกรายได้ของแม่ทารกมีความสัมพันธ์ใน ทิศทางเดียวกันกับอัตราการตายของทารกในขณะที่ปัจจัยที่มีความสัมพันธ์ในทิศทางตรงกันข้ามกับความ ยากจนคืออัตรา การตายของทารก ซึ่งหมายความว่าปัจจัยดังกล่าวไม่เกี่ยวข้องกับปัจจัยอื่นในแบบจำลอง

ผลการศึกษาครั้งนี้แสดงให้เห็นว่าถึงแม้ว่าเมืองมันโรเวียมีจำนวนบริการสาธารณสุขมากที่สุดแต่มี อัตราการใช้ประสิทธิภาพของทรัพยากรน้อยที่สุดและประชาชนโดยส่วนมากตัดสินใจที่จะใช้บริการทางด้าน สาธารณสุข   น้อยกว่าเมื่อเปรียบเทียบกับอัตราการใช้ในประเทศอื่น ๆ   แล้วสำหรับการประยุกต์ใช้ทางด้าน นโยบายพบว่าการลดอัตราการตายของทารกสามารถทำได้โดยการพัฒนาหรือฝึกอบรมเจ้าหน้าที่ทางด้าน

สาขาวิชา เศรษฐศาสตร์สาธารณสุขและการจัดการบริการสุขภาพ ลายมือชื่อนิสิต ....

ปีการศึกษา. 2552...   ลายมือชื่ออ.ที่ปรึกษาวิทยานิพนธ์หลัก.Chcadd......

ลายมือชื่ออ.ที่ปรึกษาวิทยานิพนธ์ร่วม................

#5285620729: MAJOR HEALTH ECONOMICS AND HEALTH CARE MANAGEMENT
KEYWORDS: SOCIO ECONOMIC/ DETERMINANTS/ INFANT MORTALITY/MONROVIA/ LIBERIA

DOMINIC FORNATI TOGBA: SOCIO ECONOMIC DETERMINANTS OF INFANT MORTALITY IN MONROVIA, LIBERIA. THESIS ADVISOR: CHANTAL HERBERHOLZ, Ph.D, Co-advisor: Pirus Pradithavanij M.D. 85 pp.

This is a cross sectional descriptive study conducted in four geographical locations in Monrovia, Liberia, namely Bushrodrod Island, Sinkor, Central Monrovia, and Airfield respectively to examine the socio economic determinants of infant mortality amongst women who are reproductive in child bearing. A stratified random sampling was use with a sample size of 400.

The main findings of this study are, access to health care, unskilled birth attendants, cultural and traditional practices, birth interval, displaced mothers, household condition and crowding, inadequate breast feeding and malnutrition have significant relationship with infant mortality in Monrovia, Liberia. According to the results of this study, infant mortality has a positive relationship with access to health care at 1% significant level, while birth interval has a negative relationship at 1% significant level. In the same vein, cultural and traditional practices has a positive relationship with infant mortality at 1% significant level. Following the same trend, unskilled birth attendants has a positive relationship with infant mortality at 5% significant level while displaced mothers has a negative relationship with infant mortality at 5% significant level. The study also found that household condition and crowding has a negative relationship with infant mortality at 10% significant level while inadequate breastfeeding and malnutrition also has a negative relationship with infant mortality at 10% significant level. Interestingly, the poverty variable turned out to be insignificant, although its coefficient entered with an expected positive sign, which may be due to regional differences as the results by geographic area indicates. These results provide useful clues for the design of future policies.

Field of Study: Health Economics and Health Care Management Student's Signature.........................
Academic Year: 2009 Advisor's Signature...................
Co-advisor's Signature ....

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LIST OF ABBREVIATIONS

CWIQ	Core Welfare Indicator Survey
GDP	Gross National Product
IMF	International Monetary Fund
IDPs	Internal Displaced Persons
LISGIS	Liberia Institute of Statistics and Geo Information Services
MOHSW	Ministry of Health and Social Welfare
NGO	Non Governmental Organizations
PPA	Poverty Participatory Assessment
PRS	Poverty Reduction Strategy
PUR	Public Utility Report
UNDP	United Nation Development Program
UNCHR	United Nation High Commision for Refugees
UNICEF	United Nation Children Fund
UNGA	United Nation General Assembly
UNMIL	United Nation Mission in Liberia

CHAPTER I

INTRODUCTION

1.1 Introduction

Infant mortality is an important factor in Sub Sahara African Countries especially a poor and conflict nation like Liberia. Poverty and education among other factors, both at the societal and individual levels, seemed to be closely associated with infant mortality. The study will address some socio economic factors of infant mortality that placed Liberia amongst the world leading infant mortality countries. One of those factors responsible for the health problem is poverty that has been living with Liberians even before the commencement of the civil crisis but has aggravated as a result of the fourteen years of war conflict in Liberia wherein thousands of women and children were affected.

This paper also aims to provide knowledge on the Liberia Poverty Participatory Assessment (PPA) that was conducted by the Liberia Institute of Statistics and Geo – Information Services (LISGIS). The assessment has revealed that 63.3 percent of the Liberian population lives below the poverty line (less than a dollar USD per day). In this study, you will examine how displaced mothers are affected and have an impact on their infants. Cultural and traditional practices among ethnic groups that are mainly practiced among the Mandingo and Vai are also being discussed and the performing of deliveries by unskilled birth attendants. The study addresses the problem of inadequate breast feeding and malnutrition that also tends to affect infants deaths. Breast milk has being seen to having multiple benefits to infants health and development, but most women do not breastfeed their babies for fear of breast shape and insufficient food for the mother. The study will also address birth interval, mother age and household condition and crowding that seem to be highly linked to infant mortality as previous studies have shown. The problem with access to health care, safe drinking water and sanitation are major problems in Liberia as the 14 years of civil conflict has demolished health infrastructures and water sewages, thus

may have a great impact on infant mortality. While there are other factors that may affect infant mortality such as acute respiratory tract infection, diarrhea, low birth weight, malaria, and other health related diseases, this study focuses on socio economic factors.

The study opens with an introduction and significance of the study and addresses one primary research question and two secondary research questions of infant mortality in Monrovia, Liberia followed by a primary research objective and two secondary research objectives that will be the focus of this research. The study laid out a scope to confine the research and a hypothesis that will be studied. The study opens with an overview of infant mortality and its determinants. Further sections of this study comprise of causes of infant mortality, methodology, results and discussion and of course conclusion and recommendations.

1.2 Significance of the Study

Gender inequality is magnified in situations of war, and women are disproportionately disadvantaged in terms of personal safety, access to resources, and human rights. Amongst the wars that took place in Liberia, the city of Monrovia was heavily affected since its commencement. Moreover, the city was engaged by series of wars which the Liberian people themselves referred to as first, second and third wars. These series of wars were very brutal and more destructive in a short period of time and has led to the increase in infant mortality in the county.

The arm conflict in Monrovia has greatly affected women, children and their access to health care. These series of wars affected the capital city mostly than the initial war (the revolution of Charles Taylor). The war has affected the population of Liberia especially Monrovia, having many to be placed in displaced camps and cannot have access to the many good things in life. Monrovia, the capital city of Liberia is over populated and is having almost quarter of the nation's total population. Due to hardship in rural areas, many are coming to the capital where they think they can make life easier. The rapid rural to urban migration as a result of the war has made the

capital of Liberia, Monrovia overpopulated. Many have their own reasons for coming to the capital city but the most amongst the reasons are to find daily bread, go to school and meet some basic needs. These civil conflicts resulted in a complex emergency situation and a catastrophic humanitarian crisis. The war adversely affected all of Liberia's national and social life. The conflict has undermined children chances of survival both directly, causing many to be place in the line of fire, and indirectly compromising the provision of basic services that are essential to good health.

A recent study by Scott, Carolyn, and Frey (2000) found that the status of Sub Sahara African Countries is directly linked to infant mortality. However, one thought is that the environment has a negative force on infant mortality. This harsh climate tends to increase the odds of contracting malaria and other diseases that also result into infant death. Many civilian casualties are infants. Warfare deaths are relatively modest over a long period of time; however, warfare creates peaks in high mortality and communicable diseases as in the case of Liberia are spread by war. Because of the civil war in Liberia, infants are at a higher mortality risk due to a weakened immune system. This strife and animosity will not resolve over night as Liberia is just recovering from a 14 year of unbroken civil conflict and will need time to reconsolidate. Finally, the city of Monrovia had being heavily affected by series of brutal civil conflicts leaving mostly women and children at a disadvantage state and has also led to the increase of infant deaths in the country.

1.3 Research Questions

1.3.1 Primary Research Question

What are the socio economic determinants of infant mortality in Monrovia, Liberia?

1.3.2 Secondary Research Questions

- What are the main determinants amongst the factors that contribute to infant mortality in Monrovia, Liberia?

- Does poverty significantly contributes to infant mortality in Monrovia, Liberia?

1.4 Research Objectives

1.4.1 Primary Research Objective

To analyze the socio economic factors that determine infant mortality in Monrovia, Liberia

1.4.2 Secondary Research Objectives

- To analyze the main determinants of infant mortality and determine which one of those factors heavily affect infant mortality in Monrovia, Liberia

- To determine the effects that poverty poses on infant mortality and the effects that infant mortality may pose on poverty in Monrovia, Liberia

1.5 Scope of the Study

The scope of this study tends to focus on the socio economic determinants of infant mortality in Monrovia, Liberia and will use primary data collected in 2010 from a survey of 400 women who are reproductive in child bearing.

1.6 Hypothesis

Displaced Mothers, Cultural and Traditional Practices, Access to Safe Drinking Water and Sanitation, Poverty, Inadequate Breast Feeding and Malnutrition, Home Delivery by Unskilled Birth Attendance, Access to Health Care, Birth Interval, Mother Age, Mother Education, Household Condition and Crowding contribute to infant mortality in Monrovia, Liberia

CHAPTER II

LITERATURE REVIEW

2.1 Overview of Infant Mortality

The war in Liberia has caused high increase in infant mortality. Though the rate tends to decrease due to high level of vaccination, Liberia's infant mortality rate still remains high in world ranking. A study from Heer (1983), explains that infant mortality refers to the deaths of children under the age of one year and is measured by the infant mortality rate, which is the total number of deaths to children under the age of one year for every 1000 live births. The infant mortality rate is often broken down into two components relating to timing of deaths: neonatal and post neonatal. Kuate Defo (1996), in a study mentioned that health conditions in Sub Sahara Africa continue to be the worst of all developing regions. Scott et el.(2000), in a study mentioned the relationship between infant mortality and the level of socio economic development is not perfect, the infant mortality rate is used more than any other measure as a general indicator of socio economic wellbeing and of general medical and public health practices. A study conducted by Matteson, Jeffery, Burr, and Marshall (1998), found that familiar set of personal risk factors (smoking, alcoholism, accidents etc) associated with poor infant health has long contributed to socio – economic factors in infancy. Many developing countries lack the resources to keep track of infant deaths especially when there are insufficient resources to carry out efficient data processing and management; therefore data of these areas are estimated only. Another methodological problem in measuring infant mortality is ascertaining the number of live births. Sometime this problems is one of the undercounts of births (ie. births are not registered and thus not counted), especially across countries because the distinction is not as clear – cut as one might imagine.

2.2 Determinants of Infant Mortality

There are a number of causes of infant deaths and these deaths vary with countries around the world. The determinants of infant mortality in developed countries will differ from those of developing countries. There is a possibility that developed countries may have less infant mortality and fewer causes due to its economic status and health system while in developing countries especially a country like Liberia that has just emerged from fourteen years of unbroken civil conflicts may experience more infant deaths and as compared to a developed nation. With the foregoing, there are a number of socio economic determinants of infant mortality that are discussed in this literature.

2.2.1 Displaced Mothers

The fourteen years of civil conflicts in Liberia has made the country to have about 500,000 to be displaced in some of Government's unused buildings such as school, hospitals, offices that have been demolished by the civil war. Mothers, who are still displaced since the end of a brutal civil war, lack many facilities to take care of their babies. There are no beds and the mother along with her child /children sleep on blankets provided by some Non Governmental Organizations (NGOs) which may not be adequately suitable for both the child and the mother. Moreover, there may not be sufficient blankets to double and sleep and this has also coupled with mosquito bites as there may not be sufficient bed nets. Though the United Nation High Commission for Refugees (UNCHR) provides mosquito nets and other supplies to these Internal Displaced Persons, some of them sell their supplies including mosquito nets because there may be other needs that were not supplied and would actually be needed. This may lead to their detriment as well. To further buttressed the inconveniency of the situation at hand, most internally displace persons (IDPs) centers are build by partition and there are not proper windows and doors to adequately safeguard a particular mother and her infant. Most of the displaced camps faced problems with safe drinking water and sanitation as hand pumps sometimes dry out during the dry season and many have to make other means to fetch water. The

displaced camps are highly congested and there are many children who are playing in the dirt as a means of making themselves happy. As there is no access to safe drinking water and sanitation, many infants encounter a lot of sicknesses especially cholera and diarrhea that is very common in displaced camps especially when there are too many kids. With the high level of inadequate access to health care in the county, most mothers in displaced centers faced greater problems with their infants when they are ill and cannot seek medical care. This threatens the life of the infant especially when the illness is a chronic one. Now that government are in the process of rebuilding and rehabilitating some of its basic infrastructures, many of the IDPs are giving set dates to leave a particular infrastructure owned by government especially when it happens to be a ministry that needs to be functioning.

2.2.2 Inadequate Breast Feeding and Malnutrition

Winikoff and Laukaran (1989) conducted a study and found that another item of contention is the extent to which it is the economic activity of mothers themselves, their participation in the paid labor force – which is responsible for more use of bottles and less breast feeding. Some students of social trends have insisted that all the forces of modernization - including increases in woman's work will inevitability result in less breast feeding and that it is futile to attempt to reverse the new pattern of infant feeding. Labbok (2006), studied that exclusive breast feeding and continued breastfeeding for two years is associated with reduction in underweight and is an excellent source of high quality calories for energy. By reducing fertility, exclusive breast feeding reduces reproductive stress. Many mothers in Liberia do not eat the right food for a healthy breastfeeding for their infants especially the ones living below poverty line. The war in Liberia especially in Monrovia coupled with poverty has made many homes to be living on less than a dollar USD a day. A woman who is hungry will not want to breastfeed her infants. However, the mother would feed her infant with bottle milk or would use some other means. Inadequate breast feeding may not make a child healthy and may caused serious illness to the child. Because a mother's breast milk prepares a child to be strong and helps to fight diseases, a mother should breast feed her child at least for the first six months after birth before giving

him/her any other food and must continue breastfeeding till the appropriate time. Most mothers do not want to breast feed their infants for fear that their breast will change shape and fall flat. This happens especially among young girls who always want to look young at all times. Even when a baby is crying, the mother will not give the breast milk to the child but rather prefer bottle feeding which is most common practiced in some homes. Most rural dwellers do not use bottle milk because it may be too costly rather they use water and rice dust at an early age less than six months which may not be healthy for a child. A study by Palloni, Tienda (1986), found that human milk is species-specific, and all substitute preparations differ markedly from it, making human milk uniquely superior for infant feeding. Exclusive breast feeding is the ideal infant nutrition and is sufficient to support optimal growth and development for approximately the first six months of life.

Breast milk has been shown to have multiple benefits to infant health and development. Breast feeding is endorsed by many health organizations as the optimal form of infant nutrition. When infants do not received breast milk, there are increased health risks for both mothers and infant. For women who do not breastfeed, there may be increased risked such as breast cancer. Mothers who do not breast feed their babies are at an increase risk of infant mortality and infant who do not received breast milk have an increased incidence of many acute and chronic conditions. Therefore, it is important for all health care professionals to protect breast feeding and minimize barriers that may threaten the mother to infant breast feeding relationship.

Everyone feels hungry at times and hunger is the body signal that it needs food to satisfy other body needs and when after we have eaten, hunger goes away until our stomachs are empty again. Malnutrition is not the same thing as hunger, though they often go together and people who are malnourished lacked the nutrients needed for proper health and development, thus someone can become malnourished for a long period or short period of time and the condition may be mild or severe, a study found by Nelther, Chem, and Wilson (2005). People who are malnourished are more likely to get sick and in severe cases, may even die. Unfortunately, there are millions of people in the world who do not get enough to eat most of the time and are at risk of

malnutrition.   In a study conducted by Nelther, et al. (2005), found that malnutrition is the insufficient, excessive or imbalance consumption of nutrients and people who don't get enough food often experience hunger, thus hunger can lead to malnutrition over the long term. But someone can become malnourished for reasons that has nothing to do with hunger. Even people who have plenty to eat may be malnourished if they don't eat food that provides the right nutrient, vitamins, and minerals. Someone with celiac disease has intestinal problems that are triggered by a protein called gluten, which is found in wheat, rye, barley, and oats. Kids with cystic have trouble absorbing nutrients because the disease affects the pancreas, an organ that normally produces enzymes necessary for digestion. Kids who are lactose intolerant have difficulty in digesting milk and dairy products. By avoiding dairy products, they are at a higher risk of malnutrition because milk and dairy products provide 75% in food supply.Lee, Rosenzweig, and Pitt (1997) in a study found that allocation of resource to children selectively effects the alteration in the health infrastructure via their effects on child survival. Chronic hunger and malnutrition can cause significant health problems and people who go hungry all the time are most likely to be under weighed, weighing significantly less than an average person of their size. Their growth may also be stunned, making them much shorter than average. (Of course, people can also be underweight or short because they have an illness or because of their genetic makeup). Worldwide, as many as 27% of children younger than age five and infants are highly affected. (Nelther et al. 2005).If a person does not get enough of a specific nutrient, that's a form of malnutrition (although it doesn't necessarily mean that the person will become seriously ill). The most common form of malnutrition in the world is iron deficiency which affects up to 80% of the world population as many as 4 – 5 billion people. Iron is found in food like red meats, eggs yolk, and fortified flours, bread and cereal

A number of different nutrition disorders may arise, depending on which nutrients are under over abundant in the diet. Malnutrition remains a wide spread in developing countries, particularly amongst the poorest and most vulnerable segments of the population. One major reason why infants suffer from malnutrition is that the mother did not eat nutritional food during her pregnancy. On the other hand, mothers

do not feed their infants with breast milk till the specified time and do not give them nutritional food to keep them healthy.

2.2.3 Mother Education

Suwal (2001), found in a study that the knowledge gained through education will not only enable mothers to gained greater awareness of access to safe drinking water and sanitation and a more hygiene way of living, eating and providing nutritious food and to use healthcare facilities and family planning more, but also to have improved skills and more self confidence to marry late, to keep up well paid jobs, to break traditional rules and to be more expose to the media and other information which may have a favorable impact on infant mortality. The war in Liberia has demolished many of the infrastructures including health facilities, schools buildings, and government ministries. The war has also led many of the qualified teachers to flee the country and has resulted into some unqualified ones who are teaching not because they love teaching but because they actually want to find a daily bread for their families and look after some basic needs. The low salary of government teachers has had an impact on the educational level of Liberians as some teachers made teach two to three schools, thus making them ineffective. The war has made many of the young girls to engage into prostitution for the survival of their families and to meet their basic need as well. There is a saying amongst women in Liberia that a woman load cannot leave on the road, meaning though they might not be educated, there will be a man to marry them as long they are living. A study conducted by Scott et al. (2000), found that one of the most convincing theories is the gender stratification theory which states that as female gender is appreciated, so is her role as a mother. Female education is one of the most important ways of reducing infant and child mortality. Educated mothers are also likely to seek care for their children; a literate mother is more likely to communicate with health care providers and female education has a positive effect on the balance of family relationships regarding child's care. Educated mothers tend to be self – esteem than uneducated mothers that triggers into healthy outcomes and healthy babies. On the other hand, Suwal (2001) studied that although infant caring is solely done by mothers in general, the education of fathers shows a

positive impact on infant and child survival. This effect may be due to better income and better information on health care, leading to better decision making in terms of medical care.

Adetunji (1995), from previous studies have observed that mother's level of education had a strong inverse association with infant mortality. In broad terms, child bearing may affect a mother education and child investment choices through income and learning education increases a mother's income stream through both the labor market and the mating market. In addition to the income channels, education can improve a woman's stock of knowledge regarding contraceptive technologies or health pregnancy behaviors, either because it argues her knowledge directly (i.e., educational curricula are important), or because it improves her ability to absorb the processed information generally, Justin and Hillary (1996).

2.2.4 Home Delivery by Unskilled Birth Attendants

Home delivery by unskilled birth attendants are major causes of infant mortality and mobility. There lies in Sub – Sahara African Countries especially a poor nation like Liberia where some births occur at homes or are attended by unskilled birth attendants. Though health care in Liberia is free but in actual sense, some people still pay for their health services. Due to poverty, the lack of health facilities and reduction of health personnel (doctors / physicians, nurses) in the country, some pregnant women cannot have access to healthcare and have to pay for their health services. As a result of some of these obstacles, they sometimes prefer to be delivered at home. In many cases where there are no professionals or trained Traditional Birth Attendants (TBA), unskilled birth attendants try to perform delivery at homes. In some communities especially when a pregnant woman is in pain at mid night, there are highly professionals at the health facilities. The practice of unskilled birth attendance in many homes is giving rise to infant mortality especially during the neonatal period or the first four weeks of life. It is also acknowledged that infant mortality is higher in lower socio economic groups residing in backwards tribal

districts in most of the poor communities**.**

2.2.5 Access to Safe Drinking Water and Sanitation

A study conducted by Lee, Rosenzweig and Pitt (1997), found that access to safe drinking water and sanitation plays a very important role in the life of an infant . A study from World Health Organization, WHO and United Nation Children Fund, UNICEF (2004), found that poor access to safe drinking water services are major causes of illness and poverty in Liberia. The impact of inadequate drinking water and sanitation is greatest on the poor who are badly served by formal sector. Many people, particularly women and children, fetch water from long distances or pay high prices from vendors. In addition, water and sanitation related sicknesses put severe burden on health services, keep children out of school and undermine investment in agriculture and other economic sectors. A study conducted by Gamper, Kahn, and Timmins (2009), found that pipe water supply reduces infant mortality directly by reducing the incidence of diarrhea that arises from the injection of contaminated water and food and indirectly when caregivers are able to devote more time to childcare instead of water collection activities. The war in Liberia significantly undermined the delivery of safe drinking water services (pipe boiled water). Access to safe drinking water and sanitation fell from 37 % and 27% of the population in 1990, respectively to 17% and 7% respectively in 2003 (the end of the war) and Monrovia water supply fell from 18 million gallons daily to just 1 million gallon, Timothy, Fang, O'Neill, and Stratton (2008).

While significant progress has being made since the end of the war, still only about 25% of Liberians have access to safe drinking water. The government must also make plans as to how to sustain these services as they are currently donor funded. Increase access to improved drinking water is one of the Millennium Development Goals that Liberia along with other nations worldwide has adopted, United Nations General Assembly UNGA (2001).

FACE Africa is working to being point − of use water purification methods to communities in Liberia, with a focus on rural Liberia where access to safe drinking water is almost non-existent. Current and future program include:

➢ Installing sky hydrant water purification systems

➢ Distributing Public Utilities Report (PUR) to disaster areas

➢ Rehabilitating existing wells

➢ Training of water and sanitation committee

Liberia is only beginning recently to recover from a fourteen year of brutal civil war that left nearly 270, 000 people dead and nearly a million displaced. The length, ferocity and indiscriminate natures of the conflict left the country's infrastructures in ruins. The war compounded the sufferings of millions of Liberians who, even before the war, had little or no access to basic human needs such as access to safe drinking water and sanitation. For the majority of Liberians, waters fetched from wells, streams, or rivers remain the primary source of drinking water.

2.2.6 Access to Health Care

Suwal (2001) conducted a study and found that pregnant mother's health care has a direct effect on the unborn baby. Thus, medical advice and nutritious food are essential for delivering a healthy baby. Attendance of a doctor, nurse or trained mid wife is necessary for a safe delivery. Similarly, seeking a doctor's advice, timely vaccination, and access to safe drinking water and sanitation, etc. are other factors necessary to save infants from the risk of dying. Hence, the hypothesis is that utilization of healthcare services has a positive effect in decreasing infant mortality. Improving the access to quality and affordability healthcare is a key priority in a post conflict and poor country like Liberia. According to a recent publication by Liberia's Ministry of Health and Social Welfare, MOHSW (2007), the conflict has led to the destruction or poor maintenance of a number of health facilities. Out of 521 facilities,

only 389 are functional and among these, 300 are currently being supported by NGOs, some of which may reduce their support a year or two. Many health facilities, even when they are operational, lack portable water supply, lightening equipments, refrigerator, and emergency facilities. Public spending for health is very low at $3.4 per person per year. Karungula (1992), found that nursing personnel represent a potentially powerful force in the health care system and in contrast to other health care workers, they are the most widely distributed group of health care personnel throughout the country and can play a major role in reducing health problems around the world. Liberia currently has about a total of 4000 health workers as compared to 13,000 recommended by the World Health Organization. There is a lack of capacity at the central and county levels to implement health policies and programs. Health indicators for monitoring the Millennium Development Goals such as infant and child malnutrition infant and child mortality and maternal mortality are low. The high share of individual who seek care is probably due to the fact that in many instances, health care appears to be free in Liberia. A report from the Core Warfare Questionnaire Indicator Survey (2007), found that 4% of consultation of health care is free while 54.8% of cases, households do pay for care. Very few have insurance or benefit from their employee so their employer pay for care. In turn, the high proportion of visits that are free may be related to the important role played by NGOs in the administration of care. A recent survey conducted by the Liberian Institute of Statistics and Geo – Information Services LISGIS (2007), found that some 390 health facilities (18 hospitals, 55 health centers and 310 clinics are presently functioning, while another 30 are no longer operational. The use of free care services is higher among the poor than among better off households, but differences between urban and rural areas and between sexes are negligible.

Even though health care can be obtained for free in many instances, and even though many individual do seek care, cost may still be a barrier for some households. Many do not seek care due to long distances from their homes to the health centers or due to the availability of transport vehicles. Moreover, the rainy seasons has an effect for travels especially in the rural areas, while cost is more of a problem in the urban areas where a large amount of the population relies on private care providers and

prices are generally higher. At the national level, health clinics are on average are about two hours from where household lives, but in rural areas, it takes almost three hours to reach the nearest clinic or hospital. These distances to health centers are high in comparison of what has being observed in other countries, which justify an effort on the part of the Ministry of Health and Social Welfare as well as donors not only for rehabilitating existing facilities, but also for building new facilities in order to improve access to rural dwellers.

2.2.7 Cultural and Traditional Practices

A study conducted by Kute (1996), found that another factor that influences infant mortality may be the diverse ethnic group of the country. The different cultural and traditional practices and the socio economic background of these groups somewhat affect the well being of infants. Also, the different norms and beliefs of some religions which encourage families to have more babies or discourage the use of contraceptives, nutritious food, modern medical practice, etc. may play a significant role in shaping infant health and survival. One important cultural difference among groups in Liberia is the prevalence of polygamy. The most polygamous populations are those that have kept their traditional beliefs and practices followed by other ethnic groups, mainly the Vai and Mandingo ethnic groups. Most men who take several wives in a polygamous society are general wealthier, so that polygamy may be associated with increased resources for child rearing. On the other hand, those resources must be shared among more wives and children so that the predicted net effect is ambiguous. Infants in a polygamous union may receive less attention than children in a monogamous marriage, and it is possible that the general well being may be lower and their potential for survival somewhat reduced. Such differential are expected in Liberia because in a polygamous union where a man's attention and resources must be shared by several women and their children, the real issue has to do with the quality of cooperation between husband and wife and the possibility of support from other family members. Crowded living conditions increase the likelihood of death and infants born under such a condition are at risk of death, a study from the United Nation Development Program, 1994. Crowding increase the

chance that infections are passed on from one household member to another. In Liberia, there are several cultural and traditional practices that poses treat to the society as well as there are more good ones that are highly respected. There are sixteen tribes in Liberia, all of these tribes have some cultural and traditional practices but amongst the sixteen, there are two, the Mandingo and Vai Ethnic Groups that practice mainly the act of polygamy though others tribes do. The act of polygamy means a man can marry two or more women. This practice has led to so many children especially when every woman will need a child from her husband. Moreover, if a woman has only a boy child she may want a girl child so that she is satisfy. While in the process of wanting a boy, the pregnancy may probably lead to a girl child, and she may want to try for the next time and so on. Furthermore, if all women of a specific husband decide to have both a boy and a girl child, it will eventually lead to a large family. What would happen if the father is not working or has a low income? There would be massive suffering in the family, and all kids will not have access to basic services such as health care, safe drinking water and sanitation, and primary school. In Liberia, those with large families are mostly found between these two groups.

2.2.8 Mothers Age

Kalipena (1993), in a study found that an increase in unfavorable age pregnancy (less than 18 years coupled with first marriage increases the risk of an infant dying at birth or during the first year of life while a woman who may give birth at age ranging from 18 – 39 may be physically fit to give both to a healthy infant and also better prepare to take care of her baby. Kalipena (1993) found that the relationship between teenage fertility and infant mortality has been a controversial issue for some time in the world. Women who are too young and too old (age <18 and ≤45 may not have adequate strength in the process of delivery. This is a major problem because there are many teen agers ≥15 who are getting pregnant in Liberia than those who are in the normal age of being able to obtain pregnancy for a safe delivery. This is because many are not taught basic health education by their parents. The fact is severe in that teenagers seem to be more sexually active. In this case,

maternal age can influence infant mortality but not indirectly through birth weight due to the poverty pose on Sub Sahara Countries in Africa especially Liberia that has fought a long term conflict (Sirvastava el. 1998).

2.2.9 Birth Interval

A major risk factor for infant mortality is a birth interval of less than two years. A considerable body of demography literature exists that has examined the relationship between birth spacing behavior and infant mortality, and has high lightened the greater risks of mortality associated with short preceding birth intervals. The detrimental impact of short preceding birth intervals on infant and early childhood mortality is well documented in demography literature, although the pathways of influence within the relationship remain an area of debate. The greatest risks of an infant following a short birth interval are among those whose previous siblings died, high parities, those with young mothers and those whose previous siblings was breast feed for a short duration. The presence of birth interval and infant mortality relationship across countries with such diverse culture and socio economic settings has led to many questions concerning its functional pathways. Despite the number of studies that have examined the relationship between birth interval and infant mortality, the mechanisms through which short birth intervals influence mortality remain a subject of debate. Previous studies have concentrated on three (3) main mechanisms. Firstly, stop the maternal depletion syndrome which postulates that short intervals between births do not allow the mother sufficient time in a non-pregnant, non-lactating state in order to replete her nutritional status, the child succeeding short interval is thus disadvantaged as a result of foetal malnutrition and a compromised intrauterine environment. Secondly, it is suggested that the relationship between birth interval and infant mortality may be explained by sibling rivalry. If there are two or more children close in age within the family, it is necessary for them to compete for resources and for maternal care and attention. This could have an impact on the nutritional status of the index child, on incidence of mortality, and on higher fatality from illness and accidents. Finally, it is suggested that there is an increase exposure to infectious disease suffered by the younger child. A birth interval

of less than two years increases the risks of mortality in neonatal period, and therefore stresses the need of prenatal causal factors, past studies from Whitwortha and Stephenson (2002).

2.2.10 Housing Condition and Household Crowding

Anson (1988) in a study found that the decrease of mortality in the Western world has been the result of the standard of living. There is likelihood that poor housing and congested living conditions have a detrimental impact on infant health. At first two major casual crowding mechanisms are thought to be in the relationship between crowding and physical health. First, high level of households crowding can produce stress that leads to illness. Second, through shared proximity, household congestion contributes to the cause of communicable diseases. A significant body of research conducted primarily in affluent countries has documented the detrimental effects of housing conditions on a variety of illness, including various contagious diseases. Poor housing may be linked to higher infant and adult mortality rates. The view that poor housing conditions and household crowding inevitability leads to poor health is challenged. However, by several observers, who question the role played by both crowding and housing quality.

Crowded communities provide a more fertile ground for the spread of infections than more scattered communities. A community that is overcrowded will likely to have the spread of disease than those that are not. In Liberia, especially Monrovia, there are a number of communities that are over populated and those are the communities that are likely to be the poorest communities. A significant research has documented the detrimental effects of housing condition – such as sanitation, space, air quality, food storage facilities, lightening, noise, and especially damp, cold and moldy conditions on a variety of illnesses. Poor housing condition even has been documented to relate to higher infant mortality rates and there is little question that under certain circumstances crowding may be linked to an increased incidence of communicable diseases, but other circumstances, no such relationship has being

discovered" a study conducted by Fuller, Edwards, Sermsri andVorakitphokathorn (1993).

2.2.11 Poverty

Suwal (2001) in a study found that the chance of survival of infants depends on the family income because the accessibility to a doctor, hospital, good food, and safe drinking water and sanitation depends not only on availability but also on affordability. The infant may have a higher chance of survival because of extra expenditure for their well being as a result of their mothers and fathers paid jobs or a lower chance due to a lack of care. Sohail Agha (2000), in a study found that children born into poverty are likely to die in infancy. In other words, poverty measures the proportion of total household expenditure especially on food. According to a recent study by the International Monetary Fund (IMF) (2009), industrialized nations in particular the United States, have a warped sense of war poverty. Yes, poverty exists in our nation, our town, and our streets. However, poverty also occurs in third world countries. A different type of poverty exists in these countries that are not as prevalent in the United States: complete and total lack of food and water. In most instances, starvation can and is prevented by industrialized nations. However, the major causes of infant mortality in developing nations are easily traced to poverty and some other socio economic factors. In the last thirty years, infant deaths due to these causes have declined, yet these rates are the root of disparity in world health care and the imbalance of resources. The infant mortality rate varies tremendously among less developed countries. A recent study conducted by Scott et el. (2000), enumerate five micro-social change theories that can explain the variation of infant mortality across less developed countries: modernization theory, dependency / world - system theory gender stratification theory, economic disarticulation theory and developmental theory. The main goal of these theories is to evaluate which one of them works in an addictive fashion. Currie, Shields, and Wheatly (2006), found that the relationship between income and health is an important policy – related issue that has generated a large empirical literature in economics and other related sciences.

2.2.11.1 Methods Measuring Poverty

Years of conflict and mismanagement have left Liberia one of the poorest countries in the world, with GDP per capita estimated at US $190. Poverty is pervasive, and is particularly acute in rural areas and the most remote corners of the country. Poverty has many dimensions, including low levels of income and consumption, poor nutrition and food security, low health and education indicators and inadequate infrastructure. It is reinforced by inequalities, especially in access and economic opportunities, IMF (2008). When Liberia developed its Poverty Reduction Strategy (PRS) in late 2006, there was little reliable information on poverty across the country. In preparation for the full PRS in 2007, there were three sources of data that were emphasized. First, the Liberia Institute of Statistics and Geo – Information Services (LISGIS) carried out a Core Welfare Indicator Questionnaire Survey (CWIQ) in collaboration with various partners. The CWIQ surveyed 3600 households, covering every region, demography group, income level, and house hold type. It gathered detailed information on both objective measures and perceptions of poverty. It focused on consumption and collected complimentary data on household's composition by size and age, education levels, and access to basic services. Second, the survey collected a data from a national representative sample of over 7000 households between December 2006 and April 2007, IMF (2008).

2.2.11.2 Income and Consumption Dimensions of Poverty (Measuring Urban and Rural Poverty Lines)

The CWIQ surveys focus on consumption rather than income, for two reasons. First, consumption is better measured in household surveys than income, especially when net income is difficult to measure and where most of the population work in the informer sector. Second, consumption is a better indicator than income of welfare and a household standard of living. The survey calculated urban and rural poverty lines based on the cost of basic needs, in two parts. First, it estimated urban and rural food poverty lines derived from the cost of a food basket providing 2400 Kcal per day per adult equivalent. Second, a computed non - food poverty line by estimating the non –

food spending of households whose food expenditure were within 5% of the food poverty line. The total poverty line is in the sum of two, while the food poverty line is in the basis for measuring extreme poverty, IMF (2008).

CHAPTER III

RESEARCH METHODOLOGY

This study tends to determine the socio economic determinants of infant mortality in Monrovia, Liberia and will mainly use this chapter to answer the research questions. This chapter is divided into five sections. The first section present the conceptual frame work of the study while the second section talks about population and sample which include sub sections. The third section has to do with the research design and to follow is the fourth which concerns data collection followed by other sub sections – data collecting period, data source, data analysis, operation definition of variables, and reason for choosing variables. The last section of this chapter is the data analysis or the model which will finally answer the research question.

3.1 Conceptual Frame Work

The conceptual frame work of this study is presented below. The frame work is divided into two sections. The first section of this frame work focuses on the economic and household variables of infant mortality in Liberia. We say economic and household variables because there are factors in this section that are economic related as well as household related. The second section of the frame work has to do with factor concerning health facilities. The both factors (economic plus household factors and health facilities factor) directly contribute to infant mortality in Liberia as the link shows. Infant mortality has a relationship with poverty as well as poverty may also be the result of infant mortality.

Conceptual Frame Work

Economic and Household Factors   Health Facilities

Household Income - average Household income

Displaced Mothers - mothers who left their homes due to the war

Mother Education – mothers who have not had primary or secondary education

Cultural and Traditional Practices Access to Safe Drinking Water and Sanitation

Inadequate Breast Feeding Mother Age - $\geq 15 \leq 45$ – may lack strength in delivery

Household Condition and Crowding

Birth Interval - birth spacing < 1years

Infant Malnutrition

Access to Health Care – mothers who cannot access to health care

Unskilled Birth Attendance –

Deliveries that are performed at homes due to the inadequacy of professionals and may lead to an infant death or the mother as well

Infant Mortality – deaths of infants less than one year and may be the result of poverty

Poverty - family living on less than a dollar per day (poverty line) that cannot afford the proper meal for their family and may affect their infant

3.2 Research Design

This study is a cross – sectional descriptive study that aims to identify the major socio economic determinants of infant mortality in Monrovia, Liberia.

3.3 Research Population:

3.3.1 Target Population

Women living in Monrovia, Liberia

3.3.2 Sample Population

Women who are reproductive in child bearing in Monrovia, Liberia

3.4 Study Location

Liberia has 15 counties and covers an area of 3600 square miles. The capital of Liberia, Monrovia is getting populated everyday as many from the rural areas want to have access to some basic needs in life such as water, health care, market, and education etc which is even difficult. The city of Monrovia was heavily engaged by series of wars which the Liberian people themselves referred to as first, second and third wars. These series of wars were very brutal and more destructive in a short period of time that has led to the increase of infant mortality mainly in the county. The approximate population of women who are reproductive in children bearing in Monrovia is about 450,000. Many of the people living in Monrovia are Christians about (70%); Muslims about (20%) and the rest of other religions are likely to be about 10%. Most NGO workers, Ministers of Government and other high professionals in the former and informal sectors are those who have higher incomes and can received salaries and other benefits on time while other government workers such as health workers, securities, teachers etc are the middle income people and often do not receive their salaries on time. The rest of the people living in Monrovia

are mostly business people who have no choice but to do a pity business as a means of survival. Transportation is a serious problem as many have to fight their way out every day to go to their working places.

3.5 Sample Size Calculation

The sample size of this study will reflect women who are reproductive in child bearing in Monrovia, Liberia and will use a sample calculation with a simplified formula

$$ n = \frac{N}{1 + N(e)^2} $$

n = sample size

N = Population size – the population in this study will reflect women who are reproductive in child bearing in Monrovia, Liberia and the total women in this range is approximately 450,000

e = this is the maximum error / level of precision for the sample and is the largest acceptable percentage between the estimated value from the sample and the true population value. The study will use 5% as the level of precision

$$ n = \frac{450,000}{1 + 450,000\,(0.05)^2} $$

Sample size   400

From the sample size calculation, the sample size is 400. However, the study will add 40 to the already calculated sample size (10% of 400 for no response and incomplete questionnaire) thus; the sample size for this study will now be 440.

Due to the limitation of the allocation of population data to the various communities in Monrovia, the sample size allocated to each geographical location in this study is based on how a particular geographical location or community is populated.

In this regard, the population and sample size of this study is only estimated and is also stated as percentage of the estimated population and sample size regarding the various geographical locations in Monrovia due to limitation of data.

3.6 Sampling Procedure

Diagram 3.1   440

Sinkor	Central Monrovia	Airfield	Bushrod Island
120 or 27.27%	75 or 17.04%	85 or 19.31%	160 or 36.36%

27 40 23 30	24 20 17 14	22 17 14 32	34 37 42 47
1-6; 7-12; 13-18; 19-24	BTC;SW;WT;CS	RT;OM;NM;LZ	CT;DC;WP;NKT
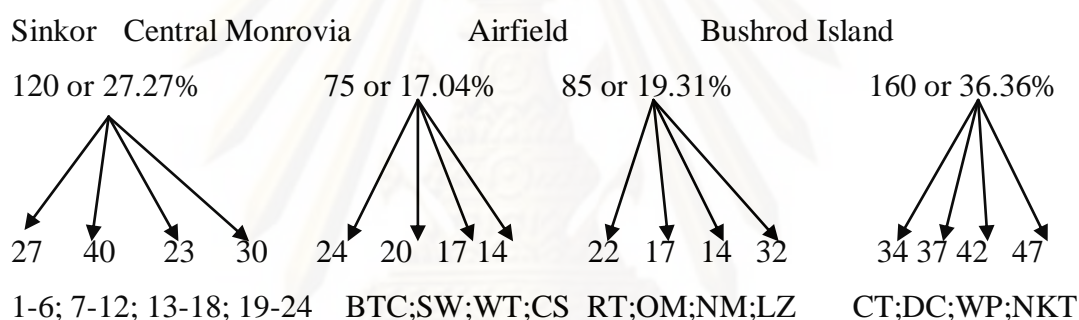
Table 3.1   Estimated population

Where,   in percentage at community level

1-6 = 1st – 6th Street	-	22.5	BTC = Baclay Training Center	-	32
7-12 = 7th – 12th Street	-	33.33	SW = Soniewien Community	-	26.66
13-18 = 13th – 18th Street	-	19.16	WT = Water Street	-	22.66
19-24 = 19th – 24th Street	-	25	CS = Carey Street	-	18.66
		100%			100%
RT = Roto Town	-	25.88	CT = Clara Town	-	21.25
OM = Old Matadi	-	20	DC = Doe Community	-	23.12
NM = New Matadi	-	16.47	WP = West Point	-	26.25
LZ = Lakpazee	-	37.64	NKT= New Kru Town	-	29.37
		100%			100%

As shown in figure 3.1and table 3.1, Monrovia is divided into four geographical locations namely Sinkor, Central Monrovia, Air Field and Bushrod Island. The samples attributed to each of these geographical locations are only estimated due to the lack of population data in the various communities in Monrovia. Bushrod Island was attributed 160 (CT. 34 + DC. 37 + WP. 42 + NKT. 47) sample because it has the highest population of all the geographical locations. In the same way, New Kru Town (NKT) is attributed a sample size of 47 because of its high population followed by West Point (WP) with a sample of 42. On the other hand, Doe Community (DC) has a sample of 37 because in this location, it is next in population to West Point followed by Clara Town (CT) which happens to have the least population of these locations. Following the same trend, Sinkor has a sample size of 120 (1-6th St. 27 + 7-12th St. 40 + 13-18th St. 23 + 19-24th St. 30) because this location is next in higher population to Bushrod Island. In this location, 11-12th Street is allocated sample size of 40 because this community has the highest population followed by 19-24th street with a sample size of 30. 1-6th Street and 13-18th Street are allocated the lowest samples in this location because these communities are lower in population as compared to the others. Airfield and Central Monrovia are attributed lower samples of 85 and 75 because they have lower population (RT. 22 + OM. 17 + NM. 14 + LZ. 32 = 85 for Airfield) and (BTC. 24 + SW. 20 + WT. 17 + CS. 14 = 75) for Central Monrovia respectively. Lakpezee (LZ) is allotted a sample size of 32 because this location seems to have the highest population in this geographical location followed by Roto Town (RT) with a sample size of 22. Old Matadi (OM) and New Matadi(NM) are allotted lower samples sizes of 17 and 14 because these geographical locations seem to have lower population as compared to Lakpazee and Roto Town. BTC is allocated a sample size of 24 because this community is highly populated followed by Sonniewein with a sample size of 20 while Water and Carey Streets have the lowest samples in the location because these communities are lower in population.

3.7 Eligibility Criteria

3.7.1 Inclusion Criteria

Women who are reproductive in child bearing in Monrovia, Liberia

3.7.2 Exclusion Criteria

Mothers residing outside of Monrovia
Mothers who cannot communicate
Mothers who refused to participate

3.8 Data Collection

This study will use primary data collected from structured questionnaire. The target population for this study are women who are reproductive in child bearing in Monrovia, Liberia and the population to be sampled is women at a reproductive child bearing age. The study will use 440 women who will be interviewed from structured questionnaire on the socio economic determinants of infant mortality Monrovia, Liberia. The main objective of this questionnaire is to gather pieces of information about the socio economic factors that are responsible for increase in infant mortality in Monrovia, Liberia. The questionnaire is composed of background and socio economic variables out of which each variable contains several questions and given in Appendix A.

3.8.1 Data collecting period

The data in this study was collected from February – March 2010

3.9 Operational Definition of Variables

3.9.1 Infant Mortality – death of infants less than a year

3.9.2 Poverty

Family living on less than a dollar US per day (poverty line) who cannot afford the proper meal for their family

3.9.3 Displaced Mother

Mothers who are homeless due to the civil war in Internal Displaced Persons (IDPs) camps and have encounter lots of problems with their infants as displaced camps are not good for their infants

3.9.4 Cultural and Traditional Practices

These are practices that do affect an infant as polygamy is commonly practiced and there are too many children in the family who may not be properly spaced and well taken care of

3.9.5 Mother Education

A mother who may not have had primary education and may not know the basic   health knowledge for her infants

3.9.6 Access to Safe Drinking Water and Sanitation

Infants who cannot have access to safe drinking water and sanitation (mothers give them water from unpurified wells, pumps and creeks)

3.9.7 Inadequate Breast Feeding and Malnutrition

Mothers who cannot breastfeed their infants as for the proper length of time as breast feeding may be healthy for an infant and prevent them from diseases

3.9.8 Unskilled Birth Attendants

Deliveries that are performed at homes due to the inadequacy of professional and may lead to an infant death or the mother as well

3.9.9 Access to Health Care

Mothers who cannot access to health care because the distance is too far from their home to the health center. Moreover, there is lack of staffs or they don't have the money to pay for their medical expenses

3.9.10 Birth Interval

A birth interval of less than one year or too short intervals (less than 12 months) after a previous birth – birth spacing

3.9.11 Mother Age ≥15 and ≤ 45

Mothers ages ≥15 and ≤ 45 who are too young or too old and may lack the strength in the process of delivery

3.9.12 Household Condition and Crowding

Household that are worse in condition and may be over crowded

3.10 Reasons for Choosing Variables

3.10.1 Poverty

According to past studies from the international monetary fund 2009, major causes of infant mortality in less developed countries are caused by poverty. Liberia

happens to be no exception to this fact due to the brutal 14 years of civil crisis that took place in the country. Moreover, the civil war has also led to the high increase of unemployment and has had a negative impact on the country's economy. A Poverty Participatory Assessment was carried out and found that 63.3 percent of the Liberian population lives below 1 US dollar a day (poverty line).

3.10.2 Cultural and Traditional Practices

The cultural and traditional practice in Liberia as it relates to polygamy has given rise to large family size. Though other tribes practice polygamy, it is mostly practiced amongst the Mandingo and Vai ethnic groups. Most people in these groups seemed to be poor yet practice this tradition. Every wife wants to have a child for her husband or would even need both a boy and a girl.

3.10.3 Displaced Mothers

The war in Liberia has led many to be placed in the line of fire especially women and children who are greatly affected. Mothers in displace centers with their infants faces a lot of problem and there are no adequate facilities to keep their infants healthy. Women and infants sleep on the floors with just blankets that are issued by UNHCR. Lack of water and sanitation in displaced camps are a great problem and infants are greatly affected.

3.10.4 Mother Education

The war in Liberia has demolished a good number of school buildings and has also resulted into unqualified teachers. Female education is one of the ways of reducing infant and child mortality. There are many mothers in Liberia who are not educated or who may not have had primary education, thus having a negative impact on their infants as well. A mother who is educated will know the basic health for her

infants while a mother who is not educated may not. A study conducted by Scott et el. (2000), found that one of the most convincing theories is the gender stratification theory which states that as female gender is appreciated, so as her role as a mother.

3.10. 5 Inadequate Breast Feeding and Malnutrition

Most mothers do not breast feed their infants for a long period of time for the fear that their breast may fall flat. This mostly happens among young girls who want their breast to always be in shape for better attraction. When an infant is not breast fed, he/ she may encounter illness in the future and may also lead to malnutrition. One the other hand, People who are malnourished are more likely to get sick and in severe cases may even die. Unfortunately, there are millions of people in the world who do not get enough to eat most of the time and are at risk of malnutrition, a study found by (Nelther et al. 2005).

3.10.6 Access to Health Care

Karungula (1992) found that nursing personnel represent a potentially powerful force in the health care system and in contrast to other health care workers. The war in Liberia has made many of the health personnel to flee the country. The war also demolished many health facilities that have aggravated the problem of access to health. Healthcare in Liberia was announced by the government to be free yet some hospitals collect money in order to keep the hospitals ongoing.

3.10.7 Access to Safe Drinking Water and Sanitation

A study from WHO and UNICEF (2004), found that poor access to safe drinking water services and sanitation are major causes of illness and poverty in Liberia. The war in Liberia has demolished the water sewages in there are only a few community that are receiving pipe boiled water. Many communities fetch water from unpurified wells, pumps and creeks that are dangerous to an infant's health. Mothers

who cannot have access to safe drinking water for their kids may lead to the child's detriment.

3.10.8 Unskilled Birth Attendants

A mother who cannot have access to health care takes a second chance of being delivered at home as there are inadequate health professionals. When some women are in pain of pregnancy especially at mid night or where their homes are so far from the health facilities, some unskilled birth attendants perform the delivery which may result into unsafe delivery

3.10.9 Birth Interval

One of the major risk factors for infant mortality is a birth interval of less than one year or too short intervals (less than 12 months) after a previous birth – birth spacing. A considerable body of demography literature exists that has examined the relationship between birth spacing behavior and infant mortality, and has high lightened the greater risks of mortality associated with short preceding birth intervals

3.10.10 Mother Age ≥15 and ≤ 45

Kalipena (1993), in a study found that an increase in unfavorable age pregnancy (less than 18 years coupled with first marriage increases the risk of an infant dying at birth or during the first year of life while a woman who may give birth at age ranging from 18 through 39 may be physically fit to give birth to a healthy infant and also better prepare to take care of her baby. Mothers who are too young and too old (age ≥15 and ≤45 may not have adequate strength in the process of delivery.

3.10.11 Household Condition and Crowding

There is likelihood that poor housing and congested living conditions have a detrimental impact on infant health. At first, two major casual crowding mechanisms

are thought to be in the relationship between crowding and physical health. First, high level of households crowding can produce stress that leads to illness. Second, through shared proximity, household congestion contributes to the cause of communicable diseases.

3.11 Data Source

The data will be both primary and secondary data sources. More specifically, the primary data source will come from interview using structured questionnaire

3.12 Data Analysis

This study will use descriptive statistics and regression analysis to analyze the data collected. This method will describe the factors affecting infant mortality in Monrovia, Liberia and will analyze amongst various socio economic determinants to find out which one of these determinants significantly affects infant mortality. This study will use a cross - sectional data that will focus on a survey of 440 women who are reproductive in child bearing in Monrovia, Liberia.

Logistic regression model can be used not to only identify risk factors but also to predict the probability of success and that lends itself to a biological meaningful interpretation. This is especially true for the analysis of a dichotomous outcome like mortality (alive / dead). The regression allows estimation of the probability of an event occurring for a particular group of independent variables.

For analysis purpose, infant mortality (infant dying versus not dying) is the dependent variable. the independent variables selected are poverty, mother's education, breast feeding and infant malnutrition, mother's age, cultural and traditional practices, unskilled birth attendants, birth interval, access to safe drinking water and sanitation, access to healthcare, inadequate breast feeding, displaced mothers and household condition and crowding. Correlation coefficients will be

computed to study the relationship between the independent variables, and also to trace any multicolinearity that may exist between the variables.

$$Y \begin{cases} = 1, \text{ if the mortality occurs} \\ = 0, \text{ alive} \end{cases}$$
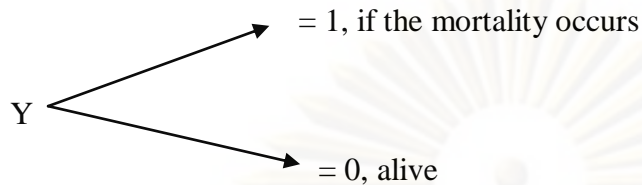
$\ln \text{odds}_{IM} = \alpha + \sum \beta_i X_i$

where:

odds denotes the odds ratio (ratio of the probability of occurrence of an event (here: infant mortality) to the probability of an event not occurring)

IM denotes infant mortality

X_i denote explanatory variables (i.e. POV, ASDWTS, CTP, IBFM, DM, ACCHC, UBA, MED, BI, MAGE, HHCC) and

α and βs are unknown parameters

Where,

- o IM ----------------- infant mortality
- o POV ---------------- poverty
- o ASDWTS---------- access to safe drinking water and sanitation
- o CTP----------------- cultural and traditional practices
- o IBFM---------------- inadequate breast feeding and malnutrition
- o DM------------------ displaces mothers
- o ACCHC------------ access to health care
- o UBA----------------- unskilled birth attendance
- o MED---------------- mother education
- o BI-------------------- birth Interval
- o MAGE-------------- mothers age
- o HHCC--------------- household condition and crowding

3.13 Expected Signs of Variables

Independent Variables

1. Poverty (+)
2. Access to safe drinking water and sanitation (-)
3. Cultural and Traditional Practices (+)
4. Inadequate Breast Feeding and Malnutrition (+)
5. Displaced Mothers (+)
6. Access to Health Care (-)
7. Unskilled Birth Attendance (+)
8. Mother education (-)
9. Birth Interval (-)
10. Mother Age (+)
11. Household Condition and Crowding (-)

3.14 Explanation of Signs of Variables

Displaced mothers will have a positive effect on infant mortality because the infant will be vulnerable to a lot of diseases in IDPs centers and access to safe drinking water will have a negative sign because when mothers can find safe drinking water for her infant, there is a better chance for the child surviving. Home delivery by unskilled birth attendants on the other hand is positive because there is a likelihood that the infant may die during the process and poverty as well will be positive because when people are poor, they encounter a lot of sicknesses and may not have the income to access healthcare. Cultural and traditional practices is also positive because it may lead to a lot of children and there may not be proper care for many kids. Inadequate breast feeding do affect an infant positively because if a mother do not breast feed her baby till the appropriate time, there may be future sicknesses that the baby may encounter while access to health care may seem to be having a negative impact because the more mothers seek care, the more there is a likelihood for their children survival. Birth interval is positive because if there is a mother who does not do proper spacing of her kids, there is a likelihood that it may affect an infant and mother age

≥15 and ≤45 is also positive because if a woman gets pregnant at a much younger age and a much older age, there is a possibility of an infant death occurring. Infant malnutrition has a positive implication because if a child is malnourished, there is a high possibility of that child being immune with illness. Household condition and crowding is also positive because a mother who lives in a house that is in a terrible condition (a mat, mud or zinc house) and that has the natural ground (dust floor / a floor without cement) as a floor may have a greater risk of infant death.

3.15 Expected Benefits

The study seeks to identify the main socio economic determinants of infant mortality in Monrovia, Liberia and to provide clues for future policies

CHAPTER IV

RESULT AND DISCUSSIONS

According to the methodology of this chapter, 440 women were interviewed using structure questionnaire. A selected team was trained to help in data collection and imputing. After assigning data collection given to sub groups according fo this study, the data for this study was collected from February through March 2010. This chapter will discuss how to answer the research questions and objectives stated in the first chapter of this thesis. Furthermore, this chapter will do a descriptive analysis of tables and graphs and regression analysis well.

4.1 Description of geographical locations

Monrovia was divided into for geographical locations namely Bushrod Island, Central Monrovia, Sinkor and Airfield respectively. Theses geographically locations differ in term of their location basic economic activities.

Bushrod Island for example is surrounded by the Atlantic Ocean and the St. Paul River. It contains the Freeport of Monrovia, the major national airport of Liberia and a variety of business. It is found to be an industrialized area that has made it a commercial center for the country. As the nation centre of commerce and transportation, it has attracted petroleum, paint, tuna, pharmaceutical and cement enterprises. Most people living in this area are business people. Most of the war that took place in Monrovia was fought in the location.

The Airfield area, where the James Spriggs Payne Field is located was formerly a domestic airport, and has handled limited international flights for Liberia. The Airfield is located within the busy and thickly-settle section of the Methopolitan area, and is therefore convenient to the entire central city. Airfiled comprises of four main

communities (Roto Town, Lakpazee, Old Matadi and New Matadi. These areas are residential areas but there are few business centers such as community market, video clubs etc.

Central Monrovia is a part of Monrovia where one would find more government ministries, and private business. More people living in Central Monrovia are business people especially business owned by foreigners. Most of the war fought in Monrovia was fought in Central Monrovia. The people living in this geographical location are mainly store owners. Most of the stores are owned by foreigners though a few are owned by Liberians themselves. In here, there are many government ministries and agencies. There are not much people living in this region because it is mainly occupied by government ministries and some private owned businesses.

Sinkor is a section of Monrovia Metropolitan area in Liberia. There are a lot of Schools is this area and there are many companies that are building their headquarters in this area. This is where the United Nation Mission in Liberia (UNMIL) has its headquarters, Embassies, health facilities and educational institutions and non-governmental organizations are also located in Sinkor and it is also a residential area as well as a business oriented centre. Fahngon and Sirleaf, 2008

4.2 Data Description

This section provides a descriptive analysis of tables and graphs

Diagram 4.1 Means of Survival of Respondents
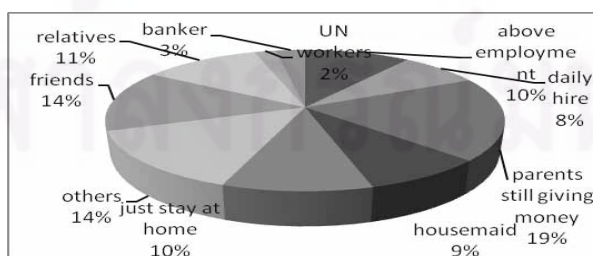
According to diagram 4.1, 19% of the respondents said that parents still give them money as a means of survival while 14% said they are surviving from friends. Of the respondents, 11% said they survive from relatives while both above employment and just staying home were both 10% respectively. On the other hand, 9% of the respondents were housemaid while 8% said they were daily hire. United Nation (UN) workers and bankers were 2% and 3% respectively while others were 14%.

Diagram 4.2 Distance to Drinking Water according to Respondents
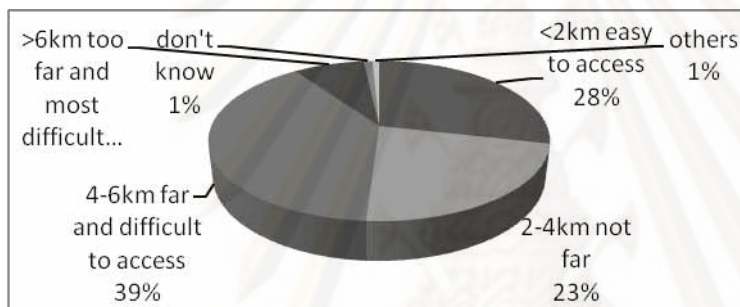
According to diagram 4.2 , the number of respondents who said distance to getting drinking water was far and difficult to access were 39% followed by 28% of the respondents who said that they could easily access drinking water. On the other hand, 23% of respondents said that the distance to getting drinking water was not far while 8% said that the distance to getting drinking water was too far and most difficult to access. Respondents who gave other reasons and said I don't know were both 1% respectively.

Diagram 4.3 Respondents Employment Status
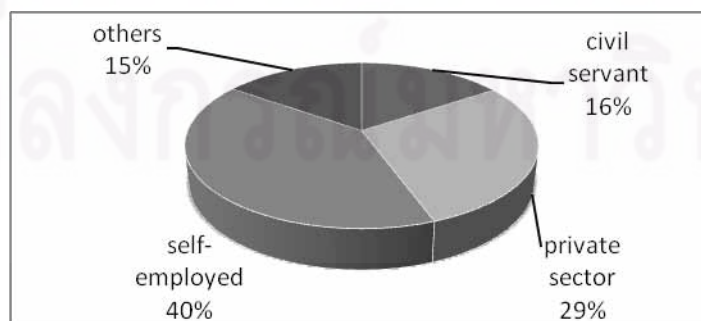
According to the diagram 4.3, 40% of the respondents said that they were self employed while 29% said they were working in the private sector. The balance of 16 and 15% were civil servants and other

Diagram 4.4 Delivery in health facilities and at home, 2008
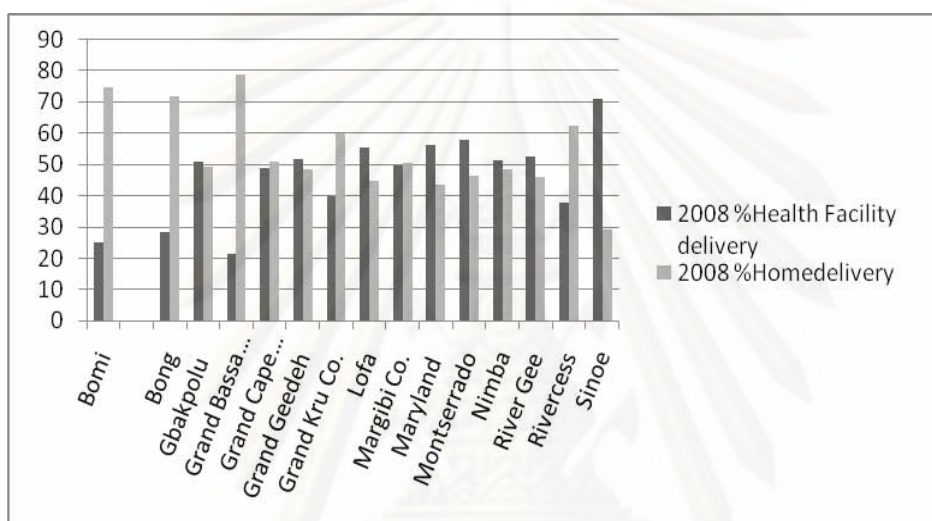
According to diagram 4.4, Grand Bassa County has the highest home delivery of 78% and the lowest health facility delivery 22% followed by Bomi County with a home delivery of 74% and a lower health facility deliver of (26). Bong County has a home delivery of 72% and a facility delivery of 28% followed by Revercess County with a home delivery of 62 and a health facility delivery of (38). In the same vien, Grand Kru County has a home delivery of 60% and a health facility delivery of40% while Grand Cape Mount has a home delivery of 51% and a health facility delivery of 49%. Following the same trend, Magibi County has a home delivery of 50% and a health facility delivery of 50% likewise while Nimba County has a home delivery of 47% and a home delivery of 53%. Grand Geedeh County has a home delivery of 48% and a home delivery of 52% while Montserrado County with a home delivery of 45% and a health facility delivery of 55%. River Gee County has a home delivery of 46% with a health facility deliver of 54% while Lofa County has a home delivery of 44% with a health facility delivery of 56%. Ggbapolu County has a home delivery of 49% and a health facility delivery of 51% while Maryland County has a home delivery of 44% and a health facility delivery of 64%.Sinoe County seems to have the least home delivery of 28%

but with a health facility delivery of 62%. Bomi, Bong, Grand Bassa, Grand Kru, Rivercess have more home deliveries because there are insufficient health professionas in these counties while Lofa, Montserrado, Sione, Maryland, River Gee, Nimba, and Grand Geedeh Counties have high health facility deliveries because there are more health professional in these areas.

Diagram 4.5 Antenatal Care Visits to Health Facilities by County
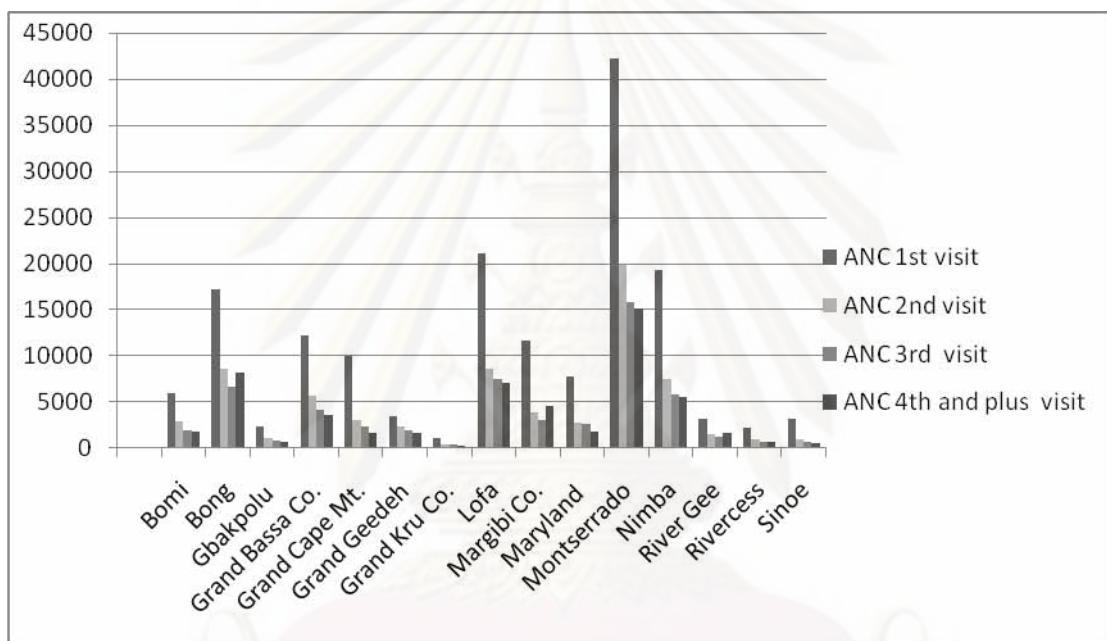
According to diagram 4.5, Montserrado has the highest antenatal visit – 1st , 2nd , 3rd and 4th visits followed by Lofa County but notice that 1st antenatal visit for both counties are quite high as compare to 2nd 3rd and 4th visits. In the same vien, Grand Bassa, Bomi, Gpkpolu, Grand Bassa, Grand Cape Mount, Grand Geedeh, Grand Kru Maryland, Nimba Rivercess and Sinoe counties have high antenatal care for 1st visit and have subsequent decline in the 2nd, 3rd, and 4th visits. On the contrary, Margibi and Rivear Gee Counties antenateal care visits are fluctuating in that both counties 1st antenatal care visits of all four visits is higher followed by its 2nd antenatal visit. The 3rd antenatal visit is the least of all the antenatal visits in this county and the fourth antenatal visit again goes higher. In the same way, Margibi 1st antenatal visit is quite high and subsequently the 2nd and 3rd antenatal visits are lower but the 4th antenatal visit is higher than the 2nd and 3rd antenatal visits. Following

the trend, the 1st antenatal visit for River Gee is higher than the 2nd, 3rd, and 4th, visits. The 2nd and 3rd visits are gradually decreased in a descending order. However, the 4th visit is higher than the 2nd and 3rd visits. . Montserrado County has the highest antenatal care because she has many health facilities. Many women mostly attend first antenatal visit as shown in the diagram above and visits tend to decrease subsequently.

Diagram 4.6 Number of health care facilities and Utilization
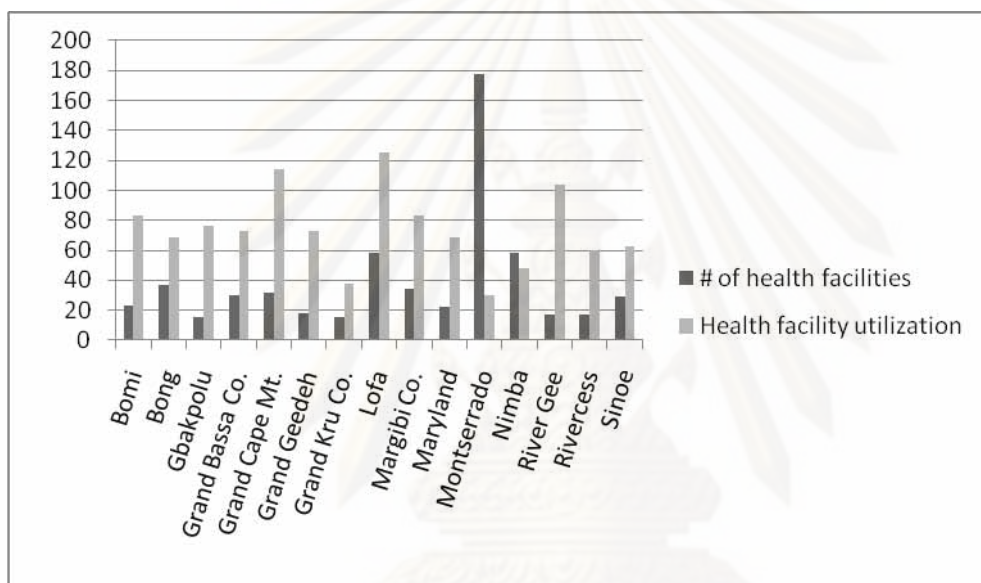
According to diagram 4.6, Montserrado has the highest number of health facilities of (178) but its health facility utilization is the least of all the counties in Liberia (22) followed by Nimba County with a health facility level of (58) and a health facility utilization of (42). Lofa County has the highest health care utilization (122) with a health facility level of (58) followed by Grand Cape Mount with a health care utilization of (115) and a health facility level of (35). River Gee has a health care utilization of (105) and a health care utilization level of (18) followed by Bomi with a health care utilization of (84) and a health facility level of (22). Following the same trend, Gbakpolu has a health care utilization of (74) and a health facility level of (18) followed by Grand Bassa County with a health care utilization of (70) and a health facility level of (30). Bong County has a health utilization of (68) and a health facility level of (55) followed by Maryland with a health care utilization of (79) and a health facility level of (21). In the same vein, Rivercess has a health care utilization of (60) and a

health facility level of (18) followed by Nimba with a health care utilization of (48) and a health facility level of (58). Grand Kru of all the counties in Liberia has the least of health facility level of (22) but a health care utilization of (38). People in Montserrado tend to use health care less because this county has the highest amount of population though she has the highest amount of health facilities and health professionals. Due to the huge population, many persons cannot have access to health care

Diagram 4.7 Distribution of Respondents Age
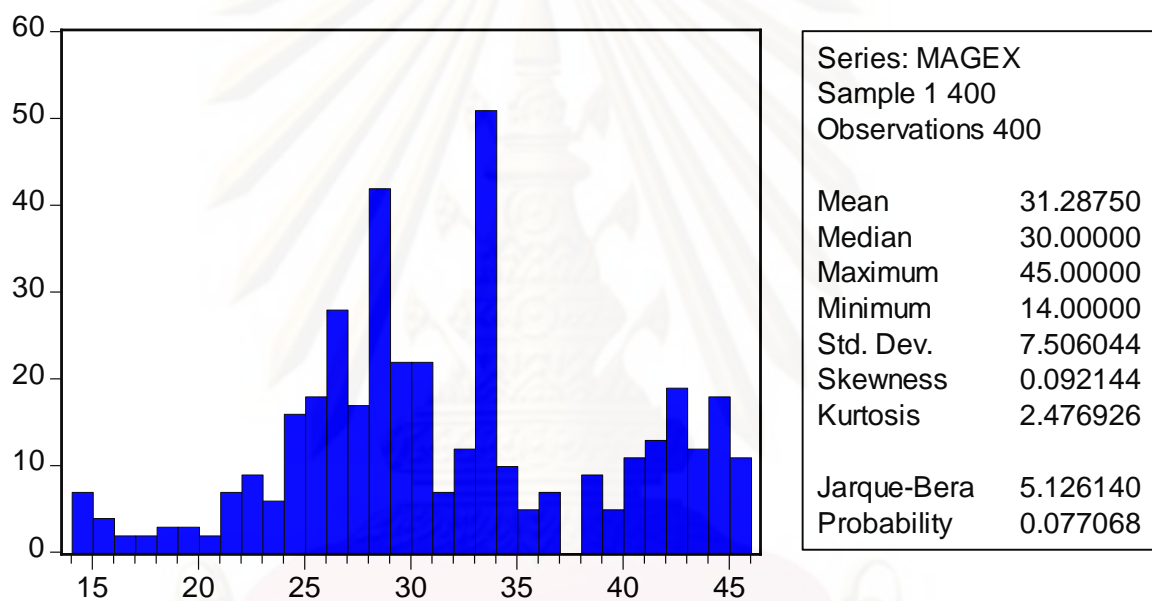
According to diagram 4.7, the maximum age of all respondents in all geographical locations in Monrovia was 45 and the minimum age was 14 years. The mean of the age of all respondents was 31.287 and the median was 30. And the range of respondents according to their ages was 45 – 14 (31). Also, the standard deviation of all respondents was 7.50. The diagram shows that the respondent's ages reign from 15 through 45 and that most of the respondents falls between 25 – 34.

Table 4.1 Correlation Analysis Pov * infant mortality cross tabulation

Count

		im		Total
		no	yes	
pov	no	153	151	304
	yes	54	42	96
Total		207	193	400

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.024(b)	1	.311		
Continuity Correction(a)	.801	1	.371		
Likelihood Ratio	1.027	1	.311		
Fisher's Exact Test				.349	.185
Linear-by-Linear Association	1.022	1	.312		
N of Valid Cases	400				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 46.32.

There are partial correlation between poverty and infant mortality at level of 0.05 significance. Reject the Ho that infant mortality and poverty have no relation. Therefore, Ha hypothesis are statistically not significant at level of 0.05. On the other hand, infant mortality and poverty are independent and the hypothesis rejected.

Table 4.2 Correlation Analysis pov * displaced mothers crosstabulation

Count

		dm		Total
		no	yes	
pov	no	79	225	304
	yes	27	69	96
Total		106	294	400

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.171(b)	1	.679		
Continuity Correction(a)	.079	1	.779		
Likelihood Ratio	.170	1	.680		
Fisher's Exact Test				.692	.386
Linear-by-Linear Association	.171	1	.679		
N of Valid Cases	400				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 25.44.

There are partial correlation between poverty and displaced mothers at level 0.05 significance. Reject the Ho that poverty and displaced mothers have no relation. Therefore, Ha hypothesis are statistically not significant at level of 0.05 and displaced mothers and poverty are independent thus, the hypothesis is rejected.

Table 4.3 Correlation Analysis, pov * cultural and traditional practices cross tabulation

Count

		ctp		Total
		no	yes	
pov	no	8	296	304
	yes	0	96	96
Total		8	392	400

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.578(b)	1	.108		
Continuity Correction(a)	1.410	1	.235		
Likelihood Ratio	4.442	1	.035		
Fisher's Exact Test				.207	.109
Linear-by-Linear Association	2.571	1	.109		
N of Valid Cases	400				

a Computed only for a 2x2 table

b 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.92.

There are partial correlation between poverty and cultural and traditional practices at level 0.05 significance. Reject the Ho that poverty and cultural and traditional practices have no relation. Therefore, Ha hypothesis is statistically not significant at level at level 0.05. It can also be concluded that cultural and traditional practices and poverty are independent and the hypothesis is rejected.

Table 4.4 Correlation Analysis pov * access to safe drinking water and sanitation cross tabulation

Count

		asdwts		
		no	yes	Total
pov	no	34	270	304
	yes	12	84	96
Total		46	354	400

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.124(b)	1	.725		
Continuity Correction(a)	.028	1	.866		
Likelihood Ratio	.122	1	.727		
Fisher's Exact Test				.716	.424
Linear-by-Linear Association	.124	1	.725		
N of Valid Cases	400				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.04.

There are partial correlation between poverty and access to safe drinking water and sanitation at level 0.05 significance. Reject the Ho that poverty and access to safe drinking water and sanitation have no relation. Therefore, Ha hypothesis is statistically not significant at level 0.05. It can also be concluded that access to safe drinking water and sanitation and poverty are independent and the hypothesis is rejected.

Table 4.5 Correlation Analysis pov * inadequate breast feeding and malnutrition cross tabulation

Count

		ibfm		Total
		no	yes	
pov	no	14	290	304
	yes	11	85	96
Total		25	375	400

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.848(b)	1	.016		
Continuity Correction(a)	4.737	1	.030		
Likelihood Ratio	5.155	1	.023		
Fisher's Exact Test				.027	.019
Linear-by-Linear Association	5.833	1	.016		
N of Valid Cases	400				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.00.

There are partial correlation between poverty and inadequate breast feeding and malnutrition and sanitation at level 0.05 significance. Reject the Ho that poverty and inadequate breast feeding have no relation. Therefore, Ha hypothesis is statistically not significant at level 0.05. It can also be concluded that inadequate breast feeding and malnutrition and poverty are independent and the hypothesis is rejected.

Table 4.6 Correlation Analysis pov * unskilled birth attendants cross tabulation

Count

		uba		Total
		no	yes	
pov	no	22	282	304
	yes	5	91	96
Total		27	373	400

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.477(b)	1	.490		
Continuity Correction(a)	.209	1	.647		
Likelihood Ratio	.504	1	.478		
Fisher's Exact Test				.642	.335
Linear-by-Linear Association	.476	1	.490		
N of Valid Cases	400				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.48.

There are partial correlation between poverty and unskilled birth attendants at level 0.05 significance. Reject the Ho that poverty and unskilled birth attendants have no relation. Therefore, Ha hypothesis is statistically not significant at level 0.05. It can be concluded that unskilled birth attendants and poverty are independent and the hypothesis is rejected.

Table 4.7 Correlation Analysis pov * access to health care cross tabulation

Count

		acchc		Total
		no	yes	
pov	no	177	127	304
	yes	60	36	96
Total		237	163	400

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.553(b)	1	.457		
Continuity Correction(a)	.390	1	.532		
Likelihood Ratio	.556	1	.456		
Fisher's Exact Test				.477	.267
Linear-by-Linear Association	.551	1	.458		
N of Valid Cases	400				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 39.12.

There are partial correlation between poverty and access to health care at level 0.05 significance. Reject the Ho that poverty and access to health care have no relation. Therefore, Ha hypothesis is statistically not significant at level 0.05. It can be concluded that access to health care and poverty are independent and the hypothesis is rejected.

Table 4.8 Correlation Analysis pov * mother's education cross tabulation

Count

		med		
		no	yes	Total
pov	no	75	229	304
	yes	24	72	96
Total		99	301	400

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.004(b)	1	.948		
Continuity Correction(a)	.000	1	1.000		
Likelihood Ratio	.004	1	.948		
Fisher's Exact Test				1.000	.523
Linear-by-Linear Association	.004	1	.948		
N of Valid Cases	400				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 23.76.

There are partial correlations between poverty and mother's education at level 0.05 significance. Reject the Ho that poverty and mother' education has no relation. Therefore, Hi hypothesis is statistically not significant at level 0.05. It can be concluded that mother's education and poverty are independent and the hypothesis is rejected.

Table 4.9 Correlation Analysis pov * household condition and crowding cross tabulation

Count

		hhcc		
		no	yes	Total
pov	no	61	243	304
	yes	20	76	96
Total		81	319	400

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.027(b)	1	.870		
Continuity Correction(a)	.000	1	.986		
Likelihood Ratio	.026	1	.871		
Fisher's Exact Test				.885	.487
Linear-by-Linear Association	.027	1	.871		
N of Valid Cases	400				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 19.44.

There are partial correlations between poverty and household condition and crowding at level 0.05 significance. Reject the Ho that poverty and household condition and crowding has no relation. Therefore, Hi hypothesis is statistically not significant at level 0.05. It can be concluded that household condition and crowding and poverty are independent and the hypothesis is rejected.

4.3 Determinants of Infant Mortality in Monrovia, Liberia

The study aimed to understand the determinants of infant mortality in Monrovia, Liberia interviewing women who were reproductive in children bearing in four geographical locations of Monrovia, namely Bushrod Island, Sinkor Central Monrovia and Airfield respectively. Understanding the factors affecting infant mortality in Monrovia can help policy makers to better make better decisions to help improve infant mortality in the country. For this study, not all factors determining infant mortality may be useful to policy makers, but the main factors that can be essential in reducing the health problem. In this study, the following factors are analyzed: poverty, access to safe drinking water and sanitation, cultural and traditional practices, inadequate breast feeding and malnutrition, displaced mothers, access to health care, unskilled birth attendants, mother's education, birth interval, mother's age, and household condition and crowding.

Table 4.10

Regression result of Infant Mortality

Dependent Variable: IM
Method: ML - Binary Logit (Quadratic hill climbing)
Included observations: 400

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.132457	0.954927	2.233108	0.0255
ACCHC	-0.690038***	0.23627	-2.920543	0.0035
ASDWTS	-0.265426	0.351395	-0.75535	0.4500
BI	-1.757505***	0.437861	-4.013839	0.0001
CTP	1.787283***	0.350796	5.094932	0000.0
HHCC	-0.520433*	0.307409	-1.692965	0.0905
POV	0.105253	0.235267	0.447378	0.6546
MAGE	-0.010383	0.014941	-0.69493	0.4871
MED	0.217289	0.278094	0.781354	0.4346
UBA	1.12082**	0.534155	2.098302	0.0359
DM	-0.64941**	0.322891	-2.011236	0.0443
IBMF	-0.467044*	0.257046	-1.816962	0.0692
LR statistic (11 df)	78.55078	McFadden R-squared		0.141781
Probability(LR stat)	2.81E-12			
Obs with Dep=0	207	Total obs		400
Obs with Dep=1	193			

*, **, *** significant at the 10%, 5% and 1% level

In the above regression result, infant mortality is the dependent variable; C is the intercept while all other variables are independent. After running the regression, there were seven variables that were significant and four variables that were insignificant.

Focusing on the 5 percent level, the following can be observed:

Access to safe drinking and sanitation

According to the regression result, access to safe drinking water and sanitation does not significantly relate to infant mortality because its Z statistics is less than 1.96 (0.755350) and it p value is more than 0.05 (0.4500).

Cultural and traditional practices

The regression result shows that cultural and traditional practices significantly relates to infant mortality because its Z statistics is more than 1.96 (5.094932) and its p value is less than 0.05 (0.0000). This means that if cultural and traditional practices are present, the probability of infant mortality will increase by (1.787283) because the coefficient has a positive value.

Access to health care

According to the regression result, access to health care significantly relates to infant mortality because its Z statistics is more than 1.96 (2.920543) and its p value is less than 0.05 (0.0035). This means that if there is access to health care, will make the probability of infant mortality to decrease by 0.690038 because of the negative sign attached to the coefficient.

Unskilled birth attendants

The regression result shows that unskilled birth attendants significantly relate to infant mortality because its Z statistics is more than 1.96 (2.098302) and its p value is less than 0.05 (0.0359). This means that if there is unskilled birth attendant, the probability of infant mortality will increase by 1.120820 due to the coefficient having a positive value.

Mother education

The regression result shows that mother education does not significantly correlates to infant mortality because its Z statistics is less than 1.96 (0.781354) and its p value is more than 0.05 (0.4346).

Birth Interval

The regression result shows that birth interval significantly relates to infant mortality because its Z statistics is more than 1.96 (4.013839) and its p value is less than 0.05 (0.0001). This means that if there is long birth interval, the probability of an infant death will decrease by 1.75750.

Mother age

The regression results shows that mother' age does not significantly relate to infant mortality because its Z statistics is less than 1.96 (0.694930) and its p value is more than 0.05 (0.4871).

Household condition and crowding

According to the regression result, household condition and crowding does not significantly correlates to infant mortality because its Z statistics is less than 1.96 (1.692965) and its p value is more than 0.05 (0.0905).

Poverty

According to the regression result, poverty does not significantly correlates to infant mortality because its Z statistics is less than 1.96 (0.447378) and its p value is more than 0.05(0.6546). The insignificant sign may be due to regional differences according to diagram 4.1, the model was re-estimated for each geographical locations separately. The results are shown in Appendix G, H, I and J. And interestingly reveal that in central Monrovia the poverty variable enters with a significant but negative sign.

Inadequate breast feeding and malnutrition

The regression result shows that inadequate breastfeeding and malnutrition does not significantly correlates to infant mortality because its Z statistics is less than 1.96 (1.816962) and that its p value is more than 0.05 (0.0692).

Displaced mothers

Following the same trend, the regression result shows that displaced mothers significantly correlates to infant mortality because its Z statistics is more than 1.96 (2.011236) and its p value is less than 0.05 (0.0443). This means that if a mother is displaced, mothers increase by one unit, the probability of an infant death will increase by 0.649410 which is contrary to expectations.

Regression result of poverty (regression results are shown in Appendix F)

The main reason for initiating this regression was to find the relationship between poverty and infant mortality. After running the regression, the result showed that infant mortality is not significantly related to poverty because its t - statistics is less than 1.96 (1.006447) and its p value is more than 0.05 (0.3149).

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The many conflicts fought in Liberia have carried the country backwards. The city of Monrovia which happens to be the capital of Liberia was greatly affected by the civil war wherein thousands of Liberians were affected especially women and children. These series of wars have lead to the increase of infant mortality. Due to the prolonged civil war, there are many setbacks on the country's health sector especially its economy. A total of 400 women who are reproductive in child bearing were interviewed about the social economic determinants of infant mortality in four geographical locations namely Bushrod Island, Sinkor, Central Monrovia and Airfield respectively.

According to the study also found that access to health care was a major factor that determines infant mortality in Monrovia, Liberia. The lack of health qualified health professionals and access to health can lead to infant death. The war fought in Liberia has made many of the qualified health professionals to flee the country. It is not until now that the health system has just begun training some of its employees in order to improve the health system. Unskilled birth attendants in some cases are the ones who performed deliveries at home in the absence of health professionals. Birth interval was also found to be one of the main determinants of infant mortality as mothers cannot properly spaced their child / children. Birth interval of less than a year can have an impact on infant mortality as mothers should properly spaced their children for better health conditions. It was also observed from the study that cultural and traditional practices had a significant impact on the deaths of infant as certain tradition and cultural beliefs from a particular ethnic group or religion can post serious threats to infant health. The practice of polygamy amongst certain religion especially the Vai and Mandingo ethnic groups where in there are so many children in the family can easily lead to the spread of sicknesses. The war in Liberia has played a major role in the increase of infant deaths as many women and children were greatly affected by the crisis. Moreover, displaced mothers are at a disadvantage due to unsafe homes, lack of food, water, medical care. A displace mother who may have a child and lacked the following mentioned

above may likely result in the death of her child. But the sign is negative. Perhaps they have better access to health facilities when living in displaced camps. Household condition and crowding and inadequate breast feeding and malnutrition also significantly relates to infant at level of 10%.

On the other hand, there were other factors that were not significant according to this study such as access to safe drinking water and sanitation, , poverty, mother's age and mother's education,

Most rural dwellers are yet to return home despite the ending of the civil war in late 2003. Nearly 300, 000 refuges and internally displaced persons have returned to their homes in 2006 after the end of the civil war. Peaceful elections have being held, but the reestablishment of state authority law and order has just begun. The reconstruction and peace building of Liberia will not just happen overnight, but will actually takes time as the country has just started its redevelopment process.

5.2 Recommendations

Infant and child health is a central public policy issue in developing countries especially in a struggling nation like Liberia that has just returned from a 14 year of civil war. Infant mortality should decline as countries develop. War carries on mal practices on women and children and they are highly disadvantaged in the process due to rape and other mal practices. Though the war has heavily affected all sectors of Liberia especially the health sectors, the country must now begin to play some major roles in its development process. From the study, the following recommendations and policy implications can be drawn:

- Increase mother access to health facilities by creating a totally free access to health care, building and rehabilitating more health facilities and training more health professional.

- Train traditional birth attendants to a standardized level to assist health professionals in the process of delivery and other health related matters

- Government should build displaced centers and Solicit help from NGOs and other donors to help the internal displaced persons especially the mothers

- Educate and inform mothers about important aspects of pregnancy (age and birth interval) so that they know when pregnancy is best for them

- Educate ethnic groups on unhealthy traditional practices and customs that are dangerous to an infant's health

- Provide guideline for breastfeeding by educating mothers when they go to hospital

5.3 Limitations of the Study

Due to the limitation of the allocation of population data to the various communities in Monrovia, the sample size allocated to each geographical location in this study is based on how a particular geographical location or community is populated. In this regard, the population and sample size of this study was only estimated and was also stated as percentage of the estimated population and sample size regarding the various geographical locations in Monrovia, Liberia. The study did use a cross-sectional and not a panel data. Moreover, measurement of the determinants of IM was a constraint for this study; The study also face a problem of confounding factors. Also, one of the limitations of this study was due to time and financial constraints.

REFERENCES

Adetunji, J. 1995. Infant Mortality and Mother's Education, in Dondo State, Nigeria: Journal of Social Science and Medicine, 40: 253-263.

Anson, J.1988. Mortality and Living Condition: Relative Mortality Levels and their Ben Relation to Physical Quality of Life in Urban Populations: Journal of Social Science and Medicine, 27: 901-910.

Bhargava, A. 2003. Family Planning, Gender Differences, and Infant Mortality: Evidence from Uttar Pradesh, India. Journal of Econometrics,112: 255-240.

Currie, A. Michael A., Shields, S., Wheatley P. 2006. The Child Health/Family Income Gradient: Evidence from England, Victorian Department of Treasury and Finance. Journal of Health Economics, 26: 213-232.

Fahn, J. M. Sirleaf, J. 2008. To Launch 16 Days of Activitism: The News (Liberia)

Fuller, D.T., Ewards N. J., Sermsi S., Vorakitphokathorn, S. 1999. Housing, Stress, and Physical Wellbeing: Evidence from Thailand. Journal of Social Science and Medicine, 36: 1417-1428.

Heer, D. 1983. Infant and Child Mortality and the Demand for Children. In Academy Determinants of Fertility in Developing Countries, New York Press

Hillary, R., Justin L. 1996. A Takes a Village and Other Lessons Children to Teach Us, New York: Simon and Shuter Printing Press

International Monetary Fund, 2008. Liberia Poverty Reduction Strategy Papers, Washington D.C: Publication Services

Karungula, J. 1992. Measures to Reduce Infant Mortality Rate in Tanzania.
Journal of Nursing Studies, 29: 113-117.

Kuate, D. 1996.A Real and Socioeconomic Differentials in Infant and Child Mortality
in Cameroon. Journal of Social Science and Medicine,42: 399-420.

Lee, F. L. Rosenzweig, R. M. Pitt, N. M. 1997. The Effects of Improved Nutrition,
Sanitation and water Quality on Child Health in High Mortality
Populations: Journal of Econometrics,77: 209-235.

Liberia Institute of Statistics and Geo- Information Services, 2007. Core Welfare
Questionnaire Indicator Survey Basic Diagnostics, Monrovia, Liberia

Liberia Institute of Statistics and Geo Information Services, 2007.Liberia
Demography   and Health Survey, Monrovia, Liberia

Martin, E. Gamella F. J. 2005. Marriage Practice and Ethnic Differentiation: The
Case of Spanish Gypsies (1870 – 2000). Department of Anthropology Social,
University of Granada, 18072, Spain

Ministry of Health and Social Welfare, 2007. Annual Report, Monrovia, Liberia

Ministry of Health and Social Welfare, 2009. Annual Report, Monrovia, Liberia

Modin, B., 2002. Birth Order and Mortality: A long – Life Follow up of 14,200 Boys
and Girls born in Early 20th Century, Sweden. Journal of Social Science and
Medicine, 54: 1051-1064.

National Research Council, 1989. Contraception and Reproduction: Health
and Girls Born in Early 20th Century Sweden. Washington D.C: National
Academy Press

Nelther, Thomas, G., Chemm, J.D., Elizabeth Wilson. 2005. Improving Kids
    Environment, India polis: Indiana Publishing Press

Palloni, A., Tienda, M. 1986. The Effects of Breast Feeding and Pace of Children
    Bearing on Mortality at Early Ages. Journal of Demography, 23: 31-52

Rue de Lausanne. 2007. No Cheap Solution for Health in Liberia, Médecins Sans
    Frontières, Geneva 21 – Switzerland

Scott, R., Carolyn, F., Frey, S. 2000. The Determinants of Infant Mortality in Less
    Developed Countries. A Cross National -Test of Five Theories. Journal of
    Social Indicator Research, 52: 215-234.

Sohail, A. 2000. The determinants of Infant Mortality in Pakistan, Journal of Social
    Science and   Medicine, 51: 199-208

Srivastava, J.N., D.N. Saksena, D.N and Verma, S.K. 1998. Fertility and Family
    Planning among White Collar Workers, Department of Economics, Lucknow
    University: Population Research Center

Suwal, V. J. 2001. The Main Determinants of Infant Mortality in Nepal, Journal of
    Social Science and Medicine, 53: 1667-1681.

Timothy, B., Fang, F. E., O'Neill E.O., and Stratton H. 2008. Maternal Age and Infant
    Mortality: American Journal of Epidemiology. A Test of Wilcox –
    Hypothesis, Russia: National Academic Press

United Nations General Assembly. 2001. Road Map towards the Implementation of
    the United Nations Millennium Declaration: Report of the Secretary-General.
    New York: United Nations General Assembly.

United Nation Development Program. 1994. Human Development Report. Oxford

University Press, New York

Vendamulla, H. P. 2008. Factors Affecting Utilization of Health Care Services in
          Monaragala District, UVA Province: A thesis Submitted in Partial
          Fulfillment of the Requirements for the Degree of Masters of Science in
          Health Economics and Health care Management. Faculty of Economics,
          Chulalongkorn University (state in paper)

Whitwortha, A., Stephenson R. 2002. Birth Spacing, Sibling Rivalry and Child
          Mortality. Journal of Social Science and Medicine, 55: 2107-2119.

WHO / UNICEF Joint Monitoring Programme for Water Supply and Sanitation.
          2004. Meeting on the MDG Drinking Water and Sanitation Target: A Mid-
          Term Assessment Progress. New York: World Health Organization and
          United Nations Children's Fund

APPENDICES

Appendix A

Introductory Information

Respondent Number:					County:	
Area / Place of Residence:					Interviewer:	
Religion:					Reviewer:	
Ethnic Background:					Date:	
Age:					House Number:	

Hello, my name is Dominic F. Togba, a student from the Chulalongkorn University in Bangkok, Thailand studying Health Economics and Health Care Management, MSc. The purpose of this questionnaire is to conduct a survey on infant mortality in Monrovia, Liberia and to determine the socio economic factors that are responsible for the health problem. The study will add 40 to the already sample size (10% of 400 for no response and incomplete questionnaire) thus; the sample size now for this study will be 440 and will use said sample size to interview 440 women who are at a reproductive child bearing age in the various geographical locations in Monrovia, namely: Sinkor, Central Monrovia, Airfield and Bushrod Island respectively. Please note that the data collected will be treated confidentially and that your rights to answer or not to answer any of these questions are highly respected. However, please cooperate as findings from this survey can help policy makers to come up with interventions to help reduce infant mortality in Liberia. If you feel that the survey is not implemented in an appropriate way, please contact me by email at detonic@yahoo.com or tel. +66892177143. Thank you very much.

Questions

1) Have you experienced any infant deaths in the past?   Yes ☐   no ☐

2) How many infants deaths have you experienced in the past? specify_____

3) What may be the likely cause of infant deaths that you experience in the past years?
Please state _____

   A. Poverty

4) Are you employed? Yes ☐   no ☐

5) What kind of employment? Civil servant ☐   private sector ☐   self-   ☐
employed
others please specify_____

6) How do you meet your basic needs? Above employment ☐   daily hire   ☐
parents still give me money ☐   house maid ☐   just stay at home ☐
others specify_____

7) How much are you paid for being employed (in relation to ques. 4)? 100 –
1,000LD ☐   1,000 – 5,000LD ☐ 5,000 – 10,000 ☐   10,000 and above ☐
others specify _____

8) How much are you paid if you fall in the category of question six?
Please specify_____

9) What is your monthly expenditure on food in this home?   Please
specify_____

10) Is there a father in this home? Yes ☐   no ☐

11) Is the father of this home employed?   Yes   ☐   no   ☐

don't know   ☐   others_____

12) What is the father income of this home? Please specify_____

B. Birth interval

13) What is the date of birth of your own child / children (birth interval)? Please state
date: dd/mm/yy

1st child_____

2nd child_____

3rd child _____

4th child_____

5th child_____

6th child_____

others specify_____

14) What is the date of death of your own child / children? Please state date:
dd/mm/yy

1st child_____

2nd child_____

3rd child _____

4th child_____

5th child_____

6th child_____

others specify_____

C. Displaced Mother

15) Are you displaced? Yes ☐   no ☐

16) What are some problems you faced being displaced? Sleeping condition is not good ☐   drinking water ☐   food ☐   health care ☐   diseases ☐ too many in a room ☐   others specify_____

17) Do your infants experience any major sicknesses? Yes ☐   no ☐ Sometimes ☐

18) Do you receive support from NGOs? Yes ☐   no ☐   sometimes ☐

19) What kinds of support do you received? Food ☐   clothes ☐   water ☐ bed nets ☐   medicines ☐   others specify_____

D. Cultural and Traditional Practices

20) There are how many mothers in this home?   Please specify_____

21) What is the total number of children in this home?   Please specify_____

22) How many of these children are your own children?   Please specify_____

23) How many of these children are adopted?   Please specify_____

E. Access to Safe Drinking Water and Sanitation

24) What is the source of your drinking water? Well ☐   pump ☐   creek ☐ Pipe boiled water ☐   mineral water ☐   others please specify_____

25) Is the drinking water treated? Yes ☐ no ☐ sometimes ☐
don't know ☐ others please specify_____

26) How often do you treat your drinking water? Every month ☐ every three
months ☐ every six months ☐ don't know ☐
others please specify_____

27) How far is the place of your drinking water? < 2km easy to access ☐ 2-
4km not far ☐ 4-6km far and difficult to access ☐ > 6km too
far and most difficult to access ☐ don't know ☐
please specify_____

F. Inadequate Breast Feeding and Malnutrition

28) Do you breastfeed your infants? Yes ☐ no ☐ sometimes ☐

29) How long do you breastfeed your infants? 1 month ☐ 2 months ☐
3 months ☐ 4 months ☐ 5 months ☐ the first 6 months ☐
One year ☐ till my child starts to walk ☐ not at all ☐
others specify_____

30) Why do you stop breastfeeding your infant? I do not have enough food to eat ☐
my breast will change shape ☐ my child has other foods to substitute ☐
others please specify_____

31) What kind of food do you give your infant? Rice cereal ☐ rice dust ☐
boney dust mixed with rice ☐ corn meal ☐ others specify_____

32) Has your infant suffered from malnutrition? Yes ☐ no ☐
I don't know ☐

G. Unskilled Birth Attendance

33) Do you attend to antenatal care when pregnant? (Regular check up to a doctor / mid wife during pregnant)   Yes □   no □

34) Who attend to you when you are pregnant? Doctor/mid wife   □ traditional   birth attendants   □   traditional healer / country doctor   □
others specify_____

35) How often do you go to hospital?   1 -3 months □   4 – 7 months   □   8 – 9 months □

36) Where do you go to perform your delivery? Hospital   □   home   □
others specify_____

37) How many times have you gone to a hospital for delivery? Specify _____

38) How many times have you attended delivery at home by unskilled birth attendants? Please specify _____

39) Why do you deliver at home?   Don't have money   □   the hospital is too far   □   the home delivery is better   □   Others please specify_____

40) Do you encounter problems with unskilled birth attendance? Yes   □   no   □
Sometimes   □

41) What are the problems you have had with unskilled birth attendants? Sometimes my child die in the process □   they do not know how to deliver   □   I feel much pain when delivering   □   there is no good care   □   others please specify_____

H. Access to Health Care

42) How do you access health care? Payment ☐ free access ☐

others please specify_____

43) Through what other means other than going to a health facility do you seek health services? Traditional healer / country doctor ☐ prayer woman ☐ drugs store ☐
herbalist prophet / faith healer ☐ others please specify_____

44) Are there any obstacles that hinder your seeking health care? Yes ☐ no ☐

45) What are some obstacles that hinder your seeking health? No money ☐
distance to hospital is too far ☐ no transport ☐ long queue ☐
poor services ☐ not confident ☐ others please specify_____

46) How often do you go to hospital? 1 time in a month ☐ 1-2 time for every three months ☐ 2- 3 times for every six months ☐ 3 – 5 times in a year ☐ only when I feel sick ☐ others specify_____

I. Mothers Education

47) Have you being to school? Yes ☐ no ☐

48) How many years did you spent in school? Please specify_____

49) What is your level of education (mother)? Vocational school ☐
elementary level ☐ junior level ☐ high school complete ☐ University level ☐ Masters and above ☐ have never attended school ☐
others____

50) What is the father's educational level of this home? Vocational school ☐
elementary level ☐ junior high level ☐ high school complete ☐
undergraduate level ☐ Masters and above ☐ have never attended
school ☐ others specify_____

51) Whenever your infant is ill, do you noticed the symptoms? Yes ☐ no ☐
sometimes ☐ I don't know ☐ others_____

52) Have you had any training in taking care of your baby? Yes ☐ no ☐

53) What are some of the basic health knowledge that you know?
   Please specify _____

J. Household condition and crowding

54) What kind of house structure do you live in? Mat structure ☐ zinc
structure ☐ Mud dub ☐ concrete building ☐ others please specify

55) Does the floor of this house has cement? Yes ☐ no ☐
others please specify_____

56) There are how many rooms in this house? Please specify_____

57) What is the minimum person per room in this house? Please specify_____

58) What is the maximum person per room in this house? Please specify_____

59) Do this house has fresh toilet? Yes ☐ no ☐ others specify_____

60) Where do you go if you want to use the rest room or toilet? Use an outside toilet ☐
Use the bush ☐ go on the beach ☐ use the river ☐ other specify _____

Appendix B

Table 5.1 number of delivery in health facility and at home

County	2008			2009			2008		2009	
	HF	Home	Total	HF	Home	Total	%HF	%Home	%HF	%Home
Bomi	164	484	648	799	336	1,135	25.3	74.7	70.4	29.6
Bong	526	1415	1977	1739	2855	4594	28.4	71.6	37.9	62.1
Gbakpolu	107	104	211	472	303	775	50.7	49.3	60.9	39.1
Grand Bassa	1555	4233	5388	1685	3424	5109	21.4	78.6	33.0	67.0
Cape Mt	681	712	1393	987	1398	2385	48.9	51.1	41.4	58.6
Grand Geedeh	1009	948	1957	1472	369	1841	51.6	48.4	80.0	40.0
Grand Kru	152	228	380	149	158	307	40	60	48.5	51.5
Lofa	1657	1336	2993	3450	1643	5093	55.4	44.6	67.7	32.3
Margibi	204	207	411	1797	1886	2983	49.6	50.4	60.2	39.8
Marylan	784	605	1389	1316	446	1762	56.4	43.6	74.7	25.3
Montserrado	5507	4753	10260	7528	2	7530	57.7	46.3	100.0	00.0
Nimba	1060	1003	2063	2694	1708	4402	51.4	48.6	61.2	38.8
River Gee	116	98	214	602	217	819	52.4	45.8	73.5	26.5
Riverces	83	137	220	277	212	489	37.7	62.3	56.6	43.4
Sinoe	305	125	330	599	261	860	70.9	29.1	67.7	30.3
Total	13,546	16,388	29,934	25,566	14,518	29,036	45.3	54.7	50.0	50.0

Appendix C

Table 5.2 Antenatal care visit to health facility - 2009

County	ANC 1st visit	ANC 2nd visit	ANC 3rd visit	ANC 4th and plus visit	ANC 1st visit
Bomi County	5910	2853	1933	1847	12,543
Bong County	17,292	8671	6653	8247	40863
Gbakpolu Co.	2384	1068	891	718	5061
Grand Bassa Co.	12253	5729	4153	3541	25676
Grand Cape Mount Co.	9959	2996	2366	1604	16925
Grand Geedeh	3448	2381	1906	1596	9331
Grand Kru Co	1145	463	386	302	2296
Lofa County	21052	8630	7461	7120	44263
Margibi County	11703	3934	3108	4529	23274
Maryland Co.	7775	2780	2565	1866	14986
Montserrado Co.	42172	19809	15827	15174	92982
Nimba County	19355	7445	5802	5586	38188
River Gee Co.	3147	1460	1230	1668	7505
Rivercess Co.	2221	931	697	732	4581
Sinoe County	3235	992	704	488	5419
Grand Total	163051	70,142	55,682	55,018	343,983

Source: Ministry of Health & Social Welfare Annual Report 2009

Appendix D

Table 5.3 Consultation and healthcare utilization by health care facilities – 2009

#	County	# of health facilities	Population	Consultations	Percentage of consultation	Health facility utilization
1	Bomi	23	84119	69852	3.3	83
2	Bong	37	333,481	230,494	10.8	69
3	Gbakpolu	15	83,388	63,190	3.0	76
4	Grand Bassa Co.	30	221,693	161,690	7.6	73
5	Grand Cape Mt.	32	127,076	144,699	6.8	114
6	Grand Geedeh	18	125,258	91,563	4.3	73
7	Grand Kru Co.	15	57,913	22,010	1.0	38
8	Lofa	58	276,863	346,018	16.2	125
9	Margibi Co.	34	209,923	174,457	8.2	83
10	Maryland	22	135,938	94,007	4.4	69
11	Montserrado	178	1,118,241	337,633	15.8	30
12	Nimba	58	462,026	222,276	10.4	48
13	River Gee	17	66,789	69,133	3.2	104
14	Rivercess	17	71,501	43,183	2.0	60
15	Sinoe	29	102,391	64,487	3.0	63
	Total	583	3,476,608	2,134,692.00	100	1108.26

Source: Ministry of Health & Social Welfare Annual Report 2009

Appendix E

Table 5.4 Number of Government owned health facilities in counties – 411

	County	TOTAL # of Facilities	# of Hospitals	# of Health Centers	# of Clinics
1.	Montserrado	25	2	4	19
2.	Grand Bassa	30	3	1	26
3.	Rivercess	18	1	-	17
4.	Sinoe	32	1	-	31
5.	Gbarpolu	24	1	-	23
6.	Bomi	23	1	-	22
7.	Cape Mount	33	1	2	30
8.	Margibi	33	2	10	21
9.	Grand Gedeh	22	1	-	21
10.	Maryland	18	2	2	14
11.	Grand Kru	17	-	1	16
12.	River Gee	15	-	1	13
13.	Bong	33	2	3	28
14.	Lofa	48	2	2	38
15.	Nimba	40	2	2	36
	Total				

Source: Ministry of Health & Social Welfare Annual Report, 2009

Appendix F

Table 4.1 Regression result of the determinants of infant mortality in Monrovia, Liberia

Regression result of poverty on infant mortality

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	2.04448	0.262127	7.799575	0.000
IM	0.038247	0.038002	1.006447	0.3149
ASDWTS	-0.0348	0.055434	-0.62779	0.5305
CTP	0.153972	0.124123	1.240477	0.2156
IBFM	-0.21047	0.080371	-2.61869	0.0092
DM	-0.05448	0.040239	-1.3539	0.1766
ACCHC	0.007983	0.037052	0.215448	0.8295
UBA	0.080081	0.076703	1.044044	0.2972
MED	0.057339	0.043716	1.31163	0.1905
BI	0.066588	0.059469	1.11971	0.2636
MAGE	-0.00131	0.00181	-0.72078	0.4715
HHCC	0.126419	0.052213	2.421208	0.016
LOG(INCMO)	-0.24373	0.023408	-10.4121	0.000
R-squared	0.266966	Mean dependent var		0.167123
Adjusted R-squared	0.241976	S.D. dependent var		0.373598
S.E. of regression	0.325272	Akaike info criterion		0.626654
Sum squared resid	37.24216	Schwarz criterion		0.765554
Log likelihood	-101.364	Hannan-Quinn criter.		1.680581
F-statistic	4.11E-18			

Appendix G Airfield

Dependent Variable: IM
Included observations: 70

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	6.279467	2.522861	2.489026	0.0128
ACCHC	-0.165691	0.620232	-0.26714	0.7894
ASDWTS	-1.310524	1.025206	-1.2783	0.2011
BI	-0.808188	1.015371	-0.79595	0.4261
HHCC	0.233389	0.797135	0.292784	0.7697
POV	0.733327	0.623936	1.175324	0.2399
MAGE	-0.217577	0.083963	-2.59133	0.0096
MED	1.6057	1.048008	1.532145	0.1255
UBA	-1.087713	0.96848	-1.12311	0.2614
IBMF	0.630459	0.799569	0.788498	0.4304
DM	-1.601193	0.885627	-1.80798	0.0706

LR statistic (10 df)	13.9648	McFadden R-squared		0.143992
Probability(LR stat)	0.174603			
Obs with Dep=0	36	Total obs		70
Obs with Dep=1	34			

Appendix H Sinkor

Dependent Variable: IM
Included observations: 116

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.512018	1.620696	0.315925	0.7521
ACCHC	0.237639	0.439047	0.54126	0.5883
ASDWTS	-0.294835	0.66328	-0.44451	0.6567
BI	-0.33119	0.575763	-0.57522	0.5651
HHCC	-0.841753	0.577785	-1.45686	0.1452
POV	0.695924	0.458645	1.517347	0.1292
MAGE	-0.003755	0.026027	-0.14427	0.8853
MED	-0.553582	0.498423	-1.11067	0.2667
UBA	0.863788	1.039497	0.830967	0.406
DM	-0.308025	0.583168	-0.52819	0.5974
IBMF	-0.030523	0.43712	-0.06983	0.9443
CTP	0.066868	0.487724	0.137101	0.891

LR statistic (11 df)	8.249268	McFadden R-squared		0.051397
Probability(LR stat)	0.690816			
Obs with Dep=0	61	Total obs		116
Obs with Dep=1	55			

Appendix I Bushrod Island

Dependent Variable: IM
Included observations: 138

Variables	Coefficient	Std. Error	z-Statistic	Prob.
C	0.457189	1.346316	0.339585	0.7342
ACCHC	-0.138973	0.375258	-0.37034	0.7111
ASDWTS	-0.585489	0.525337	-1.1145	0.2651
BI	0.873076	0.790031	1.105115	0.2691
HHCC	-0.138532	0.556779	-0.24881	0.8035
POV	0.248744	0.365349	0.680839	0.496
MAGE	-0.019814	0.017878	-1.10828	0.2677
MED	-0.241943	0.453178	-0.53388	0.5934
UBA	-0.303298	0.818916	-0.37037	0.7111
DM	0.523706	0.487096	1.075161	0.2823
IBMF	-0.045325	0.424873	-0.10668	0.915

		McFadden R-squared		
LR statistic	7.444569			0.038914
Prob(LR statistic)	0.682913			
Obs with Dep=0	69	Total obs		138
Obs with Dep=1	69			

Appendix J Central Monrovia

Dependent Variable: IM
Included observations: 76

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.475869	2.330371	0.63332	0.5265
ACCHC	0.435091	0.571752	0.760978	0.4467
ASDWTS	0.164193	0.914745	0.179496	0.8575
BI	0.172843	0.952744	0.181416	0.856
HHCC	-0.716595	0.668164	-1.07248	0.2835
POV	-1.090459	0.555632	-1.96256	0.0497
MAGE	-0.050315	0.030275	-1.66196	0.0965
MED	0.070288	0.602306	0.116698	0.9071
UBA	1.223821	1.351046	0.905833	0.365
IBMF	-0.708939	0.617985	-1.14718	0.2513
CTP	0.456384	0.756471	0.603307	0.5463

LR statistic (10 df)	13.08295	McFadden R-squared		0.124737
Probability(LR stat)	0.219071			
Obs with Dep=0	41	Total obs		76
Obs with Dep=1	35			

BIOGRAPHY

PERSONAL DATA

Name	Dominic F. Togba
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EDUCATIONAL BACKGROUND

2009   Certificate of Completion
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Conducted by Yale University in Collaboration with
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2006   Bachelor of Business in Accounting (BBA)
United Methodist University
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Monrovia, Liberia

JOB EXPERIENCE

2008   Accountant
Montserrado County Health Team (MCHT)
Ministry of Health & Social Welfare
Monrovia, Liberia