

HACETTEPE UNIVERSITY
INSTITUTE OF POPULATION STUDIES

**WOMEN'S EMPOWERMENT AND INFANT MORTALITY
IN RWANDA:
THE PERIOD OF 2005-2015 HEALTH SECTOR POLICIES**

Gloria NIBOGORE

Department of Demography

Master's Thesis

Ankara

June 2020

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Supervisor

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CERTIFICATION

Women's Empowerment and Infant Mortality in Rwanda, the Period of 2005-2015 Health Sector Policies

Gloria NIBOGORE

This is to certify that we have read and examined this thesis and in our opinion it fulfills the requirements in scope and quality of a thesis for Masters of Arts in Demography .

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To all not mentioned, I thank you sincerely.

DEDICATION

I dedicate this dissertation to;

To my God, the Creator,

To my Mother and my Father,

To my Uncles and Aunts,

To my Brothers and Sisters,

To my Brothers and Sisters in Law

To my cousins, nephews and nieces,

To my past and present relatives,

To all my friends

ABSTRACT

The women's empowerment is an important social determinant for describing women's abilities and capacities in society. Over past decades the various research has focused on the relationship between infant mortality and health aspects while neglecting the possible social aspects and related effects on infant mortality.

This study aims to fill the gap in research on the impacts of women's empowerment and health policy on infant mortality in Rwanda, as well as to discover the relationship between two components, and various variables include bio-demographic, socio-economic, environmental, media exposure, health care, and nutrient deficiency variables that accompany infant mortality, health policy, and women's empowerment.

The data source used in this study come from three main standards Rwanda Demographic and Health Surveys (RDHS 2005/2010 and 2015). Principle Component Analysis was used to create women's empowerment index. In the study, binary logistic regression analysis was used as the analysis method. In the first two models, the independent effects of women empowerment and health policy period variables were examined, and in the third model, the effects of these two main explanatory variables were examined under the control of all variables related to bio-demographic, socio-economic, environmental, media use, health care, and nutritional deficiency.

The findings of the study discovered the impacts of women's empowerment and health policy on infant mortality. It was found that women's empowerment reduced infant mortality by 1.47 times, and the health policy that started to be implemented in 2005 was 2.34 times. The study includes important findings on the effects of bio-demographic, socio-economic, environmental, media use, healthcare, and nutritional variables on infant mortality in Rwanda.

Keywords: Women's empowerment, health policy, infant mortality, Rwanda

ÖZET

Kadının güçlendirilmesi, kadınların toplumdaki yeteneklerini ve kapasitelerini tanımlamak için önemli bir sosyal belirleyicidir. Geçtiğimiz on yıllar boyunca çeşitli araştırmalar, bebek ölümleri ve sağlık boyutu arasındaki ilişkiye odaklanırken, olası sosyal yönleri ve bebek ölümleri üzerindeki ilgili etkileri de ihmal etti.

Bu çalışmanın amacı, kadınların güçlendirilmesi ve sağlık politikasının Ruanda'daki bebek ölümleri üzerindeki etkileri hakkındaki araştırmalardaki boşluğu doldurmanın yanı sıra iki bileşen arasındaki ilişkiyi araştırmak ve çeşitli biyo-demografik, sosyo-ekonomik, çevresel, medyaya maruz kalma, sağlık hizmetleri ve besin yetersizliği, bebek ölümleri ve kadınların güçlendirilmesine eşlik eden değişkenlerdir.

Bu çalışmada kullanılan veri kaynağı üç ana 2005, 2010 ve 2015 yıllarında gerçekleştirilen üç Ruanda Nüfus ve Sağlık Araştırması'ndan gelmektedir (RDHS 2005, 2010 ve 2015). Kadının güçlendirilmesi endeksini oluşturmak için Temel bileşen analizi yöntemi kullanılmıştır. Çalışmada analiz yöntemi olarak binary lojistik regresyon analizi kullanılmıştır. İlk iki modelde kadının güçlendirilmesi ve sağlık politikası dönemi değişkenlerinin bağımsız etkilerine bakılmış, üçüncü modelde ise bu iki ana açıklayıcı değişkenin etkisine biyo-demografik, sosyo-ekonomik, çevresel, medya kullanımı, sağlık bakımı ve besin yetersizliği ile ilişkili tüm değişkenlerin kontrolü altında bakılmıştır

Çalışmanın bulguları, kadınların güçlendirilmesi ve sağlık politikasının bebek ölümleri üzerindeki etkilerini ortaya çıkarmıştır. Kadının güçlendirilmesinin bebek ölümlerini 1.47 kat, 2005 yılında uygulanmaya başlanan sağlık politikasının ise 2.34 kat azalttığı bulunmuştur. Çalışma, biyo-demografik, sosyo-ekonomik, çevresel, medya kullanımı, sağlık hizmetleri ve besin değişkenlerinin Ruanda'da bebek ölümleri üzerindeki etkilerine dair önemli bulguları içermektedir.

Anahtar Kelimeler: Kadının güçlendirilmesi, sağlık politikası, bebek ölümleri, Ruanda

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ABBREVIATIONS

CHW	Community Health Workers
CMR	Child Mortality Rate
EAC	Easter African Community
IMR	Infant mortality Rate
ICDP	International Conference on Population and Development
RDHS	Rwanda Demographic and Health Survey
NISR	National Institute of Statistic Rwanda
GDP	Gross Domestic Product
GDI	Gender-related Development Index
GEM	Gender Empowerment Measure
MDG	Millennium Development Goals
MCH	Maternal Child Health
SDG	Sustainable Development Goals
NMR	Neonatal Mortality Rate
IMCI	Integrated Management of Childhood Illnesses
HF _s	Health Facilities
UNICEF	United Nations International Children’s Emergency Fund
USAID	United States Agency for International Development
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Problems and its Settings

Child's health is the important key among indicators of social welfare and progress of a country, infant deaths is the best essential measure of child health and estimating the life expectancy of the population meanwhile the infant mortality has the impact on changing the life expectancy. The core causes of child death in underdeveloped countries are preventable and treatable diseases that happened mostly because of poverty and poor living condition.

Generally, the child death ratio has declined from a predictable ratio of 64.8 deaths per 1000 live births in 1990 to 30.5 deaths per 1000 live births in 2016 (UN DESA Population Division, et al 2016).The World Health Organization Report 2016 presented the number of child mortality has reduced from 8.8 million in 1990 to 4.2 million (75% for all are under-five deaths) in 2016.The main causes of infant mortality are related to welfare of the population has impacts on households members include children which affect standard of living of the family. The findings displayed that the greatest of infant death ratio was in WHO African Region with 52 per 1000 live births, over six times greater than that in the WHO European Region with the lowest ratio of 8 per 1000 live births.

Indicators used to measure child health are parental education level, health services and household income level. Mosley and Chen (1984) studies about child survival in developing countries, child death is controlled by a grouping of socioeconomic, environmental, biological and behavioral aspects. A research carried out in developing countries indicated that there is an important result of promoting maternal reproductive health status with reducing child mortality (Caldwell & Mc Donald, 1982).

Mosley and Chen (1984) model offered an advantageous and significant approach by escaping errors information in program and policy in each discipline, and by collecting the diverse concerns and procedures together to offer an important approach to recognizing child survival by adding both medical and social science approaches into a reliable analytical structure. The model comprises a set of proximate elements that directly cause possibility of mortality and illness. To comprehend the socioeconomic elements that could have impacts on child's health directly, research should control through proximate elements, Mosley and Chen (1984) categorized proximate elements addicted to five groups, these are: the maternal factors or demographic factors which comprise birth interval, maternal age, birth order ,child sex, environmental factors which encompass of source of drinking water, air, type of toilet facilities, access to hygiene and Sanitation, Injuries, socioeconomic determinants, nutrition status and personal illness treatment factors.

Furthermore, the Mosley and Chen (1984) model is important to be used in this type of research related to infant mortality in Rwanda and research will acquire perfect results and an image nearby to realism about the best essential determinants upsetting child death in Rwanda. Even though the model has been identified among researchers for several years ago, the comprehensive understanding of the model was limited especially in developing countries.

The ICPD 1994 in Cairo emphasized the significance of women's empowerment and determining the reasons for "empowering women as a social goal and preserved as the essential condition for population stabilization" (Hodgson & Watkins, 1997).The various survey described elements could use to measure women empowerment include domestic abuse, occupation, authority, education, decision making, place of residence those might important elements to understand components of women's empowerment.

In spite of rising in empowerment research, outcomes on the association concerning demographic indicators and empowerment are varying. The difficulties for understanding the context of health and mortality due to different determinants such as measures,

economic and social contexts of empowerment in terms of finding out the clear connection for improving the empowerment as powerful for improving health. The researchers explain particular analytic procedures used all influence assesses the relationship between demographic outcomes and empowerment. Certain scholars use “life-event” as empowerment determinants, for instance women education level and age at first marriage (Bloom et al., 2001). Another researchers have just started to use “attitudinal” empowerment determinants plus life-event empowerment variables composed from Demographic and Health Surveys that examine about attitudes in terms of decision-making and access or control resources. Discovering the association among empowerment, infant and child death is significant to comprehend the region through great mortality level and acclaim policies and procedures to decline mortality (Hossain and Hoque, 2015).

According to the World Population Reference Bureau Report (2005), infant mortality in Rwanda was 86 deaths per 1,000 live births in 2005, with a child mortality of 152 deaths per 1,000 live births, childhood mortality was decreasing in Rwanda. The infant death ratio has declined from 102 deaths per 1000 live births in 2010 to 49 deaths per 1000 live births in 2014 (World population reference Bureau Report 2010 and 2014 respectively). The World Population Reference Bureau Report (2018) showed that the infant death ratio reached to 32 per 1000 live births; It displayed that, good achievements of MDG4: Reduce child mortality (Infant mortality and under-5 mortality), though these recent findings showed good performance for declining infant mortality. The illustrations of the country's target have almost achieved compared in the past and current moment. Rwanda has the smallest infant mortality ratio 32 per 1000 live births among in all East African Countries (EAC) and also it is the only country which had achieved Millennium Development Goal 4 (Reduce child mortality) (A.Y.Kitua, 2007). UN Sustainable Development Goal 3(Ensure healthy lives and promote well- being for all at all ages), the main target for this goal is to decline under-5 mortality rate up to the lowest rate of 25 deaths per 1000 live births. The Rwandan government committed improving child health

through training health community worker who is responsible to help mothers and their children to sustain their health status contributed big proportion in declining child mortality in Rwanda.

1.2 Aims and Objectives of the Study

This study concerns about women's empowerment indices and the viewing their impacts on infant mortality in addition with impacts of health sector policies on infant mortality. This thesis shares the concerns of the third sustainable development goal (SDG3) which purposes to ensure healthy lives and promote health of the population. Unfortunately, the several of the current studies focus on the medical features for promoting child's health while ignoring the social factors and other determinants of infant mortality. Subsequently, infant mortality is essential indicator of welfare of the population in addition to development of the nation.

Additionally, women's empowerment, demographic outcomes such as fertility, mortality and other variables will be used to create a framework of the study. The study focused on research about exploring the effects of women empowerment and implementation of health sector policy on infant mortality in Rwanda within 10 years of period (2005-2015). As the core objective of the study is to explore the impacts of women's empowerment and health sector policy on infant death in Rwanda.

- 1) To evaluate the link between infant mortality and women empowerment in Rwanda
- 2) To evaluate the relationship between bio-demographic determinants and Infant mortality in Rwanda
- 3) To analyze the association between socioeconomic, environmental, health care and nutrient deficiency determinants on infant mortality
- 4) Find out ways of computing women's empowerment index in Rwanda
- 5) To explore the impacts of health sector policies on infant mortality.

The research would be a source of information to both government planner and public institution, international organizations, politicians and future researchers related to social

health development of the population. The study will help demographers to develop their knowledge in demography; where it will give them a great experience and deeply information about infant mortality and other side of analyzing research related to mortality.

1.3 Research Questions

The main research questions follow:

1. What are the impacts of women's empowerment on infant mortality in Rwanda?
2. How are women's empowerment and bio-demographic elements linked to infant mortality in Rwanda?
3. How the proximate variables include socioeconomic, environmental, healthcare, nutritional deficiency and empowerment provide their relationship with infant mortality?
4. How women's empowerment index would be computed in Rwanda's context?
5. What are the impacts of health sector policies on infant mortality in Rwanda?

The results of these questions will find out information of women's empowerment and infant mortality by using Rwanda DHS 2005/2010/2015 datasets. The study will organize the socioeconomic, bio-demographic, environmental, healthcare and nutrient deficiency determinants which are assumed to control either directly or indirectly the infant mortality level in Rwanda. Then, the study will look at the statistical relationship between the explanatory determinants and the dependent variable (infant mortality) to evaluate the impacts initiated by those determinants. The some part of the research is focused on the Mosley and Chen model which worked by gathering determinants and exploring statistical analysis results of them through a logistic regression analysis. The Mosley and Chen approach is essential in the study for discovering the impacts of women's empowerment and health sector policy on infant mortality in Rwanda through the proximate variables.

1.4 Contribution to the Literature

The results of the study about on the impacts of women's empowerment on infant death would be used by researchers in future, as important of a source of the information in the demography discipline particularly in East African Countries because their demographic characteristics are almost the same. There is the main contribution to the literature as follows:

- The study will contribute by updating the impacts of women's empowerment indices, health sector policy and other predictor determinant variables on infant mortality in Rwanda.
- The study will provide solutions to the questions of the most affected factors and their connection with infant mortality; determinants which source overall health problems connected to infant mortality rate in Rwanda.
- The study will produce association of two core disciplines elaborated (social and medical sciences) in infant death in underdeveloped nations. It will emphasis on in cooperation of social and medical factors exposed to discover the determinants of infant mortality.

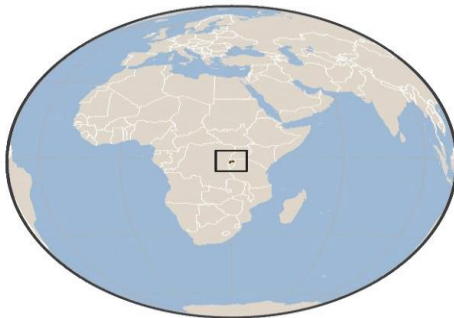
1.5 The Setting of the Country

Rwanda is the country locates in Eastern African sub-region with a population of 12.7 million, a green, mountainous landscape and the total land area is 26 338 Km² (National Institute of Statistics Rwanda, 2019). It is surrounded by four neighborhood countries include Uganda (North), Burundi (South), Democratic Republic of Congo (West) and Tanzania (East). The country is distributed into four geographically provinces North, South, East, and West and the capital city of Kigali. The lower governmental zones consist of 30 districts, 416 sectors.

It had made extraordinary progress in terms of social and economic activities to promote the standard living condition of the people after the 1994 Genocide against Tutsi while

more than 1 million people died and 2 million people became refugees. After the Genocide, the country engulfed its wounds, the infrastructure of the country has developed and more people are educated compared in the past decades. Even though, enhancement of development and investment especially in tourism, manufacturing, mining, health, and education services, and ICT.

Figure 1. 1. Map of Rwanda

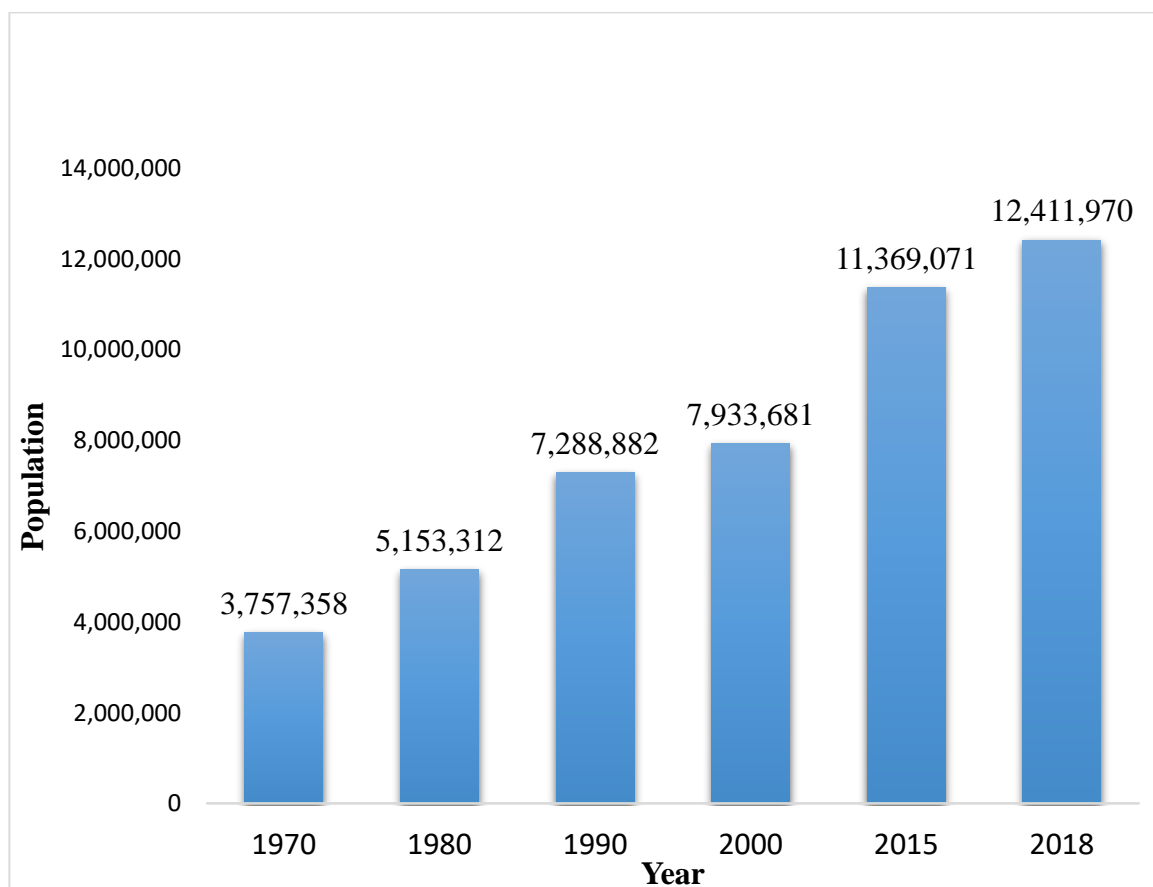


Source: RDHS 2014: National Institute of Statistics Rwanda, et al., 2015

1.5.1. Population Size and Demographic Structure

Rwandan population size is 12.8 million in 2019, population enlarged from 4,831,527 in 1978 to 7,157,551 in 1991 and 8,128,553 in 2002 before getting to 10,515,973 in 2012. Thus, the population more than doubled between 1978 and 2012. The main reason for the increasing population size is because of speedy population growth, which constantly stands great even though the advanced decline in the natural growth rate and the total fertility rate.

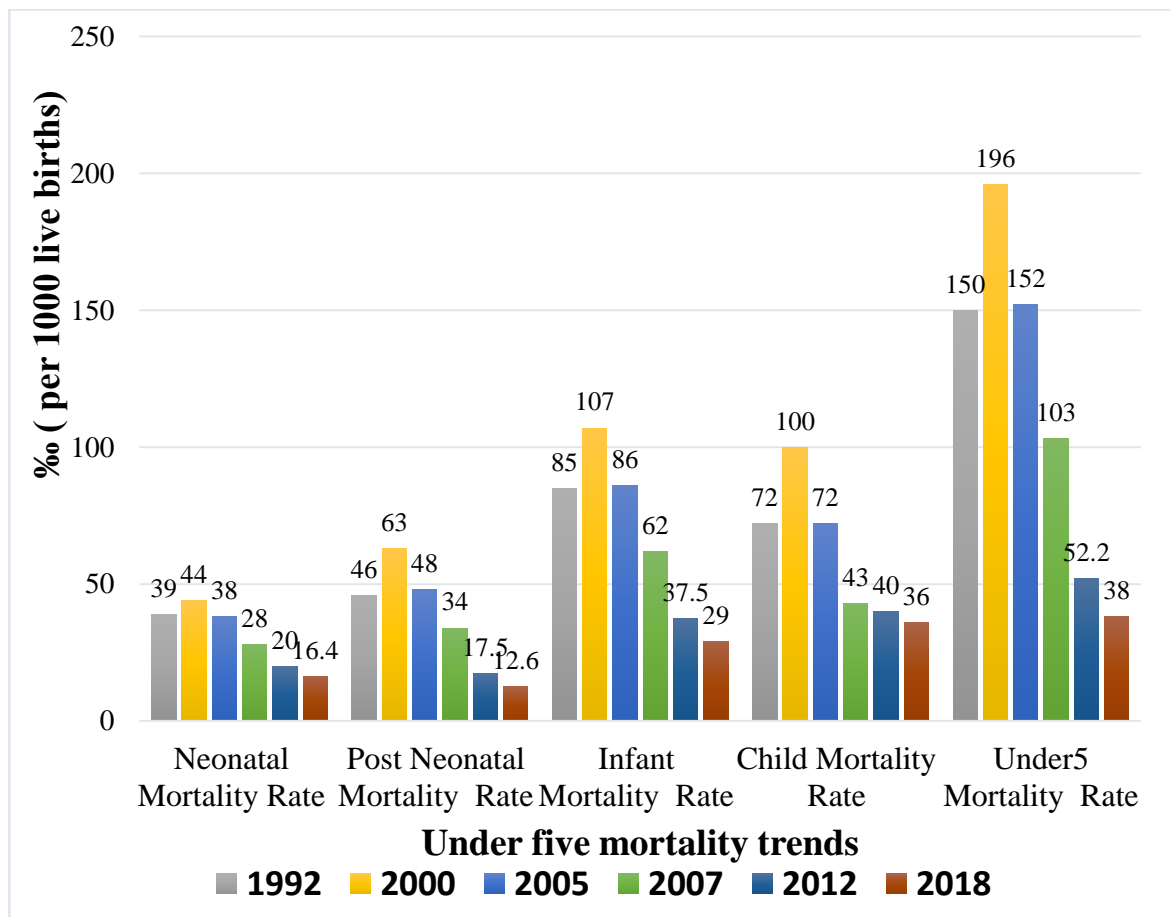
Figure 1. 2: Total population of Rwanda, 1970-2018



Source: National Institute of Statistics Rwanda et al, 2018

Rwanda DHS (2015) designated that the Total Fertility Rate has declined from 6.1 in 2005 to 4.6 in 2010 and currently is 3.8. Life expectancy at birth is 67 years and Maternal mortality Ratio equals 290 deaths per 100 000 live births. According to UN 2017 data, Rwanda is among the countries with highest population density with 479 per Km² (1,312 people per mi²), 34.0% of the population stays in the urban area (4,255,257 people in 2018) means that big proportion of the people stays in rural areas.

Figure 1. 3: Trends on Neo-natal, Post –neonatal, Infant Mortality, Child Mortality and Under-5 Mortality Rates in Rwanda (1992-2018).



Source: Data from National Institute of Statistics Rwanda

Figure 1 demonstrates an observation of childhood mortality in different periods foregoing the survey. All childhood components described the great achievement of reducing their mortality rates except in 2000 where it shows that all rates are the highest compared to other periods because during the Genocide against Tusti 1994, big proportion of the people died. After the difficult moment the country had passed through the government of Rwanda has put strong efforts on political stability, trying to build up the national economy and unity of population associated with improvement in child's health essentially from strong community involvement and the implementation of powerful management for preventing illness to the children within health facilities, the introduction of new vaccines and improving nutrition for both mothers and their children.

1.5.2. Social and Economic Indicators

According to population housing Census 2012, religions classified in into three main categories where the Christianity has a great proportion which equals 94% (44% are Catholic, 38% are Protestant, and 12 % are Adventist) of the population who are absolutely dominant in faith and believing in God. The Islamic religion has the lowest proportion of 4% of the population in the whole country and 1.5 % did not have any religion.

Rwanda has one native language and country's official first language which is Kinyarwanda and there are common foreign languages use in the country include English, French and Swahili where commonly spoken in urban areas and the Swahili language is extensively spoken in the provinces close to the countries where they use that language like Tanzania and Democratic Republic of the Congo.

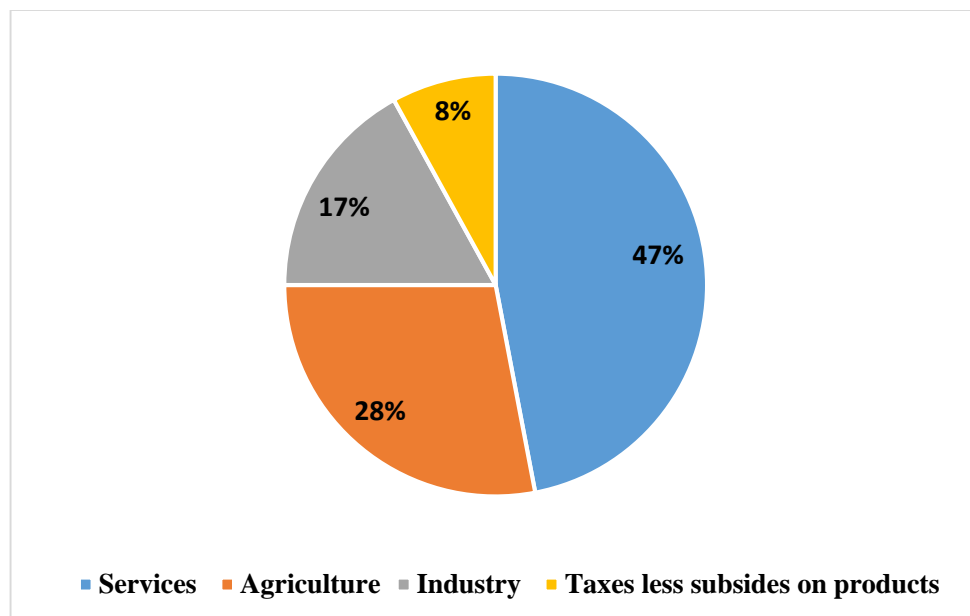
In Rwanda, in past decades the agriculture was key economic activity in the country but presently there is an improvement in the service sector and promoting investment in the industrialized zone in addition to agriculture modernization. These determinations had prepared to improve the non-agriculture zone currently bearing progressive outcomes, as

the services sector contributes more in the economy than the agricultural zone in recent years.

National Institute of Statistics of Rwanda Report (2016), the economy of Rwanda has been rising progressively the GDP per capita has accomplished at a high level compared to different years from \$700 in 2014 to \$738.6 in 2016. Activities in the services sector increased by 4 % and the GDP growth rate of 5.9% annual change (World Bank, 2018). The hospitality services have grown rapidly as the results for great achievement is services by increasing 20 percentage and also administration with support services activities enlarged by 30 % a real state enlarged by 13%. Conversely, wholesale and retail trade reduced by 10 %. (NISR, 2017).

The Fourth Household Living Conditions Survey (EICV4/ 2016) showed that the agriculture is key economic activity in Rwanda and it is the main job for Rwandan's population with a big proportion of 71% for those who involved in the agriculture sector while 61% of independent farmers and 10 percent was wage farmers.

Figure 1. 4: Sector shares of GDP



Source: NISR 2019, National accounts

The figure above presents sector shares of GDP in 2019 where agriculture contributed 28% , service 47% , industry 17% while 8% was attributed to adjustment for taxes less subsidies on products .

1.5.3. Population Policies and Programs

The Rwandan government has established anti-natalist population policies for avoiding population growth problem and its effects, particularly since the 1980s to develop the country's life of the population. In 1982 the government settled the family planning program for supporting individuals to access the family planning services through trained health communicators known as Community Health Workers.

A consequent policy approved in 1990 targeted at reduction population growth and declining fertility rate through family planning. The main targets of that policy would be to decline fertility level and improving other elements like employment and advanced women, public health improvement, promotion of education and school attendance of the people.

After the 1994 Genocide against Tutsi, overpopulation realized as a new challenge, with highlighting on both population growth and quality of life. New population policy recognized and distributed to all partners in 2003 with main objectives and strategies which had impacts on socioeconomic factors and demographic outcomes (fertility and mortality).

The policy supports accomplished sustainability of natural resources, free education to all children in primary and secondary (emphasis on vocational training center and technical courses in addition to information technology), slow population growth, involvement in development by both men and women, food safety, good governance, and equal opportunity (Ministry of Health , 2015).

I.6. Health Sector Policies and Programs in Rwanda

The health system in Rwanda based on preventing diseases and promoting health status of the population especially mothers and children health. Information, education and communication projects raised the expectation level of population on health services delivered by the government.

The implementation of the first Health Sector Policy in 2005; there was the occurrence of transformation for domestic socio-economic progress policy and extra especially in health sector policy.

The 2015 Health Policy sustained the Government to endure great achievements made through preceding established policies, obtainable strategies and the Millennium Development Goals (MDGs). Ministry of Health in partnership with Rwanda Biomedical Center and health facilities at various levels will stay to be a fundamental part of applying approaches with the important target for achieving Vision 2040 and Sustainable Development Goals (SDGs).

The Health Sector Policy provides universal alignments for the sector in order to develop numerous sub-sector policies managing key health programs and departments. The whole thing included in health sub-sector policies will be reorganized during the implementation of the new policy.

The health policy is focused on general health planning and the principal elements of reference the health stakeholders who are employing in the health sector. The main purpose of the health policy is to guarantee general accessibility through financial and geographical terms of reasonable and affordability of excellent health services through rehabilitative curative and, preventative promotional facilities for all Rwandans. In generally, health policy promotes the health indicators through promoting the standard of living of the population.

Policy Orientation

a) Vision

The vision of the health sector policy would be start in country 's vision 2020 to promote the welfare of the population by raising the production and declining poverty level surrounded by the environment of the good governance. A portion of the vision, the Rwandan Health Sector look for frequently promote the welfare of population, through corresponding involvements by qualified health stakeholders at entirely stages related to health, by the means of improving the common welfare of the people and underwriting to decline of poverty. According to Rwandan constitution Article 41 as reviewed to openly stated that Health is Human Right: "All citizens have rights and duties relating to health. The State has the duty of mobilizing the population for activities aimed at promoting good health and to assist in the implementation of these activities. All citizens have the right to equal access to public service following their competence and abilities."

b) Mission

The Rwanda Health Sector policy mission is to deliver and repetitively develop the accessibility of health services in terms of curative, preventive, and rehabilitative health carefulness services with good quality, by this means underwriting the poverty eradication strategies and improving the overall welfare of the population.

c) General Objectives of the policy

The essential objective of the health sector policy is to certify common availability of health facilities in terms of geographical and financial of equitable and affordable good quality health care service such as rehabilitative, preventive, curative and improvement of health services to all individual in the country.

The general objective would be accomplished through application of four main points for sustaining the health of population which comprise Health Key Program while strengthening the different systems like Health Support System; that will help health

facilities at all levels of service delivery such as Health Service delivery collected with the Governance of the sector.

Objectives 1: Health Key Program

This objective involved on the decline health challenges such as diseases are most common problem to the life of population. Those diseases include infectious diseases and non-communicable diseases through access to primary health care with addition of maternal and child health problems.

The accessibility and quality of necessary health service to improve population health through the various health services such as maternal and child Health; nutrition services, family planning and reproductive health; non- communicable diseases, communicable diseases and infectious diseases surveillance and research.

Objective 2: Health Support System

Emphasize policies, resources and controlling actions of health support systems to confirm most favorable achievement of the health programs.

Health system establishment composed with six building blocks for confirming the accessibility of necessary resources and controlling the actions for a proper operational of the key health programs designated under objective1. These building blocks comprises human resources for health, and regulation, Health financing, leadership and governance, health products management, health services delivery (equipment and infrastructure) and health information system (Ministry of Health, 2015).

Objective 3: Health Services Delivery

The main target of this objective is to control actions of health services delivery coordination to confirm the best production of the health programs.

The purposes of the objective at the operational management and organization of health service delivery system in various levels; from the community to health centers and

district hospitals and referral hospitals, and also comprising the emergency medicine and pre-hospitalization services.

Achievements of health sector policy in the area of maternal and child health since 2005 as follows:

- i. The growth of health facilities established on promoting services of delivery from 45% in 2005 to 70% in 2010, Clinical Integrated Management of Childhood Illnesses (IMCI) in all health facilities (HFs), and the start of maternal and child death audits in all Health Facilities which is developing to maternal death surveillance and response.
- ii. The increased proportion of the children who were immunized from 2005 to 2015 for measles 75% to 95% and fully vaccinated from 80% to 90%.
- iii. Increased the number of Community Health Workers (CHW) with their main responsibility to review health situation of pregnant women, and children under 5 years to sustain their life and also their task is to serve information regarded to Family Planning programs (CBP/FP).
 - The implementation of Malaria program to decline the rate of Malaria in the country has resulted with a big proportion of the people who are using mosquito nets to prevent Malaria especially vulnerable population like pregnant women, children, and aging people.
 - Disease control and Treatment area, there is a big proportion of the people HIV+ who can have ARVs drugs in all health facilities and also admittance full packages related to HIV services. Elimination of Malaria where currently community health workers are testing malaria at community level before any treatment due to reducing the incidence rate of malaria.

Challenges of Rwanda Health Sector

- The foremost target of the health sector in Rwanda is to cover the whole population within the country and care for the health of most vulnerable group of population regarding each program allowed to access the basic health services, but there are

difficulties underprivileged population and isolated communities due to financial accessibility and geographical location to health services in other words high poverty level and long distance to reach in health facilities.

- Lack of sustainability of funding of health System as the result of decreasing the peripheral finance quickly than raising the internal assets. Due to inadequate resources lead to make selections in terms of a number of the inhabitants who can access health services and also in budget effectual involvements. In that situation represent a danger to preserving the favorite accessibility and excellence of services.
- Poor arrangement of numerous development sectors like education, agriculture and social protection in the way of fight against malnutrition within the population.

CHAPTER 2

LITERATURE REVIEW

Women's empowerment is important concept which concerns about description of the women's ability and capacity in social transformation of their lives. Health policy is strategic action regarded to accomplish the health care outcomes of human being or within community through different programs for stimulating health status. In the most previous researches related to infant mortality, women's empowerment did not consider as to be among the factors could be discovered their influences on IMR.

Literature review chapter appraised the definitions of key words of the study and followed by various studies about women's empowerment and its influences on Infant mortality and another section will focus on health sector policy impacts to infant death.

Mosby's Medical Dictionary demarcated "infant mortality as the statistical rate of infant death during the first year after live birth, expressed as the number of deaths per 1000 live births in a specific geographic area or institution in a given period. Neonatal mortality (death within 28 days of birth) accounts for 70% of infant mortality". The infant death rate is an essential indicator for assessing child's health and pregnant woman's life because it is connected with various determinants include socioeconomic conditions, bio-demographic, maternal, health quality and access to medical care with addition of public health practices.

As stated by Rwanda DHS (2014/2015) indicated the description of Infant mortality is the likelihood of dying between birth and the first birthday of life. Rwanda DHS 2014/2015 Report showed infant death rate was 32 deaths per 1000 live births and currently the infant mortality rate is still same.

Rwanda DHS 2014/2015 report stated the different definitions related to early mortality terms:

- **Neonatal mortality:** the likelihood of dying within the first month of life

- **Post neonatal mortality:** the probability of dying between the first month of life and first birthday (computed as the difference between infant and neonatal mortality)
- **Infant mortality:** the probability of dying stuck between birth and the first birthday
- **Child mortality:** the probability of dying between the first and fifth birthday
- **Under-5 mortality:** the probability of dying between birth and the fifth birthday

There is considerable variation in the definition and conceptualization of **women's empowerment**. The United Nations Development Fund for Women Report (UNIFEM 2017) has distinct women's empowerment as "having access to and control over the means to make a living on a sustainable and long term basis, and receiving the material benefits of this access and control". World Bank distinct empowerment as the "expansion of freedom in making a choice and action to shape one's life". Women's empowerment has also been described as "an extension of a woman's ability to make strategic life choices in which these capabilities denied to her".

Malhotra and Schuler 1989 studies have established the various scopes to describe women's empowerment measurement include legitimate, economic, familial, social cultural and relational, psychological and political. Conversely, indicators used to measure empowerment in individual or family level classified as domestic decision making, control over resources, and flexibility/autonomy of movement.

Health sector policy is the actions, assessments, and plans that undertake to realize particular health care objectives within community or the general institution. They may be hiding place topics of financing and delivery of health care, admittance to care, quality of care and health equity.

According to World Health Organization, the essential objective of the National Health Policy 2017 is to accomplish the good welfare of the population through improving

health care orientation and preventive in all progressive policies and to attain common access to good quality health care services devoid of everyone taking to face a challenge.

2.1. Theoretical Framework of the Study

Mosley and Chen (1984) established the childhood survival context going on the hypothesis that exogenous variables and endogenous or biomedical determinants affecting childhood death drive over a set of endogenous determinants. Schultz 1984, the endogenous factors are called intermediate variables (intermediate inputs by Schultz) because they represent the middle point connecting childhood mortality and the exogenous variables. The most important thing to Mosley and Chen (1984) model is being able to differentiate a group of intermediate variables that take a straight result on the chance of morbidity and mortality and all socio-economic factors must drive through these variables in order to promote child's life.

Mosley and Chen (1984) classified proximate factors addicted into five groups, these are: (1) the maternal factors or demographic factors which comprise maternal age, child sex, birth order, birth interval, (2) environmental factors which encompass of air, source of drinking water, type of toilet facilities,(3) Nutrient deficiency include calories, proteins, micronutrients (Vitamins and minerals) (4) Injury comprises either accidental or intentional and (5) Personal illness treatment includes medical treatment and personal preventive measures .

The influence of socioeconomic, environmental and biological are motivating forces for the reduction of morbidity and mortality (Mosley & Chen, 1984 & Schultz 1984). The forthcoming with the prevailing variables in order to the study child survival was based on numerous assumptions:

1. All independent variables must work through some intermediate determinants after which they impact the chance of illness and the final result of the illness process.

2. Fewer survival probabilities in any given society are due to socio-economic, environmental and biological forces.
3. 97 proportion (%) or more newborns are anticipated to live through the first five years of life in an ideal setting.
4. Nutrient deficiencies and some very specific diseases seen in any living population might be viewed as maternal indicators for the work of the immediate variables.
5. Wavering growth, as well as ultimate death in children, is the additive outcomes of many disease processes. Only on rare occasions is a child's death an outcome of one isolated diseases

The conceptual framework in Figure 2.1 demonstrates the core independent variables (Women's empowerment and health sector policy) and the other proximate determinants which include bio-demographic, environmental factors, socioeconomic, health care and nutrient deficiency and Partner's characteristics and media exposure variables in order to explore their impacts on infant mortality as the main objectives of the study.

All these determinants would control toward infant mortality to reply the research questions of the study. Bio-demographic factors (Birth spacing, mother's age at first birth, sex of the child, type of child's birth, sex of the household and birth order number).The studies indicated birth order number has a statistically associated to child death through the result it demonstrated that as the birth order number was getting greater rather than third birth order and above there is high likelihood of child mortality (Becker et al., 2010). Birth interval is also important variable to determine infant death, the discussion of the different studies showed that the long birth interval may decline mortality (Kembo & Van et al, 2009) and also sex of child as the variable, the studies showed that child mortality is more strongly associated among girl child than boy child (Susuman 2012).

Figure 2 1: Researcher conceptual framework of child survival developed from Mosley and Chen Model (1984)

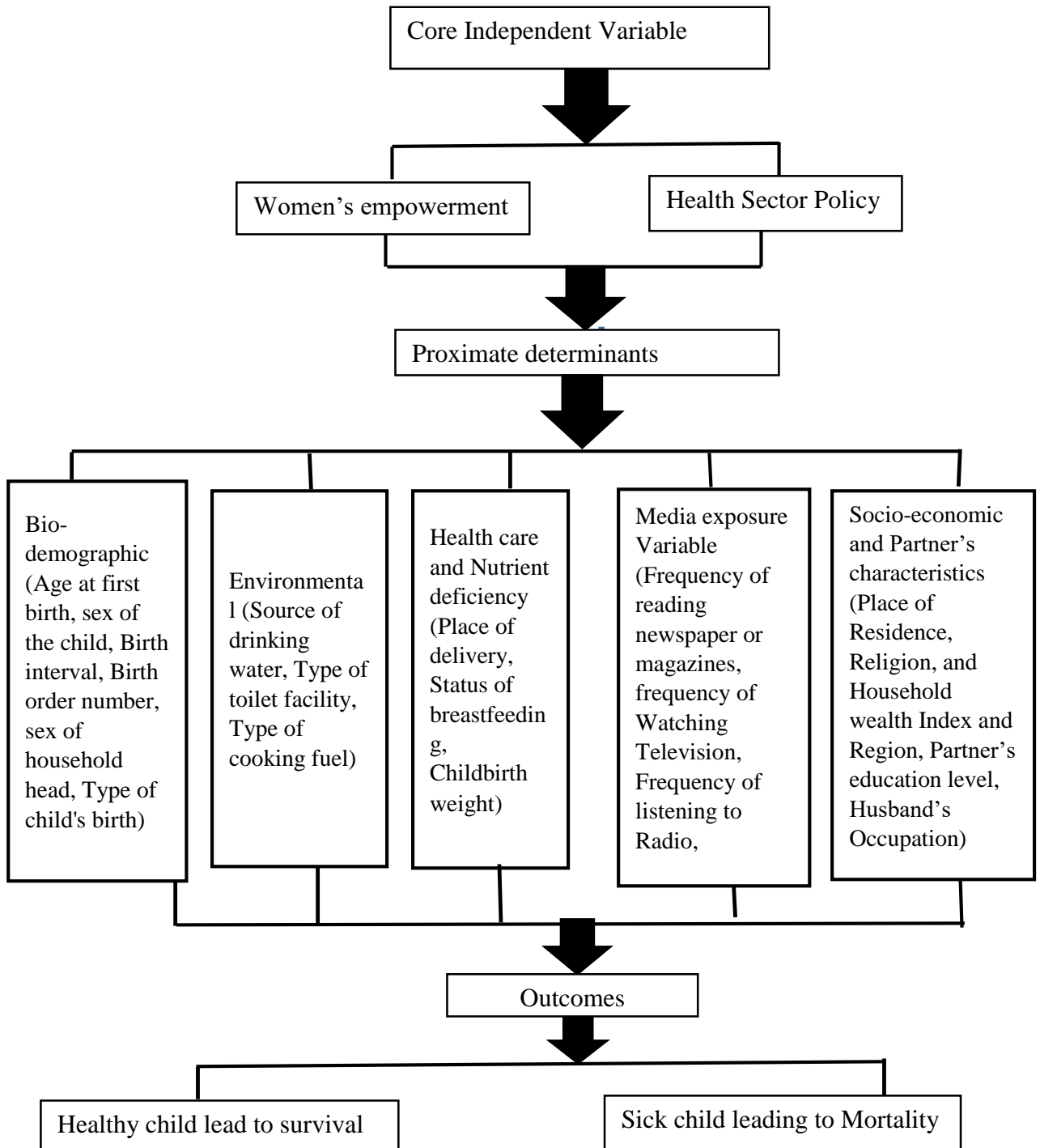


Figure 2.1 continues to explain the environmental determinants like toilet facility, source of drinking water, food and air. Children born in the household with access to hygiene and sanitation in addition to well-taken care are likely to live as the reverse of the children who had born in poor living conditions. The good nutrition promotes the child survival during pregnancy and lactation to both mother and child meanwhile all necessary nutrients elements are available such as protein, vitamin, calories, and others in order to stimulate their life.

Socioeconomic determinants categorized into groups which include household level help to determine the child health and mortality lead through household wealth index or income level have impact in the evaluation of standard living of the family.

Individual level based education level is the main key for defining the individual development skills, welfare and time. Spouse's level of education is statistically correlated to income level and employment. Spouse's career regulates household's resources and powerfully affect approaches on managing family expenses. The result occurred where educated men were married to the less educated women while women's education is determinant that have directly effects on child's life because of biological influences by making choice and lack of skills in healthcare preparation ,time dedicated to child care like hygiene and treatment of diseases. Mother's nutrition, health status and her reproductive pattern promote the children survival. Place of residence, like the urban area, is simply to access health facilities and electricity are significant to support child survival and reducing child mortality.

Accessing of the information in the presence of listening to the radio and watching television in the household used as the substitute for control media exposure variables and the few studies indicated that the media exposure are strongly linked to infant mortality (Bennet et al ,1999). According to Kabir et.al. 2011, the studies occurred on reading newspaper or magazines as another component of media exposure, it showed that reading newspaper or magazines were significantly affecting child mortality.

In other words, Media exposure plays important role in reducing mortality especially infant mortality where the mothers could be able to acquire essential information from the various program of the government or from different organizations are regarding improving the child's health through mobilization of those institutions in the way of sharing information about health improvement (Macassa et.al., 2011).

The study implements this conceptual framework in order to discuss the determinants would be used in this research. It controls the influences of the explanatory variables on the dependent variable (Infant mortality) in order to know the child's health status. The explanatory variables comprise into two groups include core independent variables (women's empowerment and health sector policy) and proximate determinants (bio-demographic, environmental, health Care and nutrient deficiency, media exposure and socio-economic) could determine the likelihood of child survival through the groups of mechanism for the proximate determinants.

2.1.1. Women's Empowerment

The women's empowerment is the important social transformation indicator to describe the capacity and ability of the women in different sectors (Kabeer, 1999) and it is significant was inserted by United Nations, 2015 as component of Sustainable Development Goals (SDGs). As stated by Kabeer, 1999, p. 436; the empowerment of women distinct as the practice where the people could realize "capability to create selections" underneath certain situations in which selection be situated before repudiated .The empowerment of women is a recognized completion in itself (Malhotra & Schuler, 2005; Cheong Dodell, 2016). The women's empowerment also improves the capability of women in order to achieve influential results, for instance enhancements in their life and promotes the kids nutrition as well as health, female would take superior right based on fertility and sexuality (James-Hawkins Peters et al, 2016), in addition with justification plus inhibition of cherished spouse violence (Ahmed, Hossain & Koenig et al, 2013).

The empowerment of women stands an essential measurement on behalf of displaying suggestion created on development policy. Certainly, it based on the 2030 agenda of Sustainable Development Goals where there is prioritization on women's empowerment especially Sustainable Development Goal5 (SDG5): achieve gender equality and empowerment among all women and girls (United Nations Report 2018).According to Klasen &Schuler 2011 have stated the women's empowerment measures based Global Gender and Development indices incline toward the abundant of the nation and developing from the situations of different countries evaluation.

Those key elements include the Gender-related Development Index (GDI) and Gender Empowerment Measure (GEM) emphasis on Education and features of Women's Empowerment regarding to economy and Gender equality and also the most current indices like Women, Peace and Security Index where it concerns to know the proportion of the women who are able to join the mission of peacekeeping in countries. Countries classify that index created on supplementary proportions of social insertion, security and justice (Klugman et al., 2017).These methods of measuring neglect significant territories of women's empowerment, for example, self-testified for women as human, economic and social means for empowerment (Kabeer 1999),along with behavior and attitudinal proof of empowerment, for instance their self-determination of undertaking and their sexual, domestic, women's approaches nearly to violence and gender against women, and creating decision related to reproductive health (Hindin,2009, Mistry & Lu, 2005; Yount et al., 2016).

A. Conceptualization of Women's Empowerment

According to Kabeer, 2011, Cornwall & Yount et al., 2016 described the information about the empowerment of women that defined as the compound of concept and interpersonal of the individuals. Different Researchers theorized various scopes of women empowerment among in those scopes comprise the capability to make selections regarding in relative to one's gendered assertiveness and opinions, resources for empowerment,

achievement in economic, political, cultural and social territories, and procreation of opportunities plus resources (Kishor et al,2005).

Women's empowerment is subject to communal revolution crossways of the interconnected areas of social transformation for women (Kabeer,2005).Women's empowerment comprises entitlements on original means with addition to conduct over opinions, standards, and approaches for promoting women's ability(Cornwall,2016). Kishor, 2000 explained the model of women's empowerment measurement is designed on the multidisciplinary form of expansion concept on about women's empowerment, and more emphasis on three interconnected areas of women's empowerment dignified in the Demographic Health and Survey (DHS). In those three areas comprises (1) *capacity to exercises selection in the family (power to or influential support)*, (2) *the appearance of equitable gender beliefs and attitudes (power within and fundamental support)* and (3) *enabling resources and access to assets*.

i) Influential and Fundamental support

It based on woman's capability to create selections relating to her lifecycle, underneath situations while the selection exists (Kabeer,2005).The influential support is frequently dignified as female's capability for making decisions related to family and households (Steele & Goldstein et al ,2016).

The regulation of the women over sexual decisions in addition to reproductive implies the great understanding between partners; (Klugman & Hanmer, 2014), the participation of the women about community and political activity or her autonomy of program (Yount et al., 2011). The dimension of the contribution of women about creating family decision has remained constant indicator of women's support (Crandall et al, 2017).

The ability and voice to precise theories that could ride stand toward main standards also is the main component of women's activity of support (Cheong et al.,2017).This fundamental organization could be dignified as the scope to which women's empowerment about sexual role approaches reproduce normative opinions. In gender inequality

sceneries, women's declaration of non-normative gender opinions is an important area of documented processes of women's fundamental organization (Yount et al. 2016). However, the significance of fundamental plus influential articles to portion support could contrast through nations.

Quantitative measures of the fundamental support may replicate women's observations of public standards beyond their specific primary opinions (Lenzi et al., 2011). In discriminatory situations, females could embrace or nevertheless precise, gender inequality thoughts to accomplish some advantages from in the system where Men are responsible for everything are needed in the household (Kandiyoti, 1988). Influential procedures of the support could diverge by the socio-traditional situation where the females alive (Malhotra & Mather, 1997). In numerous cultures of various countries, the participation of women in decision making process controls under feminine codes domains especially housing works like cooking, cleaning house and look after the children but not allow the women to join in other domains like engineering, health care and main expenses (Kabeer & Yount, 2005).

ii) Enabling resources and access to assets

Enabling resources and right to use to assets exist as the requirements of women's empowerment (Kabeer, 1999). Progressive financial, communal, and social wealth and necessities could develop female's capability to apply influential support (Kishor, 2000). As stated by Crandall, Cheong, & Yount, 2018, their studies have explained the ways for raising women's empowerment include the acquisition of economic resources, Women's schooling attainment, and late time of life at pivotal life measures forecast superior influential and fundamental support and welfare. Education improves women's intellectual capacities (Kabeer, 2005), which, in turn, is connected with better welfare between females and kids (Zureick-Brown & Vander Ende et al, 2014). The research occurred Bangladesh showed that once women have a greater chance of educational

achievement than the community average, there is low probability to be expected wife beating (Krause et al., 2016).

Women's superior sovereignty in decision making of the household is connected with spouse education achievement modifications that approval woman has right to manage partner's earnings (Hindin & Upadhyay 2005). Occupation accessibility and labour force participation improve women capacity to use an influential support (Salem et al., 2017). According to Yount et al., 2014 described the criteria at the start of marriage, for instance women's age is common means that allow young ladies to increase admittance to additional premarital economic, social and public means and change normative attitudes. Premarital allowing properties could confirm the after marriage activity (Henry Nicker et al., 2016) and women capability to discuss privileges and physical welfare during marriage period (Yount et al, 2009).

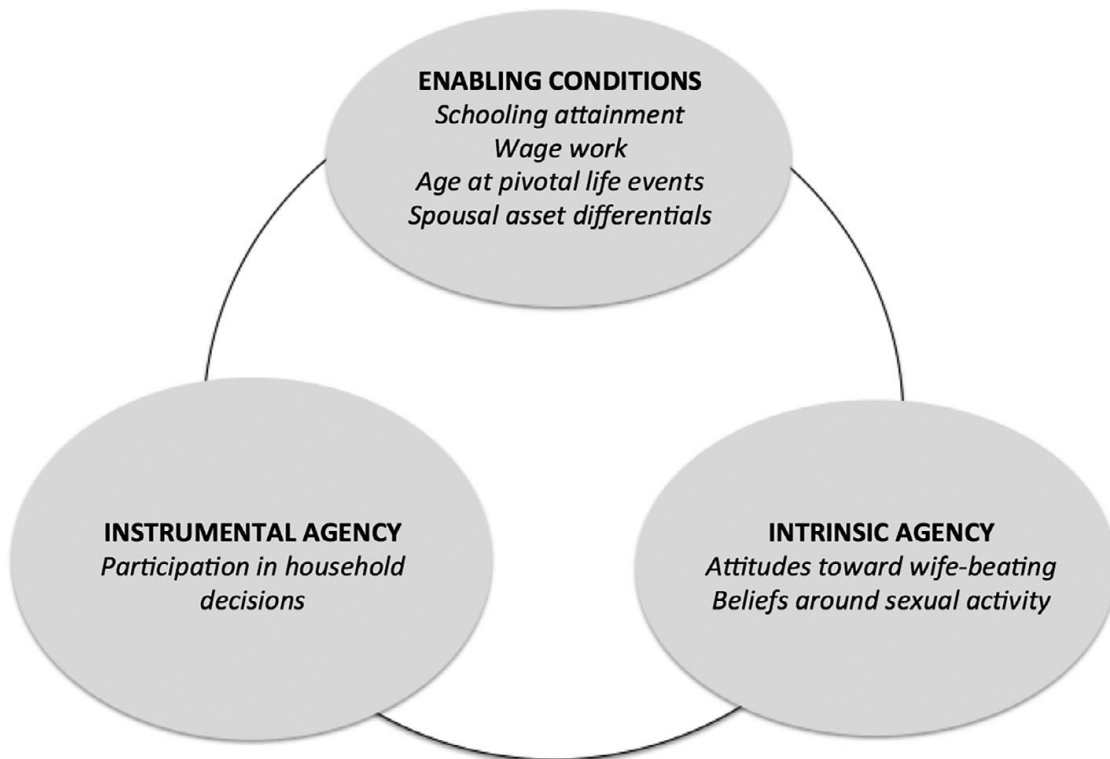
B. Description of Women's Empowerment Model

To classify the important component of women's empowerment based on different researchers used the Demographic Health Survey data, There are three models of empowerment comprises instrumental agency, power within or intrinsic agency and the last model is enabling resources and access to assets as Figure 2.2 illustrates.

The three models support and enhancement SDG indicators for Goal 5 (achieve gender equality and empowerment all women and girls). Influential Action in the family and adjacent connections enhance Sustainable Development Goal indicators focus on procreative decision-making and women's domestic work. Intrinsic agency related the normative environment surrounded by Sustainable development Goal indicators dignify friendly spouse viciousness. We practice element information obtainable from the Demographic and Health Survey to operationalize each domain.

Enabling resources model relay to Sustainable development Goal indicators which are based on women's employment status, property ownership and control and age at first marriage.

Figure 2 2: Theoretic structure for conditions of women's empowerment



Demography and Health survey in 2000 had started to conduct information related to women's empowerment component. The requests about women's empowerment component include management related to ways of making decision about sexual and reproductive health plus conditions where members explain men's control and authority, men have higher ability than women, in the method of familiar spouse viciousness, women's involvement in decision making for the family (Subaiya & Kishor 2009). The DHS study is piloted nearly every five years in over 95 countries and data are openly

accessible. Information from DHS carries substantial importance as a foundation of observing information on women's empowerment, fertility, mortality, child health and other items (Hanmer &, Klugman, 2016).

C. Women's Empowerment Measurement

In the past several decades, different kind of researchers like demographers, economists, sociologists had developed the ways of measuring women's empowerment as independent variables. Researchers counted on the ways of analyzing empowerment, for instance; decision making level, age at first marriage ,employment and education level (Mason, 1986).The UN International Conference on Population and Development (1994) apprehended in Cairo, Egypt, scientists initiated to improve additional straight methods of women's empowerment, for example sovereignty of movement methods and household decision-making.

Demographic and Health Surveys (DHS) is among essential foundation of the information on empowerment which is mainly composed key data of sample elements of the women across national boundaries of several countries. In 2000, the DHS questionnaire included part of empowerment questions categorized as the "women's status part". The countries may select the group of questions that could be added, neglect or changing the question structure. The ordinary parts of the questions comprise of four main measures of empowerment like such as free movement, decision making power in the household, uses of the money for household purchases, attitudes toward violence in the household.

Decision-making is evaluated through questions relating to household purchases and food preparation, health care and contraception, and the ability to visit friends and family. These decisions can be made jointly (husband and wife), alone, husband only or someone else (such as a mother-in-law). Questions relating to attitudes toward violence ask the respondent if a husband is justified in beating his wife if she performs or omits a particular act, such as neglecting children or arguing with him. Question-related to Freedom required permission to go to the market, health center or friend's homes. Finally, women are asked

about economic decisions, such as controlling money to buy food and working for money (Demographic and Health Surveys, 2005a). There was the improvement of adding new questions related to women's empowerment including education and employment status.

2.2. Relationship of Women's Empowerment and Demographic Outcomes

Women empowerment is closely related to fertility and child mortality in developing countries. In many developing countries, where a man is normally the head of a household, makes most of the household decisions, and the wife has not experienced in that process (Duflo2012). For instance, men often control the financial matters who earn the cash and make decisions regarding major household purchases which are necessary for the household. This translates into financial vulnerability and lack of autonomy of a woman and more dependent on her spouse. In such cases, a woman who needs health care services has to rely on the husband's judgment and willingness to spend on such cares.

It can be hypothesized that the huge participation in the household decisions making process by women; there is a greater likelihood of receiving health care, which may promote child survival in a developing country (Eswaran, 2012).The studies indicated that, empowered women particularly those who are more autonomous have increased pregnancy health care-seeking are more likely to have skilled delivery attendance, utilize modern contraceptive methods and have lower infant mortality. But unfortunately, most of the studies on infant mortality do not address the role of women empowerment on child mortality exclusively (Hague 2012 & Bashemera, 2015). Analysis of infant mortality without including women empowerment, which is one of the important factors results in specification problem and currently study is an attempt to void this gap in the literature. Rwanda has made significant gains in improving women participation in the political and decision-making levels but it is still facing challenges in economically empowering women, deterring its desire to bring about socio-economic transformation, largely due to

deeply entrenched negative social norms and cultural mindsets, as well as weak local level institutions (Pamela, 2015).

2.2.1. Linkages between Women's Empowerment and Sustainable Development Goals

According to the United Nations Entity for Gender Equality and the Empowerment of Women had established the report related to women and Sustainable Development Goals. The United Nations General Assembly has been implemented Agenda for Sustainable Development Goals as the contracted context for improving international development because before SDGs established in the past 15 years there was Millennium Development Goals (MDGs) which sets out to sustain the living condition of the population through in different areas include environmental and climate change, children, food security and nutrition, gender equality and women's empowerment, youth , employment and migration, democratic economic governance, development and private sector, culture and development, and final area was conflict prevention and peace building.

The agenda of Sustainable development has a platform for achieving their targets up to 2030 consists a much broader scope by deliberately and environmental sustainability and more fully incorporating economic in addition to the aspiration of many nations for non-violent and inclusive societies. The agenda also applies to all nations rather than just less developing countries. In this regard, the 2030 Agenda for Sustainable Development is more determined predicting the extermination of poverty, the organized tackling of climate change due to nowadays the proportion of air pollution is increasing due to development of more industries from more developed countries and peace building, resistant, equitable and inclusive societies. The contrasting the MDGs agenda to SDGs is only stand to Goal on gender equality and the empowerment of women and girls while now for SDG5 is to achieve gender equality and empower all women and girls.

The Sustainable Development Goals Report 2018 showed that great results of some forms of SDG5 (Achieve gender equality and empower all women and girls). The discrimination against women and girls are lessening, gender inequality endures to hold women back and take away them from accessing basic rights and different opportunities. Empowering women involves addressing fundamental issues such as discriminating social norms and attitudes in addition to developing progressive legal frameworks that stimulate equality between women and men. The statistical results showed that based on 2015-2016 data from 56 countries, the proportion of adolescent girls aged between 15 -19 was 20 percent who had ever been in a sexual relationship practiced physical or sexual violence by an intimate partner in the 12 months prior to the survey. In 2017 Worldwide, a projected 21 percent of women aged between 20 and 24 years recounted that they were married or in an informal union before age 18. This implies that a projected 650 million girls and women today were married during the childhood period. Proportions of child marriage have continued to decrease around the world. In Southern Asia region, the proportion of risk to the girls who were married in childhood period has declined by over 40 percentage ever since 2000.

The female genital mutilation is cultural practice is concerned to violate the girl's rights, where the information demonstrated that one in three girls aged between 15-19 had been endangered to female genital mutilation in 30 countries in 2017 where that practice is much concentrated compared in 2000 where to close one in two girls were exposed to female genital mutilation . The results from 90 countries in the period between 2000 and 2016 on employment status described that women expend roughly three times as many hours in non -payment domestic and care work than men. The majority of women's work is unpaid work which limits the women's capacity and ability to decide their ways of living. Worldwide, the percentage of women who are in the administrative position or lower house of the national parliament has increased from 19 percent in 2010 to around 23 percent in 2018. For instance, Rwanda is among the countries which have a big proportion of women in parliament where it has 63 % of parliament members are women.

Other strategies for empowering women is promoting female education and increase female labor force participation.

2.2.2. Impacts of Women's Empowerment on Infant Mortality

The women's empowerment had become an important element for analyzing child mortality where women empowerment has been acknowledged as an essential set of methods to be comprised of the infant mortality analysis (Bloom et al., 2001). In a theoretical model Eswaran (2002) analytically demonstrated that if the negotiating power between the partners has been raised at that point it results a diminution of Infant mortality and fertility level. In a district-wise analysis of the census data of India, Murtha et al (1995) established the variables concerning to women's empowerment (particularly female literacy and female labour force participation) expressively described differences in gender inequality, fertility and in child mortality .Bloom et al. (2001) studies had suggested that female autonomy is the main factor in clarifying some significant modification in the demographics between the northern and southern states of India. Crandall (2004) perceived that the low level of child mortality is related to women's autonomy. There exists a bivariate association between a high mean autonomy level and women without child mortality in Egypt (Kishor, 1995).

The kind of care the children received specifically young children is the product of their family conditions. In many cultures, mother of the child is the person who is most likely to remark any health complications of the child for that reason, her first role as the primary [caregiver], and she is as a result expected to be in the best position to make health care choices (Griffiths, Hinde & Matthews, 2001). Similarly healthcare of mother before, during, and after pregnancy, directly and indirectly determine her child's health (Caldwell, 1986), mainly in the earlier stages children's life. The maternal and child health care could be controlled by the level to which women has right to access and control over resources through civil esteem, kinship relations and several other determinants. Additionally,

policies try to discourse child death could be well learned women's empowerment is highly reflected as important determinant. It can be assumed that the greater the contribution of the women in decision making process for the household is only occurring in the high level of getting health care, which may promote the child health in most less developed countries.

As a whole, research demonstrated that greater level of women's empowerment related with good health and likelihood for improving the children survival. For instance, the study ensued in Northern India found that women had typically higher control based on understanding structure statistical significance to lowering child mortality. Furthermore, a greater proportion of female compared to male infants and children died in northern India (Dyson, 1985). The households where women have unlimited authority and household control distinguished as indices of decision-making and mobility, the likelihood of post-neonatal mortality was low among infant, and superior household ability declines the risk of child mortality in Bangladesh (Pence et al , 2009). In Jordan, studies showed that the households which had a greater proportion of mother's autonomy and good nutrition outcomes like vitamins, proteins would be associated in the way for promoting child's health and reducing child mortality (Miles-Doan et al, 1993).

Empowered women especially those who are more independent have improved negotiating authority with their partners. It has frequently been maintained that child's life and investments in children are defined by the distribution of decisions for the household which are connected to gender equalities in the household. Consequently, women's empowerment and autonomy could be determinants in declining of fertility and child mortality rates. Conversely, there is common study has observed the link between women's empowerment and infant mortality in Indonesia although in particular societies, empowered women has positive effects on declining infant deaths.

2.2.3 Theories of Women's Empowerment on Infant Mortality

Globally, women's empowerment has turned into a significant issue for the nations in order to attain development goals for instance poverty reduction, education, welfare and raising the level of development (Golla, 2011). The description of the relationship among the components of development goals and women's empowerment. The theories about health care use and women's empowerment where they had explained how the women empowerment is an essential element in promoting mother and child's health. The contribution of the women in decision making and their approaches to destructive traditional norms like domestic violence has been emphasized as the determining factor in the maternal healthcare services (Bloom et al 2001).

The place of delivery is generally determined by income level and demographic variables whereas self-determination, sovereignty and decision making movement have intervened little encouragement on the place of delivery. Education and other determinants are more likely to improve health through the purpose of enlightening health of females and their families (Fotso et al 2009).

The various literature has explored the correlation of women's empowerment with infant death and fertility linking. Infant death and fertility are mostly determined by choice from power, autonomy of program and female's source management. The greatest signal result of those variables, there is little intervention of contraceptive use while if women are highly empowered, the health outcomes related to children and fertility could be declined due to the contribution of the women in decision making of their household (Schuler et al.1996, Al Riyami .et al,2015).

The accessibility of females for having necessary liberty and improved admittance and right to control household properties, the greatest outcomes are not only based on good welfare of the family and also contributes in reduction of infant mortality and fertility rate (Abadian 1996). Female autonomy could be measured by age at first marriage, partner

age difference and education level is in reverse connected with fertility. Household wealth index is possible to promote welfare and reducing child death rate nevertheless in raising the right to join education and declining child labour across enlarged likelihoods for kids to go to school. Attitudes about women's violence through beating has great impact on social behavior and mental health of the children (Karasek, 2012).

The discussion from different researchers where they shared information about women's empowerment has essentially based on findings of the women's empowerment indicators comprising confidence, creating decision of the family and employment. The dimension of women's empowerment indicators classified in various confirmation of empowerment such as empowerment setting and sources of empowerment. Prospective empowerment sources described as the determinants which deliver a basis of empowerment such as media publicity, access to and manage properties (clarified in terms of money) and also understanding or education attainment. Empowerment setting indicators consist of the conditions that reproduce the situations of the respondents during past and current moments and the determinants perform to state the available opinions and the probabilities of the women (Mather et al., 2002)

Women's empowerment is mainly discerned by participation of decision making, women's age, economic status, education level, marriage status of the couple and residence. Several literatures discussed the some indicators related to social development of the women include education is important connected to determine decision making for only partner apart or jointly (Subaiya and Kishor 2008). Sado et al .2014 discussed the strongly association between decision making and another determinants to influence the women's economic movement and health of the household members. In the discussion, household wealth index is among the factors could determine the management of the resources nonetheless it has negative significant relationship with women's decision making and the correlation of other covariates are not consistent to women's empowerment indicators. The components of empowerment such as education, riches,

occupation have greater impacts on infant mortality and women's empowerment position in the way for sustaining the welfare and sanitation conditions of the family members.

2.3. Health Sector Policy Information

Health sector policy is the strategic action to expand the health sustainability of the individuals and it consists of key elements in order to support the achievement of the health outcomes such as improving health care quality, health equity, sponsoring and distribution of health care and facilitating the people to be able to access health care services. Health sector policy is mostly important because it's used to establish common strategies in order to achieve health outcomes objectives and also is an essential guide to support in creating decisions related to health.

The determination of health policy and its action plans is to connect to organizations who responsible for applying the policy into practice to the society members .The fundamental health sector policy goals to control the outcomes of health care system include (1)to accomplish reasonable sharing of the good feature of health care and payment problems ,(2)to make the most accessibility of health care services which are available,(3)to increase national government expenses on health care .

Policy interventions is important component in the way for improving social and welfare of the population. Regarding to health sector policy is essential element in order to decline health complications such as diseases especially Less Developed Countries and also lack of health policies implementations are strongly connected to irritate impacts on child survival as the results of increasing child death especially in less developed countries.

2.3.1 Impacts of Health Sector Policies and Infant Mortality

The World Health Organization based on SDG3 (Ensure healthy lives and promote well-being for all at all ages) as the way for endorsing health of human being like children ,women ,elderly people , disable persons and other categories of human being who need to have good health status. In relation to Sustainable Development Goals report 2018, It

demonstrated that the population nowadays are living healthier compared in past years however people are still suffering with different diseases such as non – communicable disease, infectious diseases but those diseases basing on various individuals groups and the location of the world. The report showed that as supporting reproductive, maternal, and newborn and child health in order to sustain health status of the population .The share of children who were born by skilled health personnel has increased globally by the following proportion within in different period from 62% (2000-2005) to 80% (2012-2017).

Policy intervention particularly the policy related to health should contribute in reducing child mortality and support maternal health in different nations while the government shows significant role in providing education and health services to the citizens as good tools for eradicating some health difficulties. There are limitations in terms of accessing good health care due to lack of medical equipment, lack of health care payment, limited number of skilled health care stakeholders, enforcing payouts to health care workers plus small earnings of them. The strategies used to decline health care payment problems are to mobilize the people to find health insurance because without health insurance; health care expenditures are so expensive and hard meanwhile it is important to save life of the people by using health insurance.

Development of infrastructure such as health centers or hospital are necessary to save life of the population through high quality of services delivery. Public health facilities have essential role through campaigns to develop the recognition of sickness and improvement of the operational management of infections, birth process of the children, low birth weight babies who need health care aid.

One study carried out in Uganda about health care expenditures and child mortality, it showed that improved the quality of health care expenditures specifically on vaccination of the children have great positive impacts on declining Infant mortality. Increasing vaccination rate to the highest level was reflected as best important measure and probably greatest of cost effective intervention on child survival. The applicable treatment of

pneumonia and Diarrhea to the children has demonstrated the rapidly declining of child mortality and as a great impact in promoting of child survival. Policy makers should note that health care system must translate in spending to significant improvements in population health. Urbanized area has more availability of health facilities (health centers, hospital, skilled health personnel) than rural areas which help the population to access health care services within short period of the time.

According to Shetty A .et .al 2014 discussed the health spending on Infant mortality into two main concepts of health spending include per capita spending on health and the percentage of GDP directed health and private payments as the full proportion of health cost and their determinant on infant mortality while the country does not invest on health care expenditure, health status of the citizens would be in bad conditions due to lack of accessing health care services. Some research related to the analysis of the government expenses on community health indicators and health advocated that public health expenses took important impact to promote health and specifically on declining infant mortality and also the study occurred in India demonstrated that there was strong connection between health expenses and infant death rate. More developed countries has access to natural resources like petrol or oil, use more percentage of their riches on contributing and developing the health infrastructures while the less developed countries have not ability and means of prioritizing to health and their payment in terms of health access of the individuals are complicated.

The current study in Asia nations, it showed that greater per capita government expenses on health took advantage in decreasing infant mortality and commonly those countries had bigger percentage of their GDP focused at health needs. South Korea, Singapore and Arab countries such as UAE and Qatar could be able to meet the expense of health expenditure and normally achieved good welfare of their populations. In study demonstrated that around 1995-2006 in all less developed countries ;the public health expenditures were constant in terms of finances from domestic sources raised around 100%. For instance Canada had good health system compared with other countries where

almost health expenses are from common tax revenues of the regional, provincial and state governments (Lancet, 2002).

Health spending of the countries depend on their development or financial sources specifically in low income countries private health expenditures are expensive because of the deprivation of good public health care as the result of increasing health difficulties. The investment in health care is not common at all ages of the people. Grownups and children could not advantage similar accessibility to health facilities because the strategies plan for promoting their lives are not alike for instance, in Bangladesh through the policy of improving child survival in order to decline neonatal mortality rate up to 4.0% ever since 2000, replicating higher development in health facilities such as availability of medical equipment, increasing the number of skilled health personnel, constructing new hospital and serving mothers the basics skills of treating care of the children as the results of speedily reduction of child mortality (1-59 months) was twice at the rate of 8.6% (Shetty A et al .2014). Generally, in worldwide the 21st century the infant mortality rate has declined due to high investment level in health sector in order to improve human being social life. There is great impacts of per capita income and GDP budgeted on health especially to improve the child survival.

Another research examined about the influence of public expenses on health in defining child and infant mortality. The results from cross national studies exposed that about 95% of mortality differential could be explicated by national's income per capita, magnitude of female education disparity of income sharing. Socioeconomic determinants might influence mortality include poverty, inequality and female ignorance, gross domestic income/capita and public health expenses and other determinant variables such as social and cultural characteristic comprising gender predilection. Community health workers can play important role to achieve good health care services of the population and increasing the proportion of children who need to cover the vaccinations due to fight against different diseases.

The study carried out among 44 nations from Sub Saharan Africa about policy intervention on health care expenditures demonstrated that there is strong positive connection through health sector although the accessibility level of public health care is high and tend to show greater results on promotion of health status. The high proportion of government budget on health had positive impacts on declining infant death as infant mortality is main social health indicator to determine welfare situation of the country in other words the improvement of health no need to implement other strategies of reducing IMR and also greater public health expenses support most vulnerable group like poor or middle class based on wealth index status could benefit to access good health care.

In the 1990s Italy denationalized an important percentage of health care delivery system, some researchers of epidemiological study designed the level of variation in preventable mortality in 20 regions of Italy. The outcomes of the study showed that public health care was expressively connected with decreases mortality rate whereas private sector expenses did not intervene in decline mortality rate. The current study showed the countries like Yemen, Vietnam, and Afghanistan had the greatest percentage of private expenses as a portion of total expenses and they had the greatest infant mortality rate in their regions that links the good public health care system and public health facilities are not accessible to the people (Lantona et al, 2011). It indicated that the population must only depend on private health cares which were not affordable to everyone especially poor people. The research assessed about the achievement of Millennium Development Goals in India. It demonstrated that illiteracy, poverty, nutritional deprivation and lesser financial distribution are connected to rise infant mortality and allocation of government expenditures on health had taken place in in order to promote health status of the citizens.

2.3.2 Theories of Social Health Policy in Relation to Mortality

The various studies carried out by economists, sociologists, and demographers in the way for looking information about mortality rates in the sense of realistic and practical rather than theoretical frameworks. Research on infant and child death in the third World, researchers gave emphasis to the need for practical knowledge about mortality reduction (Behm, 1983:26). However, a realistic investigation of mortality reduction could be embedded in a broader perspective of theoretical studies of socio- economic development and also determinants of health.

Mc Keown 1989 stated that the reduction of death rate was determined by medical advancement plus improvement of nutrition. Even though the exploration has moderated the significance of medical developments. Another researchers disagreed Mc Keown's opinion through explanation points to the importance of public health technology in mortality reduction. The debate about income, nourishment, and other indicators of standard of living cannot contribute more than 25 percentage of increasing in life expectancy at birth of the population in twentieth century (Preston et. al.1991) and also Preston described the evidence of declining mortality without measurable enhancement in the standard of living in less developed countries.

According to *epidemiological transition theory*, a change has ensued in the primary causes of mortality from pandemics to non-communicable diseases. Conversely the period of this change is diverse among more developed and underdeveloped countries in the common sense while pandemics started to evacuate in Europe in the late eighteenth century, this followed in the twentieth century in the under developed countries, enhanced by medical advancement and public health actions (Omran,1994).

The assumptions of *modernization theory* argued in various previous evaluations of declining mortality. Consequently, those assumptions advocated that progress and enhancements in standard of living are the basic determinants of reduction mortality have

imitated the statement that development level would convey evolution in social welfare parts especially promoting health of population.

Conversely, the historical valuation had shown that various further researchers developed references to exterior determinants like medical technology. The world systems theory debates for the need for creating common agreement on the establishing of health service and universal support, although dependency theorists appealed that the very nature of economic dependence hinders mortality reduction (Gobalet, 1989). In cooperation of both theories underlined the change between more developed and underdeveloped world, and the previous states that integration into the country economic activities is an influential determinant to death reduction, whereas the final statements the reverse proposed stated that the dissimilarities will continue on the assumption that necessity occurs.

In spite of different theoretical assertions, the relationship among health status of the community members and economic development is underlined by entirely concepts. The only difference in hypothesizing the socioeconomic method to be accomplished. However, the obvious in lack of health facility is great problems in communities are the principal and direct observation of economic growth and concentrates on variation between different countries. Certainly, financial elements, such as income inequalities look as one feature of descriptive model, and progressively in the governmental statement of socio-economic transformation is taken into account for developing well-being of the population (Navarro & Shi, 2005).

The description studies about the relationship between health and income inequality. Richard Wilkinson argues that high life expectancy occurred while social equality is less marked, and social incorporation greatest meanwhile high wealth quintile could contribute big proportion in promoting health status of the population (Wilkinson, 1992).

Consequently his conclusions discuss to relative income inequalities as the best important influence about health inequities because of the effect of socioeconomic problems. Wilkinson argued that improvements of health status of the populations is openly connected with the importance of promoting standard of living for the community

members. He gives Japan as an example of a democratic public that extended the equivalent of life expectancy with the United Kingdom, with in little time succeeding the Second World War (Wilkinson 1996)

CHAPTER 3

DATA AND METHODOLOGY

The third chapter consists of the following components those are; the discussion sources of data, variables information, methods of analysis of the study and description of the dependent (Infant mortality), main independent variables and also the proximate determinants like bio-demographics, socio-economic, environmental, husband's characteristics, health care and nutrient deficiency variables. Description of data through the ways of determining the impacts of women's empowerment and health policy on infant mortality in Rwanda.

3.1. Data Source

In this study, research analysis would be used secondary data as the source of data for processing information and carried out of analysis with DHS data.

The data used in the study was obtained from three main Standard Rwanda Demographic and Health Surveys include Rwanda DHS 2005, 2010 and 2015, which are nationally representative sample surveys. Rwanda DHS Surveys were conducted by the National Institute of Statistics of Rwanda as part of the global Demographic and Health Surveys project sustained by the United States Agency for International Development with technical support from ICF International. Rwanda DHS surveys collect data on an arrangement of factors comprising family planning, fertility, maternal and child health, HIV/AIDS and other sexually transmitted diseases (STD), contraceptive use and Nutrition and breastfeeding practices.

The DHS survey has an important objective for providing that update information on the living condition of the population and updating information related to health in the country. All Rwanda DHS enclosed the population was living in regular household's crossways the country. The sampling methods used for conducting information are "*Stratification sampling*" to provide adequate representation of the place of residence as

well as the provinces including the city of Kigali, North, South, West, and East. Stratification is the method by which the sampling frame is divided into subgroups or strata that are as homogeneous as possible using certain criteria and also stratification objective is to reduce sampling errors. The *clustering sampling* is a method of collecting sample data that complies with probability rules where the research divides the population into small groups called a cluster. The DHS cluster sampling based on the district or village level in the country. Cluster sampling used for selecting households as a fixed number of household equal probability. All three Rwanda DHS (RDHS 2005, RDHS 2010 and RDHS 2015) consist of two questionnaires; the household and individual questionnaires. The 15-49 age group of ever-married women (individual questionnaire) covered critical issues such as; child nutrition, family planning, fertility, pregnancy, contraceptive use, child's health, breastfeeding, respondent's background. These are illustrated in Table 3.1 below;

Table 3. 1: Description of the number of households, women, and children from the main three RDHS standards surveys

Surveys	Household number	Women Number	Number of children
RDHS 2005(III)	10272	11321	8649
RDS2010(V)	12540	13671	9002
RDHS2014/2015(VI)	12699	13497	7856

Then after the child death information collected from women survey questionnaires to seizure information on women's birth history. Women questioned the month, year of birth and the age of the child during the interview if alive, and if not alive, the age at death generally basic information on child's identification. In case a child died for the period of the observation, the strict age at which the child deceased recorded.

The birth history information comprises the reported data of births and deaths of every surveyed mother's children. In contrast, information about birth history consists only of

the total number of children born and the total number of children who deceased for each mother.

Rajaratnam et al. (2010) described several methods, including one that uses birth history data to derive empirical distributions of births and deaths before the survey and then match's birth history of the women to the relevant empirical distribution. That provides a yearly estimate of the ratio of children that died to children ever born. The ratio is then related via a logistic regression model to the probability that a child dies within five years, calculated using birth history data. In practice, birth history data from surveys in different countries and periods are pooled together to build the regression model and empirical distributions.

3.2. Dependent Variable: Infant Mortality

Infant mortality is the likelihood of dying between birth and the first birthday of the child. In this study, it is only dependent variable infant mortality (IM), which established on Rwanda Demographic and Health Survey conducted into different three main standards surveys (RDHS 2005, RDHS 2010 and RDHS 2015). The prerequisite data was gotten from their mums who conveyed the age of death (in days) of any of their children who deceased before their first birthday. The study will be used the right-changed data from birth to 11 months years of age and those who were alive during the time of interview and younger than 1 year. The variable used in the study to create infant mortality was B5 (child is alive) and B7 (Age at death) from RDHS Data sets.

3.3. Independent Variables

Mosley and Chen (1984) categorized proximate determinants addicted into five groups, these are: (1) the maternal factors or demographic factors which comprise maternal age, child sex, birth order, birth interval, (2) environmental factors which encompass of air, source of drinking water, type of toilet facilities, (3) nutrient deficiency include calories, proteins, micronutrients (Vitamins and minerals), (4) injury comprises either accidental

or intentional, and (5) personal illness treatment includes personal preventive measures and medical treatment.

This study mainly used three groups of proximate variables include maternal, environmental, and nutrient deficiency. These three proximate determinants operate the combination of socio-economic variables, according to the models of independent variables are grouped into three important categories in social science studies to achieve the analytical value of the study.

3.3.1. Women's Empowerment

Women's empowerment variables are grouped into three main groups include; (1) *human and social assets*, (2) *decision making*, and (3) *gender and attitudes beliefs* as can be seen in Table 3.2. Several ways for creating women's empowerment index such as principle component analysis, factor analysis which are important to determine the capacity or rights of the women who can access and afford the services for promoting child survival as the measure for declining infant mortality. The variables are women's education level, occupation, the justification for going out without telling husband, the justification for neglecting children, justification for refusal sex, justification if the woman burns food, final say on own health care, final say on making a large household purchase, final say on visit family or relatives.

Table 3. 2: Women Empowerment variables from RDHS 2005-2015

Groups	Variables
Human and Social Assets	Education /V106
	Occupation /V717
	Age at first marriage/ V511
Decision Making	Final say on Own health care/V743A
	Final say on making large household purchase/V743B
	Final say on Visit Family or relatives/V743D
Gender and Attitudes beliefs	The justification for going out without telling husband /V744A
	The justification for neglecting children/V744B
	The justification for refusal of sex /V744D
	Justification if the woman burns food/V744E

A. Human and Social Assets

Maternal Education /Women’s Education level

Most demographic researchers specified that there was an important association among maternal education and infant death (Bicego & Boerma 1991). These results had concluded that there was a strong relationship between women's education level with child health and mortality trend. The studies showed the relationship between women’s education and reduction of infant death were significantly in some countries and it disappears in others while they control for community characteristics and socioeconomic status of the mothers with different models (Alva et al., 1995).

In Nepal, maternal education and woman's decision making in the household are the greatest factors of infant death (Sawangdee et al., 2011). As well as mother’s education and other socioeconomic determinants were significant contributing factor of infant

mortality; the educated mothers are more expected to have a better life which is important in terms of accessing social health care, better housing environment, and better socioeconomic position qualifying for better nutrition.

Maternal education may impact a child's health and mortality through various ways (Rosen Zweig and Schultz 1982; Caldwell 1993; Hob craft 1993), those ways are:

- Education develops the achievement and use of health knowledge.
- Education enriches the use of health services.
- Women's education rises family resources, either through their work or that of their partners, in order to disturb the health of family members.
- Education disturbs preferences for family and child's health.

Occupation/ Employment Status

Occupation is an economic activity that has numerous advantageous effects on women's lives and their families, not the slightest of which is related to the promotion of accessing and controlling income.

Women's labor force participation has greater positive impacts on the way for promoting child survival. The employment status of women would develop as a progressive result of the incomes for the household that enriched by the possibility of increasing the proportion of income for women compared to male's incomes would be direct to promote a child's health status (Kumar1977 & Mencher1988). Additionally, female labor force participation could endorse interested in monitoring over the spending of earnings, improved publicity, and admittance to appropriate and improvement of capability in different activities outdoor of the household such as nutrition, survival needs and medical of children. Conversely, these conjectured remunerations of women's employment status remain expected to be determined by analytically on the kind of occupation where women are involved such as; earnings special effects are best possible to follow while females are paid money, and occupation is the best perspective to promote the opportunities of the women for working outside of their households (Farah & Preston, 1982).

In various less developed countries, the women work in the professional and service sector are more likely to have a big proportion of child mortality due to not having enough time for taking care of their children (McDonald & Caldwell, 1982). The women who have any occupation meanwhile who contribute to the household's earnings might designate the absence of taking care of children that could depend on the mother's occupation category.

B. Decision Making Variables

The decisions making variables belong to the following variables; *visiting family or relatives, health care and making large household purchases*. Each variable is grouped into three core groups of responses include only respondent, someone else making the decision or jointly with husband. Some studies indicated that brokering authority in the family over management (either exclusively or conjointly) could determine child death through accessing and control over assets (Eswaran 45, 2002). In Rwanda, women do not intervene in decisions making the process of the household take a larger possibility for the nutritional deficiency (Hindan, 2005), which could determine their children's survival. The intervention of the women in the decision making of the households promotes the welfare of the family members and living conditions that implies the women's empowerment in decision making.

Admittance to properties and ideas keen on decision making are both main components of women's empowerment. Continuously, they will determine intra-household delivery and properties distribution, which will end up affecting the productivity level. Productivity demonstrates the overall earnings of the family, which takes excessive impacts on general family welfare. But intra-household circulation and source distribution also have a straight impression on the welfare of the population, especially children, and women.

C. Gender and Attitudes Beliefs

Gender attitudes and beliefs as mechanisms of women's empowerment index that shall be used to determine the impacts of women's empowerment on infant mortality. It consists of the following variables as seen in Table 3.3; Justification of going out without telling

husband, Justification for neglecting children, Justification for refusal sex with her husband and Justification if woman burns a food.

Information about gender attitudes and beliefs for women, some questions examined in case of women justified wife neglects children or refusal sex with her partner under numerous situations to acquire information based on gendered views roughly husband authority and control over women. In Rwanda, women examined if a partner was warranted in beating his spouse if she had sex with another person. Response options coded as yes, no or don't know. Don't know answers coded as missing values and variable information were opposite coded which implies that woman recorded 1 if she replied negatively, indicating that women empowered and additional belief on rightful of the gender. There were two questions related to women's beliefs about sexual activities; respondents asked whether a spouse could have any chance of requesting her partner to use a condom if she recognized that the husband had any sexually transmitted disease. Respondents were asked whether a wife could refuse sex with her partner if she knows husband has sex with another woman. Both answers coded as 1, 0 using 1 reflecting additional belief on rightful of the gender.

Table 3. 3: The percentage distribution of women's empowerment variables

Variables labels	Variable names	Category	%
Educ2	Women's education	No education	21.4
		Other education levels	78.6
Womenoccup	Women's occupation	Agricultural sector	83.7
		Non-Agricultural sector	16.3
Ageatfstm	Age at first marriage	Under 18	35.6
		Above 18(18 ⁺)	64.4
V743Anew	Health care	No-Respondent	29.6
		Intervention	
		Respondent Intervention	70.4

V743Bnew	Household purchase	Decision making without women's intervention	34.7
		Decision making with women's intervention	65.3
V743Dnew	Visit of family or relatives	Response without women intervention	20.9
		Response to women's intervention	79.1
V744Anew	Justification if she goes out without telling him	No	70.8
		Yes	29.2
V744Bnew	Justification if she neglects the children	No	60.8
		Yes	39.2
V744Dnew	Justification if she refused sex with him	No	73.0
		Yes	27.0
V744Enew	Justification if she burns the food	No	86.6
		Yes	13.4

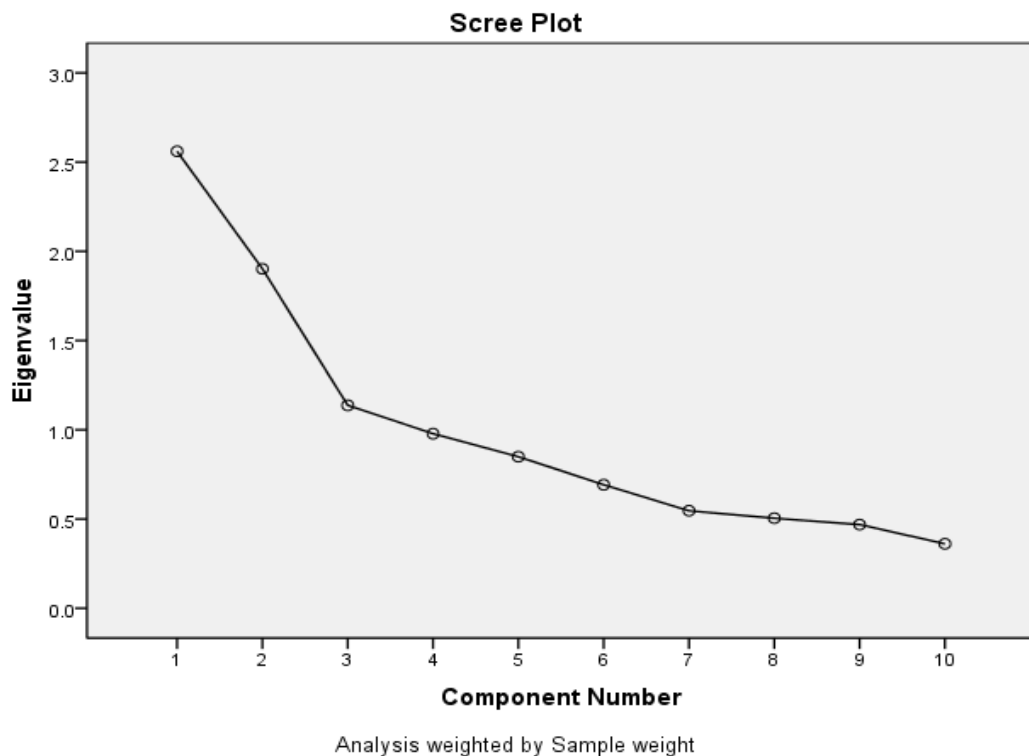
Note: The categories of the variables developed from DHS variables to be useful while creating women's empowerment index by using Principal Component Analysis. (Researcher Compilation, 2019)

3.3.2. Methods of Creating Women's Empowerment Index

Principal Component Analysis used to create the women's empowerment indices from the variables of women's empowerment indicated in the previous literature related to women's empowerment measurement. Principal Component Analysis is a statistical technique that converts the possible large correlated variables into the small uncorrelated variables termed as principal modules (Lindsay I, 2006). Principal Component Analysis is important in reducing large data set into small understandable data sets in order to create

a factor for explaining the information belonged in big data set, its aim is dimension decline of the sequence for the data in order to create the factor or cofactor that could be used in the interpretation of largest series of the data.

Figure 3. 1: Scree plot of women’s empowerment elements



The scree plot in Figure 3.1 displays the total of principal modules in competition with the corresponding Eigenvalues. In the Principal Component analysis, The Eigenvalues are always greater than one. The scree plot prepares the Eigenvalues from largest to smallest. The variances of the principal components equal to the Eigenvalues of the correlation matrix.

The structure of the scree plot used to select the number of components focused on the scope of the Eigenvalues. The ways for deciding the number of components through the structure of the curve with the following characteristics; a steep curve, subsequently a

bend, and then a straight line. Use the components in the steep curve before the first point that starts the line trend.

The component plot demonstrates the ways of classifying women’s empowerment index into three main types include; high, medium, and low index from the determinants which are stated in the previous context. Women’s Empowerment Index as shown in Table 3.4 was classified by using the component matrix value from the Principal Component Analysis. Interpretation of the values of the component matrix shows that the lowest value implies high empowerment level, moderate values describe medium empowerment level and lastly, the heading to highest values implies low empowerment level.

Table 3. 4 : Components of Women’s Empowerment Index

Index	Values of components matrix
High Empowerment Index	Lowest to -0.701
Medium Empowerment Index	-0.665 to 0.2691
Low empowerment Index	0.26791 to highest

Source: Researcher compilation, 2019

Figure 3. 2: Component plot of women’s empowerment elements

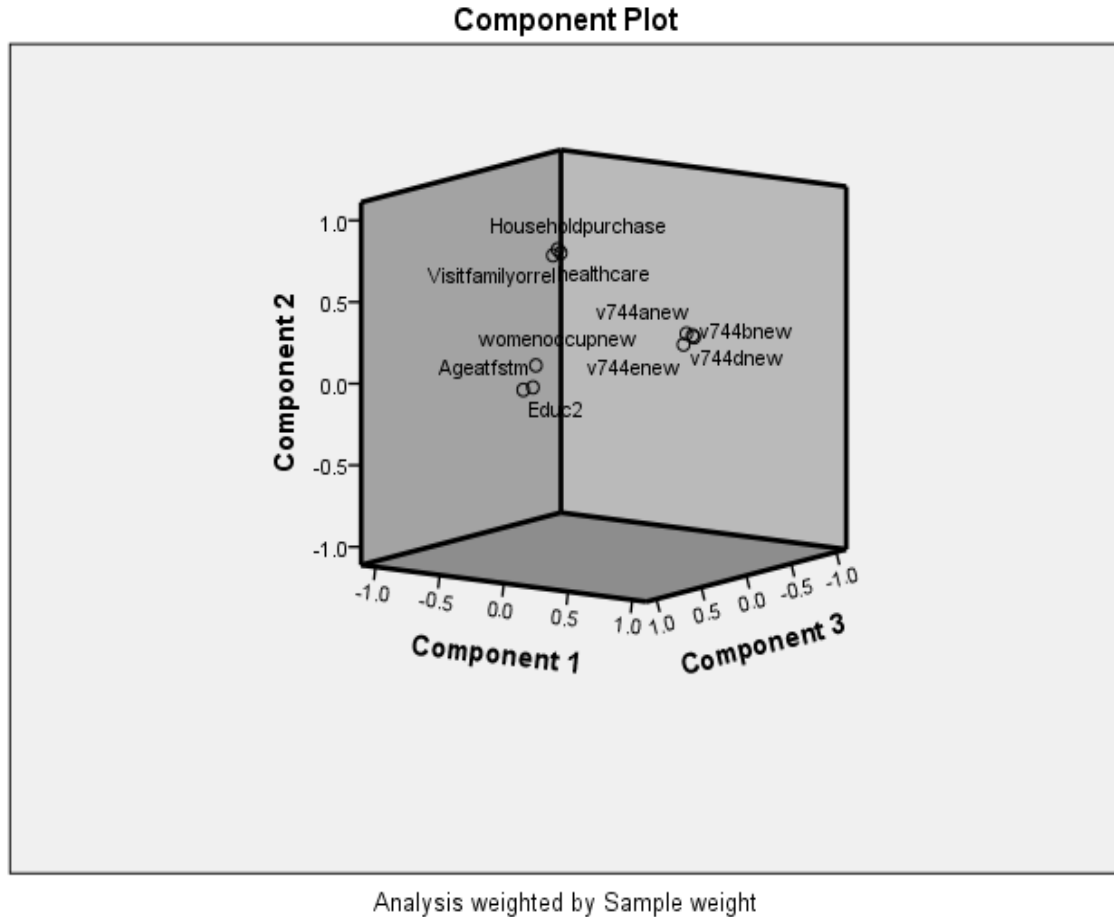


Table 3. 5: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.731
Bartlett's Test of Sphericity	Approx. Chi-Square	43850.457
	df	45
	Sig.	.000

Source: Researcher compilation, 2019

Table 3.5 demonstrates the suitability of the data for Principal Components Analysis. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy is a statistic that indicates the proportion of variance in your variables that might be caused by underlying factors. High

values (close to 1.0) generally indicate that a factor analysis may be useful with the data. Bartlett's test of sphericity tests the hypothesis that the correlation matrix is an identity matrix, which would indicate that the variables are unrelated and therefore unsuitable for structure detection. The significance level indicate that a factor analysis may be useful with the data if values is less than 0.05.

3.3.3. Health Sector Policy Information

The health policy is important to sustain health status of the population through providing good feature of health care services, increased the number of skilled health stakeholders in a health facility as well as helping the government in the establishment of the targets and identification of health situation for the short, medium and long term.

Health sector policy is the actions, plans, and decisions that take on to realize particular health care objectives within society. They may hide place themes of supporting and distribution of health care, admittance to care and to promote welfare quality and health equity. The core goals of a health care policies and their system to determine the actions of health sector in the way for improving the health of the population those include; to reduce total national expenses on health care, to accomplish equitable spreading of the welfare of health care quality and the problem of costs and to develop available health care quality.

In Rwanda, The Ministry of Health designed the first health sector policy in February 2005 to support the health stakeholders to identify the core importance for health policy on the way to protect and stimulating public health services because it permits the individuals who are elaborated in the decision-making progression to reflect the health impacts with other issues. The key point of health sector policy in this research is to determine the impacts of health policy on infant mortality either before policy intervention or after policy intervention.

The health sector policy component is an important independent variable in the study to explore the impacts of health policy intervention on infant mortality in Rwanda during 15

years of period. In Rwanda, the Health sector policy had started in *February 2005*. Generally based on *Guide to DHS Statistics* from Demographic Health Surveys measures, there is a method for calculating the period variable based on the available information.

Ways of Calculating Period Variable of in the Study

- ❖ Date of Health Sector Policy (Dohp)

$$Dohp = ((2005-1900)*12) + 2$$

B3= Date of Birth of the child (CMC), **2005**: Beginning year of the policy intervention,

2: *February: Beginning Month of the policy*

$$Period\ Variable = Dohp - B3$$

Recode method to classify the component of the variable

Recode period (lowest thru- =1) (0 thru highest=0) (Syntax command from SPSS)

The health policy is presented by a Period variable which is grouped into two categories such before policy intervention and after policy intervention.

3.3.4. Bio-Demographic Variables

a) Age at first birth

The maternal age at first birth has a great impact on determining infant death where the young mother who aged under 18 and advanced maternal age group which is frequently definite as age 35 or more (35+) have a high possibility of rising infant mortality level. Advanced maternal age influences to have a health problem and raising the difficulties of having a Down Syndrome Baby (Elliott, 1992). The risk of infant death based on the stage of the woman's age (Carlson et al., 2015).

The Center for Global Development report (2018) has shown that young girls in less developed countries have a high possibility of rising infant mortality linked with maternal age. In the consideration of the child's health, the report had drawn on intergenerational

guidance to promote the health of the children rather than cross-sectional surveillance of children alone. In less developed countries, teenage mothers are more likely live poor living condition and they are uneducated which affects their mentally and physically social life and they are unable to take care their children because they had responsibilities of becoming mothers at early age and they feel shameful in the community and they are not able to develop themselves (Kabir et al, 2006).

The studies observed the influence of maternal age at first birth on the child's health in some countries using Demographic and Health Surveys (DHS) data available at that time (Hobcraft, 1992). The results showed that the incidence of poor child health outcomes in less developed nations, and not just great infant death, studies continue to spread the research about observing of child's health beyond infant death deliver comprehensive facts concerning about health inequalities and development in achieving Sustainable Development Goals related to health of the individuals and its sub-goals relating to child survival.

b) Birth spacing/Birth Interval

P. Rasheed and BK al- Dabal (2007) found that Children born in short birth interval have a strong relationship with a raised possibility of having various health difficulties such as diseases, infant and child death. There are effects of the short birth interval to the mother and child health include maternal depletion syndrome milk reduction and difficulties for taking care of siblings who have a short difference of age between them in terms of food and other resources. The broad study about infant and child mortality in India demonstrated that the birth spacing of fewer than 24 months raised child death by about 67% (National Family Health Survey, 2014).

A longitudinal study occurred in Bangladesh for determining the impacts of birth spacing on promoting child survival showed that long birth interval is essential in the way for improving the child's health. Analysis of data from Rwanda DHS 2015 had shown that the comparison between birth interval components where the infant mortality rate was higher in short birth interval 43% (less than 24 months) than long birth interval (more than 24

months) 26% which implies that the increased of the birth interval is important to promote child survival and declining the risk of child who is exposed to stunting.

c) Birth order

Birth order discusses the order of a child is born in the family generally based on the birth number in the family for instance first born or second born are the example. Birth order affects the psychological development of human beings. There are various reasons why birth order related to mortality risk where a group of parental incomes includes both time and material resources that could be accessible to each child. The kinship size increases the time of taking care of children is limited. Furthermore, younger siblings are prospective to be introduced to developmentally wrong activities by older siblings (Elliott, 2012).

The high likelihood of mortality is recognized to be high among the first births and starts to reduce for the second and third births and progressively increasing (Gyimah, 2002). High births order increases infant mortality, and it is endorsed to the statement that mothers who have had more pregnancies will be physically drained and mostly where the birth interval is shorter and pressure on household resources (Koenig et al, 1990). Educating families on the need for birth interval would have a huge positive impact on bringing down infant deaths in the high fertile populations of Africa (Becker et al., 2004). Sufficient birth spacing is beneficial to the wellbeing of both the mother and the child. Lastly, a superior sibship raises the probability of communicable illnesses being announced into the family, and younger siblings may be more vulnerable to these illnesses (Holman et al., 2003).

Table 3. 6: Bio-demographic determinants information and their Categories

Variable Names	Variable Labels	Explanation	Categories/Value Labels
B4	Sex of child	Sex describes the differentiation of the baby	Male
			Female
BOR/BORD	Birth order number	Birth order of the women since the last 5 years	1,2,3,4,5,and 6 and above
BirthInt /B12	Birth Interval	Number of the months passed since the preceding birth	Less than 24 months
			More than 24 months
V151	Sex of Household head	The person who is responsible in the household	Male
			Female
V212new/ V212	Age at first birth	Number of years during her first birth	Under 18
			18- 34
			35+(35 and above)
B0	Child is twin	Type of child's birth	Single
			Multiple

3.3.5. Socio-Economic Variables

a) Household wealth index

Household wealth index has an emotional impact on child survival through socio-economic and bio-demographic connections. Mothers from rich families could have enough resources for accessing health care services even in private hospital, such mothers can also deliver in health facilities and with of qualified health stake holder (Omedi & Wanjiru, 2014), they also recognized the low hospital deliveries in rural areas due to the long distance to reach in health facilities which attract an extensive high charges of the

services at the health facilities. A wealthy family can afford all the basic needs to promote the welfare of the family member.

b) Mother's place of residence

Place of residence classifies among the socio-economic factors which have special effects on infant death associated with place of delivery, modern or traditional ways used to explain the way of accessing health facilities. The supposition showed that infant death would be greater among the children who delivered in traditional health care mostly located in rural areas.

K'Oyugi (1982) concluded that infant mortality was lesser in urban areas than in rural areas. Lower mortality patterns in urban were attributed to better sanitation, short distances to health facilities and higher income in urban residents. This situation was contradicted by Kittur (2014) when she observed that infant death was higher in urban areas and she recognized these findings to the emerging slums and poor living conditions in the slums. Additionally, the urban poor residents are restricted to access health facilities and social services delivered in cities due to lack of financial resources, consequently, in less developed countries, the child mortality rate is higher among the urban poor compared to urban affluent or rural residents.

c) Religion

Religion as a determinant of infant mortality, some scholars classified as the social model because the model distinguishes that the believers can influence collective attitudes and norms which could be the evidence for determining different health outcomes like IMRs. Audiences can construct a moral attitude in communities that could yield characteristics of social effects, comprising community-level mortality and morbidity patterns (Uddin et al, 2006).

The connection among religion and infant death, the religious association is contrariwise associated with morbidity and mortality where the scholar stated that religious individuals follow their standard of living, health practices, understanding enriched social support and which have higher impacts than non- religious group of people. The survey established

under religious studies differentials in individual health is lacking in the certification of ecological examination between religion and infant death. Religion is statistically connected to increase the mortality patterns level on population-based death rates.

The mortality rate was expressively greater in Protestant communities than other types of religion in countries where the big proportion of the population is Catholic and traditional believers. The factors variations described anti-institutional features of Protestants directed to a reduced investment level in communal infrastructures that stimulate the development of different services related to population welfare, for instance, health care. The Pentecost communities had high mortality rates due to believing in faith healing within this group of religion and associated disbelief of conventional medicine (Blanchard et al, 2010).

Table 3. 7: Socioeconomic determinants information and their Categories

Variables labels	Variable names	Explanation	Categories
religion/V130	Religion	The type of religion that the head of the household belongs too.	Catholics
			Protestants
			Adventists
			Muslims
V025	Types of the place of residence	It describes the development level through urban and rural areas	Urban
			Rural
V190	Household wealth index	It shows the household economic level	Poorest
			Poorer
			Middle
			Richer
			Richest
Region5/V024	Regions		City of Kigali
			South

		Regional has settled based on the geographical location of the country	Western
			North
			East
Partner's characteristics			
V701	Husband's education level	Husband's highest education has attended	No education
			Primary
			Secondary
			Higher
Occupationp/V 705	Partners working status	Husband's working status during the survey	Not working
			Agricultural sectors
			Non Agricultural sector

3.3.6. Environmental Variables

Numerous studies support the influence of environmental variables on child mortality. It has been previously shown that a low socioeconomic position is related with environmental risk and poor housing conditions (Mutunga, 2004). The environmental features of the household are statistically connected to child mortality who lives in households that use to access to safe hygienic facilities, safe drinking water, have those using low polluting fuel and those living in a house with better roofing material for their main dwelling.

Bettelheim, (2008) observed that children who resided in the household with at least a toilet facility were not likely to fall sick compared to those from households without toilet facility. The use of pit latrine and earth floor houses contributed to high infant deaths. He

further found out that residing in a permanent house and making use of piped water resulted in lower infant mortality (Muganzi, 1984).

The study carried out in Zimbabwe DHS 2005-06 on sanitation found that households that used piped drinking water and the flush toilet had a positive effect on child mortality than infant mortality. Their results support the view that environmental 17 factors at the household level are particularly critical for inhibiting development faltering in the fetus and infant which has impacts on a child's health and survival status (Van Ginnecken et al, 2009).

The environmental factors such as the type of toilet facilities, the source of drinking water and hygienic facilities are strongly related to childhood mortality. Besides, the use of piped water or cleaned water, and sanitation have been found to reduce the risk of mortality (Ezeh- et al.2015).

Table 3. 8: Environmental determinants information and their Categories

Variables Labels	Variables Names	Explanation	Categories
toiletfacility/V116	Types of Toilet facility	The improved facility is a toilet where it is used by only members of one household means that it is not united with other people outside of the household	Improved
			Non-improved
V113new/V113	Source of Drinking water	Improved as the source of drinking water comprise a piped source within a yard, plot, dwelling, a tube hole or borehole, a public tap, bottled water, and a protected well or spring.	Improved
			Non-improved

Cookingfuel/V161	Type of cooking fuel	It displays the source of energy using while cooking	High polluting fuel
			Low polluting fuel

The health care and nutrient deficiency variables consist of three variables; place of delivery, childbirth weight and breastfeeding as presented in the table below

Table 3. 9: Categories and explanation of healthcare and nutrient deficiency variables

Variable Names	Variable Labels	Explanation	Categories/Value Labels
Deliveryplc/M15	Place of delivery	A place of accessing health services	Home
			Public facility
			Private facility
M4new/M4	Status of breastfeeding	Breastfeeding period of children	Ever breastfeed
			Never breastfeed
Birthweightkg/M19	Birth weight	Number of kilograms child has at birth	Less than 2.5 Kg (Underweight)
			More Than 2.5 Kg (Normal)

Media exposure variables consist of the following variables; the frequency of reading newspaper or magazines, frequency of listening to the radio, frequency of watching Televisions presented in Table 3.10.

Table 3. 10: Explanation and categories of media exposure variables

Variable Labels	Variable names	Categories	Explanation
V157/V157new	The frequency of reading newspaper or magazine	Not at all Reading newspaper or magazines	Types of media (newspaper or magazine, radio, and television) that women keep to follow up during daily life in the way of accessing information.
V158/V158new	The frequency of listening to Radio	Not at all Listening to Radio	
V159/V159new	The frequency of watching television	Not at all Watching television	

3.4. Statistical Analysis Methods

In the study, three waves of Rwanda DHS surveys were merged. Rwanda DHS data set 2005, 2010 and 2015. In all waves, a multi-stage, stratified, weighted, and cluster sampling was completed and collective questionnaires were used. The large of data set attained by combining the three wave deals two significant benefits. Primarily, the sufficient number of observations used in the analysis, confidence intervals develop slighter and estimations development closer to point estimations. In addition, it assists the analysis of infant deaths, which are fundamentally exceptional measures, by expending data from a huge number of explanations. Therefore, to escape potential errors in the analysis reducing from the various explanations in diverse studies, weighting factors found from the equation $1 / (a \times nc/n_T)$ were used (Marriot et al., 2007), where a is the

number of surveys, nc is the number of respondents for survey c , and n_T is the total number of respondents for all surveys.

The study analysis process would be accomplished into two main analysis types which include bivariate analysis for describing the distribution of explanatory variables to the dependent variable and Multivariate Analysis for discovering the impacts of Women's empowerment and Health Sector policy and other explanatory variables on infant mortality. *Bivariate Analysis* to examine the relationship between bio-demographic, environmental, socioeconomic, partner's characteristics and health care and nutrient deficiency variables, women's empowerment variable and health sector policy and lastly media exposure as predictor variables to the dependent variable of the study which is infant mortality. Generally, the main purpose of the bivariate analysis is to explore how bio-demographic, socioeconomic and other explanatory variables with the addition of women's empowerment and health sector policy variables are related to infant mortality in Rwanda.

Multivariate Analysis, Binary logistic regression models would be recycled to determine the impacts of women's empowerment, health sector policy and other independent variables on Infant mortality in Rwanda as the dependent variable. *The Multivariate Analysis* evaluates the possibility of child mortality focused on the main independent variables for example women's empowerment and health sector policy. Children continuing alive will be right-censored. For children who are informed dead, each child has a month and year of birth and month and year of death. For children who are reported still alive, each child has a month and year of birth. These children are right-censored since they remain living at the time of the survey.

To comprehend multiple regressions in multivariate analysis, basically to know the meaning of the word, "regression" would be well-demarcated. It is considered in this perspective as "a statistical portion that endeavors to define the strength of the association

between one dependent variable and a sequence of other changing variables known as independent variables”(Steel & Torrie,1960).

The dependent variable (Infant Mortality) in the study is a dichotomous (a dummy variable), where the subject is P (Y=1) if the child is not alive and P (Y=0) is a child alive, and the binary logistic regression analysis would be considered appropriate. A logistic equation will be fitted to a group of sampled women's empowerment, health sector policy, bio-demographic, socio-economic and health care variables besides other predictor variables.

The study comprises three main models based on the independent variables, the first model called women's Empowerment model; it comprises that women's empowerment indices developed from the variables which established in previous literature about women's empowerment. The second model is health sector policy and the third Model consists of all the remaining proximate determinants such as Bio-demographic variables include birth interval (Int), birth order (Or) and sex of the child (Sex), Sex of household head and Respondent age at first birth (FirstBr), Socio-economic determinants which consist the following variables, household wealth index (We) and place of residence (Res), Religion (Rel), Region (Re). Environmental determinants that include the source of water for drinking (Wat), Type of toilet facility (Tf) and Type of cooking fuel, health care and nutrient deficiency determinants include status of breastfeeding (Bf), Childbirth weight (CBW), and place of delivery, covers partner's characteristics include husband's education level and partner's occupation and media exposure variables include frequency of reading magazine or newspaper, frequency of listening to radio and frequency of watching television.

Regression has two main basic categories; multiple regression and linear regression. Linear regression has only one independent variable procedure and/or forecast the outcome of the dependent variable, however, multiple regressions use dual or more

independent variables to forecast the outcome. The common form of each category of regression is given as:

Linear Regression: $Y = \beta_0 + \beta_1 X_i + \epsilon_i$

Multiple Regressions: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_p X_p + \epsilon_i$

Where: Y = the dependent variable

X_i = the variable that we are using to forecast dependent variable (Independent variable)

β_0 = the intercept

β_i = the slope

ϵ_i = the regression residual or error term that differentiates the regression equation.

It stated differently, (β_0) is the intercept word which establishes the influence of information on the dependent variable in the model. In place of the variables that were omitted through the regression analysis, the correlation coefficient (β_i) can take a value from -1 to +1. A -1 designates a perfect negative association, while a +1 designates a strongly positive association. An association of 0 implies that there is no connection between the explanatory variable and the dependent variable in the multi regression model.

The study would use binary logistic regression as a way of analysis to explore results that explain the objectives of the study. The variables classified in seven main groups which are women's empowerment index, health sector policy variable, bio-demographic, socioeconomic, environmental, median exposure, partner's characteristics and health care and nutrient deficiency determinant variables have already existed and they will use to accept if there is a correlation to infant death and explanatory variables.

Secondly, Infant mortality (dependent variable) has binary values that coded as not alive and alive as a component for it. Lastly, predictor variables could be binary or not, and it's important to the component of the dependent variable depends on the predictor variables.

The logistic regression function was resulting in the following formula:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_p \beta_p + \epsilon_i$$

$$E(y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_p \beta_p + \epsilon_i$$

$$E(y) = P$$

$$f(P) = \log\left(\frac{P}{1-P}\right)$$

$$\log\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_p \beta_p + \epsilon_i$$

$$E(y) = P = \frac{e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_p \beta_p}}{1 + e^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_p \beta_p}}$$

R² (R square) estimates for the ratio of the variance described by the model while the multiple logistic regression formula has equivalent measures.

R² (R square) uses when there is no direct statistical measure of multiple regression which is equivalent to R².

For the study we used one among the various option of R² called Cox and Snell R² describes in the following formula.

$$R^2 = 1 - \left\{ \frac{L_0}{L_1} \right\}^{2/n}$$

Where **L₀**: Value of the intercept that occurs only in the model

L₁: The likelihood value of the fitted model and **n** is the sample size

The binary logistic regression model will be used by assessing the infant death indicator as a dependent variable under control of selected predictor or explanatory variables that

identify the basic of Mosley Concept framework to acquire the impacts of women's empowerment and health sector policy on Infant mortality in Rwanda.

In the thesis, we used stepwise model construction where the variables contained in each model are added to estimate the "additive effects" especially the final model which consists of all independent variables of the study. All the models and variables within the models that were used in the logistic regression.

Table 3.11: The Groups of Models and Variables for the binary logistic regression analysis

Model 1	Model 2	Model 3
Women's empowerment	Health sector Policy	Final model
High	After policy Intervention	+health sector policy
Medium	Before Policy Intervention	+Women's empowerment Index
Low		Bio- Demographic variables
		Socio-Economic variables
		Environmental variables
		Health care and nutrient deficiency variables
		Partners characteristics
		Media Exposure variables

CHAPTER 4

DATA ANALYSIS, RESULTS AND DISCUSSION

The chapter covers the statistical analysis of the research which presents the results of early age mortality in Rwanda, the bivariate analysis for determining percentage distribution of proximate determinants, health sector policy and women's empowerment index by infant mortality. Multivariate analysis carried out on the determinants connected with infant mortality in Rwanda by using binary logistic regression in the way for discovering the effects of the core independent variables such health sector policy, women's empowerment and explanatory elements on the main dependent variable which is infant mortality. The data sets used in the analysis of this study from three main standard Rwanda Demographic Health Surveys occurred into different surveys (RDHS 2005, RDHS 2010 and RDHS 2015)

4.1 Early Age Mortality

4.1.1 Early Age Mortality Rates in Rwanda

Trends in early age mortality in Rwanda have shown the highest values in Rwanda DHS 2005 compared to other Rwanda DHS Survey which used in the analysis of the study. In the period between 2005- 2015 according to Rwanda DHS; the neonatal mortality rate and infant mortality rate from merged files for all waves were 29.1 and 58.7 per thousand live births, respectively. Those high rates declined over time 19.5 and 33.0 per thousand live births by 2005-2015 according to the results of Rwanda DHS 2015, as presented in Table 4.1. Declined from 40.0 to 19.5 and 92.4 to 33.0 of neonatal mortality rate and infant mortality rate respectively as presented in Table 1.1. The decrease of post neonatal, child mortality and under mortality from 52.4 to 13.5 per 1000 live births, from 73.5 to 18.3 per 1000 live births and 159.1 to 50.7 per 1000 live births correspondingly.

Table 4.1 : Trends in early childhood mortality from Rwanda DHS Surveys (2005-2015)

Survey	Early age mortality rates(per 1000 live births)				
	NNMR	PNNMR	IMR	CMR	U-5MR
RDHS 2005	40.0	52.4	92.4	73.5	159.1
RDHS 2010	28.7	23.7	52.4	21.7	73.0
RDHS 2015	19.5	13.5	33.0	18.3	50.7
All waves	29.1	29.5	58.7	36.6	93.1

Table 4.2 : Relative changes of early age mortality by RDHS waves

Surveys	Early age mortality				
	NNM	PNNM	IM	CM	U-5M
RDHS 2005	1.00	1.00	1.00	1.00	1.00
RDHS 2010	0.72	0.45	0.57	0.30	0.46
RDHS 2015	0.49	0.26	0.36	0.25	0.32

Table 4.2 shows that decline was more visible in the post neonatal period compared with the neonatal period. Considering under-five mortality, the decline was higher in the period of infancy compared with the childhood period.

4.1.2 The Link between Women Empowerment and Early Age Mortality

As presented in Table 4.3, all rates relating to early-age mortality rates are distinctly highest among children born to less empowered women. Infant mortality rate found to be 73.7 per 1000 live births and 60.7 per 1000 live births among children to women with low and medium empowered women respectively, compared with 46.0 per 1000 live births among children born to highly empowered women. The early age mortality rates of highly empowered women were the lowest form NNMR, PNNMR, IMR, CMR and U-5MR as displayed in Table 4.3.

The results of the percentage distribution of deceased children are also higher from neonatal, post neonatal and infant mortality for children of women with medium and low empowerment index 1.53 %, 1.68% and 1.60% correspondingly as seen in Table 4.4.

Table 4. 3: Early age mortality rates by Women empowerment index

Women Empowerment Index	Early age mortality rates (per 1000 live births)				
	NNMR	PNNMR	IMR	CMR	U-5MR
High	23.9	22.1	46.0	38.3	82.5
Medium	29.5	31.3	60.7	41.1	99.4
Low	36.6	37.1	73.7	33.5	104.8

Table 4. 4: Relative changes of early age mortality by women empowerment index

Women's Empowerment Index	Early age mortality				
	NNM	PNNM	IM	CM	U-5MR
High	1.00	1.00	1.00	1.00	1.00
Medium	1.23	1.42	1.32	1.07	1.20
Low	1.53	1.68	1.60	0.87	1.27

4.1.3 The Link between Health Sector Policy and Early Age Mortality

The result of early age mortality rates by health sector policy variable demonstrated that Infant mortality rate found to be 91.6 per 1000 live births was higher for children who had born before the period of policy intervention compared with 43.1per 1000 live births of children who had born after the policy intervention period as shown in Table 4.5. The Under-5 mortality rate is the highest 158.4 per thousand live births in the period of before policy intervention among early mortality groups.

Conversely, all early age mortality rate results were higher before the involvement of health policy in Rwanda. The relative change of child mortality is the lowest 0.27% among

the early age mortality groups during the period of after policy intervention as seen in Table 4.6.

Table 4.5: Early age Mortality Rates by Health Sector Policy

Health Sector Policy	Early age mortality rates (per 1000 live births)				
	NNMR	PNNMR	IMR	CMR	U-5MR
After policy intervention	24.5	18.5	43.1	20.0	62.3
Before Policy Intervention	39.0	52.6	91.6	73.5	158.4

Table 4.6: Relative changes early age mortality by health sector policy

Health sector Policy	Early age mortality				
	NNM	PNNM	IM	CM	U-5M
After policy intervention	0.63	0.35	0.47	0.27	0.39
Before Policy Intervention	1.00	1.00	1.00	1.00	1.00

4.2 Descriptive Analysis of Infant Mortality, Health Sector Policy and Women's Empowerment Index of the Study

4.2.1 Descriptive Analysis of Infant Mortality

This part presented the percentage distribution of explanatory variables by the child survival. The independent variables include bio-demographic, socio-economic, environmental, health care and nutrient deficiency, partner's characteristics and media exposure variables.

Table 4.7 : Percentage distribution of bio-demographic determinants by infant mortality

Variables	Infant Mortality (%)	Number of children	Children (%)
Sex of household head			
Male	7.0	21085	80.9
Female	7.2	4974	19.1
Sex of the child			
Male	7.4	13220	50.7
Female	6.7	12838	49.3
Women's age at first birth			
Under 18 (<18)	7.6	4785	18.4
18-34	6.9	21193	81.3
35+(35 and above)	9.9	81	0.3
Birth order			
1	7.5	6193	23.8
2	6.4	5117	19.6
3	6.7	4018	15.4
4	6.2	3199	12.3
5	6.0	2381	9.1
6 and above (6 ⁺)	8.3	5152	19.8
Birth Interval			
Less than 24 months	8.5	10935	42.0
More than 24 months	6.0	15124	58.0
Types of the Birth			
Single Birth	6.6	25328	97.2
Multiple Birth	22.2	713	2.8

The results of the sex of the household head demonstrated that the children whose household headed by females had a higher proportion of infant deaths 7.2 than children whose household headed by male 7.0 percent. There is small difference of infant death proportion between men and women. Male children (7.1%) had expressed infant mortality greater than female children (6.4%). Women at the two extreme age groups, under 18 (7.6%) and 35+ above (9.9%) had a greater percentage of infant deaths than the age group of 18-34 (6.9%). The result shows that a woman is getting older, there is the highest possibility of increasing infant mortality.

First-born children (7.5%) and those who were born as the ≥ 6 th child (8.3%) experienced greater infant mortality than those of birth order 2-3 and 4-5 respectively. Consequently, the children born in high birth order are more expressed to infant mortality than the children born at the first birth order level. The birth interval is strongly connected with infant mortality were women who spaced the pregnancy of their birth less than 24 months (8.5%) were more likely experienced infant deaths than those who spaced pregnancy by more than 24 months 6.0 percent. Generally, as the birth interval rises, there is a lower likelihood of dying during the infancy period. The children who were born in multiple births were more likely experienced infant deaths almost 4 times (22.2%) than those who born in single birth 6.6% because most time the children who born in multiple births are underweight and have some health problems like the weak immune system which is hard to survive after birth.

The region variable demonstrated that the City of Kigali has the lowest infant mortality (4.3%) among all components of region variable while the Northern region has the highest infant death which is equal to 10.4 percent. The proportion of other regions is respectively followed as 6.0 %, 8.3% and 9.1 % by South, East, and West. Women who were in Protestants (7.1%) and Catholics (7.0%) religion had higher infant mortality than Eglise du 7eme Jour (Seven Day Adventist) and Muslims with 6.9 % and 6.0 % respectively. The result of the place of residence showed that infant deaths in rural areas (7.3%) is greater than their counterparts in urban areas (5.2%) as seen in Table 4.8.

Table 4. 8: Percentage distribution of socio-economic determinants by infant mortality

Variables	Infant Mortality (%)	Number of Children	Children (%)
Region			
City of Kigali	4.3	2281	8.8
South	6.0	13092	50.2
West	9.1	2437	9.4
North	10.4	2074	8.0
East	8.3	6175	23.7
Religion			
Catholics	7.0	10573	40.6
Protestants	7.1	11093	42.6
Eglise du 7 ^{eme} Jour (SDA)	6.9	3413	13.1
Muslims	6.0	980	3.8
The place of Residence			
Urban	5.2	3698	14.2
Rural	7.3	22360	85.8
Household Wealth Index			
Poorest	8.3	5933	22.8
Poorer	6.9	5527	21.2
Middle	6.5	5227	20.1
Richer	8.0	4885	18.7
Richest	5.0	4486	17.2

The household wealth index establishes a continuous decreasing effect on infant mortality as the wealth index raised from the poorest group up to the richest group. The poorest group has the highest proportion of infant mortality 8.3% compared to other wealth index

groups while lowest infant deaths experienced by those in richest wealth index (5.0%). The percentage distribution of other wealth categories is 6.9 %, 6.5 % by poorer and middle correspondingly with exception of richer group had higher percentage 8.0% of infant death than middle group 6.5% because of the standard items of recoding wealth index variable may not be suitable to Rwanda’s population condition of living. Generally, the likelihood of infant mortality was mostly experienced by women in the poorest wealth index (8.3%) and it is lowest in the richest wealth index.

Table 4. 9: Percentage distribution of environmental determinants by infant mortality

Variables	Infant Deaths (%)	Number of Children	Children (%)
The source of drinking water			
Improved Sources	6.8	10893	41.8
Non-Improved Sources	7.2	15161	58.2
Type of Toilet Facility			
Improved/ Not Shared facility	7.3	20694	79.4
Non Improved / Shared facility	10.2	5365	20.6
Types of cooking fuel			
High polluting fuel	7.1	23035	88.4
Low polluting fuel	6.2	3024	11.6

The findings of women who obtained drinking water either improved or non- improved sources had experienced infant mortality with 6.8% and 7.2 % respectively also of using portable water in the household help to promote sanitation and preventing different infectious diseases like cholera. The type of toilet facility results, for the household of non- improved facility had experienced high infant deaths (10.2%) compared to those had improved facility with 7.3 percent. The types of cooking fuel, high polluting fuel has a

greater percentage of infant mortality (7.1%) than low polluting fuel (6.2 %) such as electricity, gas, Kerosene, etc.

Table 4.10: Percentage distribution of partner’s characteristics by infant mortality

Variables	Infant deaths (%)	Number of Children	Children (%)
Partner’s Education Level			
No Education	8.5	7130	27.4
Primary	6.8	16116	61.8
Secondary	4.9	2371	9.1
Higher	3.2	443	1.7
Partner’s Occupation			
Non-agricultural sector	5.5	6830	26.3
Agricultural sector	7.9	17408	66.9
Not working	5.1	1776	6.8
Women’s education level			
No education	9.4	5584	21.4
Primary	6.7	17535	65.8
Secondary	4.7	2264	8.7
Higher	1.1	676	4.1
Women’s Occupation			
Non- agricultural sector	4.9	3267	12.5
Agricultural sector	7.1	19527	75.0
Not working	8.5	3264	12.5

The partner's characteristics result establishes, the decline of infant mortality as the husband's education level increased. The children who had born to the fathers with no

education level has the highest likelihood at 8.5% of infant mortality compared to other education groups while the children for partners with higher education level, the proportion of infant mortality is the lowest among all education level group which is equal to 3.2%.The percentage of the primary and secondary groups is followed by 6.8% and 4.9% correspondingly. For partner’s occupation variable, the agricultural sectors have the highest ratio (7.9 %) of infant mortality compared to other groups with their corresponding percentage of distribution of 5.1 % and 5.5% by not working group and non-agricultural sectors.

The percentage distribution of women’s education by infant deaths showed that women did not have any education level had the greatest proportion 9.4% of infant mortality compared to other women’s education levels. The highest infant deaths percentage 8.5% belongs to women did not work among all groups of women’s occupation.

Table 4.11: Percentage distribution of health care and nutrient deficiency determinants by infant mortality

Variables	Infant Deaths (%)	Number of Children	Children (%)
Place of delivery			
Homes	10.0	10044	38.5
Public facility	5.1	15213	58.4
Private facility	2.5	701	3.1
Child birth weight			
Less than 2.5 Kg	8.4	1595	6.1
More than 2.5 Kg	6.9	24463	93.9
Status of breastfeeding			
Never breastfeed	75.3	526	4.0
Ever breastfeed	5.6	25532	96.0

The relationship of health care and nutrient deficiency variables displayed that women having birth at home (10.0%) experienced higher infant deaths than their counterparts having a birth in public health facility (5.1%) and private health facility (2.5%). The childbirth weight variable, the children have born with less than 2.5 Kg were more expected to infant death than those who had more than 2.5 kg at birth. The infant mortality of children had less than 2.5 kg at birth was 8.4% whereas the percentage of children with more 2.5 kg at birth was 6.9 %. Conversely, the under-weight children had high likelihood of infant mortality than the children who had normal weight during birth.

The status of breastfeeding variable findings demonstrated that there is a clear difference between its categories, where never breastfeed category had a relatively high risk of death than ever breastfeed category. The percentage distribution of the variable for infant mortality is followed by 75.3% and 5.6% by never breastfeed and Ever breastfeed correspondingly. Commonly, there is a high possibility of dying to the children who have never breastfeed compared to other categories of the variable.

Table 4.12: Percentage distribution of Media Exposure determinants by Infant Mortality

Variables	Infant deaths (%)	Number of Children	Children (%)
The frequency of reading newspaper or magazines			
Not at all	7.5	20769	79.8
Reading newspaper or Magazine	5.3	5252	20.2
The frequency of listening to Radio			
Not at all	8.8	4728	18.2
Listening to Radio	6.6	21274	81.8
The frequency of watching Television			
Not at all	7.7	20175	77.5
Watching Television	4.9	5841	22.5

The results of media exposure determinant variables showed the women who had exposure to reading newspapers or magazines were less likely experienced infant mortality (5.3%) than those who did not read any newspaper or magazine at all (7.5%). For the frequency of listening to the radio, a greater percentage distribution of 8.8% of infant mortality belongs to not at all groups for listening to radio than the group of the women who have the accessibility of listening to Radio with 6.6 percent.

The frequency of watching television findings demonstrates that the women who did not watch television at all had experienced higher infant mortality of 7.7% than the women who had the accessibility of watching Television (4.9%). Commonly, the accessibility of information through media exposure has an optimistic impact on declining infant death and also in Rwanda, there is a great share of the people who can listen to radio compared to other means of accessing information which occurs in the country.

4.2.2 Descriptive Analysis of Health Sector Policy

This section presented the relationship of explanatory variables comprise of bio-demographic, socio-economic, environmental, partner's characteristics, media exposure, health care and nutrient deficiency variable to the health sector policy as core independent variable.

Table 4.13: Percentage distribution of bio-demographic determinants by Health Sector policy

	Health sector Policy		Number of children
	After the policy intervention (%)	Before the policy intervention (%)	
Sex of household head			
Male	63.5	36.5	21086
Female	67.0	33.0	4974
Sex of the child			
Male	64.0	36.0	13220
Female	64.3	36.7	12839
Women's age at first birth			
Under 18 (<18)	59.2	40.8	4785
18-34	65.2	34.8	21193
35+(35and Above)	77.8	22.2	81
Birth Order			
1	71.9	28.1	6193
2	68.1	31.9	5117
3	62.9	37.1	4017
4	60.9	39.1	3199
5	60.3	39.7	2381
6 and above (6 ⁺)	55.5	44.5	5152
Birth Interval			
Less than 24 months	64.7	35.3	10934
More than 24 months	63.7	36.3	15124
Types of child's birth			
Single birth	64.1	35.9	25327
Multiple births	66.9	33.1	731

The percentage distribution of bio-demographic variables by the health sector policy as a core independent variable examines the relationship between those variables. For the sex of household head, after the policy intervention, there was increasing the number of female households with a percentage of 67.0% compared to the male household head percentage of 63.5%. The sex of the child, the percentage of male child was lower 64.0% compared to female child proportion with 64.3% during the period of after policy implementation and another component of health sector policy for before the policy implementation female child had 36.7 percent which was a greater than male child percentage 36.0%. The age at first birth of the women, the group of 35+ has 77.8% which is the highest percentage distribution in all groups during the period after policy intervention. The proportions during the period before policy intervention for all groups are 40.8%, 34.8% and 22.2% by under 18, 18-34 and 35+ age group respectively.

The birth order variable consists of 6 groups, the findings displayed that as the birth order number becomes higher, there is decreasing of proportion in the period of after policy involvement where sixth and birth order has 60.3% that is lowest among all components of the variable. The birth interval is significantly associated health sector policy implantation where the share of after policy intervention has a greater percentage than before the policy intervention as the results showed that 64.7% and 63.7% by less than 24months, and more than 24 months correspondingly meanwhile the policy intervention has good impacts in boosting women to increase the birth interval period in other to promote child's health. For types of birth, the percentage distribution of the single birth after the policy involvement was lower than the proportion of multiple births with the respective percentage of 64.1% and 66.9% with the period of the time as illustrated in Table 4.14 below.

Table 4.14: Percentage distribution of socio-economic determinants by health sector policy

	Health sector Policy		Number of Children
	After policy intervention (%)	Before policy intervention (%)	
Region			
City of Kigali	75.9	24.1	2281
South	82.7	17.3	13091
West	5.4	94.6	2437
North	5.1	94.9	2074
East	63.5	36.5	6175
Religion			
Catholics	60.8	39.2	10573
Protestants	68.1	31.9	11094
Eglise 7 ^{eme} du Jour (SDA)	63.4	36.6	3413
Muslims	59.4	40.6	468
The place of residence			
Urban	63.9	36.1	3698
Rural	64.2	35.8	22361
Household Wealth Index			
Poorest	66.6	33.4	5933
Poorer	65.2	34.8	5528
Middle	63.5	38.0	5228
Richer	62.0	37.4	4884
Richest	62.6	35.9	4486

For the socio-economic determinants described the correlation with the health sector policy variable (period variable). Region variable results, the South region has the highest percentage 82.1% compared to other regions with exception of West and North Regions have a small percentage of 5.4% and 5.1 % respectively after the policy intervention period. During the period of health policy intervention, the North region had the greatest proportion of 94.6% compared to all regions of the country which implied that health policy did not yet applied into action in the North Region.

The religion results displayed that the Protestant's portion is highest with 68.1% after the policy intervention. Eglise 7^{eme} du Jour (Seven Day Adventist), Catholics, Muslims as types of religion with their proportion are 63.4%, 60.8%, 59.4% correspondingly during the period after policy involvement. The result of the place of residence demonstrated that before policy involvement the percentage of the women who lived in the urban area was greater than individuals who lived in rural areas with the following percentage 36.1% and 35.8 % respectively. The household wealth index displayed that the percentage of the poorest household 66.6 % implies the big proportion of women in the poorest group had good motivation after policy intervention on the way for promoting their standard living compared to other groups. The remaining groups poorer, Middle, Richest and richest with their respective proportion 65.2 %, 63.5%,63.0% and 62.6% developed under the after policy involvement as part of the health sector policy variable.

The environmental determinants results showed that the percentage of the source of drinking water was 59.4% and 67.5% by corresponding categories of the source of drinking water such as Improved and Non –improved in the period of after policy intervention. For the toilet facility variable, the improved facility has a big portion after policy intervention compared to non –improved facilities with 56.9% and 53.3% correspondingly.

Table 4.15: Percentage distribution of Environmental determinant by health sector policy

	Health sector policy		Number of Children
	After policy Intervention (%)	Before policy Intervention (%)	
Sources of drinking water			
Improved sources	59.4	40.6	10893
Non-improved sources	67.5	32.5	15160
Types of Toilet facility			
Improved / Not shared a facility	56.9	43.1	20694
Non Improved/ Shared facility	53.3	46.7	1200
Types of cooking fuel			
High polluting fuel	62.4	37.6	23035
Low polluting fuel	77.5	22.5	3024

Types of cooking fuel, before health policy intervention; the number of the women whose had used the low polluting as source of energy was lower than during the period of after health policy intervention with the following percentage 22.5% and 77.5% and also generally the low polluting fuel group had higher percentage 77.5 % than high polluting fuel group with its percentage of 62.4% during after health policy intervention. Conversely, the implementation of health sector policy had a positive impact on the population's health through promoting hygiene and sanitation based on environmental determinants.

Table 4.16: Percentage distribution of Partner’s characteristics by health sector policy

	Health sector Policy		Number of children
	After policy Intervention (%)	Before policy Intervention (%)	
Partner’s Education level			
No education	59.2	40.8	7130
Primary	66.8	33.2	16117
Secondary	58.0	42.0	2370
Higher	78.6	21.4	443
Partner’s Occupation			
Non -agricultural sectors	70.8	29.2	6830
Agricultural sector	60.5	39.5	17408
Not working	74.1	25.9	1776

The relationship between partner’s characteristics and health sector policy indicated that after health sector policy implementation, as the partners were a more educated had greatest percentage of policy intervention 78.6% compared to other education levels. The findings of other education levels include No education, Primary and Secondary have the respective percentage 59.2%, 66.8%, and 58.0% for after health policy involvement. Partner's occupation for agricultural sectors had 60.5% lowest proportion of after policy intervention compared to not working group and non –agricultural sectors. Generally, it based on the results of the partner's characteristics that had progressive impacts after the period of policy implementation than before the implementation of the policy.

Table 4.17: Percentage distribution of health care and nutrient deficiency determinants by health sector policy

	Health sector Policy		Number of children
	After policy Intervention (%)	Before Policy Intervention (%)	
Place of delivery			
Homes	34.4	65.6	10044
Public facility	83.5	16.5	15213
Private facility	38.5	61.5	200
Childbirth weight			
Less than 2.5 Kg	83.8	16.2	1595
More than 2.5 Kg	62.9	37.1	24463
Status of Breastfeeding			
Never Breastfeed	48.8	51.2	527
Ever Breastfeed	64.4	35.6	25532

The place of delivery result shows that the percentage of the woman who delivered in public health facility during the period after the policy intervention had a greater percentage 83.5% compared to private facilities with a percentage distribution of 38.5%. The percentage of the women who delivered at homes, public and private facilities was 65.6 %, 16.5%, and 61.5% respectively during the period of the before policy intervention.

The childbirth weight result after policy intervention displayed that the children who had more than 2.5 Kg (Normal children) it's percentage 62.9% is lower than the percentage of the children who are underweight with 83.8% percentage. For Status of breastfeeding, the result of after policy involvement demonstrated that the ever breastfeed category has a lower proportion of 35.6% than never breastfeed with 48.8%.

Table 4.18: Percentage distribution of media exposure variables by health sector policy

	Health sector policy		Number of children
	After policy Intervention (%)	Before policy intervention (%)	
The frequency of reading newspaper or magazines			
Not at all	64.9	35.1	20769
Reading newspaper or magazines	61.2	38.8	5253
The frequency of listening to Radio			
Not at all	50.2	49.8	4728
Listening to Radio	67.3	32.7	21273
The frequency of watching Television			
Not at all	57.0	43.0	20176
Watching Television	88.8	11.2	5841

The percentage distribution of media exposure variables by health sector policy comprises the following variables include; frequency of reading newspaper or magazines variable, the women did not read any newspaper or magazine at all had a larger proportion 64.9% after policy intervention period than those who read newspaper or magazines with 61.2%. The frequency of listening to the radio, women who had access of listening to radio had a greater percentage of distribution 67.3% compared to those who did not listen to Radio at all with the proportion of 50.2% during the period of after policy involvement and also it has a lower percentage 32.7% during the period of before policy involvement.

The frequency of watching Television variable during the period before the policy involvement, Women did not watch Television had a greater proportion of 43.0% than the women who watched television 11.2% meanwhile in those years the level of infrastructure development was low, so few households were able to watch television. Generally, Radio is a simple way for the Rwandan population can access information compared to other

means of communication, which could yield great impacts in the transformation of the sustainability of the community and the daily life activity.

4.2.3 Descriptive Analysis of Women's Empowerment Index

This section presented the relationship proximate determinants include bio-demographic, socio-economic, environmental, media exposure, and health care and nutritional deficiency variables by the women's empowerment index as core independent variable.

The association of bio-demographic determinants with women's empowerment index demonstrated in the succeeding explanation of the results from the variables; the medium empowered women had the greatest percentage (35.3%) for male household heads compared to other women's empowerment group while female household heads had highest proportion (40.8%) of highly empowered women among all groups of women's empowerment. The result of the sex of the child, male and female had the same proportion 32.6 % of less empowered women, medium empowered women had the highest percentage (34.9%) for female children compared to other women's empowerment categories as shown in Table 4.19.

The age at first birth results, the women who aged under 18 were less expected to be highly empowered 29.5 percent compared to other groups while those who were in two groups 18-34 and the 35⁺ group have the respective percentage 33.4 % and 55.0% of being highly empowered in community. The medium empowered women has the greatest proportion of 35.6% in 18-34 groups compared to the remaining groups with the corresponding percentage of 30.4% and 25.0% by under 18 age and 35⁺ group respectively. The women who aged under 18 had experienced the biggest proportion of 40.1% in low women's empowerment index compared to all groups and also the group of 35⁺ has the highest percentage 54.2% in high women's empowerment index among all the groups.

Table 4.19: Percentage distribution of Bio-demographic determinants by Women empowerment index

	Women's empowerment index			Number of children
	High (%)	Medium (%)	Low (%)	
Sex of household head				
Male	31.6	35.3	33.1	19739
Female	40.8	30.4	28.8	2901
Sex of Child				
Male	33.0	34.4	32.6	11528
Female	32.5	34.9	32.6	11115
Women's Age at First Birth				
Under 18 Age (<18)	29.5	30.4	40.1	3942
18-34	33.4	35.6	31.0	18640
35+(Above 35)	55.0	25.0	20.0	60
Birth Order				
1	33.1	35.1	31.8	4825
2	31.8	36.0	32.2	4493
3	32.9	34.3	32.8	3605
4	33.4	34.5	32.1	2877
5	34.9	33.2	31.9	2146
6 ⁺	31.8	34.1	34.1	4698
Birth Interval in Months				
Less than 24 months	32.3	34.8	32.9	9223
More than 24 months	33.1	34.6	32.3	13420
Types of child's Birth				
Single Birth	32.8	34.6	32.6	22013
Multiple Birth	31.5	37.8	30.7	629

As the results of birth order number established that the fifth birth order has the highest percentage 34.9% of high women's empowerment index, second birth order number is the greatest ration 36.0% in the category of medium women's empowerment index and the first birth order number has the lowest percentage of 31.8% in the category low women's empowerment index.

The highly empowered women were more likely to experience a long birth interval (more 24 months) with a percentage distribution of 33.1% than those who were less empowered 32.3%. The medium empowered women had experienced a more proportion of 34.8 % in short birth interval (less than 24 months) followed by less and highly empowered women groups with their respective percentage 32.9 % and 32.3%. The result of the birth type variable, women who had single birth had experienced the highest percentage of 34.6% in medium women's empowerment index compared to other women's empowerment indices. The women who had multiple births have the lowest percentage of 30.7% in low empowerment index compared to other groups of indices.

The proportion sharing of socio-economic elements to women's empowerment index. The results in the table above shows that region variable, highly empowered women belonged to City of Kigali with the proportion of 50.5%, medium empowered women lived in West region with the highest percentage 37.8 % and also the City of Kigali had experienced the lowest share of the women who were less empowered 16.3% among all the regions of the country.

Table 4.20: Percentage distribution of socio-economic factors by Women's empowerment index

	Women's empowerment Index			Number of children
	High (%)	Medium (%)	Low (%)	
Region				
City of Kigali	50.5	33.2	16.3	19606
South	33.5	33.8	32.8	11269
West	23.2	37.8	39.0	2263
North	41.1	31.8	27.1	1942
East	25.8	36.9	37.3	5264
Religion				
Catholic	31.4	36.4	32.2	9268
Protestants	33.7	33.7	32.5	9545
Eglise du 7 ^{eme} Jour (SDA)	33.3	33.1	33.6	3003
Muslims	35.7	38.2	26.1	398
The place of Residence				
Urban	45.7	32.6	21.6	3138
Rural	30.7	35.0	34.3	19504
Household Wealth Index				
Poorest	27.8	33.6	38.6	4895
Poorer	29.1	34.8	36.2	4830
Middle	30.5	34.5	35.0	4615
Richer	31.1	38.3	30.6	4394
Richest	48.0	32.0	20.0	3909

The relationship between religion and women's empowerment indices as seen in Table 4.20 above, showed that the women from Catholics had the lowest percentage of high women's empowerment index 31.4% compared to other religion, the women from Eglise du 7^{eme} Jour (Seven Day Adventist) is the lowest portion 33.1% of medium empowerment index in all religions and also the lowest percentage 26.1% of low women's empowerment index is for women from Islamic religion. The place of residence, women from urban areas were highly empowered with 45.7% higher than the percentage of women from rural areas 30.7%. The women from rural areas were more likely to be less empowered as the results showed with the corresponding percentage 34.3% for low empowerment index .The result implied that women's empowerment strongly occurs in urban areas than in rural areas. The household wealth index variable, the women who were from the richest group were highly empowered 48.0% compared to other groups, women from richer group had also the biggest ration 38.3% of medium women's empowerment index among in all groups and finally the lowest percentage 20.0% of less empowered women belongs to the richest group.

Table 4.21: Percentage distribution of environmental determinants by women’s empowerment index

	Women’s empowerment index			Number of Children
	High (%)	Medium (%)	Low (%)	
Sources of drinking water				
Improved sources	35.2	34.2	30.6	9519
Non-improved sources	31.0	35.0	34.0	13119
Types of Toilet Facility				
Improved / not Shared facility	33.6	35.3	31.1	18342
Non- improved /shared facility	30.2	32.7	37.1	3743
Types of cooking Fuel				
High polluting fuel	32.6	34.6	32.8	20223
Low polluting fuel	33.7	35.8	30.5	2419

For the results of environmental determinants as seen in Table 4.21 above, the highly empowered women (35.2%) were most likely to access improved water sources compared to medium and less empowered women group with respective percentage 34.2% and 30.6%. The percentage distribution of the non-improved sources was higher in medium empowered women 35.0% in all women's empowerment group. The type of toilet facility variable, the high and medium empowered women had experienced more proportion 33.6% and 35.3% respectively in the way for accessing improved facility than non – improved facility while the less empowered women had a higher percentage 37.1% for non- improved facility compared to high and medium empowered women. The types of cooking fuel results showed that medium empowered women had a greater 35.8 percent of low polluting fuel than other groups. The less empowered women had the lowest distribution of low polluting fuel 30.5% equated to other groups and also the low polluting

fuel group had a more percentage 33.7% in high women's empowerment index than high polluting fuel group.

Table 4.22: Percentage distribution of partner's characteristics by women's empowerment index

	Women's empowerment index			Number of Children
	High (%)	Medium (%)	Low (%)	
Partner's Education Level				
No education level	28.7	35.2	36.1	5267
Primary	31.4	35.0	33.7	14849
Secondary	44.5	34.3	21.2	2121
Higher	74.9	18.5	6.7	789
Partner's Occupation				
Non Agricultural sector	42.0	32.5	25.5	6130
Agricultural sector	29.0	35.5	35.4	15959
Not Working	35.7	35.0	29.3	1012

Partner's education level result demonstrated that husband with higher education level, their wives were highly empowered (74.9%) compared to wives where their partners had other education levels. The husband who had no education had the greatest percentage (36.1%) of less empowered women in all levels and also those who had higher education had the lowest percentage (6.7%) of less empowered women compared to other levels of education. Partner's occupation result showed that the husbands who worked in the non-agricultural sector had the highest percentage distribution of 42.0% of highly empowered women compared to non- working group and agricultural sectors. The husbands who worked in Agricultural sectors had the greatest percentage 35.5% of medium empowered women in all groups of partner's occupation and non – agricultural has the lowest percentage 25.5% of less empowered women compared to the rest of the groups as seen in Table 4.22 above.

Table 4.23: Percentage distribution of health care and Nutrient deficiency determinants by Women’s Empowerment Index

	Women’s empowerment Index			Number of children
	High (%)	Medium (%)	Low (%)	
Place of Delivery				
Homes	28.1	36.4	35.6	9108
Public facility	35.8	33.5	30.6	12831
Private facility	53.7	25.5	20.7	658
Child’s Birth Weight				
Less than 2.5 Kg	32.6	34.0	33.4	1296
More than 2.5 Kg	32.8	34.7	32.5	21347
Status of Breastfeeding				
Never Breastfeed	26.6	35.0	38.4	527
Ever Breastfeed	32.2	33.9	31.8	25532

Table 4.23 shows that the percentage distribution of place of delivery by women's empowerment index described that the less empowered women had experienced to deliver at home with the highest percentage 35.6%. The women who had access to the private facility has the highest proportion of 53.7% of high women's empowerment index compared to other types of places of delivery and the lowest percentage of 20.7% of low women’s empowerment index.

The women who had children with less than 2.5Kg / Underweight were mostly likely experienced to become less empowered with the proportion of 33.4% while children who had more than 2.5 Kg / Normal children group had more proportion of high and medium women’s empowerment indices with the respective percentage 32.8% and 34.7% that is implied that their mothers were moderate and highly empowered which is important in promoting child’s health.

The percentage distribution of breastfeeding status by women's empowerment index demonstrated that the children who had ever breastfeed have the greatest percentage of 33.9% in medium empowerment index compared to other indices. Never breastfeed group had a big percentage in both groups of indices include medium and low women's empowerment index with the corresponding percentages 35.0% and 38.4% than high empowerment index.

Table 4.24: Percentage distribution of media exposure variables by Women's Empowerment Index

	Women's empowerment Index			Number of children
	High (%)	Medium (%)	Low (%)	
The frequency of reading newspaper and magazines				
Not at all	30.3	34.7	34.9	17981
Reading newspaper or magazines	42.1	34.4	23.4	4630
The frequency of listening to Radio				
Not at all	26.2	33.5	40.3	3950
Listening to Radio	34.1	34.9	30.9	18644
The frequency of Watching Television				
Not at all	29.6	35.7	34.7	17772
Watching Television	44.4	30.8	24.8	4834

The results of media exposure variables in relationship with women's empowerment index were followed by the frequency of reading newspaper or magazines, the women who were able to read newspaper or magazines had a higher percentage 42.1% of high women's empowerment index than those who did not read any newspaper or magazine (30.3%).

A higher percentage of 34.9% of medium women's empowerment index had been experienced by the women who had access to listening to Radio compared to those who

did not listen to Radio. The women who did not listen to the radio had a higher percentage distribution 40.3% low empowerment index than those who listen to Radio.

For the frequency of watching television variable results showed that women who watched television had more percentage 44.4% of high women's empowerment index than those who did not watch television at all (29.6%) and women who did not watch TV at all group had a greater percentage 35.7% of medium women's empowerment index compared to women watched television (30.8%) besides the women who did not watch TV at all group had a greater proportion of 34.7 % of low women's empowerment index as seen in Table 4.24 above.

Commonly, the media exposure variables have good importance on the transformation of women's empowerment ability in different communities. The absence of accessing media indicates a big challenge of describing women's ability in decision making due to the limit of information.

4.2.4 Descriptive Analysis of Women's Empowerment Index and Health Sector Policy by Infant Mortality

Table 4.25 presented the percentage distribution women's empowerment index, Rwanda DHS phase and period variables which presents health sector policy by the survival status of the infant. Descriptive analysis results of the infant deaths by women's empowerment indices showed that the infant deaths had declined as the women were empowered. The results displayed that low empowered women had a higher percentage of infant death (8.4%) compared with medium (7.5%) and high empowered women (5.9%).

The percentage distribution of infant deaths by three Rwanda DHS phase showed that the proportion of infant mortality declines as the survey phase increases. Rwanda DHS 2005 had the highest proportion of infant mortality 10.5% among all RDHS phases used in the study. The result implies that over 15 years, there was a great improvement in the health sector and socio-economic transformation as the best ways for promoting the welfare of

the population and child's health as the result for decreasing the infant mortality rate. The distribution results of health sector policy by infant mortality demonstrated that before health policy intervention had occurred the percentage of infant deaths (10.8%) was higher than after the health policy implemented with 4.9%.

Table 4.25: Percentage distribution of women's empowerment indices, Rwanda DHS phases, and health sector policy by Infant Mortality

Variables	Infant deaths (%)	Number of children	Children (%)
Women's Empowerment			
High	5.9	7415	32.7
Medium	7.5	7853	34.7
Low	8.4	7374	32.6
RDHS Phase			
RW4(2005)	10.5	9876	37.9
RW5(2010)	5.8	8575	32.9
RW7(2015)	3.9	7608	29.2
Health Sector Policy			
After policy intervention	4.9	16712	64.1
Before policy intervention	10.8	9348	35.9

4.3. Binary Logistic Regression Analysis of the Study

4.3.1 Logistic Regression Model for Predicting Infant Mortality, Health Sector Policy Model

The first model of the study called the health sector policy model which comprises the period variable as a predictor variable on infant mortality. The period variable has two main components that include the period before policy intervention and the period after the policy intervention. The health sector policy is strongly connected to infant mortality because of P-value = 0.000 < 0.05 as standard significance value. The R square is ranged between 0-1 and it designates the amount of the variance of the dependent variable that is accounted for explained by the explanatory factors, Here, Nagelkerke R square shows 2.9% of the infants decreased after the implementation of the health sector policy. R – Square Nagelkerke is 0.029 as the value had presented in Table 4.26

Table 4.26: Binary Logistic Regression Model for expecting Infant Mortality, Health Sector Policy Model

Variable and Categories	Significance Value	Odds Ratio	95% CI
Health Sector Policy	0.000	-	-
After policy intervention (RC)	-	1.000	-
Before policy intervention	0.000	2.341	2.128-2.577
R2 Nagelkerke	-	0.029	-
Constant	0.000	0.052	-

***Binary Logistic Regression Results of health sector policy model*

RC: Reference Category, CI: Confidence Interval and OR: Odds Ratio

The health sector policy variable described the impacts of the policy intervention on infant mortality in Rwanda within the period of 15 years. The result showed that infant mortality before policy intervention (OR=2 .341, 95% CI 2.128-2.577) was more likely to increase the number of children who died during the infancy period than the period after policy intervention. Conversely, after health policy implementation, there was a good achievement of promoting a child's health due to the improvement of health facilities and promotion hygiene between mothers and their children.

4.3.2 Logistic Regression Model for Expecting Infant Mortality, Women's Empowerment Model

The second model, Women's empowerment as a core explanatory element of the study. It explores the impacts of women's empowerment on Infant mortality. It is strongly associated with Infant mortality with P-value equals to 0.000 (P-Value =0.000<0.05). R-square shows a model summary through the results of displaying the fitting line that could determine the perfect relationship between variables. R square is 0.094.

Table 4.27: Binary logistic regression model for expecting infant mortality, women's empowerment model

Variable and Categories	Significance Value	Odds ratio	95% CI
Women's Empowerment Index	0.000	-	-
High (RC)	-	1.000	-
Medium	0.000	1.304	1.147-1.482
Low	0.000	1.467	1.292-1.666
R ² Nagelkerke		0.094	-
Constant	0.000	0.062	-

***Binary Logistic Regression Results of the women empowerment model*

RC: Reference Category, CI: Confidence Interval and OR: Odds Ratio

The findings of women empowerment model demonstrated that Children had born to the women who belonged in medium women's empowerment index group had 1.304 times as the odds ratio (OR=1.304, 95% CI 1.147-1.482) of being exposed to infant mortality than the children of highly empowered women (High women's empowerment index). Similarly, the likelihood of infant deaths for less empowered women 1.467 (OR=1.467, 95% CI 1.292-1.666) was greater than medium empowered women (OR=1.304 and 95% CI 1.147-1.482). Correspondingly, the children of less empowered women (OR=1.467, 95% CI 1.292-1.666) had a high risk of dying during the infant period than children of highly empowered women (Table 4.27). Women's empowerment is statistically related to infant death which intervenes in promoting the social life of the people specifically women as the way for describing their ability and capability for endorsing maternal child's health in addition to sustaining the health of the population.

4.3.3 Logistic Regression Model for Expecting Infant Mortality, Final Model

The third model as classified as the final model of the study includes the set of variables such as bio-demographic, socio-economic, environmental, media exposure, health care, and nutrient deficiency, health sector policy, and women's empowerment index as independent variables on infant death. The core objectives of this model to control the impacts of explanatory variables on Infant Mortality in Rwanda through the results. R^2 Nagelkerke equal to 0.220 in terms of percentage of 22.0% for all final model variables explore the impacts of declining infant mortality in Rwanda (Table 4.28).

Table 4.28: Binary logistic regression model for expecting infant mortality, for final model women empowerment and health sector policy variables added

Variables and Categories	Significance Value	Odds Ratio	95% CI
Women's empowerment Index	0.024	-	-
High	-	1.000	-
Medium	0.083	1.136	0.983-1.313
Low	0.006	1.224	1.058-1.415
Health Sector Policy	-	-	-
After policy intervention (RC)	-	1.000	-
Before policy Intervention	0.000	1.928	1.641-2.265
R ² Nagelkerke	-	0.220	-

The results of women's empowerment and health sector policy in the final model under control of other explanatory variables demonstrated that there is important impacts of proximate variables on determining the survival status of the infant. The women's empowerment is significant, results showed that less empowered women had a greater (OR=1.224, 95% CI 1.058-1.415) of infant death than medium empowered women (OR= 1.136, 95% CI 0.983-1.313).The women empowerment is essential component for promoting mother and child health through having rights in access and control households assets, decision making and improving women's access to labour force like creating job opportunities.

The findings found that before the policy intervention had 1.928 times (OR= 1.928, 95% CI 1.641-2.265) higher likelihood of infant mortality than after policy intervention period which indicated that health sector policy implementation had played important role in declining infant death in the country, and also health sector policy is statistically associated to infant mortality (p-value= 0.000<0.05).

Table 4.29: Binary logistic regression model for expecting infant mortality, for final model bio-demographic variables added

Variables and Categories	Significance Value	Odds Ratio	95 CI
Sex of household head	-	-	-
Male(RC)	-	1.000	-
Female	0.061	1.170	0.993-1.379
Sex of child	0.000	-	-
Male(RC)	-	1.000	-
Female	0.041	0.890	0.795-0.995
Age at first birth	0.329	-	-
Under18(<18) (RC)	-	1.000	-
18 -34	0.186	0.907	0.786-1.048
35 +	0.609	1.302	0.474 -3.579
Birth order	0.319	-	-
1(RC)	-	1.000	-
2	0.694	0.962	0.793-1.167
3	0.739	0.965	0.780-1.192
4	0.259	0.877	0.698-1.102
5	0.263	0.868	0.677-1.112
6+	0.490	1.073	0.879-1.309
Birth Interval (Months)	-	-	-
Less than 24 months (RC)	-	1.000	-
More than 24 months	0.000	0.609	0.531-0.699
Types of child's birth			
Single birth (RC)	-	1.000	-
Multiple births	0.000	4.003	3.171-5.052
R ² Nagelkerke	-	0.220	-
Constant	0.061	1.921	-

The bio-demographic variables (sex of household head, sex of the child, and maternal age at first marriage, birth interval, birth order and types of childbirth) results were presented into infant mortality binary logistic regression, as shown in Table 4.29.

The findings of sex of household head variable showed that female household heads had (OR=1.170, 95% CI 0.993-1.379) a greater likelihood of infant death than male household heads and female household head is not statistically related to infant mortality (p-value= 0.061>0.05). The reasons are male household heads are more responsible for providing all basic needs for their household members to sustain good health care conditions. The sex of the child variable is statistically significant to infant mortality, Female children had 0.890 times (OR=0.890, 95% CI 0.795- 0.995) lower chance of infant deaths than male children.

The woman's age at first birth variable, the results found that infant mortality for mother aged above 35 (35⁺) was 1.302 times (OR=1.302, 95% CI 0.474-3.579) higher than those who aged under 18 and the children who had born to the mothers who aged 18-34 had 0.907 times (OR= 0.786-1.048) a low chance of being exposed to infant mortality than the children who had born to the mothers who aged under 18.

The result of birth order, the reference category is the first birth order compare to others up to 6⁺ (Sixth and above). It observed through the result of the variable, mothers who had more than sixth as birth order category had the greatest likelihood 1.073 times (OR= 1.073, 95% 0.879-1.309) of infant mortality compared to other groups and fifth birth order has the lowest odds ratio 0.868 (OR=0.868, 95%CI 0.677-1.112). The association of birth order and Infant death is not slightly significant due to P-value which is equaled 0.319< 0.05 and as the reality for theoretical expectations. In other words, second, third, fourth and fifth birth order is not significant however their odd ratios value are higher compared to fifth birth order. Odds ratios are 0.962times, 0.965 times and 0.868 times for second, third and fourth respectively.

As seen in Table 4.29, for birth interval variable consists of two components; less 24 months (short birth interval) as the reference category and more than 24 months (long

birth interval). The birth interval variable is strongly correlated and its groups also are significantly based their P-value ($P = 0.000 < 0.05$). More than 24 months group of the birth interval have comparatively low risk 0.609 times (OR= 0.609, 95% CI 0.531-0.699) than less than 24 months category for increasing infant deaths. The results of types of child's birth demonstrated that multiple birth group has a greater chance of 4.003 times (OR= 4.003, 95% CI 3.171-5.052) of increasing infant mortality than a single birth. The multiple birth type is statistically significant P-value =0.000<0.05.

In Table 4.30 shows the binary logistic regression results of the socio-economic variables presented in the following ways where the Region variable comprise five regions include the City of Kigali (Reference category), South, West, North, and East. The results had found that the children who had lived in the West region had 1.053 times the lowest likelihood of infant mortality compared to all regions except the City of Kigali as the reference category. West region is a region that is known for the rich in terms of food, cattle keeping, and close to Lake Kivu where fishing is one of the occupations of the people who live in the west region. Therefore accessibility of milk, food, and fish (those are important in nutritional support to children), as well as consistent mother care, could be the reasons why infant mortality in the West region to be lowest compared to other regions.

East region has 1.605 times (OR= 1.572, 95% CI 1.120-2.206) greatest odds ratio of the children who were exposed to infant mortality compared to other regions. South and North regions raised the likelihood of infant deaths by 1.362 and 1.332 times respectively compared to the City of Kigali. Consequently, cities or towns have estimated to have better health facilities which could contribute to declining of infant mortality more than other places of the country. Generally, the region is statistically significant to infant mortality due to P-value is less than 0.05 (P-value =0.000). North and East are significant to expect South and West regions are insignificant. Therefore the effects were regular with regional distinctions in infant mortality initiated in Kenya (Madise, Banda & Benaya 2003).

Table 4.30: Binary Logistic Regression model for expecting Infant Mortality, For Final model Socio-economic variables added

Variables and Categories	Significance Value	Odds Ratio	95 %CI
Region/ Provinces	0.001	-	-
City of Kigali	-	1.000	-
South	0.065	1.362	0.981-1.892
West	0.783	1.053	0.730-1.519
North	0.126	1.332	0.923-1.924
East	0.009	1.572	1.120-2.206
Religion	0.771	-	-
Catholics(RC)	-	1.000	-
Protestants	0.183	1.088	0.961-1.233
Eglise du 7 ^{eme} Jour (SDA)	0.603	1.048	0.877-1.253
Muslims	0.942	1.017	0.642-1.612
The place of Residence	0.000	-	-
Urban(RC)	-	1.000	-
Rural	0.030	1.260	0.996-1.595
Household Wealth Index	0.003	-	-
Poorest(RC)	-	1.000	-
Poorer	0.014	0.809	0.683-0.958
Middle	0.001	0.746	0.625-0.890
Richer	0.856	0.984	0.825-1.173
Richest	0.272	0.873	0.685-1.113
R ² Nagelkerke	-	0.220	-
Constant	0.061	1.921	-

Religion variable consists of four groups of the religion those are Catholic (Reference category), Protestants, Eglise du 7^{eme} Jour (Seven Day Adventists) and, Muslims. The Muslim's women had experienced the lowest odd ratio (OR=1.017, 95% CI 0.642-1.612) of infant deaths compared to other religions. Protestants and Eglise du 7^{eme} Jour increased the risk of infant mortality by 1.088 and 1.048 times correspondingly compared to the Catholic religion. Religion is not statistically associated with infant mortality (P-value =0.771> 0.05) because of people's attitudes and believes about their religion and also its categories are not statistically significant to infant mortality.

Place of residence variable includes urban as the reference category and rural areas, the results showed that the likelihood of infant mortality in rural areas is 1.260 times (OR=1.260, 95% CI 0.996-1.595) higher than the infant mortality likelihood in urban areas. Conversely, the rural area is statistically significant at 0.030< 0.05. Individuals who live in rural areas are usually facing challenges for retrieving health services on-time and poor living conditions. Therefore, there is a high possibility of raising their mortality risk (Banda & Benaya 2003).

The household wealth index variable consists of five groups; which are the poorest (reference group), poorer, middle, richer and richest. Overall, the household wealth index is statistically correlated to Infant mortality (P-value = 0.003<0.05). As the household wealth index grows, the likelihoods of infant mortality is getting low in addition to the access of basic human needs and affordable all health services in good ways tend to contribute to the reduction of infant deaths. The results found that middle group had the lowest odds ratio 0.746 times (OR= 0.746, 95% CI 0.625-0.890) of infant mortality compared to other household wealth indices but there is exception of Richer and richest group results has the highest odds ratios 0.984 and 0.873 respectively due to the standard items of recoding household wealth index variable may not be suitable to Rwanda's population living condition; the exception results occurred in discovering the impacts of households wealth index on infant mortality. As illustrated in Table 4.30, the poorest women had experienced the highest infant mortality odds ratio compared to other

household wealth indices because women who belong in the poorest group were not able to have the access to health facility during their pregnancy period and health care services for their new baby born (poverty).

Table 4.31: Binary logistic regression model for expecting infant mortality, for final model environmental variables added

Variables and Categories	Significance Value	Odds Ratio	95% CI
Sources of drinking water	0.112	-	-
Improved sources (RC)	-	1.000	-
Non improved sources	0.836	1.579	1.015-2.458
Toilet facility	0.117		
Improved/not shared facility(RC)	-	1.000	-
Non Improved /Shared facility	0.134	1.254	0.932-1.687
Types of cooking fuel			
Low polluting(RC)			-
High polluting	0.403	1.098	0.890-1.356
R ² Nagelkerke	-	0.220	-
Constant	0.061	1.921	-

In the Table 4.31 above, the results of environmental variables displayed that the source of drinking water and the type of toilet facility are not statistically significant to infant mortality. The source of drinking water results expressed that the likelihood of infant mortality for non-improved water users is 1.579 times (OR = 1.579, 95% 1.015-2.485) higher than those who used improved water sources. The type of toilet facility variable includes an improved facility (Reference category) and a non-improved facility. The result of type of toilet facility is not statistically correlated to infant mortality, the results designated that the odds ratio of households with non-improved facility such as no toilet

facility and bush or field was higher 1.254 times (OR= 1.254, 95% CI 0.932-1.687) than households which had improved facilities like flush toilet and pit latrines. The household sanitation level mother's sanitation could be diversely controlled by other factors. On the other hand, a greater possibility of death connected with the inefficiency of toilet facilities could be enlightened by unsanitary disposal of excreta and infection caused by elimination in the field for instance bushes and other open places (Gyimah2003). As stated before, this correlation was not statistically associated specifying that the dissimilarity could have just been out of chance.

The type of cooking fuel comprises two components, low polluting as the Reference category and low polluting. High polluting fuel is not significant to infant mortality because the significance value $p=0.403>0.05$ as standard P-value for knowing the association between variables. The result of high polluting had a greater odds ratio (OR=1.098, 95% CI 0.890-1.356) of infant mortality likelihood than low polluting fuel.

Table 4.32: Binary logistic regression model for expecting infant mortality, for final model partner's characteristics added

Variables and Categories	Significance Value	Odds Ratio	95% CI
Partner's education level	0.000	-	-
No education (RC)	-	1.000	-
Primary	0.001	0.805	0.707-0.917
Secondary	0.000	0.587	0.428-0.727
Higher	0.064	0.558	0.300-1.146
Partner's Occupation	0.001		
Non Agricultural sector(RC)	-	1.000	-
Agricultural sector	0.00	2.185	1.474-3.549
Do not work	0.001	2.287	1.396-3.419
R ² Nagelkerke	-	0.220	-
Constant	0.061	1.921	-

For Partner's characteristics, it consists of a partner's education level has no education level (RC). The children born to fathers with primary education level had 0.805 times (OR=0.805, 95%CI 0.707-0.917) lower likelihood of infant mortality than the children who had born to the fathers with no education level. Whereas the risk of infant mortality where the fathers had either secondary or higher education level was 0.587 and 0.558 times respectively lower than children for their fathers had no education level as the reference category. The results showed that the partner's education level is statistically significant to infant mortality (P-value =0.000<0.05) as seen in Table 4.32.

The occupation of the husband is an important core determinant in the way of defining the household standard of living in terms of income earning. The results showed that the husband who did not have any occupation, their children had 2.287 times (OR= 2.287.95% CI 1.474-3.549) higher odds ratio of infant death than children where their fathers had worked in agricultural sectors with odds ratio 2.185 (OR=2.185 95% CI 1.474-3.549). The partner's occupation is statistically associated with infant mortality due to P-value =0.001 >0.05 as illustrated in Table 4.32 above.

For health care and nutrient deficiency variables as seen in Table 4.33, Place of delivery variable includes homes as the reference category, public facility, and private facility. The results of binary logistic regression showed that women having birth at home experienced a greater odds ratio of infant deaths than those were having in public facilities with an odds ratio of 0.590 for decreasing IM. Place of delivery is also an important determining factor of infant death in Rwanda because it supports pregnant women and mothers can access health services include antenatal care services and immunization for children to contribute both mother's and child's health and it is statistically associated with infant mortality due to P-value =0.000<0.05.

Childbirth weight, the reference category of child birth weight is less than 2.5 kg (under average category) and more than 2.5Kg as the normal weight for the child at birth. The results found that children who had born with weight more than 2.5 kg had lower risk 0.792 times of infant mortality less than the under average category (less than 2.5 Kg) as

the reference category and they can adapt to the new life outside their mother's womb than underweight children. More than 2.5 Kg is not statistically significant to infant mortality (P-value $0.062 > 0.05$).

Table 4.33: Binary logistic regression model for expecting infant mortality, for final model health care and nutrient deficiency variables added

Variables and categories	Significance Value	Odds Ratio	95 %CI
Place of delivery	0.000	-	-
Homes(RC)	-	1.000	-
Public facility	0.000	0.590	0.511-0.682
Private facility	0.015	0.311	0.122-0.794
Child Birth Weight	-	-	-
Less than 2.5 Kg(RC)	-	1.000	-
More than 2.5 Kg	0.062	0.792	0.620-1.012
The status of Breastfeeding	0.000	-	-
Never Breastfeed (RC)	-	1.000	-
Ever Breastfeed	0.000	0.018	0.014-0.023
R ² Nagelkerke	-	0.220	-
Constant	0.061	1.921	-

The status of breastfeeding variable, which comprises of two categories ever breastfeed (Reference Category) and never breastfeed. The results demonstrated that the number of children ever breastfed had a lower likelihood of infant mortality 0.018 times (OR=0.018, 95% CI 0.014-0.023) than never breastfeed category. The important information describes through the analysis of this variable displayed that breastfeeding is statistically significant to survival infant status because breastfeeding helps the children to receive basic minerals and protein during breastfeeding period those minerals stimulate the children's immune system to fight against diseases.

Table 4.34: Logistic Regression model for expecting Infant Mortality, media exposure variables added

Variables and categories	Significance value	Odds Ratio	95% CI
The frequency of reading Newspaper or Magazines	0.000	-	-
Not at all (RC)	-	1.000	-
Reading newspaper or Magazines	0.004	0.770	0.655-0.906
The frequency of listening to the radio	0.062	-	-
Not at all(RC)	-	1.000	-
Listening to Radio	0.201	0.958	0.829-1.108
The frequency of Watching Television	0.000	-	-
Not at all(RC)	-	1.000	-
Watching television	0.747	1.056	0.855-1.245
R ² Nagelkerke	-	0.220	-

The results of media exposure variables demonstrated that the impacts of media exposure on infant mortality, for the frequency of reading newspapers or magazines is statistically significant to infant mortality; the infant who had born to woman who had access of reading newspaper or magazines has a lower odds ratio 0.784 times (OR = 0.770, 95% CI 0.655-906) of declining infant mortality than infants born to women who did not read any newspaper or magazines at all. The reference category for this variable as not at all reading newspapers or magazines has the greatest possibility for increasing infant mortality due to the limit of knowing the basic health information.

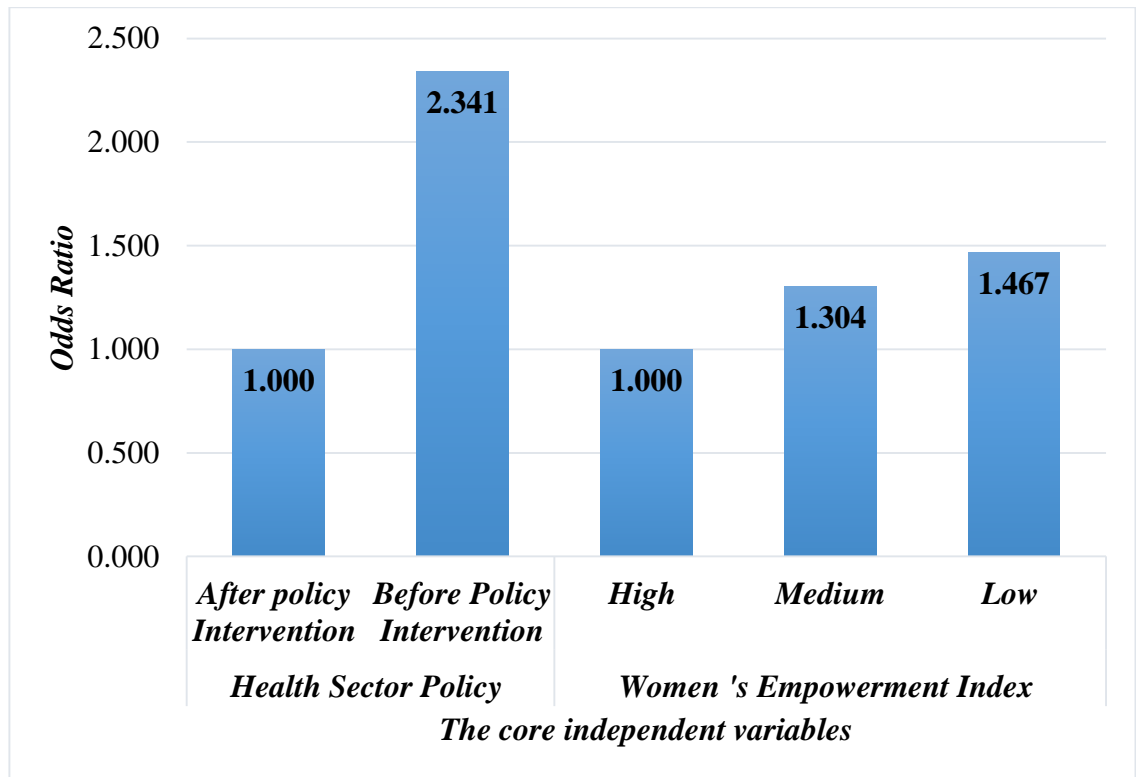
The frequency of listening to radio results demonstrated that variable is not statistically associated with infant death and the infants born to women who did not listen to Radio at all had higher odds ratio of infant deaths compared to infants born to women had access of listening to Radio (OR= 0.958, 95% CI 0.829-1.108).

The frequency of watching television variable, there is the extra exception of the result where it indicated that the women who had watched television, the odds of infant mortality was higher 1.056 times (OR = 1.056, 95% CI 0.855-1.245) than women did not watch television at all not all due to low number of the women who had television in their households and infrastructure development level was low in past decades.

Commonly, lack of information access through media is a great challenge of infant mortality among the population due to lack of basic information for promoting child survival especially different programs that have been established by the government or the institutions related to support the welfare of the population.

In summary, Figure 4.1 describes the impacts of health sector policy and women's empowerment components on infant mortality through the presentation of the odds ratio values without control other explanatory variables.

Figure 4. 1: Health sector policy and women's empowerment index



Source: Author's own estimation from the results of the study

Health Sector policy result presented on chart demonstrates that the period before policy intervention, the infant mortality was 34.1% higher than after the period of policy intervention that implies that the implementation of health policy played important role in promoting health status of the population in the country through establishing new programs for sustaining health of the population like training of Community Health Workers to support health care stakeholders as the measure for decentralizing health services to the people.

Women's empowerment defines the capacity and ability of the women in different ways through the transformation of social, political, economic and health status of them or the member community around them.

The results displayed that as the empowered women contribute the big share in reducing infant mortality, the less empowered women had experienced the highest percentage of infant mortality 46.7% compared to other women empowerment group also of medium empowered women with is the proportion of 30.4 %.In other words, the likelihood of infant mortality was higher in less empowered women than the medium empowered women with their respective percentage of 46.7% and 30.4 %.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

As the key elements of this study are women's empowerment and health sector policy through exploring their impacts on infant mortality. Women's empowerment is essential determinant through the transformation of the social life of the women and improving their capacity and ability based on control and access the resources, stimulating their knowledge, information, ideas and also support in creating a decision in their household, society, community to have authority.

Health sector policy is action or plan which is designed by the public institution like government or other institution linked to promoting and sustaining the welfare of the population.

Rwanda had the lowest infant mortality ratio 32 per 1000 live births among all EAC countries and also it is the only country that had achieved Millennium Development Goal 4 (Reduce child mortality) for declining under-five mortality rate for the children by two-thirds (A.Y.Kitua, 2007).

World Population Reference Bureau Report (2017) showed that the infant death ratio reached 32 per 1000 live births; it showed that the good achievement of MDG4 which aims to reduce child mortality. This shows the country's target had achieved, through the comparison between past decades and the current moment, Rwanda has a low infant mortality rate than in past decades. The Rwandan government had implemented the programs and activities which play a significant contribution in promoting the welfare of the human being. Therefore, improvement of a child's health through training health community workers who are responsible to help mothers and their children to sustain their health status contributed to a big proportion of declining child mortality in Rwanda.

There are various studies that have worked on infant mortality in relationship with demographic or medical aspects but women's empowerment and health sector policy did not be used in a certain study to determine their impacts on infant death. The main objective of the study is to explore the impacts of health sector policy and women's empowerment on infant mortality. As the previous context listed above shows that not enough research occurred in social science methodologies or social life disciplines such as health sector policy and women's empowerment as an element of the study in the way of assessing their impacts on infant mortality. The special difference of this research is that it focuses on the theoretical framework which developed from bio-demographic, socio-economic, environmental, health care and nutrient deficiency, media exposure and partner's characteristics those could take indirect or direct effects on infant mortality, the most important analytical framework on infant mortality is Mosley and Chen Framework (1984).

This study aims to discover the impacts of health sector policy and women's empowerment on infant mortality in Rwanda, subsequently, the result information was from three main standards Rwanda DHS 2005/2010/2015. The distribution of Mosley and Chen framework variables to support the study to classify the determinants in different groups include bio-demographic, socio-economic, environmental, health care and nutritional deficiency media exposure and partner's characteristics.

The binary logistic regression in the analysis of the study. The infant death as a dependent variable that works under control of independent variables which are necessary to determine the net impacts of women empowerment and health policy on infant mortality.

Chapter 4 consists of three main sections of the results for the study comprises early mortality in Rwanda, descriptive and multivariate analysis. The computation of early mortality rates in Rwanda, the descriptive analysis demonstrates the percentage distribution of infant mortality, women's empowerment and health sector policy to the other proximate determinants focused on datasets from Rwanda DHS 2005/ 2010/ 2015.

Firstly Computation of early mortality rates include NNR, PNNMR, IMR, CMR and U-5M5 by using the data from three main standards Rwanda DHS 2005/2010/2015.

Secondly descriptive analysis, the percentage distribution of infant mortality under six blocks of independent determinants; bio-demographic, socio-economic, environmental, health care and nutrient deficiency, media exposure, and partner's characteristics.

Briefly, infant mortality is a greater less empowered woman who was unable to find the basics needs of their children also with the proportion of infant death during the period before policy intervention was also high.

The third section of Chapter 4 covers the binary logistic regression of the study to evaluate the impacts of women empowerment and health sector policy on infant mortality without control of explanatory variables and under control of explanatory variables for assessing the risk effect of those elements in an additive way.

The binary logistic regression consists of three components of the models as health sector policy, women empowerment and final model of the study which includes all explanatory variables of the study.

Firstly, the findings demonstrate the impacts of health sector policy on infant mortality without control of other explanatory variables. The health sector policy is statistically significant ($P\text{-value} = 0.000 < 0.05$) with infant mortality. The findings presented that before policy implementation, the likelihood of infant deaths was higher 2 times ($OR=2.341$, 95 CI 2.128-2.577) than after health policy implementation. The implementation of health policy is important because it supports the health stakeholders to prevent some health difficulties such as low immunization coverage for children which affects a child's health and also preventing some infectious diseases like malaria which is common in most countries from tropical areas.

Secondly, the results demonstrate the impacts of women empowerment on infant mortality without control of other independent variables. The women empowerment is strongly significant to infant mortality and its categories were also significant. The less empowered women had experienced infant mortality of the children as the results from the binary logistic regression analysis. The children of less empowered women ($OR=1.467$, 95% CI

1.292-1.666) had a high risk of dying during the infant period than children of highly empowered women (Table 4.21).

Women's empowerment has a strong relationship to promote child survival due to women have the ability and capacity to participate in decision making for the household contribute to declining infant mortality equated to the women who are always eliminated to participate in the household's decision. According to Yypij & Shelah and Gupta (2001) stated that Women have a greater part to control and manage their own life and child's health which ultimately decreases infant mortality.

Maternal education level and women's occupation play essential role in declining infant mortality level because the children are more expected to have a higher possibility of survival due to access to all the basics needs for improving their lives. In other words, women's employment status has impacts on reducing the time for taking care of children and irregular duration of breastfeeding which could contribute to increasing infant mortality (Shresthal et al., 1998)

Thirdly, the final model of the study which consists of all sets of independent variables (women empowerment, health sector policy, bio- demographic, socio-economic, environmental, partner's characteristics, health care and nutrient deficiency also with media exposure variables).

All variables presented in the final model of the study by exploring their impacts on infant mortality. The binary logistic regression results of bio-demographic, socio-economic, media exposure, health care, and nutrient deficiency determinants found that there are great impacts of those variables on infant mortality because all explanatory determinants had shown clear additive effects on reduction of infant mortality. R- Square value is 0.220 for the final model of the study.

The partner's characteristics and environmental determinants had limited impacts on infant mortality within variables and the final model of the study based on the results of binary logistic regression. R-square of the model is the same value 0.220.

Finally, the results for impacts of health sector policy and women empowerment on infant mortality under control of six explanatory variables, bio-demographic, socio-economic, and environmental, partner's characteristics, health care, and nutrient deficiency also with media exposure variables. The binary logistic regression models presented in terms of determining the impacts of all explanatory variables on infant mortality found a strong relationship for the final model and additive effects of explanatory variables on infant mortality.

Summary, the important points cover conclusions of this study:

- The women empowerment variable demonstrated that less empowered women were highly experienced the greatest impacts on infant mortality in the binary logistic regression results.
- The health sector policy variable findings indicated that the great positive impacts on reducing infant mortality during the period of after policy implementation compared to the period before policy implementation in Rwanda
- Variables concerning socio-economic, bio-demographic, media exposure, health care, and nutrient deficiency determinants have a great high impact while the partner's characteristics and environmental determinants had limited impacts on infant mortality in binary logistic regression.
- The results of the study showed that children in rural areas were more likely to infant deaths than urban children in binary logistic regression also with the result of place of delivery displayed that the women who had birth at home had experienced high likelihood of infant mortality compared to women who had birth either in public or private health facilities. Breastfeeding is an important variable in terms of determining a child's health such as promoting child development either mentally or physically and increasing the immune system to fight against diseases of the child referred to results from logistic regression.

5.2 Recommendations

There are various measures of women's empowerment that would continue to contribute in the ways for promoting child health through the different activities of the government and social institution regarding the sustainability and capacity of the women.

5.2.1 Recommendations Related with Women's Empowerment

❖ Social institutions

The various departments occur in the social institutions, which could be able to capture and design the policies or plans regarding empowerment or raising the capacity of the human being such as education, political involvement, legacy and marriage decisions (kinship), informal work (economic activities), religious community (religion).

❖ Survey design about women's empowerment

In most institutions, the process of determining empowerment has been improved. This is most important to collect information through longitudinal research rather than to collect data at cross-sectional research meanwhile at only one point of time. Ever since empowerment is a progression (Rowlands, 1995), because cross-section research is not collect enough information related to empowerment due to empowerment is a progression which implies that longitudinal research is the best way for gathering empowerment information through different periods of the time.

For instance, where education is an essential factor to improve a personal's knowledge and skills. The cross-sectional research would not be a good method for conducting information on the education sector. The increase of women proportion who are educated over a certain period could demonstrate the good achievement of women's empowerment level through involvement in different events to sustain their living no need to depend on others.

Longitudinal research could afford a good quality of information and a more comprehensive valuation of empowerment. It is difficult to find the data for various

countries because different challenges include a long period during data collection and high cost connected with inadequate data due to those challenges.

❖ **Community organization and decision-making process**

The involvement of women in the community is important either informal or formal community. Community helps the women to raise their empowerment level through communicating between themselves, identification of their ability and capacity through different departments. For instance, non-governmental organization should encourage women to be educated and government institutions should participate to strengthen women's rights movements through joining politics, free female education, increasing female job participation. Through consolidating women are capable to have the power of accessing and control resources, the participation of decision making for the households and societies, knowing cultural norms and doing women's role in the specific community (Asthana, 1996).

❖ **Mutual Authority**

Access to and control over resources are the main elements for determining the empowerment level between the individuals or various groups of the people to demonstrate to total freedom and the ability for what individuals can do. For example, distinguishing and performing on influence applied from household memberships are methods of Power-within. The different groups of individuals such as families, communities should initiate the portion of accessing and control of resources to the members of the community. For instance, in the family could combine the authority for controlling household wealth and property and might not be more dominant than only one individual to control the resources. The women from wealthy families could have greater opportunities to access all the basic needs such as money, health and food compare to women from poor families.

❖ **Understanding**

The kinship and inheritance could be either traditionally or legally well-defined through cultural norms and the variables related to determining the beliefs of the individuals in the surveys.

Women could take the capacity to specific real property like land, house and intangible property like laws, in other words, based on the cultural norms from different communities; women might proscribe the right of these properties and demand that women are possessed by men and also the heritage of these properties could be restricted to female or male participants depends on the cultural norms of the area. According to Rwanda context in terms of heritage linked to the right of the access and control of the property while in the DHS there were additional questions related to describe the ability of the woman in decision making for household and description of the heritage which is essential to show the women's empowerment in the country.

5.2.2 Recommendations Related With Health Sector Policy

This study demonstrated that the relationship of health sector policy and infant mortality is strongly significant in all models of the study which implies that the great importance of health policy implementation in reducing infant mortality.

- ❖ ***Improving access to health care services***: It is important to promote the health status of the population by providing support to people with low or moderate income in terms of health insurance. Health care payments are specific obstacles especially poor populations because they are more likely to live under the poverty line (Minimum amount of income to live an adequate standard of living). The improvement of delivery services and antenatal care services are necessary with addition of promoting accessibility to all pregnant women.
- ❖ ***Developing all basics skills to health care providers***: It is essential in serving good quality of health services which leads to reduce health problems within the community. Having enough skills and appropriate training support communication with patients or caregivers with sympathy and clarity.

- ❖ ***Raising awareness campaign*** about vaccination of children, control of infectious diseases, nutrition and hygiene in the community especially women which could improve their knowledge related to take care of children that would contribute to a child's healthy development.
- ❖ ***Importance of government in health development:*** Recognizing all information related to the health of the population is important to analyze individual health status. The health facilities would be responsible for collecting all the information from the patients such as health status, community health needs, and epidemiologic plus other health problems.
- ❖ ***The expansion of health policy:*** General decisions imitate a complete investigation of individual interest and health problems. Developing quality of decision making related to health is required to protect the most vulnerable groups of the population particularly young children, pregnant women, disable individuals and elders are most reflected. This recommendation is the most concern of public institution especially the institution related to promoting the welfare of the population.
- ❖ ***Safe motherhood policy :*** This recommendation based on the improvement of maternal health through reproductive health advocacy; improving the quality of maternal health services by providers; and innovating community health initiatives to remove barriers to skilled birth attendance/health facility deliveries by mothers in rural areas in addition with male involvement and support in the household, maternal and child home care practices, infant and child feeding, and communication between health providers and women/caregivers

Finally, we recommend prospective studies to search the link between health sector policy and women empowerment as such interventions in the reduction of infant mortality and subsequent maternal and child health indicator in low income countries because the variables used to create women empowerment index are related to infant mortality,

followed by the study about challenges and problems facing the maternal and child's health in Rwanda.

5.3 Limitation of the Study

The limitations of this study are as follows;

First, the methodology used to data collection of the survey is not comprehensive, the study analysis did not consider some proximate variables of infant mortality well-defined in the conceptual framework subsequently the data lacked some measures on them like personal illness control as indicators on nutrition collect information available at the specific time of the survey. Therefore, the study focused on variables available from the data sets of the survey.

Second, the limitation of misreporting for the birth history data, especially those who died during the infancy period meanwhile they spent a short time after birth. This is because the recording is done retrospectively meanwhile it considers only information on the child who was born before the interview date. To this end only live births in the last five years before the survey were considered to decrease the recall bias and misreporting cases.

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