DEMOGRAPHIC AND SOCIO-ECONOMIC FACTORS ASSOCIATED WITH INFERTILITY AMONG MARRIED WOMEN IN ZAMBIA

By

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DECLARATION

I, CHITANDA RHODWELL hereby declare that this dissertation;

(a) Represents my work;

(b) Has not previously been submitted for a degree or any other academic qualification at this or any other university; and

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APPROVAL

The dissertation of CHITANDA RHODWELL is approved as fulfilling part of the requirements for the award of the degree of Master of Arts in Population Studies by the University of Zambia.

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ABSTRACT

Infertility is becoming a major public health concern because it affects one's mental well-being, disrupts social bonding, lowers economic productivity for all those affected and erodes self-confidence (Dick et al., 2003). Despite the conspicuous prominence of many issues affecting women in the global development agenda, primary infertility has not been prioritized by gender activists. It is still covered by a social veil and therefore little is known about the critical demographic and socio-economic factors associated with it. Menning (1980) asserted that infertile women are invisible in society and they do not know how to contact each other. This demonstrates that even though infertile married women have not come out in the open to seek support, they carry the burden of social stigma and sometimes economic marginalization. The study investigated demographic and socio-economic factors associated with infertility of married women in Zambia. This study analyzed raw data from four Zambia Demographic Health Surveys (ZDHS) of 1992, 1996, 2001-2 and 2007 provided by MEASURE DHS. Findings indicate that infertility prevalence in Zambia declined from 2.22% in 1992 to 1.31% in 2007. Further, the study established that age, and type of residence (rural or urban) are closely associated with infertility ($P<0.05$). Women aged 25-29 are more likely to report failure to conceive compared to those in other age groups ($P<0.05$). Thus women in their prime reproductive age and have primary or no education are more likely to report higher infertility than their counterparts in different age groups. The study further found out that a woman's HIV status is not associated with infertility ($P>0.05$) unless the woman was from an urban area ($P<0.05$). Results further show that infertility is not associated with gender-based violence ($P>0.05$). Based on these results, it is recommended that more research on the causes and effects of primary infertility should be conducted.

DEDICATION

To all infertile married women in Zambia. I salute you for your ‘psychosocial’ stamina to withstand and live with your condition amidst heavy cultural stigma. I pray to God that your day of bliss will come soon.

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This dissertation is a fruit of many people's contributions and some of them deserve special mention. With profound humility, I acknowledge the technical mentorship of my supervisor Prof. J.R.S. Malungo. He guided me through the academic maze without losing sight of my goal. He painstakingly read through every word in my proposal and in this dissertation and helped me to adhere to highest expected academic standards. I also thank all my lecturers in the Department of Population Studies for their constructive criticism during my proposal presentation.

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ACRONYMS

CI	Confidence Interval
CSO	Central Statistical Office
GBV	Gender Based Violence
HIV	Human Immunodeficiency Virus
MDG	Millennium Development Goals
MEASURE	Monitoring and Evaluation to ASsess and Use REsults
MCP	Multiple Concurrent Partnerships
MOH	Ministry of Health
OR	Odds Ratio
SPSS	Statistical Package for Social Sciences
STDs	Sexually Transmitted Diseases
STIs	Sexually Transmitted Infections
TFR	Total Fertility Rate
VAW	Violence Against Women
WHO	World Health Organization
ZDHS	Zambia Demographic Health Survey
ZNBC	Zambia National Broadcasting Corporation

CHAPTER ONE: INTRODUCTION AND BACKGROUND

1.0 Introduction

The global picture of infertility is not available partly due to the difficult in defining the problem. The inconsistencies are compounded by stark differences between clinical and demographic definitions. Mascarenhas et al (2012), pointed out that clinical definitions are oriented towards early detection of individual patients with the aim of starting treatment while the demographic definition attempts to measure infertility on a population level so that there is clear understanding of the magnitude, distribution and trends of the infertility problem.

By definition infertility is a fluid concept and is therefore difficult to define without putting it into context because different scholars define it differently. From the clinical point of view, primary infertility is defined as the inability to become pregnant or conceive after 12 months of unprotected sexual intercourse (Mazor & Simons, 1984).

The definition by Wikipedia[1] acknowledges that infertility differ depending on one's orientation, "with demographers tending to define infertility as childlessness in a population of women of reproductive age, while the epidemiological definition is based on "trying for" or "time to" a pregnancy, generally in a population of women exposed to a probability of conception." In demographic studies which estimate the prevalence of infertility, it is common to use a period of five years[2]. However, there are practical measurement problems no matter which definition is used, because it is difficult to measure *continuous exposure* to the risk of pregnancy over a period of time. Therefore, it is clear that existing definitions of infertility lack uniformity, rendering comparisons in prevalence between countries or over time problematic. Therefore data estimating the prevalence of infertility differ significantly. However, Larson and Hollos, (2004) found that primary infertility was generally low in the Sub-Saharan Africa and hardly exceeds 3% in 28 countries that he analyzed.

[1] http://en.wikipedia.org/wiki/Infertility
[2] http://www.who.int/reproductivehealth/topics/infertility/DHS-CR9.pdf

On the other hand, secondary infertility is a woman's inability to give birth after at least one successful birth. This is the most common type of infertility in sub-Saharan Africa with prevalence rates ranging from 5% in Togo to 23% in Central African Republic for women in age group 20-44 (Larson and Hollos, 2004).

The World Health Organization (cited in Rowe, Comhaire, Hargreave & Mellows, 1993) states that a woman is considered to be infertile, if she reports that she had tried to get pregnant for at least 24 months (two years), she wanted a child, was not pregnant, not using contraception, not sterilized, not lactating and in a regular sexual union.

In this study, primary infertility was defined as follows: a woman who had been *married for not less than two years, she had no child and she had never used contraception.* However, and as indicated in Chapter Four, both two and five year marital durations were used on selected variables for analysis with a view to compare outputs.

It should be noted that the focus of this study was on women experiencing primary infertility as opposed to secondary infertility because it aimed to provide comprehensive analysis of the problem. Further, it is widely believed that social stigma and other forms of ridicule are more pronounced to women suffering primary infertility than their counterparts who have had a child before. Larson (2004) argued that the above situation is especially true in African societies where having children is very much valued.

1.1 Background

Infertility is becoming a major public health concern because it affects one's mental well-being, disrupts social bonding, lowers economic productivity for all those affected and erodes self-confidence (Dick et al., 2003). Researchers in Canada put it differently when they wrote: infertility has important implications for individual and public health (Bushnik et al., 2011). Thus the emotional, physical and financial costs borne by couples experiencing infertility can be substantial. In the recent past Bushnik et al., 2011 noted that there is a significant increase in the

use of assisted reproductive technologies which could be a signal of rising infertility levels. This growing concern about infertility in the world has prompted demographers, statisticians, epidemiologists and other public health activists to study the issue of infertility more closely.

In 2002, over 186 million women worldwide experienced problems conceiving (Bhattacharya et al., 2009). This figure was higher than previous estimates, suggesting a global rise in the prevalence of infertility (Farley, 1986, Rutstein and Shah, 2004). At the turn of the last century projections of infertility in the United States indicated a sharp upward trend over the next two decades (Stephen and Chandra, 1998) while data from Europe suggested that increasing numbers of couples were seeking assisted reproduction (Lutz and Qiang, 2002). There is widespread concern about the effect of contributory factors such as sexually transmitted infections like Chlamydia trachomatwas (Pal and Santoro, 2003; Karinen et al., 2004), deterioration in semen quality (Irvine et al., 1996; Karinen et al., 2004) and age-related decline in ovarian function in women (Gosden and Rutherford, 1995; Dunson et al., 2004) who choose to postpone childbirth (Bhattacharya et al., 2006; Goto et al., 2006).

In most African societies "the achievement of parenthood is regarded as the definitive goal for the attainment of the full development as a complete person to which all aspire" (Fortes, 1978, p. 125). Among the Ewe and the Ashanti, a man or woman who has no child was not considered fully adult and after death, they were not to be buried with the full adult funeral ritual (Fortes, 1978, p. 141). Among the Ekiti Yoruba of Nigeria (Ademola, 1982) and among the Aowin of Ghana (Larson, 2004), infertile women are treated as outcasts and their bodies are buried on the outskirts of town. A childless woman in the Ijo society of Nigeria (Hollos, 2003) and among the Tswana in Botswana (Suggs, 1993) cannot attain full adult womanhood by progressing through the stages of the life cycle which is predicated on having given birth.

Furthermore, the achievement of parenthood was evidence of virility and potency for a man and of femininity and a distinctive womanhood for a woman. "A woman becomes a woman when she is able to bear children; and continued childbearing is irrefutable evidence of continued femininity" (Fortes, 1978 p.141). In Sudan (Boddy, 1989) as well as in Egypt (Early, 1993 &

Inhorn, 1994), children are a source of power for women vis-à-vis men; and infertility threatens their power and social order.

Apart from these considerations for consequences for individuals, anthropologists stress that parenthood is also a fulfillment of fundamental kinship, religious and political obligations to the community, since the child "whose birth confers parenthood is born not only to its parents and into its family but also into a lineage, a clan, a community, to all of which its survival is of critical economic, juridical and religious interest" (Fortes, 1978, p. 126). Researchers also highlight that in African societies, children represent a connection to the ancestors and their birth represents a continuation of the family not only in physical but in religious terms. In a subsistence economy, they are also important in providing a labor force and economic success has been shown to be correlated with family size in that "it was the rich men who have large families and not the poor", for example among the Hausa (Hill, 1972).

It is not surprising, therefore, to find that across the continent of Africa infertile women seek treatment for their problem at a number of venues, both traditional and biomedical, often with a preference for traditional healers (Green, 1994; Gerrits, 1997; Kielman, 1998; Sundby & Jacobus, 2001). In addition to remedies primarily sought by individuals alone, some communities also offer mechanisms for dealing with infertility which include voluntary associations and cults that support women with infertility problems (Skramstad, 1997; McCurdy, 2000), thereby demonstrating community interest and involvement in the problem of infertility.

Makoba (2005) argued that regardless of the medical causes of infertility, in most cultures women suffer personal grief and frustration, social stigma, exclusion and, often, serious economic deprivation. They receive the major blame for reproductive failure and in many places infertility was a ground for divorce, causing a woman to lose access to livelihood or social belonging. She further underscored that women go through their married lives striving for motherhood, along with the sense of identity, achievement and status that comes with it. In this ideological context, women's decisions are not so much about whether or not to have children, but about when to have them, how many to have or at what point in their marriage to have them.

Therefore, realizing that having children may be hindered by reproductive failure comes both as a shock and as disbelief to infertile women.

It is for example, argued that delayed realization of an infertility problem can be attributed to the fact that women never expect or are never prepared for the possibility of being infertile in adulthood. As a result of the socialization process and guidance from parents who are role models, children are led to believe that they too will be parents one day and are never prepared for the possibility of not being able to have children (Needleman, 1987). As Menning (1980) put it, children are raised with the belief that they will be parents one day and they must therefore prevent the possibility of an illegitimate pregnancy. Therefore, some of these women grow up using contraceptives to prevent illegitimate pregnancies, and even when they are not falling pregnant earlier on in their lives, they do not identify it as a problem because they are either still growing up or they just assume that it was taking time for them to fall pregnant.

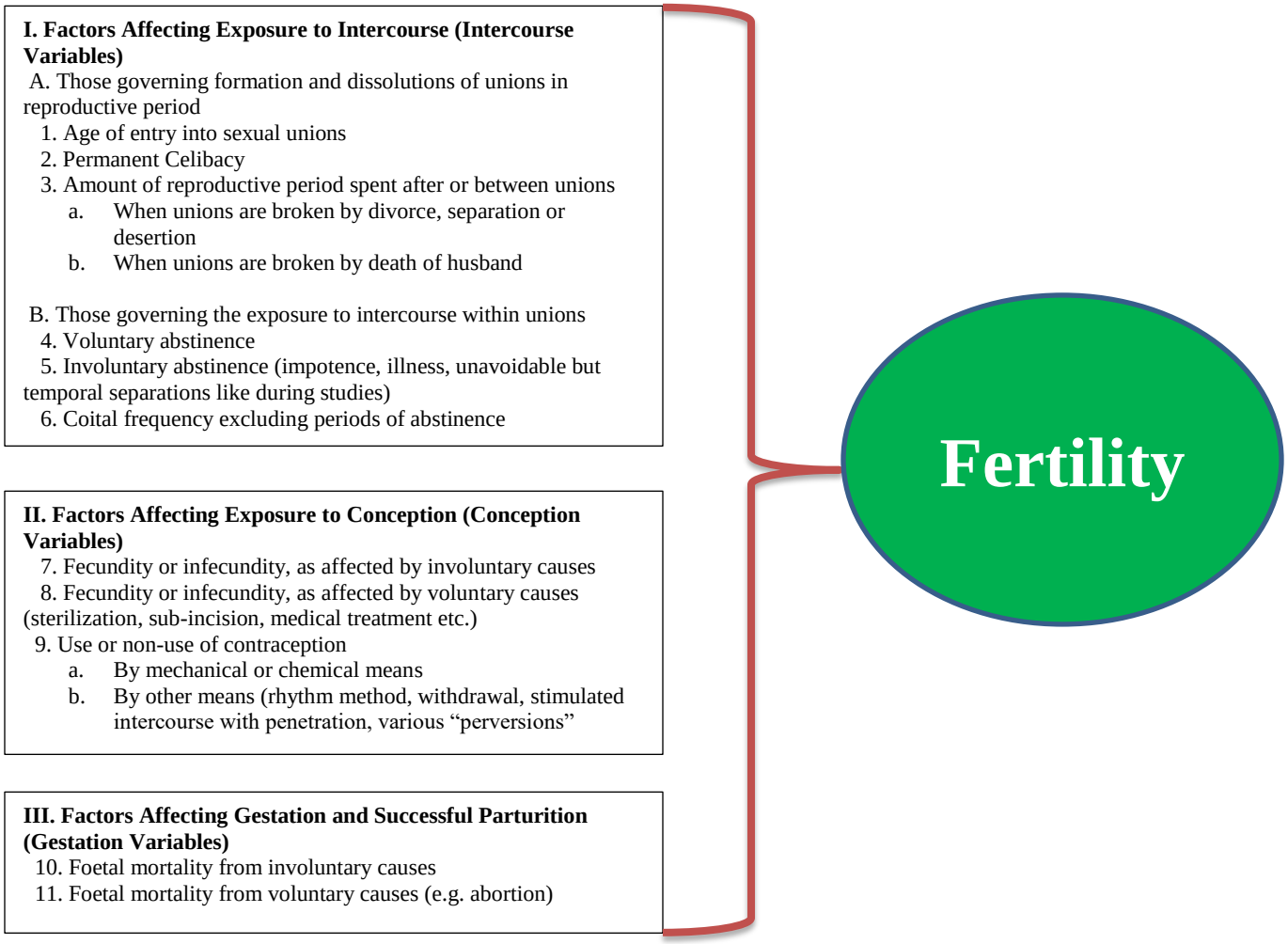
Given the above background and despite the elaborate literature on the effects of infertility on women, there is limited amount of effort by demographers regarding the analysis and isolation of demographic and socio-economic factors such as age, residence and education attainment which are associated with infertility in many countries. Among the few studies conducted on infertility, there is evidence that demographic and socio-economic factors are associated with level and pattern of infertility. For example, some of the studies cited in the literature review section highlight some demographic and socio-economic factors associated with infertility[3]. For example, Safarinejad (2007) found that infertility increased with age and he noted that there was a pronounced regional pattern in the levels of infertility. Dhont et al. (2010) study demonstrated that HIV infection was associated with infertility because men in infertile relationships more often reported multiple concurrent partners. Similarly, Favot et al. (1997) also found that HIV infection was associated with infertility when they wrote that infertile women have higher HIV prevalence and higher exposure to sexually transmitted diseases. Further, McCloskey, Wereiams and Larsen (2005) pointed out that infertility was associated with gender-based violence when they wrote that the likelihood of violence was elevated if the women had problems conceiving.

[3] See details of these studies in the literature review section

1.2 Theoretical Framework

There is no specific theory on infertility but there are notable frameworks on fertility such as the Davies and Blake's Intermediate Variables of Fertility and Bongaarts' Proximate Determinants Model. Since infertility can be termed as the reverse of fertility, the identified frameworks above are to a large degree useful in the analysis of infertility. The most appropriate theoretical framework to this study was the Davies and Blake's Fertility Model (Davies and Blake, 1956). This framework postulates that fertility is largely a function of social structures arising from the interplay of cultural and economics processes. Figure 1 below summarizes Davies and Blake's fertility model.

Figure 1.1: Davies and Blake's Fertility Model: An Analytical Framework of Intermediate Variables of Fertility



As can be seen from Figure 1.1, the Davies and Blake Framework helps analysts to understand the different elements which affect fertility either positively or negatively. In a way, the framework also identifies some factors associated with primary infertility particularly with reference to involuntary causes such as numbers 7 and 10 in the model.

However, the reader should understand that infertility has no theory of its own. As such, contextual analysis is required. The above framework describes elements required for fertility to take place. From the theory, it can be observed that the category of women selected for this study meet all necessary conditions for fertility but they still cannot reproduce. This entails that there are other factors that can explain their infertility. Since this study focuses on primary infertility as opposed to fertility, the above framework does not exhaustively address all factors associated with infertility. In addition, this study made an assumption that HIV/AIDS and gender-based violence were associated with primary infertility. These two variables are not part of the framework above. Nonetheless, it suffices to say that gender-based violence is a social construct and as such, it somehow fits into Davies and Blake's arguments that fertility is affected by social structures.

Due to the shortcomings of the Davies and Blake framework, it was important for the author to diagrammatically relate different realities that affect infertile women in a conceptual framework (See Figure 1.2 for details). The conceptual framework shows that there are different complex and interrelated factors that affect infertile married women in societies.

Understanding of these factors requires a holistic and coordinated analysis about their individual effect and how they interplay among themselves before manifesting into psychosocial or economic trauma. For example, educated women are likely to delay child bearing due to school commitments. Due to their economic status, educated women have access to contraception and have better health seeking behavior thereby prolonging their stay in school. Because they pursue careers for a long period, educated women do not prioritize child bearing until in their late twenties or early thirties. This makes them unaware of fertility complications that they may have, which sometimes results into childlessness. Educated women's fertility may also be affected by

their demanding careers which exert lots of pressure on their mental and physiological state thereby affecting their fecundability. Demographic factors such as age and type of residence may affect fertility depending on exposure to factors which cause infertility such as STIs. For age, it is clear that the older someone gets, the less the chance of falling pregnant. From this perspective, education and age are related and both can affect a woman's fertility. It should be noted that the age variable in the conceptual framework is a bit different from age of entry into sexual unions discussed in the Davies and Blake model. Whereas Davies and Blake focused on age of entry into sexual unions, the conceptual framework focuses on age throughout the reproductive period for women who already entered into sexual unions.

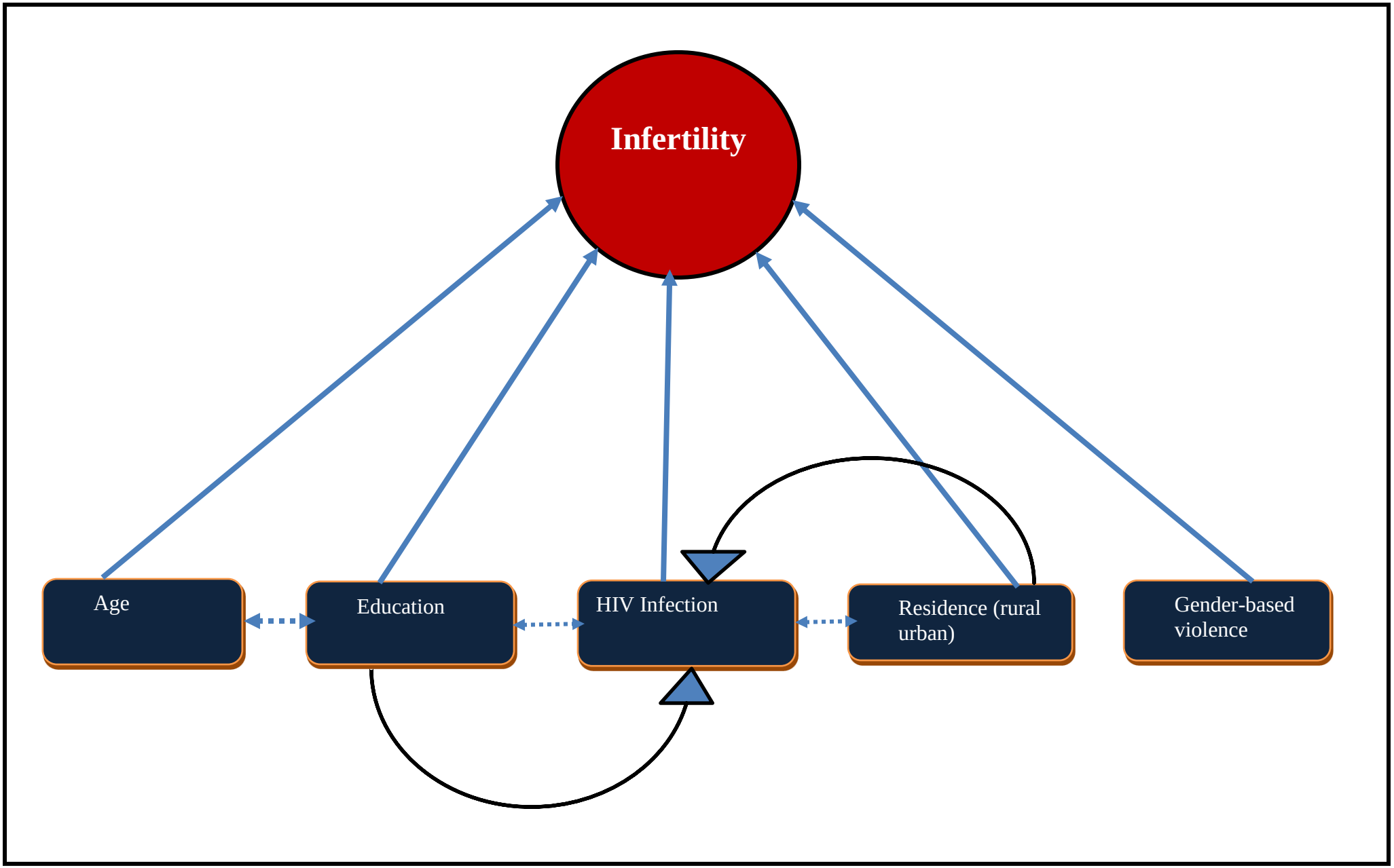
Residence (urban or rural) is likely to influence one's HIV status due to certain conditions present in either urban or rural areas. Equally, education is likely to influence one's HIV status as depicted in Figure 1.2. All factors in the framework should be examined holistically before making conclusions about infertility.

Social cultural factors include gender-based violence which is a socially construed phenomenon. Gender-based violence may cause infertility, especially secondary infertility and widespread psychosocial suffering because women subjected to violence cannot be expected to maintain a normal reproductive system. This is mostly due to stress arising from mental torture and public ridicule. In this conceptual framework, the other factor that affects fertility is HIV infection and other STIs. The author assumed that infertility is higher in married women if they are unable to bear children because their spouses are more likely to have extra-marital affairs in a bid to father children outside wedlock.

The resultant effects of infertility may include economic destitution, poverty and stigmatization leading to low self-esteem and psychosocial trauma. Further, infertile women may just feel a sense of helplessness at their inability to enjoy 'normal' womanhood which may be depressing to their self-worth and could affect their concentration at work and may further degenerate into poverty if they are dismissed from employment. Regardless of their age, education or geographic location infertile married women all suffer similar consequences (Larson & Hollos, 2004). Some

of the infertility implications mentioned here are beyond the scope of this study but they demonstrate the significance of this study.

Figure 1.2: Conceptual Framework: Demographic and Socio-Economic Factors Associated with Infertility



1.3 Statement of the Problem

The importance of marriage and child bearing in the Zambian society cannot be overemphasized. More importantly, it is considered that the bedrock for a successful marriage lies in the woman's ability to bear children. Therefore, the importance of marriage in many cultures is equated to the importance of having children. Couples that are unable to bear children are subjected to stigma which in turn affects their social and psychological well-being. The spiral effect of low self-esteem may result into poor economic engagements and later poverty with potential to run several generations in the family. Therefore, infertility is a major public health issue which deserves more attention.

Anecdotal evidence arising from discussions with friends, family members, professionals in the field as well as colleagues in work places indicate that infertility affects a considerable number of Zambians particularly women but little is known because no research exists on it. Its effects may be deep and widespread but unknown. It is also likely that primary infertility may drive couples into having multiple concurrent partnerships (MCP) and consequently fueling STIs, including HIV because husbands think that by trying out with other women, they have a chance of becoming a father.

The Ministry of Health (MOH, 2008, p.17) National Reproductive Health Policy states that "the rates of infertility in Zambia are not known. Nevertheless, gauging from the prevalence of STIs alone, it is estimated that both primary and secondary infertility rates are high". Further, the policy noted that infertility "…affects both men and women in approximately equal proportions and causes considerable personal suffering and disruption of family life". Even though the policy clearly notes that infertility is a problem it does not provide any demographic and socio-economic factors which are associated with it.

On the news clip aired on Zambia National Broadcasting Corporation (ZNBC) on 10th January 2013 and reported by Effie Mpande, it is was said that infertility is a public health concern. Both Dr. Maximillian Bweupe, Deputy Director of Reproductive Health and Dr. Bellington Vwalika, Head of Reproductive Health Unit acknowledged that infertility has disruptive social effects and

that government is streamlining interventions to help childless couples. The demographic and socio-economic factors associated with infertility were not been discussed. In fact, there has been no study in the country which closely examined demographic and socio-economic factors associated with infertility. This study attempts to narrow the existing knowledge gap.

1.4 Significance of the Study

In many countries including Zambia, primary infertility is not considered a problem and therefore no substantial effort is directed towards understanding factors associated with it. Frank (1983) noted that although the phenomenon of extraordinary infertility in Africa has been documented and carefully studied in a few cases, the dimension of the problem on regional and national scale have been largely ignored. This statement still holds true for many countries and Zambia is not an exception. It is clear from the ZDHS reports that significant amounts of data analysis exist on fertility and its impact on demographic trends but data on infertility is scant and almost nonexistent in Zambia. For example, the 1992, 1996, 2001-2 and 2007 Zambia Demographic Health Surveys (ZDHS) and the 1980, 1990, 2000 and 2010 censuses only discuss levels, trends and patterns of fertility but do not discuss demographic and socio-economic factors associated with infertility. There is simply no analysis on primary infertility and its impact on the demographic structure. Primary infertility should be studied because it may be associated with psychological distress, depression and low self-esteem for couples who want to have children.

This study was significant and relevant because it generated fresh knowledge on the subject which is relevant for further research. By understanding the demographic and socio-economic factors associated with primary infertility, researchers can shed light on the subject and help stakeholders devise better mechanisms of addressing the problem either using preventive or curative means. Further, this study was intended to spur discussions among demographers on best ways of estimating primary infertility from surveys and censuses given practical difficulties of data collection on the exposure to the risk of falling pregnant.

In addition, deeper understanding of demographic and socio-economic factors associated with primary infertility is important because infertility influences population dynamics. High

infertility levels may lead to population decline because many women will be unable to reproduce. At the same time, high infertility rates may lead to population increase due to general reluctance among women to initiate contraception for fear of jeopardizing future fertility. On the other hand, low infertility rates may lead to high population growth in the short term, stabilization in the medium term and decline in the long term (John Hopkins Bloomberg School of Public Health, 2006). These population dynamics are important for planning and should clearly be researched and understood by all actors in the country's development.

Primary infertility therefore interplays with other demographic and socio-economic factors such as age, education, residence, Gender-Based Violence (GBV) and HIV prevalence.

It is therefore important to document the magnitude, patterns and trends of the problem of infertility so that there is clear and consistent information which can help stakeholders to appropriately respond to the challenges that infertile couples go through. This study was significant because it provided information on the problem of infertility in Zambia.

1.5 Research Objectives

1.5.1 GENERAL OBJECTIVE

- To investigate demographic and socio-economic factors associated with primary infertility of married women in Zambia

1.5.2 SPECIFIC OBJECTIVES

1. To estimate primary infertility levels in Zambia
2. To establish demographic and socio-economic factors associated with infertility: (age, rural-urban, and level educational attainment)
3. To assess whether primary infertility is associated with gender-based violence (GBV).
4. To investigate whether primary infertility is associated with HIV infection

1.5.3 STUDY QUESTIONS

1. To what level is infertility a problem in Zambia?
2. What demographic and socio-economic factors are associated with infertility?
3. What research designs can clearly document the magnitude, distribution, and trends about the problem of infertility in Zambia

1.6 Dissertation Outline

This dissertation is organized as follows: Chapter 1 presents contextual information about the study. It presents background information, statement of the problem, conceptual framework, significance of the study and outlines research objectives. The subsequent chapters address different aspects of the study. For example, Chapter 2 discusses relevant literature or similar studies conducted by other researchers on the same subject. Chapter 3 explains the methodology used in this study while Chapters 4 and 5 are about findings and discussion respectively. Chapter 6 presents conclusions and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter outlines related studies conducted by researchers on the topic of infertility. Apart from reference to the Zambia Demographic Health Survey (ZDHS), the author did not come across any solid literature on primary infertility in Zambia. Therefore, the reader should note that the literature used is from other countries. Despite this limitation, the literature was sufficient enough to guide discussions and conclusions of this study. Further, it should be noted that the first part of this chapter focuses on the literature that explains the association of primary infertility to demographic factors. The second part presented literature that explain infertility's association with HIV infection while the subsequent part discusses literature in light of gender-based violence and primary infertility. The last part gives a conclusion of the chapter.

2.1 Infertility and demographic factors

Larsen & Hollos (2004) examined the ramifications of infertility and coping mechanisms in an African urban population with low fertility in the study conducted in Moshi, Tanzania, a multi-ethnic community with relatively high levels of education and a well-developed health services infrastructure. Of the 1,549 sexually active women 2.7% had never had a child in spite of trying to conceive for at least 2 years. Out of the 1,352 women who had previously had a child an additional 6.1% were subsequently infertile.

The most important finding from their qualitative analysis was that childless women were stigmatized and called names and had little respect in the community. They also found that in this community of mixed ethnic groups, beliefs about the causes of infertility and remedy seeking were mixed. They concluded that while most women have been informed about the western biomedical treatment of infertility, traditional beliefs persisted in explaining the problem and both western medical facilities and traditional healers were utilized for treatment.

Makoba (2005) found out that the longing for a child that women experience was something that no rational explanation can ever make sense of. Thus women have always been defined by events related to their reproductive functions – the experience of pregnancy, childbirth, parenting

and the eventual launching of their children into the adult world and preparing for grandparenthood. The expectation of married women to become mothers was seen as a normative or mandatory quality of womanhood in society.

Kumar (2007) examined socio-economic factors associated with infertility. This study was necessitated by the fact that the Khairwar tribe of India was dwindling due to infertility and migration. The results showed that prevalence of infertility of the study population was 33 (14.2%) out of 232 women. In the Khairwars, infertility was found in 23 (17.2%) significantly higher than in non-Khairwars - 10 (10%). He concluded that infertility prevalence was higher in the Khairwars compared with non-Khairwars. It was suggested that further study needs to determine the causes and necessary interventions.

Mohammad Reza Safarinejad (2007) explored the prevalence and risk factors of infertility in Iran. Data were obtained about their age, education, marital status, toxic habits, medical history, disabilities and illnesses, help-seeking, economy, ethnicity, geographic location, contraceptive use and age at which they had first intercourse. The study used the definition of childlessness proposed by World Health Organization: 'the woman has never conceived despite cohabitation and exposure to pregnancy for a period of 2 years. He found that the overall prevalence of infertility was 8% and there was a pronounced regional pattern in the levels of primary infertility. The prevalence of secondary infertility was 3.4%. He further found out that the prevalence of infertility increased with age. He recommended that even though the study provided a quantitative estimate of the prevalence and main risk factors associated with infertility in Iranian couples, there was need for further studies on the cause of primary and secondary infertility.

2.2 Infertility and HIV/AIDS

In relating HIV infection to infertility, Dhont et al. (2010) conducted a study at an infertility clinic of the Kigali Teaching Hospital in Rwanda between November 2007 and May 2009. Results showed that involvement in a secondary infertile relationship was associated with HIV infection after adjusting for socio-demographic covariates for women. Secondary infertile women were more likely to have engaged in risky sexual behaviour during their lifetime compared with primary infertile and fertile women. Men in primary and secondary infertile

relationships more often reported multiple partners in the past. The study concluded that increased HIV prevalence and risky sexual behaviour among infertile couples was driven by secondary infertility. It recommended that infertile couples, and especially those with secondary infertility, should be targeted for HIV prevention programmes and their fertility problems should be addressed.

Similarly, Favot et al. (1997) found that HIV prevalence was markedly higher among infertile women than among fertile women and concluded that women with fertility problems appear to have higher HIV prevalence.

2.3 Infertility and gender-based violence

McCloskey, Wereiams and Larsen (2005) explored the association between gender-based violence and infertility in the urban district of Moshi, Tanzania. They found out that the likelihood of violence in the past year was elevated if the woman had problems conceiving or had borne five or more children. They concluded that gender inequality within sexual unions was associated with intimate partner violence and they recommended that policies and programs that discourage men from blaming women for infertility promote monogamous unions and expand access to education for women.

2.4 Chapter Conclusion

Based on the above literature, this researcher noted that there are few studies that have specifically considered socio-economic factors associated with primary infertility. In addition, the data used were mainly collected through primary data collection techniques; thus data were either collected in a hospital setting or population-based surveys whose sampling and data collection methods may not have been robust enough because they were not nationally representative samples.

In contrast to studies above, this study analyzed data from the ZDHS which has a nationally representative sample and is relied upon by many stakeholders. The data quality in the ZDHS was guaranteed because there were many stakeholders that checked for quality and consistence in the entire research process. This gives ZDHS data better credibility over surveys conducted by

individual consultants in specific geographic areas of a country like was the case for some studies cited above. However, this study is similar to those discussed above in respects of quantitative analysis and its failure to focus on causes of primary infertility since it is only looking at factors associated with infertility.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This study analyzed data from four Zambia Demographic and Health Survey (ZDHS) of 1992, 1996, 2001-2 and 2007. Raw datasets were obtained from MEASURE DHS after seeking permission. See Appendix 1 for details on the process of acquiring datasets, merging and gender-based violence variables. The data management and analysis process involved reviewing ZDHS questionnaires on specific questions and variables that were considered important to this study. It should be noted that some variables were not captured in all survey periods. For example, the 2007 dataset is the only one where information on domestic violence was recorded.

Since the focus was on women, the variables were obtained from the ZDHS's **Woman's Questionnaire** in the following sections[4]:

- Identification (for residence variables)
- Section 1: Background (Question(s) 106-109)
- Section 2: Reproduction (Question(s) 201)
- Section 3: Contraception (Question(s) 304)
- Section 6: Marriage and Sexual Activity (Question(s) 601-602 & 615)
- Section 9: HIV/AIDS (Question(s) 917, 922)
- Section 12: Domestic Violence (Question(s) 1206A)

The following variables were used in the analysis

- Age group
- Educational level (no education, primary, secondary, higher)
- Residence (rural/urban and province)
- Marital status
- Marriage duration

[4] The listed sections are found in the 2007 ZDHS. Section numbers from other ZDHSs may not match those in 2007 ZDHS but they have same titles. For example, Section 9 in 2007 ZDHS may be Section 7 in 1992 ZDHS but the title (HIV/AIDS) remains the same.

- Never used Contraception
- Children Ever Born is Zero
- Domestic violence (assorted questions)
- HIV results

In the actual data sets, the variables are denoted as follows:

- Questionnaire Identification (caseid)
- Age group (v013)
- Province (v024)
- Rural/Urban (v025)
- Education Level (v106)
- Children Ever Born (v201)
- Ever used contraceptive method (v302)
- Marital Status (v501)
- Years in Marriage (v512)

The following formula illustrates how calculations were done:

$$\textbf{Proportion of Infertility}^{5} = \frac{\text{number of infertile married women 15-49}}{\text{Total number of married women 15-49}} \times 100$$

Given that use of assisted reproductive technologies are on the rise globally, this study made an assumption that infertility may equally be increasing in Zambia.

The proportion of women experiencing domestic violence was calculated using a compound variable. The variable was a combination of all **yes** responses to any question on domestic violence. See Appendix 1 for actual questions.

The following formula illustrates how calculations were done:

[5] Primary Infertility should be understood as defined in this study. See Chapter One subsection 1.0 paragraph 6

$$\textbf{Proportion of domestic violence} = \frac{\text{\# of infertile married women 15-49 experienced GBV}}{\text{Total \# of infertile married women 15-49}} \times 100$$

Given that some researchers (McCloskey et al., 2005) have found that domestic violence was higher in infertile married women, it was also assumed in this study that infertile married women in Zambia suffer higher domestic violence. This proxy indicator aimed to establish the degree to which infertility was associated with domestic violence. In computing the proportion, the study assumed that infertile married women are more likely to suffer domestic violence than their counterparts because their spouses might be frustrated due to lack of children.

For analysis on HIV infection, only one variable was required:

- Blood test result (HIV03)

The following formula illustrates how calculations were done:

$$\textbf{Proportion of HIV+ infertile women} = \frac{\text{\# of infertile married women 15-49 that tested positive}}{\text{Total \# of infertile married women 15-49 tested for HIV}} \times 100$$

The above HIV proportion was a measure intended to specifically capture HIV infection among infertile married women. This calculated percentage was compared to the rate for all married women 15-49 as presented in the ZDHS report. The purpose for this calculation was rooted in the assumption that infertile married women are more likely to have higher infection rates because of their spouses' higher propensity to engage in multiple concurrent partnerships (MCP) thereby exposing them to a higher risk of contracting HIV.

3.2 Other secondary data sources

The study analyzed data from ZDHS reports, census reports; national development plans such as Sixth National Development Plan (SNDP), national policies such as Population Policy and Gender Policy, Millennium Development Goals (MDG) reports, public health and epidemiological journals. Further, the study used the internet to search for relevant and similar studies that have been conducted in places other than Zambia.

3.4 Data analysis

Data from DHS datasets were analyzed using SPSS version 18.0. Descriptive statistics in form of frequencies and cross-tabulations were generated. Statistical tests were done using Chi-square and logistic regression [Backward Stepwise Likelihood Ratio (LR)]. These statistical tests helped to identify the best socio-economic predictors of infertility.

3.4 Study limitations

The study relied on DHS datasets for analysis and interpretation of factors associated with primary infertility but it did not capture personal narrative views of the affected women. Further, the inclusion criteria (i.e. married women for 2 years and above, no child and never used contraception) was rather crude because it was an 'unreal' condition defined by the researcher following international guidelines and not the actual medical condition diagnosed by a qualified gynecologist or endocrinologist. In other words, the analysis were based on variable manipulations as opposed to actual experiences of women with difficulties to conceive which entails that there were no insights from affected women on the subject.

For this study, it must be noted that qualitative data was not collected to support quantitative data as it was impossible to do so because this study relied on a nationally representative quantitative sample. In order for the researcher to match the quantitative sample, he would have been required to collect qualitative data from nationally representative respondents. Given the expensive nature of national surveys, it was not possible to carry it out singly. Apart from cost, a national survey requires manpower which could not be provided by one researcher. For these reasons, this study solely focused on using quantitative datasets provided by Central Statistical Office (CSO) and MEASURE DHS.

The other limitation was about the study's exclusive focus on primary infertility. The restricted focus was intended to help the researcher to focus on a smaller scope so that deep and focused analysis is done on primary infertility other than splitting efforts too thinly thereby doing shallow analysis on both.

CHAPTER FOUR: FINDINGS

Introduction

This chapter presents findings on all four issues under investigation namely; infertility levels, infertility with regard to demographic and socio-economic factors, infertility in relation to GBV and infertility in relation to HIV infection. All four sub-chapters are reflective of research objectives stated as follows;

1. To estimate the primary infertility levels in Zambia
2. To establish demographic and socio-economic factors associated with infertility: (age, rural-urban, level educational attainment)
3. To assess whether primary infertility is associated with gender-based violence (GBV).
4. To investigate whether primary infertility is associated with HIV infection

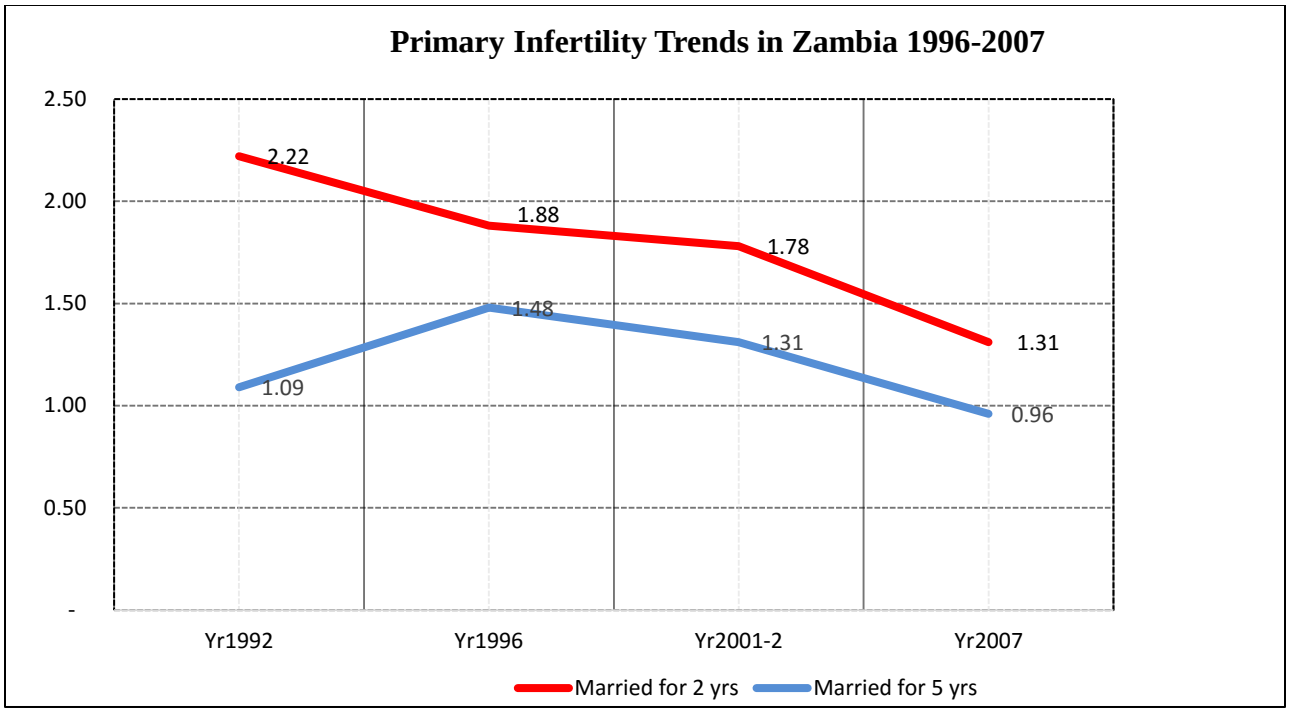
Both chapters on findings and discussion are presented in the same order as that of objectives so that there is a consistent flow and easy reading pattern. Chapter 4 provides detailed results which are mostly presented in form of statistics and short elucidations while Chapter 5 provides contextual explanations critical to the understanding and interpretation of presented statistics and their likely implications on population changes.

4.1 Primary infertility Levels in Zambia

This section gives an overall picture of primary infertility levels in Zambia from 1992 to 2007. It relates to objective one of this study which aims to estimate the primary infertility levels in Zambia. This section is based on the premise that there is no properly documented literature in Zambia which gives an overview of the country's primary infertility trends over the years. As noted in chapter one paragraph six, the report present comparative results of primary infertility at both two and five years of marriage.

Overall, Zambia's primary infertility level is on a downward trajectory. It dropped from 2.22% in 1992 to 1.31% in 2007 for women married for 2 years and above. Similar pattern was observed for women who were married for at least 5 years. Figure 4.1 has more details.

Figure 4.1: Primary Infertility trends in Zambia 1992-2007



The above finding is consistent with the results in the 2007 DHS where it was concluded that, "In Zambia, primary infertility is low, with 2 percent of all women unable to have children" (CSO, et al. 2009 P. 61). Larsen (2000) equally wrote that primary infertility is generally low in the Sub-Saharan Africa (SSA). In his article to International Epidemiological Association Journal, he wrote; "It is generally deemed that about 3% of all couples cannot have children due to immunological incompatibility, genetic abnormality, anatomic anomalies, or other conditions that prevent conception or reduce fetal viability" P.287. In the same article on page 289, he presented Zambia's 1992 infertility rate

Table 4.1: Percentage of Primary Infertility in selected Sub-Saharan countries for all women based on the proportion childless after at least 7 years since first marriage

No.	Country	Survey Year	% childless
1	Botswana	1988	2
2	Kenya	1993	2
3	Lesotho	1977	4
4	Malawi	1992	2
5	Mozambique	1997	4
6	Namibia	1992	3
7	Tanzania	1996	2
8	Uganda	1995	3
9	Zambia	1992	2
10	Zimbabwe	1994	2

Source: Larson (2000) Table 2 on page289

at 2%. Table 4.1 has more details on how Zambia's primary infertility compares with other countries within the region ranging from 2% for most countries and a high of 4% for Lesotho and Mozambique respectively. Please note that survey periods are different with Lesotho's, which was carried out as far back as 1977. Currently, there may be different primary infertility trends in all cited countries above as has been the case for Zambia which has seen a downward drift. Generally, research has demonstrated that infertility prevalence has taken a nose dive in many countries in the last 20 years (Larson & Hollos, 2004).

4.2 Demographic and Socio-Economic Factors

This section relates to objective two in this study which aimed at analyzing demographic and socio-economic factors; (by age, rural-urban, province and education attainment). Under this objective, the study sought to highlight the salient differences that are there by virtue of a woman's age, residence (urban/rural), provincial location and education level and how these affect infertility. The observed differences provided finer details for strategic planning and execution of interventions which aim at addressing demographic and socio-economic effects of infertile women. It has sections that discuss the main demographic and socio-economic factors (age, residence and education attainment) under investigation.

For purposes of generalization and since this section compares data from the different surveys, all percentages presented are weighted[6] and the reader will note that they are lower than the un-weighted figures. In fact, they all fall below 1% with the average being 0.43% for those married for at least two years and 0.30% for those married for at least five years across survey periods.

4.2.1 Primary Infertility and Age group

In 1992, primary infertility was highest in the age group 25-29 with a 0.93% while the lowest was 0.11% in 15-19 age group which also recorded lowest percentages for 1996 and 2001-2 at 0.06% and 0.00% respectively. In 2007, 20-24 age group had the lowest percentages of 0.06% though it was not very different from that of age group 15-19 which was at 0.07%. In 1996, the highest primary infertility was observed in age group 30-34 at 0.66%. Age groups 40-44 and 45-49 posted primary infertility figures at 0.28% and 0.26% for 2001-2 and 2007 respectively.

The results pattern shows that younger age groups consistently posted lower infertility proportions compared to the middle to older age groups. On average, percentage analysis reveals that primary infertility was highest in age group 25-29 with an average figure of 0.45% across survey periods. On the other hand, the lowest primarily infertility scores were observed in age

[6] The weighting process was computed as follows: Firstly, the author computed a sum for all women that met the infertility condition as defined in this study. See Chapter One for infertility definition. For example, infertile women in 1992 were 96 plus those in 1996 (92), 2001-2 (83) and 2007 (56). The sum was 327. To obtain weights, the author divided number of infertile women in each survey period by the sum, i.e. 96/327=0.29. For 1996, 2001-2 and 2007 and weights were; 0.28, 0.25 and 0.17 respectively. The author then created a variable called ***Weight*** in SPSS for each dataset. This variable was applied every time an output was generated in SPSS.

group 15-19 at 0.06%. It was noted that results show a similar pattern for both women who had been married for at least two or five years as primary infertility is low in younger ages with more women in the middle-ages reporting higher infertility.

Further analysis revealed consistently lower figures for women who had been married for at least five years than their counterparts at two years of marriage. See more details in Table 4.2. For comparison purposes, Appendix 2 has details of un-weighted percentages.

Table 4.2: Primary infertility proportions by Age group and survey periods (%) – Weighted percentages

	Survey Periods											
	1992		**1996**		**2001-2**		**2007**		**Mean %**		**% change (1992 & 2007)**	
	At 2 years marriage	At 5 years marriage	At 2 years marriage	At 5 years marriage	At 2 years marriage	At 5 years marriage	At 2 years marriage	At 5 years marriage	At 2 years marriage	At 5 years marriage	At 2 years marriage	At 5 years marriage
Age Group	**n=96** N*=4334	**n=64** N*=4334	**n=92** N*=4888	**n=66** N*=4888	**n=83** N*=4675	**n=51** N*=4675	**n=56** N*=4264	**n=41** N*=4264				
15-19	0.79	0.11	0.51	0.06	0.45	0.00	0.27	0.07	**0.50**	**0.06**	**-66.4**	**-41.4**
20-24	0.72	0.33	0.65	0.28	0.72	0.21	0.21	0.06	**0.58**	**0.22**	**-70.6**	**-82.5**
25-29	0.93	0.74	0.59	0.53	0.44	0.39	0.16	0.13	**0.53**	**0.45**	**-82.4**	**-82.2**
30-34	0.55	0.52	0.66	0.66	0.17	0.17	0.21	0.17	**0.40**	**0.38**	**-61.9**	**-67.4**
35-39	0.39	0.39	0.24	0.24	0.42	0.42	0.24	0.24	**0.32**	**0.32**	**-37.9**	**-37.9**
40-44	0.29	0.29	0.40	0.40	0.28	0.28	0.35	0.35	**0.33**	**0.33**	**23.2**	**23.2**
45-49	0.40	0.40	0.29	0.29	0.46	0.46	0.26	0.26	**0.35**	**0.35**	**-35.0**	**-35.0**
Totals	**0.58**	**0.40**	**0.48**	**0.35**	**0.42**	**0.27**	**0.24**	**0.18**	**0.43**	**0.30**	**-58.1**	**-53.9**

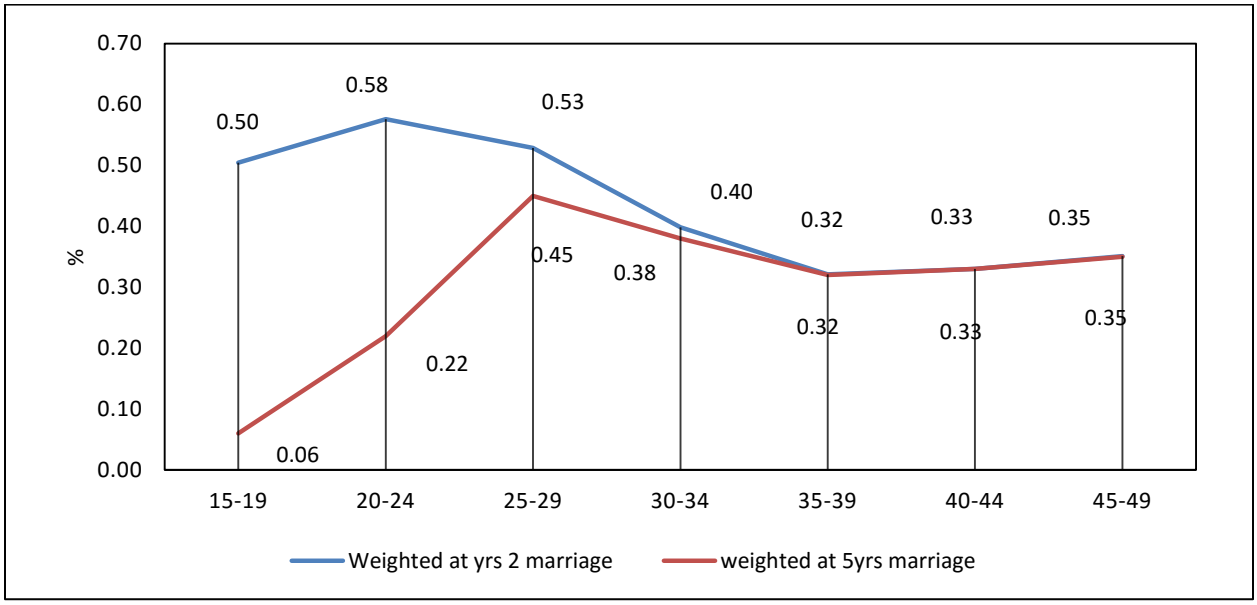
Key:

n *= Total number of infertile women as defined in this study. This is used as* ***numerator*** *when calculating %*

N**= *Total number of married women in DHS. This is used as* ***denominator*** *when calculating %. The N across age groups are shown in Appendix 7.2*

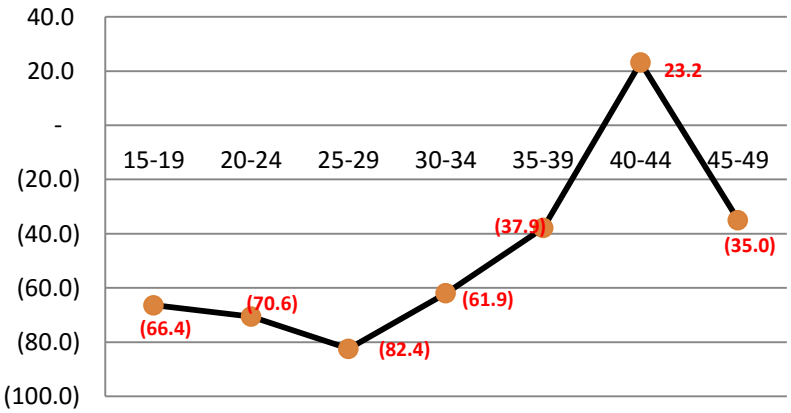
The pattern of mean percentages across survey periods are presented in Figure 4.2. This graphic presentation clearly shows that primary infertility for women married for at least five years is lowest in age group 15-19 at 0.06%. It steeply rises to 0.45% in age group 25-29, slightly drops in age group 30-34 and stabilizes around 0.33 for age groups 35-49 combined. As for the women married for at least two years, primary infertility was highest (0.58%) in age group 20-24 but gradually drops to exact figures as for women married for five years in age groups 35-49.

Figure 4.2: Mean percentages of primary infertility by age groups and marital duration



Similarly, analysis of percentage change between 1992 and 2007 showed that younger age groups were falling below zero line. Figure 4.3 has more details. The graph clearly indicates that women aged 35 years and above were found to have higher primary infertility reaching its highest (23.2%) in age group 40-44. Further, results show that even though the

Figure 4.3: Percentage change of infertility between 1992 and 2007

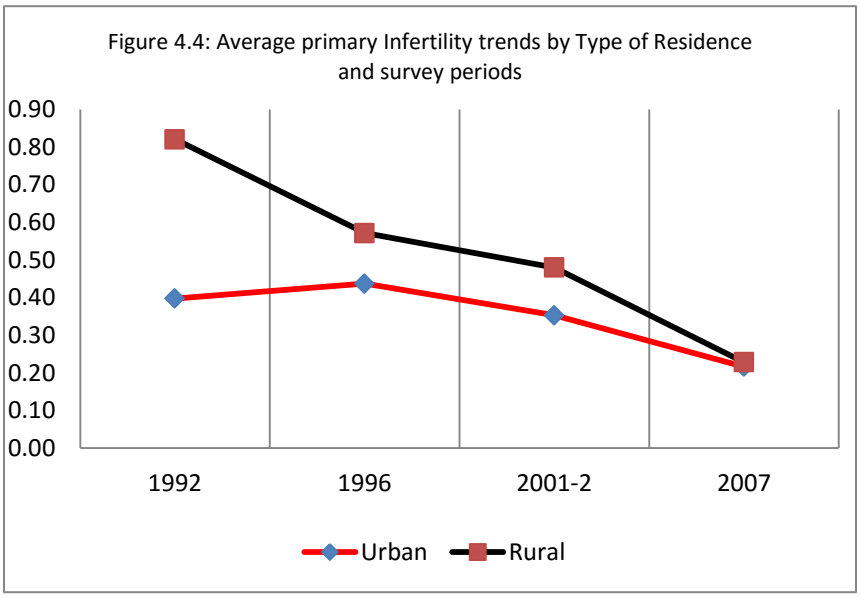


average primary infertility declined across age groups and survey periods by 58.1%, analyzed data for the older age groups (40-44) revealed a sharp increase in primary infertility rates as indicated by Figure 4.3. This was contrary to mean percentage results which showed highest average proportion in age category 25-29. For a balanced interpretation, both mean and percentage change results should be considered.

Even though Table 4.2 shows that age group 25-29 has the highest mean infertility rates, ZDHS reports for all survey periods indicates that the same age group has the highest TFR. These two results on opposing ends present a paradoxical situation. The reasons are not clear but some literature suggests that this is the most productive age group and therefore more likely to report failure to conceive due to their advancing age (Frank, 1983). This researcher equally believes that the above results could be explained by the fact that the infertility condition as defined in this study may be more aligned to capturing women in this age group. As stated in the study limitations section in chapter three, primary infertility is a defined condition which means that women filtered by this condition may only be those with uneven distribution in findings.

4.2.2 Primary Infertility and Type of Residence (Rural/Urban)

Results in Figure 4.4 consistently show that primary infertility is much higher in rural than urban areas. The 1992 primary infertility proportion in rural areas was 0.82% compared to 0.40% in urban areas while the 1996, 2001-2 and 2007 respective rural-urban primary infertility rates were 0.59%-0.44%, 0.48%-0.35% and 0.23%-0.22%. It should be noted that even though primary infertility pattern was



consistently dropping in rural areas, the urban infertility rate slightly went up between 1996 and 2001-2 and marginally dropped in 2007. Results in Figure 4.4 clearly demonstrate that there is a narrowing gap of primary infertility proportions between urban and rural areas. Chapter five has more details on possible factors. Further analysis showed that primary infertility in rural areas decreased by over 100% (260.27%) from 1992 to 2007 compared to the reduction of 84.02%% in urban areas.

4.2.3 Primary Infertility in provinces

Primary infertility in all provinces also show a downward trend except in Northern Province which recorded a percentage change 56.7% from 0.15% in 1992 to 0.26% in 2007. Despite this increase, Northern Province had the lowest mean score across survey periods while Western Province had the highest mean score of 0.70% followed by Luapula and Southern provinces at 0.66% and 0.59% respectively. Table 4.3 has more details.

Table 4.3 Primary Infertility in provinces by survey periods at 2 years marriage

	Survey periods					
Province	**1992 N=64**	**1996 N=66**	**2001-2 N=51**	**2007 N=41**	**Mean**	**% Change**
Central	0.38	0.23	0.41	0.20	**0.31**	(47.15)
Copperbelt	0.55	0.62	0.19	0.18	**0.39**	(67.47)
Eastern	0.78	0.56	0.69	0.19	**0.56**	(75.68)
Luapula	1.12	0.46	0.69	0.37	**0.66**	(67.04)
Lusaka	0.25	0.42	0.55	0.20	**0.36**	(20.49)
Northern	0.15	0.34	0.30	0.24	**0.26**	56.70
North-Western	0.66	0.51	0.19	0.21	**0.39**	(68.75)
Southern	1.16	0.52	0.49	0.18	**0.59**	(84.94)
Western	0.71	1.16	0.66	0.27	**0.70**	(62.52)
Totals	**0.64**	**0.54**	**0.46**	**0.22**	**0.47**	**(64.92)**

4.2.4 Primary Infertility and Education Level

The results show that women with no education and those with primary education have higher primary infertility than those with secondary or higher education. From Table 4.3; in 1992,

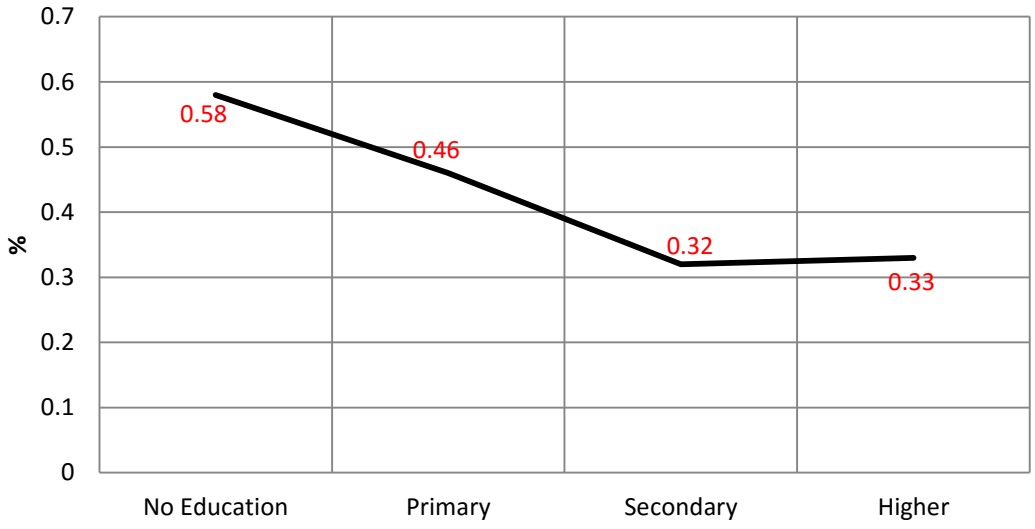
primary infertility for women with no education and those with primary education was 0.72% and 0.70% respectively. Women with secondary and those with higher education was 0.30% and 0.75% respectively. In subsequent survey periods, the data show a generally falling trend of infertility rates in 1996, 2001-2 and 2007 surveys where women with no education have highest primary infertility proportions. This pattern was consistent across all survey periods except in 1992 where women with higher education had the highest figure. Table 4.4 has more details.

Table 4.4: Infertility trends by education level and survey periods

	1992	1996	2001-2	2007		Overall %
Education level	N=96	N=92	N=83	N=56	Mean %	Change
No Education	0.72	0.74	0.56	0.31	0.58	-57.3
Primary	0.70	0.53	0.43	0.19	0.46	-72.6
Secondary	0.30	0.31	0.44	0.24	0.32	-18.6
Higher	0.75	0.27	0.00	0.29	0.33	-61.0
Totals	**0.62**	**0.46**	**0.36**	**0.26**	**0.42**	**-58.1**

Similar to results presented above on age and residence, Table 4.4 equally reveals that even though women with no education had the highest average score, the biggest percentage change was seen among women with primary education with a -72.6% decrease in primary infertility from 0.70% in 1992 to 0.19% in 2007. Mean percent results show a falling trend of primary infertility as education level rises. Figure 4.5 has more details.

Figure 4.5: Mean percentage of primary infertility and education level



4.2.4 Bivariate Test for association

In order to determine the association of demographic variables to infertility, statistical testing was performed. The focus of this section is to present results that either confirm or deny existence of a statistically significant association of dependent variables to infertility. The Chi-Square was used to test for association.

According to results, age group was positively associated with infertility in only one survey period (2001-2) $p<0.01$. Further, the region or province where a married women comes from was also significantly associated with infertility in 1992 and 1996, both at ($p<0.01$). In addition, type of residence was also significantly associated with infertility but only in 1992 ($p<0.01$). Education level, partner's education level, HIV status and GBV were not significantly associated with infertility in all surveys ($p>0.05$). Table 4.5 has more details.

Table 4.5: Summary of Chi-Square Tests on Infertility 1992-2007 [Asymp. Sig.(2-Sided)]

No.	Independent Variables	Survey Periods								Comment
		1992		1996		2001-2		2007		
		df	*P value*	*df*	*P value*	*df*	*P value*	*df*	*P value*	
1	Age group	6	p>0.05	6	p>0.05	6	P<0.01	6	p>0.05	This variable was significantly associated with infertility in 2001-2 only for age group 25-29
2	Region/Province	8	P<0.01	8	P<0.01	8	p>0.05	8	p>0.05	This variable was significantly associated with infertility in 1992 and 1996 only
3	Type of Residence	1	P<0.01	1	p>0.05	1	p>0.05	1	p>0.05	This variable was significantly associated with infertility in 1992 only
4	Education Level	3	p>0.05	3	p>0.05	3	p>0.05	3	p>0.05	This variable was not significantly associated with infertility in all survey periods
5	Partner Education Level	4	p>0.05	4	p>0.05	4	p>0.05	4	p>0.05	This variable was not significantly associated with infertility in all survey periods
6	HIV Status	na	na	na	na	na	na	1	p>0.05	This variable was not significantly associated with infertility in the applicable survey period
7	GBV	na	na	na	na	na	na	1	p>0.05	This variable was not significantly associated with infertility in the applicable survey period

4.3 Primary Infertility and Gender-Based Violence

This section is about the relationship between infertility and gender-based violence (GBV). The section relates to objective three of this study which aims to assess whether infertility is associated with (GBV) among married women. The author assumed that infertile married women are more likely to suffer GBV from their spouses because they may be frustrated by the lack of children. This reality could drive spouses to behave aggressively physically or emotionally towards their wives. As noted in the methodology, data analysis is limited to the 2007 ZDHS dataset because it is the only one with data on domestic violence.

Overall, data show that about three quarters (73.2%) of all infertile married women suffer from gender-based violence[7] with 63% of these coming from rural areas while 37% are from urban areas. Whereas ZDHS 2007 reported that "women with no children are less likely than other women to have experienced physical violence" this study found that 73.2% of infertile married women experience gender-based violence compared to their counterparts with "three to four children at 55%" (CSO et al., 2009 P.305). The ZDHS 2007 report further recorded that "experience of violence increases by number of living children up to three to four children and then decreases among women with five or more children".

When analyzed by province and rural-urban classification, results indicate that infertile married women suffer more gender-based violence in Luapula (19.51%) followed by Eastern at 14.63%. Copperbelt and Western Provinces are at 12.20% with Central and Northern Provinces both at 9.76%. For Lusaka, North-Western and Southern Provinces, each have 7.32% of gender-based violence incidences. Table 4.6 has more details.

[7] In this study, a woman was considered having experienced Gender Based Violence if they answered **Yes** to at least one question in the ZDHS questionnaire.

Table 4.6: GBV Prevalence rate by Province

Province		**At 2** years marriage	**At 5** years marriage
Central	(n=5 and 3)	9.76	7.30
Copperbelt	(n=5 and 4)	12.20	9.80
Eastern	(n=7 and 2)	14.63	4.90
Luapula	(n=10 and 7)	19.51	17.10
Northern	(n=6 and 5)	9.76	12.2
Lusaka	(n=7 and 5)	7.30	12.2
North-Western	(n=5 and 4)	7.32	9.80
Southern	(n=5 and 5)	7.32	12.2
Western	(n=6 and 5)	12.20	14.6

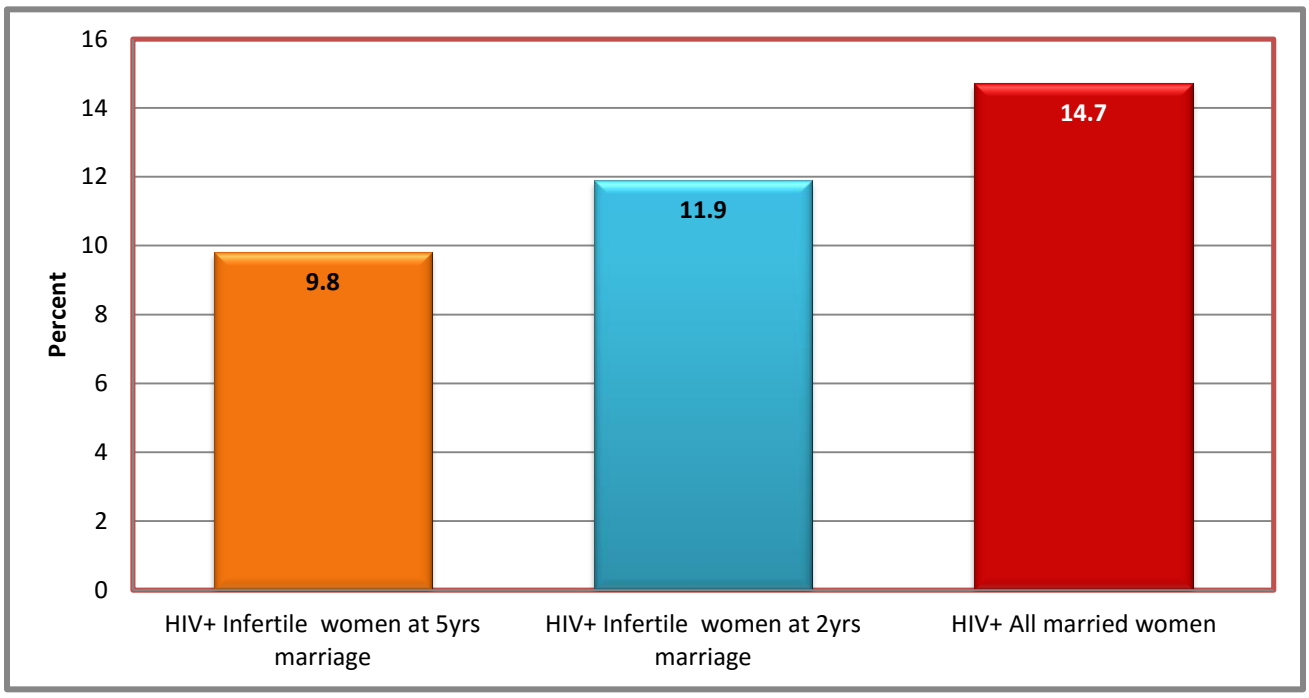
Both this study and the ZDHS 2007 results indicate that Luapula Province has higher GBV levels whether for all women or infertile married women only. According to the ZDHS 2007, "the highest percentage of women who reported experience of physical violence within the past year was in Luapula Province (46%)" and further pointed out that "women in Eastern province are least likely to report ever experiencing physical violence since age 15 and experiencing physical violence within the last 12 months (37% and 20% respectively)" (CSO et al., 2009 P.305). Overall, all GBV incidences reflect a consistent and solid presence in all provinces; there were no major differences, which means that this maybe a national problem.

4.4 Primary Infertility and HIV infection

This section is about the relationship between infertility and HIV infection. The section is related to objective four of this study which aims to investigate whether infertility is associated with HIV infection among married women. This study made an assumption that infertile married women are more likely to contract HIV than their counterparts because their spouses are more prone to having extra-marital affaires in a bid to have children thereby increasing their spouses' exposure to the risk of HIV infection. This assumption was substantiated by Favot et al. (1997), who found that "the HIV prevalence was markedly higher among infertile women than among fertile women".

Results show that out of a total of 56 women from the 2007 ZDHS dataset that met the condition of infertility as defined in this study in Chapter one, 42 were tested for HIV and 5 were found positive representing 11.9% at two years of marriage. Analysis at five years of marriage show a similar trend where only 4 out of 41 infertile married women tested positive, representing 9.8%. Figure 4.6 has more details. The above percentage is lower than 14.7% HIV prevalence rate for all married women in Zambia (CSO et al., 2009 P.261). Results demonstrate that infertile married women do not have higher exposure to HIV infection than other women.

Figure 4.6: Percentage of HIV status of Infertile Married Women at two and five years of marriage



Analysis by age group shows a uniform pattern across all age groups. Thus, HIV prevalence rate of infertile married women is evenly spread for all age groups averaging 20%. This is a slightly different pattern from the ZDHS 2007 Report which showed that HIV prevalence rate is highest in the prime reproductive age group 20-34 for all women in Zambia with the age group 30-34 years at 42% share.

The Chi-Square test of association did not show a statistically significant relationship ($p>0.05$) between age group and one's HIV status. The generated p value was 0.85. It entails that

regardless of an infertile woman's age group, the chance of contracting HIV is the same. Table 4.7 has more details.

Table 4.7: HIV Status of Infertile Married Women by Age Group

		Number of HIV positive and negative infertile married women		
		HIV-	HIV+	Total
Age 5-year groups	15-19	4	0	4
	20-24	8	1	9
	25-29	6	1	7
	30-34	6	1	7
	35-39	5	0	5
	40-44	6	1	7
	45-49	2	1	3
Total		**37**	**5**	**42**

Analysis by urban-rural classification on HIV prevalence rates reveal a considerable difference with urban areas posting 80% compared to only 20% for all infertile married women living in rural areas. The Chi-Square test of association showed a statistically significant and positive relationship ($p<0.05$) between type of residence and one's HIV status. The generated p value was 0.02. This result entails that an infertile married woman living in an urban area is more exposed to HIV infection than her counterpart in a rural area. The above finding is consistent with ZDHS 2007 results which found that "Among women age 15-49, the HIV prevalence rate in urban areas is more than twice as high as in rural areas i.e. 23 and 11percent, respectively" (CSO et al., 2009 P.257).

It should be noted that while ZDHS 2007 results computed for all women, this study specifically focused on women that met the infertility condition defined in Chapter one. Whereas the ZDHS 2007 report show that HIV prevalence rate for all women is twice as high for women in urban areas, this study results demonstrate that the HIV prevalence rate for infertile married women is 60% higher in urban than rural areas. Table 4.8 has more details.

Table 4.8: HIV Status of Infertile Married Women by Type of Residence-2007 ZDHS

			Blood test result		
			HIV negative	HIV positive	Total
Type of place of residence	Urban	(n=14)	10 (27.0%)	4 (80.0%)	14 (33.3%)
	Rural	(n=28)	27 (73.0%)	1 (20.0%)	28 (66.7%)
Total		(n=42)	37 (100%)	5 (100%)	42 (100%)

4.5 Bivariate and Multivariate Results

As noted in sub-section 4.2.4 above, bivariate analysis revealed that age, type of residence (rural or urban) were significantly and positively associated with infertility. However, the regression model does not show a consistent pattern with bivariate results, with some variables showing negative associations to infertility. For example, the variable; region/province variable was removed first from the regression model rendering it insignificant or the weakest variable in step one. This is in spite of significant p-values presented in Table 4.9.

Table 4.9: Infertility Analysis: ZDHSs 1992-2007 Summary Results

Backward Logistic Regression
(Backward method was used because it allowed for step-by-step analysis of dependent variables' contribution to the model)

INDEPENDENT VARIABLES	1992	1996	2001-2	2007
	B [Exp (B)]	**B [Exp (B)]**	**B [Exp (B)]**	**B [Exp (B)]**
Age groups			***(this variable was removed from the model at Step5)***	
15-19	0.695 [2.004]	0.802 [2.230]	-0.002 [0.998]	0.452 [1.572]
20-24	0.673 [1.960]	1.106 [3.022]**	0.456 [1.577]	0.053 [1.054]
25-29	0.935 [2.547]*	0.985 [2.678]*	-0.015 [0.985]	-0.358 [0.699]
30-34	0.429 [1.535]	1.056 [2.875]*	-0.984 [0.374]	-0.063 [0.939]
35-39	0.410 [1.042]	-0.056 [0.945]	-0.073 [0.929]	-0.036 [0.965]
40-44	-0.303 [0.739]	0.422 [1.525]	-0.463 [0.630]	0.691 [1.997]
45-49 (RC)	0.000 [1.000]	0.000 [1.000]	0.000 [1.000]*	0.000 [1.000]
Province			***((this variable was removed from the model at Step1)***	
Central	-0.519 [0.595]	-1.657 [0.191]***	-0.521 [0.594]	-0.494 [0.619]
Copperbelt	0.368 [1.445]	-0.531 [0.588]	-1.252 [0.286]**	-0.188 [0.829]
Eastern	0.085 [1.088]	-0.933 [0.394]***	-0.006 [0.994]	-0.369 [0.691]
Luapula	0.468 [1.597]	-1.029 [0.357]**	0.015 [1.015]	0.178 [1.195]
Lusaka	-0.435 [0.648]	-0.982 [0.375]**	-0.211 [0.810]	-0.629 [0.533]
Northern	-1.561 [0.210]**	-1.329 [0.265]***	-0.819 [0.441]*	-0.195 [0.823]
North-Western	-0.120 [0.887]	-0.953 [0.385]**	-1.269 [0.281]**	0.079 [1.082]
Southern	0.568 [1.730]	-0.912 [0.402]**	-0.329 [0.719]	-0.433 0.648]
Western (RC)	0.000 [1.000]	0.000 [1.000]**	0.000 [1.000]*	0.000 [1.000]
Highest Education Level[8]			***(this variable was removed from the model at Step6)***	
No education	-0.388 [0.678]	1.039 [2.826]	1.042 [1.268]	-0.656 [0.519]
Primary	-0.564 [0.569]	0.628 [1.874]	0.678 [0.665]	-0.878 [0.416]
Secondary	-1.291 [0.275]	-0.040 [0.961]	1.258 [2.087]	-0.153 [0.858]
Higher (RC)	0.000 [1.000]	0 000 [1.000]	0 000 [1.000]	0.000 [1.000]
Type of Residence[9]			***(this variable was removed from the model at Step2)***	
Urban	-0.812 [0.444]**	-0.262 [0.770]	-0.217 [1.138]	0.067 [1.069]
Rural (RC)	0.000 [1.000]	0.000 [1.000]*	0.000 [1.000]	0.000 [1.000]
Spouse/Husband's level of Education[10]				
No education	-0.983 [0.374]	-0.226 [0.766]	1.320 [3.010]	-0.174 [0.840]
Primary	-0.988 [0.372]	-0.079 [0.924]	1.028 [1.712]	-0.329 [0.729]
Secondary	-0.946 [0.388]	-0.009 [0.991]	0.010 [0.196]	-0.809 [0.445]
Higher (RC)	0.000 [1.000]	0.000 [1.000]	0.000 [1.000]	0.000 [1.000]
HIV Status			***(this variable was removed from the model at Step3)***	
Negative	na	na	na	0.122 [1.130]
Positive (RC)	na	na	na	0.000 [1.000]
GBV			***(this variable was removed from the model at Step 4)***	
Never experienced GBV	na	na	na	-0.122 [0.885]
Experienced GBV (RC)	na	na	na	0.000 [1.000]

Significance values: *= p< 0.1, **=p<0.05, *** = p<0.01 **** = p<0.001 RC = Reference Category

Source: Computed by Author

[8] This variable was removed in Step 2 which means only Step 1 results are presented. No significant contribution was found in 1992 dataset.

[9] This variable was removed in Step 2 which means only Step 1 results are presented. No significant contribution was found in 1996 & 2001-2 dataset.

[10] This was the only variable that remained after 7 Steps which means there is an association between infertility and husbands' level of education. However, it's not statistically significant P>0.05

From Table 4.9, results indicate that there is no consistent pattern of significant associations for all variables across all survey periods. For example, there is no age group which is significantly associated with infertility across all survey periods. Only age group 25-29 showed significant association with infertility in 1996 and 1996. On the provinces, Northern Province had significant negative associations with infertility in 1992, 1996 and 2001-2. In 2007, the association was negative but it was not significant.

The lack of significance in the regression model for many variables does not necessarily contradict bivariate results but only shows that independent variables did not fit the model well due to interactions for related variables. For example, age is related to education level and region is related to type of residence (rural/urban). When all these variables are put together in one model, they interact and affect each other thereby affecting levels of significance.

Analysis of regression outputs show that all statistical model summaries for 1992, 1996, 2001-2 and 2007 datasets reveal that variables in the model explain between 0.5% - 6.2% of variances of primary infertility in Step 1 compared to 0% - 5.4% in Step 7. In summary, all variables only account or can explain a small proportion of primary infertility. For example, in 2007 dataset, a multivariate logistic regression analysis showed 0% contribution from all variables in the last step (Step 7), meaning all variables did not have an influence on primary infertility in this survey period. This indicates that overall, all variables analyzed in study are weakly associated with infertility when combined.

Results in Table 4.9 above also shows a positive association between infertility and married women in age group 25-29 years with an odds ratio [OR, 2.547] which was significant ($p<0.1$) in 1992 while in 1996 [OR] increased to 2.678 and also significant ($p<0.1$). In 1996, age group 20-24 had an [OR] of 3.022 and was significant at $p<0.05$ while the [OR] for age group 30-34 was 2.875 and was significant at ($p<0.1$). From this table, it was only age where odds ratios indicated a positive association with infertility.

Other independent variables (province and type of residence) had significant negative association with infertility in 1992, 1996 and 2001-2. In 2007, the data generally show a negative trend across variables except for age groups and HIV status which was positively associated with

infertility. However, results were not significant ($p>0.05$). Analysis within each variable revealed that the probability of a married woman being infertile significantly declined in respect to provinces where they came from. For example, Northern Province had a significant decline of [OR] 0.210 (-79%) in 1992 $p<0.05$, [OR] 0.265 $p<0.01$ in 1996 and [OR] 0.441 $p<0.1$ in 2001-2. Other provinces with significant declines in 1996 survey were Central Province [OR] 0.191 $p<0.01$, Eastern [OR] 0.394 $p<0.01$, Luapula [OR] 0.357 $p<0.05$, Lusaka [OR] 0.375 $p<0.05$, North-Western [OR] 0.385 $p<0.05$ and Southern Province [OR] 0.402 $p<0.05$. In 2001-2, only Copperbelt, Northern and North-Western provinces had significant declines of [OR] 0.286 $p<0.05$, [OR] 0.441 $p<0.1$, and [OR] 0.281 (-71.9%) $p<0.05$ respectively.

For variables such as highest educational attainment, spouse/husband's education level, and GBV, data across survey periods showed insignificant association to infertility. In 2007, HIV status showed a positive relationship to infertility [OR] 1.130 (13%) which is a 13% chance that an HIV married woman is likely to be infertile. However, this association was not statistically significant ($p>0.05$). In the overall regression model, spouse or husband's level of education variable was the only one remaining after removing all other variables in 2007 dataset only. Even though the statistical output is insignificant, close analysis of all data across survey periods indicate that if the spouse's level of education is higher than secondary, the probability of a woman being infertile decreases by [OR] 0.146 ($p>0.05$). This may be due to use of advanced technology that enhance conception particularly for educated spouses because they are more likely to have higher incomes and therefore can afford advanced technology.

CHAPTER FIVE: DISCUSSION

Introduction

As noted in Chapter Four, this chapter provides background contextual details which help the reader to interpret and understand the findings. Similar to Chapter Four, the discussion is organized according to the four study objectives; infertility levels, demographic and socio-economic factors, infertility in relation to GBV and infertility in relation to HIV/AIDS status of married women. This chapter should be read in close connection with the relevant Sections in Chapter Four. This is important because the reader will be able to relate all different pieces as one whole argument.

5.1 Primary Infertility Levels

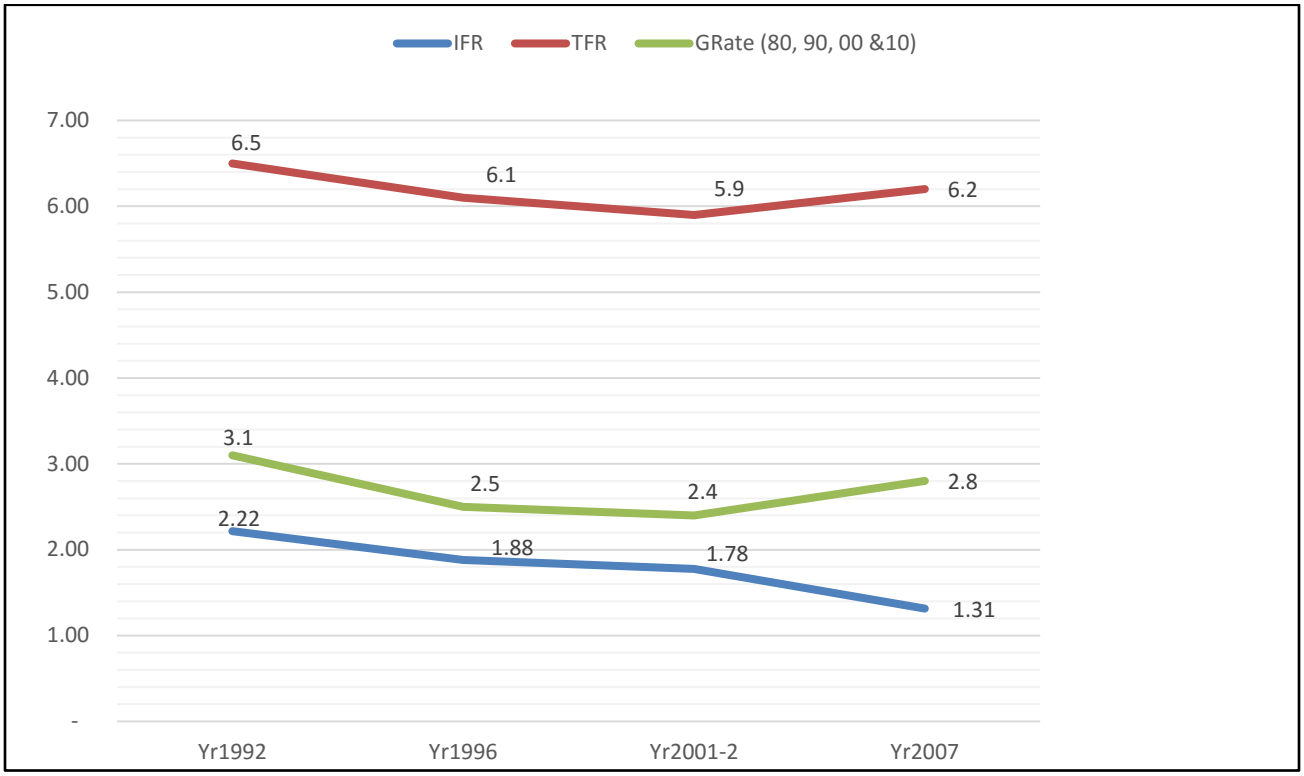
This study made an assumption that infertility trend in Zambia was rising in view of rising global figures of infertility. However, the opposite is true in Zambia as the data indicates a downward trend of infertility with a significant 41% drop from 2.22% in 1992 to 1.31% in 2007. There is evidence of the declining trend of infertility not just in Zambia but also in other countries. The John Hopkins Bloomberg School of Public Health (2006) analyzed survey data from Nigeria, Tanzania and Cameroon and all three countries showed a declining trend. However, the reason for the decline was "hard to assess" but they concluded that it is likely to be associated with "wider availability of antibiotics against STDs".

No matter the direction of the trend, infertility has important demographic implications on population change. The current body of knowledge on the subject of infertility indicates a paradoxical relationship of infertility to population dynamics. Frank (1983) described low rates of infertility as a "powerful source of increased population growth" due to its tendency to catch planners unware of rising fertility rates. This is in view of the fact that low infertility conversely indicate high fertility. Similarly, the John Hopkins Bloomberg School of Public Health (2006) wrote that reduction in infertility increases population growth rates in short term but brings stabilization and decline in the long term because high population growth rates always attract strong population policy reactions.

On the other side, high rates of infertility is generally believed to contribute to reduced population growth rates since less women are able to give birth. However, high rates of infertility can contribute to high population growth rates because of the general reluctance among women to initiate contraception for fear of jeopardizing future fertility. Frank (1983), put it more clearly when he said; “uncertainty in childbearing inhibits response to intrinsic and extrinsic fertility goals”. He further argued that infertility could remain a “strong source of resistance even when other barriers to fertility regulation are coming down”. The above arguments clearly illustrate the effects of infertility on population growth and contraception policies.

For Zambia, the focus should be on how to track trends of infertility which is most likely going to trigger high population growth. Figure 5.1 shows that when Total Fertility Rate (TFR) rises, then population growth rate (GRrate) goes up as well. In addition, Figure 5.1 equally shows that when infertility rate (IFR) drops, the TFR and (GRrate) will rise resulting into increased population. This study demonstrated some relationship between infertility, TFR and population growth rates. For effective policy planning and implementation, there is need to clearly understand how the three demographic factors interplay and their overall effect on demographic transition. It is also important to underscore the fact that since infertility rates affect fundamental population dynamics, its increase or decrease has a direct bearing on population policy and the provision of socio-economic services such as housing, water and sanitation, education, health, employment and others.

Figure 5.1: Infertility (IFR), Growth Rate (Grate) & Total Fertility Rate (TFR) in Zambia 1992-2007



The results of this study are consistent with those of other authors such as Larsen (2000) and CSO et al. (2009) where the former found 2% infertility rate in 1992 and the latter equally recorded 2% in 2007. This study's finding of 2.22% in 1992 and 1.31% in 2007 are very close to those of Larson and CSO. This epitomizes the credibility of the findings in the study. This study's findings are therefore useful for planning and implementation of interventions focused on addressing infertility.

Since the multivariate logistic regression results indicated that demographic and socio-economic factors have little influence on infertility, the probable causes may therefore be largely associated with other factors not included in the model such as medical conditions. This study also noted that the slump in infertility from 1996 to 2007 may be due to accelerated access to health services resulting into low infection rates in STIs. During this period Zambia has seen a decline in HIV prevalence from 16% in 2001-2 to 14.3% in 2007, reduction in under-five mortality rate from 190/1000 live births in 1992 to 119/1000 live births in 2007 and reduction in maternal

mortality rates from 649/1000 live births in 1996 to 591/1000 live births (UNDP, 2011). The positive trend regarding decline of major diseases indicates increased access to health care services which subsequently contributes to low infections and low infertility levels.

5.2 Infertility in relation to demographic and socio-economic factors

The research question for this objective was; how is infertility associated with demographic and socio-economic factors; residence (rural/urban), region/province, educational attainment or age?

5.2.1 Age

It is apparent from the results that age has positive association with infertility and it is statistically significant at bivariate level ($P<0.05$). This result is consistent with the assumption in the conceptual framework which highlighted age as a factor associated with infertility. As opposed to the Davies and Blake Theoretical Framework discussed in Chapter One, this study did not focus on age of entry into sexual unions but rather; it focused on age throughout the woman's reproductive period. In other words, the Davies and Blake Framework analyzed the effect of age of entry into sexual unions on fertility while this study analyzed the association between age and infertility. In this respect, the framework cannot adequately account for infertility because the condition of women captured in the study was that they were married and were having sex but they did not fall pregnant.

The study showed that age pattern follows the normal curve where young ages (below 20 years) have low infertility rates, it marginally increases in the range 20-30 years and gradually falls above 30 years but sharply increases after 40 years. The infertility structure has typically the same pattern with TFR which could mean that maternity expectation increases as one hits the prime reproductive years and subsequently increases the chance of reporting failure to conceive since they become more aware of societal expectations (Menning, 1980).

5.2.2 Residence (rural or urban)

According to this study, infertility prevalence rate in rural areas is 60% higher than urban areas and this is significant at bivariate level ($P<0.05$). This finding is consistent with the assumption in the conceptual framework which outlined that infertility levels might be higher depending on the place of residence. The study showed that there were more women reporting conception failure in rural than urban areas. Ironically, rural areas have significantly higher TFR than urban areas at 7.5 and 4.3 respectively (CSO et al. 2009). This is against logical expectation of the inverse relationship between the two, where high TFR relates to low infertility and vice-versa.

This phenomenon was also noted by Frank (1983) when he wrote; "in view of the much higher level of fertility [TFR] in Africa than in other regions, it is surprising to observe that, contrary to expectation, the level of infertility is higher in Africa than elsewhere". Therefore, this study has brought to the fore the fact that the relationship between infertility and TFR is not only strange in Zambia but also in other African countries as substantiated by the above quotation. It must also be noted that there is no scientific evidence to explain this phenomenon but the most probable anecdote explanation is that married women in rural areas are more likely to report infertility because they get more preoccupied with fulfilling reproductive functions once they get married. In this regard, policy interventions should put more emphasis on targeting rural women where both accessibility to health services and health seeking behaviour is poor.

As noted in Figure 5.1, primary infertility trends are falling in Zambia just like in many other Sub-Saharan Countries. In the first ever global study on infertility, researchers concluded that "for the most part, "[in] most regions of the world there wasn't very much change in infertility levels over time. But the big exception was actually sub-Saharan Africa, where we found there was a big decline in infertility levels. So primary infertility went [down] from 2.7 percent of women in reproductive age in 1990 to 1.9 percent in 2010. And secondary infertility declined from 13.5 percent in 1990 to 11.6 percent in 2010" (Mascarenhas et al. 2012). The results of this global research show a consistent pattern with results of this study which showed that Zambia's infertility prevalence declined from 2.22 percent in 1992 to 1.31 percent in 2007.

Just like reviewed literature, this study did not focus on reasons why infertility is falling. However, the study made some assumptions which help readers to come to a reasonable conclusion and are similar to other researchers. Like one researcher put it; “we have some ideas, but we don’t have any proof. So some studies have shown that in sub-Saharan Africa one of the main causes of infertility is the effects from sexually transmitted infections, such as gonorrhea and chlamydia. One of our hypotheses is that perhaps some of the changes in behavior that have come about from the response to the HIV epidemic might have actually gone towards reducing infertility rates” said WHO Statistician Gretchen Stevens one of the study team members for the study cited above. In a similar manner, one of the limitations of this study is the fact that it did not investigate the causes of primary infertility.

5.2.3 Education

In this study, education attainment was found to be associated with infertility if the respondent had low or no education at all but the result was not statistically significant (P>0.05). This result is similar to Bitler & Schmidt (2006) who found that both primary infertility and impaired fecundity are more common for high school dropouts and high school graduates with no college education than for 4-year college graduates. This means that little or no education may increase the chance of a woman becoming infertile mainly due to poor knowledge on matters of reproductive health and on other important health outcomes. In order to avert the situation, government should invest more in the education sector so that more women can access secondary and higher education

According to analyzed data in this study, infertility does not necessarily rise with increasing education attainment of women. Rather infertility markedly drops as the level of education rises. This finding dispels the assumption in the conceptual framework about tertiary education causing primary infertility

5.3 Infertility and Gender-Based Violence

GBV in this study should be understood in the context of a defined condition of primary infertility other than real experiences of infertile women. Further, even though several comparisons are made between findings in this study and those of ZDHS, the latter analyzed and

reported experiences of physical violence as opposed to GBV which is broader than physical violence alone. In this study, there was no evidence about the association between gender-based violence and primary infertility. This finding dispels the assumption in the conceptual framework which stated that infertile married women are more likely to suffer more gender-based violence.

However, evidence from elsewhere suggest that there is association between infertility and gender-based violence. For example, McCloskey (2005) found that twenty-one percent of women reported having experienced intimate partner violence (i.e., having been threatened with physical abuse, subjected to physical abuse or forced into intercourse by a partner) during the previous 12 months; 26% reported such an experience at any time, including the past 12 months. The likelihood of violence in the past year was elevated if the woman had had problems conceiving [OR, 1.9]. This entails that infertile married women were nearly 2 times more likely to suffer gender-based violence than their counterparts. Similarly, in a participatory end of project evaluation funded by CARE International in Bangladesh, Robinson (2012, P20), recorded that lack of children was one of the causes of Violence Against Women (VAW)

Despite the evidence from elsewhere which suggest that GBV is associated with primary infertility, this study found no evidence to support this assumption. Results showed that three quarters (73.2%) of all infertile married women are likely to suffer gender-based violence at the hands of their spouses compared to only 47% reported in ZDHS 2007 for all women. However, this result is not statistically significant ($P>0.05$) and therefore disapproves the assumption in the conceptual framework where GBV was listed a cause for primary infertility.

With regard to educational attainment, results of this study are consistent with ZDHS 2007 report which recorded that "the percentage of women who have ever experienced physical violence since age 15 (49%) and the percentage who have experienced physical violence in the last 12 months (36%) preceding the survey are higher among women with primary education than other women" (CSO et al., 2009 P.305). The report further noted that "women with no education are least likely to have experienced physical violence since age 15 (40 percent) and also that women with more than secondary education represent the education group with the lowest percentage of women reporting physical violence in the last 12 months 27%" (CSO et al., 2009 P.305). The same pattern emerges with the data of infertile married women where those with primary

education are in the first position and women with more than secondary education reported the lowest incidences of physical violence.

Literature seem to indicate that infertile married women already carry the heavy load of cultural shame for their failure to fulfill reproductive functions and any subjection to any amount of GBV doubles their already inflamed emotional pain in their lives. The reasons for high GBV cases among infertile married women in Zambia are unclear and are outside the mandate of this study but the author assumes that cultural beliefs play a big role in fueling up gender-based violence especially for women who cannot reproduce.

Overall, GBV association with primary infertility was not statistically significant. It is clear from the findings of this study and from other literature that there is a knowledge gap on this subject and therefore more research needs to be done.

5.4 Primary Infertility and HIV status

The key question in this objective was; is there a relationship between primary infertility and HIV infection? Results in this study showed that HIV infection is not associated with infertility. This finding is contrary to Favot et al. (1997)'s conclusion when they found that "HIV prevalence was markedly higher among infertile women than among fertile women". This finding also ruled out the assumption presented in the conceptual framework about HIV being a cause for infertility.

Further, the findings of this study are consistent with those of Dhont et al. (2010). He found no evidence associating HIV prevalence with primary infertility. Instead, he concluded that increased HIV prevalence and risk sexual behavior among infertile couples is driven by secondary infertility as opposed to primary infertility. Whereas Dhont et al. analyzed both primary and secondary infertility, this study only focused on primary infertility. Unfortunately, the findings of this study do not provide evidence on the level of secondary infertility in this country which makes it incomparable to the result of secondary infertility presented by Dhont.

As noted in the results section, the HIV prevalence for infertile married women is 11.9% which is 2.8% lower than HIV prevalence rate for all married women at 14.7%. The differences in HIV prevalence between the two groups is minimal which is suggestive of similar susceptibility levels to HIV infection. This finding indicates that contracting HIV is not significantly associated with infertility because chances of catching HIV are almost the same regardless of whether a married woman is infertile or not.

CHAPTER SIX (6): CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

This study was confined to analyzing the association of primary infertility with demographic and socio-economic factors among married women in Zambia such as age, type of residence (rural-urban), educational attainment, GBV and HIV prevalence.

The study results showed a declining infertility trend among the women that met the infertility condition of this study. From 1992 to 2007, it decreased by 41%. The reasons for the decrease are not clear but some researchers like Mascarenhas, 2012 are suggesting that the huge investment in HIV/AIDS in the last two decades may have an impact not only on HIV/AIDS but also on other STIs resulting into fewer infections and therefore decreasing infertility. Currently and based on this study and other findings presented in this report, infertility is not a major problem in Zambia but as MOH noted in the Reproductive Health Policy 2008, the psychosocial impact on infertile couples is undocumented.

This study also concludes that infertility is not strongly influenced by demographic and socio-economic factors. From the results, the most probable demographic factor associated with primary infertility is age with results showing that married women in age group 25-29 are more likely to report primary infertility than their counterparts in other age groups. Other factors associated with infertility at bivariate analysis were type of residence (rural or urban), HIV status and level of education. However, only age and residence (rural-urban) had statistically significant associations with infertility at multivariate level of analysis. For education, women with less education are more likely to be infertile. There was no statistically significant evidence indicating that GBV is significantly associated with infertility since both infertile and fertile married women had fairly the same chance of experiencing GBV according to the regression model outputs.

Results of the statistical model does not sufficiently explain the causes of infertility. With an R^2 of only 6.4% in the regression model, this suggests that the factors covered in this study may not be the main factors associated with infertility. The other factors associated with infertility may

include both medical and socio-economic factors like marital separation or living apart due to economic reasons leading to reduced sexual intercourse. As Davies and Blake (1956) argued, high frequency of sexual intercourse increases the chance of falling pregnant and the opposite is true because living apart and/or separation reduces sexual intercourse frequency and therefore may lead to delayed conception. This scenario calls for further investigations on Demographic and Socio-economic factors Associated with Infertility among Married Women in Zambia.

Overall, primary infertility is not yet classified as a big problem in Zambia because the proportion of infertile married women is small; averaging 2% and has been declining over the years but its impact on the population remain unknown. This scenario requires strict analysis and close trends monitoring of infertility so that policy related measures can be taken in response to its effects on the population structure and composition. Therefore, future research should focus on actual causes of primary infertility and mixed study designs are recommended so that clinical data from real women seeking medical assistance can be analyzed in comparison with survey data which only rely on reported failure to conceive and give birth.

6.2 Specific Recommendations

The reader should note that recommendations are not just one-line sentences like is the case in many reports because the author wants to practically show their context and applicability to real-life interventions.

Based on results presented in this study and based on reviewed literature, the author makes the following recommendations.

1. As noted in this study, there is insufficient coverage of primary infertility in the ZDHS reports resulting into little understanding of the magnitude and its effect on the population dynamics in the country. Based on this finding, it is recommended that the country should devote a Theme or Section on variables associated with infertility; understanding the factors associated with infertility and the implications to socio-economic development.

2. Like recommended in other studies, primary infertility requires more robust and consistent research so that its role as a demographic determinant is much more clearly understood for those concerned with the subject of population dynamics. Therefore, universities and government should invest more in rigorous research aimed at understanding the actual causes of primary infertility so that it is easy to design preventive interventions.

7.0 APPENDICES

Appendix: 1. Process of acquiring datasets and variable merging

The data were filtered from the DHS datasets by the following criterion; women who have been married for at least 2 years, they want a child, they are not on contraception, not pregnant and have never given birth. Two years was used because it is a standard definition by World Health Organization (WHO). All datasets were downloaded from the MEASURE DHS website[11] after getting permission from website administrators. See details in Appendix

Using the SELECTIF command in SPSS, infertile women were identified and selected. The actual equation was as follows:

SELECTIF V201=0 & V213=0 & V302=0 & V501=1 & V512=≥2

The above group was considered eligible for analysis in Zambia because marital fertility is desired as opposed to non-marital fertility because children born out of wedlock are associated with indecency. Marriage means that women are expected to have regular sexual intercourse than those who are not married which subsequently predisposes them to the risk of falling pregnant. Therefore, if a married woman has not fallen pregnant in two years, then it was reasonable to declare her infertile.

In order to calculate HIV prevalence rate, two datasets (HIV and the main dataset) were merged. For confidentiality purposes, the HIV dataset is stored separately and does not have common variable(s) which can facilitate 'conventional merging' and therefore MEASURE sent the author the following SPSS syntax that was used to merge the two datasets.

DATA TYPE	CLUSTER	HH	LINE	BIRTH	HUSBAND/

[11] www.measuredhs.com

		NUMBER	**NUMBER**	**ORDER**	**WIFE**
HOUSEHOLD	HV001	HV002			
WOMEN	V001	V002	V003		V034
MEN	MV001	MV002	MV003		MV034*i*
CHILDREN	V001	V002	V003	MIDX	
BIRTHS	V001	V002	V003	BIDX	
COUPLES	V001	V002	V003		
HOUSEHOLD MEMBER	HV001	HV002	HVIDX		
HIV	HIVCLUST	HIVNUMB	HIVLINE		
OB	OBCLUST	OBNUMB	OBLINE		

```
GET FILE='C:\DATAUSER\ZMAR51FL.SAV'.
SORT CASES BY
HIVCLUST (A) HIVNUMB (A) HIVLINE (A).
SAVE OUTFILE='C:\DATAUSER\HIV.sav'
/COMPRESSED.

GET FILE='C:\DATAUSER\ZMIR51FL.SAV'.
SORT CASES BY
V001 (A) V002 (A) V003 (A) .
SAVE OUTFILE='C:\DATAUSER\WOMEN.sav'
/RENAME(V001 V002 V003=
HIVCLUST HIVNUMB HIVLINE)
/COMPRESSED.

GET FILE='C:\DATAUSER\WOMEN.sav'.
MATCH FILES /FILE=*
/TABLE='C:\DATAUSER\HIV.sav'
/BY HIVCLUST HIVNUMB HIVLINE.
EXECUTE.
SAVE OUTFILE='C:\DATAUSER\ZMAR_IR.SAV'
/COMPRESSED.
```

Actual Variables used to calculate domestic violence

D101A	Husband jealous if talking with other men
D101B	Husband accuses her of unfaithfulness
D101C	Does not permit her to meet her girl friends
D101D	Husband tries to limit her contact with family
D101E	Husband insists on knowing where she is
D101F	Husband doesn't trust her with money
D101G	NA-CS control issue
D101H	NA-CS control issue
D101I	NA-CS control issue
D101J	NA-CS control issue
D102	Number of control issues
D103A	Spouse ever humiliated her
D103B	Spouse ever threatened her with harm
D103C	Spouse ever insult or make feel bad
D103D	NA-CS emotional abuse: ever
D103E	NA-CS emotional abuse: ever
D103F	NA-CS emotional abuse: ever
D104	Ever any emotional violence
D105A	Spouse ever pushed, shook or threw something
D105B	Spouse ever slapped
D105C	Spouse ever punched with fist or something harmful
D105D	Spouse ever kicked or dragged
D105E	Spouse ever tried to strangle or burn
D105G	NA-Spouse ever attacked with knife/gun or other weapon
D105H	Spouse ever physically forced sex when not wanted
D105I	Spouse ever forced other sexual acts when not wanted
D105J	Spouse ever twisted her arm or pull her hair

D105K	Spouse ever threatened/attacked with knife/gun or other weep
D105L	NA-CS: physical violence
D105M	NA-CS: physical violence
D105N	NA-CS: physical violence
D106	Experienced any less severe violence
D107	Experienced any severe violence
D108	Experienced any sexual violence
D110A	Ever had bruises because of husband's act
D110C	NA-Ever went to health facility because of husband's act
D110D	Ever had wounds, broken bones, broken teeth or other serious
D110E	CS action - ever had severe burns as a result of husband's act
D110F	NA-CS action: because of husband's act
D110G	NA-CS action: because of husband's act
D110H	NA-CS action: because of husband's act
D111	Any results of husband's actions
D112	Ever physical hurt husband when he was not hurting you
D118A	Hurt during pregnancy by husband

Appendix: 2. Additional Data Tables

Primary infertility proportions by Age group and survey periods (%) - Un-weighted percentages

	Survey Periods											
	1992		**1996**		**2001-2**		**2007**		**Mean** %		**% change (1992 & 2007)**	
	@2 years marriage	@5 years marriage	@2 years marriage	@5 years marriage	@2 years marriage	@5 years marriage	@2 years marriage	@5 years marriage	@2 years marriage	@5 years marriage	@2 years marriage	@5 years marriage
Age Group	**n=96** N*=4334	**n=64** N*=4334	**n=92** N*=4888	**n=66** N*=4888	**n=83** N*=4675	**n=51** N*=4675	**n=56** N*=4264	**n=41** N*=4264				
15-19	14/ N*=514 (2.72)	2/ N*=514 (0.39)	9/ N*=492 (1.83)	1/ N*=492 (0.20)	8/ N*=441 (1.81)	0/ N*=441 (0.00)	1/ N*=257 (0.39)	1/ N*=257 (0.39)	**1.98**	**0.25**	**-42.6**	**0.00**
20-24	24/ N*=963 (2.49)	11/ N*=963 (1.14)	28/ N*=1200 (2.33)	12/ N*=1200 (1.00)	31/ N*=1081 (2.87)	9/ N*=1081 (0.83)	3/ N*=881 (0.34)	3/ N*=881 (0.34)	**2.24**	**0.83**	**-49.8**	**-70.20**
25-29	29/ N*=907 (3.20)	23/ N*=907 (2.54)	20/ N*=953 (2.10)	18/ N*=953 (1.89)	18/ N*=1033 (1.74)	16/ N*=1033 (1.55)	8/ N*=1042 (0.77)	8/ N*=1042 (0.77)	**2.00**	**1.69**	**-70.0**	**-69.70**
30-34	14/ N*=732 (1.91)	13/ N*=732 (1.78)	20/ N*=849 (2.36)	20/ N*=849 (2.36)	5/ N*=747 (0.67)	5/ N*=747 (0.67)	8/ N*=807 (0.99)	8/ N*=807 (0.99)	**1.55**	**1.45**	**-35.1**	**-44.40**
35-39	7/ N*=521 (1.34)	7/ N*=521 (1.34)	5/ N*=588 (0.85)	5/ N*=588 (0.85)	10/ N*=599 (1.67)	10/ N*=599 (1.67)	8/ N*=564 (1.42)	8/ N*=564 (1.42)	**1.32**	**1.32**	**6.00**	**6.00**
40-44	4/ N*=406 (0.99)	4/ N*=406 (0.99)	6/ N*=420 (1.43)	6/ N*=420 (1.43)	5/ N*=447 (1.12)	5/ N*=447 (1.12)	8/ N*=384 (2.08)	8/ N*=384 (2.08)	**1.41**	**1.41**	**110.10**	**110.10**
45-49	4/ N*=291 (1.37)	4/ N*=291 (1.37)	4/ N*=386 (1.04)	4/ N*=386 (1.04)	6/ N*=327 (1.83)	6/ N*=327 (1.83)	5/ N*=329 (1.52)	5/ N*=329 (1.52)	**1.33**	**1.44**	**-21.2**	**10.90**
Totals	**2.22**	**1.36**	**1.88**	**1.25**	**1.78**	**1.10**	**1.31**	**1.07**	**1.80**	**1.20**	**-41.0**	**-21.4**

Key:

n = *Total number of infertile women as defined in this study. This is used as* ***numerator*** *when calculating %*

N*= *Total number of married women in DHS. This is used as* ***denominator*** *when calculating %*

? *= Figures in brackets represent proportions of infertile married women in each age group*

Tables showing N figures that were used in the computations in the main report

Infertility by Province 1992

		# Fertile Women	Rate	# Infertile Women
Region	Central	378	1.32	5
	Copperbelt	940	1.91	18
	Eastern	482	2.70	13
	Luapula	389	3.86	15
	Lusaka	572	0.87	5
	Northern	382	0.52	2
	North-Western	264	2.27	6
	Southern	599	4.01	24
	Western	328	2.44	8
Total		4334	2.22	96

Infertility by Type of place of residence 1992

		# Fertile Women	Rate	# Infertile Women
Type of place of residence	Urban	1829	1.37	25
	Rural	2505	2.83	71
Total		4334		

Infertility by Highest educational level 1992

		# Fertile Women	Rate	# Infertile Women
Highest educational level	No education	890	2.47	22
	Primary	2688	2.42	65
	Secondary	678	1.03	7
	Higher	77	2.60	2
Total		4333		

Infertility by Province 1996

		# Fertile Women	Rate	# Infertile Women
Region	Central	490	0.82	4
	Copperbelt	628	2.23	14
	Eastern	795	2.01	16
	Luapula	550	1.64	9
	Lusaka	599	1.50	9
	Northern	491	1.22	6
	North-Western	383	1.83	7
	Southern	542	1.85	10
	Western	410	4.15	17
Total		4888	1.88	92

Infertility by Type of place of residence 1996

		# Fertile Women	Rate	# Infertile Women
Type of place of residence	Urban	1602	1.56	25
	Rural	3286	2.04	67
Total		4888		

Infertility by Highest educational level 1996

		# Fertile Women	Rate	# Infertile Women
Highest educational level	No education	871	2.64	23
	Primary	3106	1.90	59
	Secondary	808	1.11	9
	Higher	103	0.97	1
Total		4888		

Infertility by Region 2001-2

		# Fertile Women	Rate	# Infertile Women
Region	Central	544	1.65	9
	Copperbelt	525	0.76	4
	Eastern	616	2.76	17
	Luapula	402	2.74	11
	Lusaka	501	2.20	11
	Northern	757	1.19	9
	North-Western	531	0.75	4
	Southern	456	1.97	9
	Western	343	2.62	9
Total		4675	1.78	83

Infertility by Type of place of residence2001-2

		# Fertile Women	Rate	# Infertile Women
Type of place of residence	Urban	1347	1.41	19
	Rural	3328	1.92	64
Total		4675		

Infertility by Highest educational level 2001-2

		# Fertile Women	Rate	# Infertile Women
Highest educational level	No education	719	2.23	16
	Primary	2941	1.73	51
	Secondary	906	1.77	16
	Higher	109	-	0
Total		4675		

Infertility by Province 2007

	# Fertile Women	Rate	# Infertile Women

Region	Central	420	1.19	5
	Copperbelt	470	1.06	5
	Eastern	623	1.12	7
	Luapula	460	2.17	10
	Lusaka	507	1.18	6
	Northern	502	1.39	7
	Northwestern	413	1.21	5
	Southern	484	1.03	5
	Western	385	1.56	6
Total		4264	1.31	56

Infertility by Type of place of residence 2007

		# Fertile Women	Rate	# Infertile Women
Type of place of residence	Urban	1570	1.27	20
	Rural	2694	1.34	36
Total		4264		

Infertility by Highest educational level 2007

		# Fertile Women	Rate	# Infertile Women
Highest educational level	No education	555	1.80	10
	Primary	2575	1.13	29
	Secondary	961	1.46	14
	Higher	173	1.73	3
Total		4264		

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