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The association between place of residence and infant and child mortality in Angola

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CHAPTER 1: INTRODUCTION

1.0 Introduction

Significant progress in the reduction of under-five mortality globally has been observed in the past 20 years (Hill et al 2012). The global under-five mortality has declined by 35% from 87.6 deaths per 1000 live births in 1990 to 56.7 deaths in 2010. Infant mortality has reduced by 34% during the same period. Hill et al (2012) also noted that five of nine developing Africa countries studied have shown a reduction of 50% in the under-five mortality. Northern Africa has achieved the Millennium Development Goal (MDG4) with a 68% decline in under-five mortality, while sub-Saharan Africa experienced a reduction of only 30%. Sub-Saharan Africa continues to have the highest under-five mortality, with 121 deaths per 1 000 children compared to Northern Africa which had only 26.6 deaths per 1 000 live births in 2010. Infant mortality levels in sub-Saharan countries were reported at 76.2 per 1 000 live births in 2010; almost double that of developing countries (44.3 deaths per 1 000 live births).

Infant mortality rates in Egypt and Morocco were estimated at 18 and 28 per 1 000 live births respectively in 2012 (World Bank 2014). Cameroon and Ghana experienced infant mortality levels of 61 and 49 per 1 000 live births for the same year respectively. Zambia, Malawi and Namibia are estimated to have had infant mortality levels of 56, 46 and 28 per 1 000 births respectively during the period 2010 – 2015. The report also shows that the under-five mortality levels in Egypt and Morocco were estimated at 21 and 32 per 1000 live births respectively during the period 2010 – 2015. Cameroon and Ghana experienced under-five mortality levels of 95 and 72 respectively during the same year. These figures indicate a remarkable progress being achieved in under-five mortality in North African countries while the sub-Saharan African part still lags behind.

Angola is a developing sub-Saharan African country that has recently emerged from 27 years of civil war which ended in 2002. The mortality of infants and children has continued to be very high in recent years, 11 years after the war has ended in the country. The MDG requires that under-five mortality rates be reduced by two-thirds between 1990 and 2015 (Millennium Development Goals Report 2010). By 2012, the country was still experiencing 71 more deaths per 1 000 live births above its target. High levels of infant and child mortality are regarded as indicators of poor population health and lack of socio-economic development (World population Prospects 2012). Urban and rural areas are likely to be contributing differently to the observed high mortality levels in the country (United Nations 2013). This called for the current study to investigate the contribution of urban-rural variations in infant and child mortality patterns in this country.

1.1 Background

Since 2002, Angola has seen a sharp growth in its economy, mostly from the exploration of natural resources. Oil exports formed the main part (31.4%) to the growing GDP of the country in 2007. The growing economy is however not benefiting the remote areas of the country in form of socio-economic development mainly as a result of poor management and corruption of the natural resource (Hammond 2011; Oliveria 2008). Furthermore, the economic growth of Angola is concentrated in Luanda province which takes above 75% of the GDP but has just a third of the country's population. An estimated 41.6% of rural women are found to live under the poorest economic conditions while only 6.0% are living under the same conditions in urban areas (Decker and Constantine 2011). Generally, more men (30%) are employed as compared to women (20%) in the country (Prata 2005). The employment levels are likely to be much lower in rural areas, especially among

women. Subsistence agriculture forms the major part of livelihood for many rural communities in the country (Jenkins 2003).

It is estimated that the country had 13 million people of which two-thirds were under the age of 25 with a life expectancy of 38 years at birth. This was attributed to prolonged high fertility and high infant/adult mortality (Angola Malaria Indicator Survey 2011; China and South-South Scoping Assessment for Learning and Development 2012). The likelihood for Angolan citizens to enjoy prolonged life is relatively low compared to other countries. Furthermore, the country has high rates of transmittable diseases. Malaria is the main cause of death (one in every 3 infants), followed pneumonia (a third of deaths) and diarrhea constituting 9.83% infant deaths in 2007. Malaria is likely fueled by lack of proper water system, sanitation and waste collection associated with rural areas and poor urban services (Simao 2013).

There is a general disproportionate development between rural and urban areas in Angola. Access to electricity is 37.3% among urban population and only 4.9% for rural areas while access to piped water is 59.7% and 22.8% for urban and rural areas respectively. An estimated 84.6% of urban population has access to sanitation while only 31.1% of rural residences have access (African Economic Outlook 2012; Decker and Constantine 2011; Jenkins 2002). These shortages in basic necessities are more likely to affect women who form the major part of the adult population and breadwinners for households in the rural areas.

The country is ranked 146 in 182 countries on the Human Development Index (African Development Bank 2011). The average adult literacy rate (meaning achieved universal primary education) for the country was 69.6% in 2010 and 65.2% for women during the same year. This has slightly improved from a literacy rate of 67.4% and 63.2& for adults and women respectively in 2000 (African Development Bank 2011). Women in rural areas and the interior of Angola are generally less likely to have

access to schooling beyond primary level with a 32.5% urban illiteracy rate compared to a 60.3% rural illiteracy rate (Decker and Constantine 2011). This reduces women's empowerment and self-determination on matters relating to short and long term decisions affecting them and their children. As will be proven by the literature, improvement in education of women is expected to positively contribute to the reduction of infant and child mortality in the country. Angola is also struggling to realize its gender equity targets.

1.2 Problem statement

Angola is currently experiencing high infant and child mortality rates, and its figures are the highest in the Southern African Development Community (SADC) region. Although there has been a decline in infant and child mortality in Angola over the last 25 years, the levels remain high. The country's infant and under-five mortality rates were reported at 110.9 and 192.5 per 1 000 live births respectively in 2010 (African Development Bank 2011). The average levels of infant mortality were earlier estimated at 150 and 138 per 1 000 live births for the periods 1990 – 1995 and 1995 – 2000 respectively. The levels of under-five mortality have declined noticeably from 253 to 232 per 1 000 live births in 1990 – 1995 and 1995 – 2000 respectively (United Nations 2011). The high infant mortality rate in Angola is the main contributor to the under-five mortality rate in the country.

The observed high infant and child mortality rates in Angola are likely to promote pro-natal practices (risky to women's health) and persistent higher fertility rates in a country where the levels of contraceptive usage have been at a low 6% level for 30 years. This might occur as a replacement of the lost child. The pro-natal behavior and high fertility rates will further put pressure on the country's poor public health

infrastructure and poor economic conditions most women find themselves in. Angola is further exposed to high HIV/AIDS levels in neighbouring countries (like South Africa where most of the country's migrant workers reside) and other opportunistic diseases like malaria and cholera common in sub-Saharan African countries. An increase in HIV prevalence is likely due to increased free movement of people after the war, low levels of usage of condoms and lack of knowledge or myths about the disease (Prata 2005). The spread of these diseases in Angola could lead to continued higher infant and child mortality rates. This will ultimately lower the life expectancy at birth for Angolans.

The civil war in Angola has played a major role in the destruction of infrastructure (e.g. health facilities, schools) mostly in rural areas where a lot of combats occurred compared to urban areas. In Moxico Province where UNITA leader, Jonas Savimbi was ultimately killed, the city of Luena was more peaceful and a safe area for most of the people fleeing fighting in the rural areas around and towards the eastern border with Zambia (Roque, 2008). This was the general pattern in other provinces of the country. These geographically discriminative conflicts could also have resulted in long-term relatively poor rural socio-economic conditions for this developing country. Furthermore landmines placed across the country by warring parties during the war continue have a negative impact on the social and development of areas as infrastructure and economic development is hindered (Arcand 2015). These factors are likely to affect the wellbeing and survival chances of infants and children in rural areas of Angola more severely compared to infants and children in urban areas.

1.3 Research question

- How do urban-rural variations contribute to infant and child mortality in Angola?

1.3.1 General objective

- To examine the association between type place of residence (urban and rural) and infant and child mortality in Angola.

1.3.2 Specific objectives

- To examine the patterns of infant and child mortality by place of residence in Angola.
- To examine the association between place of residence and infant and child mortality in Angola.
- To examine the association between place of residence and infant and child mortality in Angola, controlling for other socio-economic factors.

1.4 Justification

Studies on infant and child mortality are generally aimed at developing preventive strategies and policies (e.g. public health, educational, employment, etc.) that in the long-term are expected to improve the lives of the population. These policies are expected to subsequently reduce infant and child deaths. However, generalizing the findings from what has been observed in other regions of the world might not be ideal to the young population in Angola and its context as well as experiences. The country is still in the early stages of demographic transition and a large portion of the population still residing is less developed rural areas. This stage is associated with both high fertility and under-five mortality rates.

Since the end of war, Angola has put in place several measures to try to uplift the socio-economic conditions of women as well as to reduce the high levels of both infant and child mortality. The Ministry of Family and Promotion of Women was developed with the aim to promote women's rights and enable women to participate in decision-making processes in

the country. The law ensuring ownership of land by women and widows as a form of wealth and collateral was also introduced (USAID 2007).

The country has a compulsory free education policy for all children until Grade 8. Furthermore, training of an additional 20 000 teachers in 2005 was conducted to support the programmes to roll out education. The policy aims to: reduce illiteracy by 10 - 15%, and to achieve social, political and economic development among the citizens. Polytechnic institutes, the Programme for Literacy and School Acceleration aimed to reduce adult illiteracy levels and the Post Literacy Adult Education (in partnership with non-government organizations) were introduced to provide adult citizens with technical training to enable them to find jobs or form small businesses (Figuiera & Inacio 2012). The Rural Women Support Programme and the Integrated Rural Development and Poverty Reduction Municipal Programmes are some of the initiatives developed to provide economic support and technical expertise to rural women to enable then to develop their own businesses and support their families (Martins 2012).

The country has also revitalized its health sector to ensure universal access to health facilities through the Child and Maternal Mortality Reduction which ensures pre and post pregnancy support including vaccinating children against diseases. The National Infant and Child Feeding Strategy and the National Strategy for School Feeding were introduced, are aimed at reducing deaths of infants and children due to hunger and malnutrition (Chr. Michelsen Institute and Centro de Estudos e Investigação Cientifica 2011).

The current study is more of a follow-up to a study in Angola which econometrically looked into the general determinants of child mortality in Angola without stratifying them by place of residence (Sjursen 2011). Grein (2003) investigated the causes of death (including under-five mortality) among UNITA refugees in camps in only four provinces of

Angola. Again, Kennedy (2005) conducted a study focusing on the relationship between childhood under-nutrition and poverty in urban and rural areas of Angola, the Central African Republic and Senegal. Studies focusing on infant and child mortality in Angola usually use 'type of place of residence' as a control variable and rarely as a key independent variable. Again, studies on infant and child mortality in Angola generally experience data constraints. Woods (2003), in his study on mortality in general during the ages of industrialization in Europe, concluded that "the long debate on urban-rural mortality differentials has not been brought to a successful conclusion, but the signs of greater cultural awareness and analytical sophistication are encouraging".

This study will in turn contribute to the policy planning framework for guiding interventions in Angola. Tailor-made programmes targeted at addressing specific challenges experienced by rural and urban communities will be easily conceptualized. This will ultimately reduce unnecessary spending of meagre revenues by the economically poor government on ineffective programmes (as budgeting would be informed by relevant scientific research). By focusing on Angola with its history of conflicts, the study will further inform programmes for the development of the population in a developing country which continues to experience the negative impact of the destruction of normal family life and infrastructure by the civil war.

This study further adds to literature in the area of infant and child mortality. It will specifically contribute to knowledge on the topic on the effects of place of residence and associated factors on infant and child mortality. The study will provide valuable inputs into the distribution of infant and child mortality and conditions experienced by rural and urban populations from the perspective of a developing sub-Saharan country which has emerged from many years of wars.

1.5 Definition of terms

Infant mortality – The probability of dying between birth and exactly one year of age (UNICEF)

Under-five mortality – The probability of dying between birth and exactly five years of age (UNICEF)

Child mortality **–** For the purpose of this study, child mortality is defined as the probability of dying between the age of one and exactly five years of age (UNICEF)

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

The study literature gives a brief summary of factors contributing to infant and child mortality. It further focuses on the effects of these factors in urban-rural areas from different regions of the world. A review of socioeconomic factors and the related proximate determinants contributing to infant and child mortality is conducted, outlining the relationships between independent and dependent variables.

2.1 Literature review

As a child grows from birth, it passes through different biological stages exposing it to varying risks on its health status and health outcome. Omariba et al (2007) argues that bio-demographic factors like maternal age are more important in explaining infant mortality while socioeconomic, sociocultural and hygienic factors are more important in explaining child mortality. However, Hanmer et al (2003) found that per capita income, together with other indicators like health, education and gender status, play a role in the reduction of both infant and child mortality. The study of 52 developing countries indicates that these countries are predominantly rural, which is associated with poorer socio-economic conditions. Rural areas are furthermore associated with higher risks of infant mortality compared to urban areas and the odds reduce when the family moves to urban areas (with better socio-economic conditions) (Omariba and Boyle 2010). A study conducted in six Francophone countries in Central and West sub-Saharan Africa further found that the differences in rural-urban infant mortality were mostly due to variations in the distribution of household factors and not necessarily their effects (Van de Poel et al, 2009). An increase in the socio-economic quintile in rural areas in South Africa is found to be associated with a

decline in child mortality, while the decline was only significant at the fourth and fifth quintiles in urban areas (Thomas 2007).

Mothers' beliefs are other sociocultural factors that contribute to infant and child mortality. The beliefs can influence the woman's use or non-use of health services required for maternal and child care. Religious and traditional practices are more likely to be enforced in rural areas as compared to urban areas. In 15 pairs of Muslim and non–Muslim countries, Ghuman (2003) found that freedom of movement was lower among Muslim women compared to other religion. A woman's influence over the treatment of a child's illness (jointly with or without her husband) was found to be lower in Muslim communities in 10 of the 15 countries. Both these factors were among factors used as an indicator for women's autonomy. The study further found that infant and child mortality rates were generally higher in communities where women were restricted in movement and had less to say on the health/treatment of their children. In the poor northeastern region of Brazil, Wood (2007) found that children born to Protestant mothers had better survival chances compared to children born to Catholic mothers. The study also found that child mortality in urban areas was 15.5% higher compared to rural areas. A significant association between the mother's religion (Islam and traditional/other) and the risk of under-five mortality was found in Nigeria when adjusting for demographic factors (Antai et al 2009). The authors argue that religion played a major role in the use or non-use of public health services in the country: hence, the there was some degree of refusal on child immunization in the country. The study further found that the under-five mortality relative risk among Islam mothers and traditional /other religions was higher compared to that among Christian mothers. However, when the use of maternal and child health care services was controlled, the relative risks for under-five morality among Islam mothers became less while the relative risk for mothers following traditional /other practices slightly declined compared to Christian mothers. This

shows the effect of access to health facilities, mostly found in urban areas for women with children. The study further found under-five mortality relative risk to be higher in rural areas compared to urban areas.

Providing education to women equips them with autonomy for making decisions on timing their marriage and pregnancy, as well as skills for caring for their babies. However the availability of functional education systems and facilities are most likely to be found in urban areas in developing countries. Fuchs et al, (2010) found that infant mortality odds were lower amongst mothers with median and higher education in 18 of the 27 studies undertaken for developing countries whiles controlling for place of residence. The study also found that urban areas (generally characterized as having better access schools and clinics) had lower infant mortality odds compared to rural areas in all 21 countries. Song and Burgard (2011) found that the odds of child mortality are lower in urban areas and among women with education compared to rural areas and women with no education in China. Inchani and Lai (2008) found that all but one region in India had more male children aged between 0 and 6 than girls. This unlikely pattern is associated with the infanticide practice in some areas of India. Increased literacy levels in urban areas has shown to reduce the child sex ratio while the reduction in rural areas was visible among women with secondary and graduate level education. Educated urban women are associated with having fewer children and, as such, are more likely to value the life of each child irrespective of gender compared to the situation in rural areas of India where girl children are less valued and protected. Hale et al (2009), found that an increase in the mother's education contributed to the largest proportion in the reduction of both infant and child mortality in Matlab, Bangladesh between 1987 and 2002. A study conducted by Hossain (2006) in rural Bangladesh found that the risk of infant and child mortality were 0.89 and 0.39 less for mothers with primary and higher education respectively (between 1988 and 1993) but the association was not found to be significant. Although

not specified by type of place, education shows to reduce child mortality by 18% and 47% for mothers with primary education and those with secondary and higher education respectively when compared to mothers without any education in sub-Saharan African countries (Omariba 2007). Maternal education played an important role in reducing under-five mortality in Angola. The effect of education in reducing under-five mortality was evident in all but one region of the country. The attainment of university qualifications reduced the under-five mortality more compared to all other lower categories of education (Sjurgen 2011).

Access to health facilities enables women to receive information, support and proper care before, during and after pregnancy. Like any other public goods, better health facilities are generally located in urban areas as compared to rural areas in most developing countries. Chen et al, (2007) argue that lack of access to health facilities is associated with poor communities, less educated women and generally mothers with higher parity. The study further indicated that access to prenatal care is associated with a decrease in the likelihood of infant death, controlling for individual level and community level socioeconomic factors. Van de Poel et al, (2009) found that the existence of a health facility was associated with the reduction in the risk of infant deaths although this association was only found to be stronger in urban areas. The Chinese reforms introduced after the end of Mao rule, promulgated an increase in the use of health facilities in the country among first time mother (77%). This resulted in reduced levels and risks of infant deaths during the period 1986-1995 compared to the previous era (1970-1980) (Song and Burgard 2011). The study further indicates that the odds of child mortality became lower in urban areas after the reforms but when the effects of prenatal care and delivery assistance are controlled, the benefits of reduced urban residence on infant mortality diminished. Fazzio et al, (2011) found that the long walking distance between home (most likely in rural communities) and the health facility in Guinea

Bissau had a slight negative effect on child mortality. The long distance also reduced the women's chance of being attended by a health professional, especially during pregnancy. Poor quality of health services (like failing to recognize severe cases) even in areas where women have good health-seeking behaviours proved to contribute largely to infant and child mortality. Antai et al, (2009) found that as under-five mortality increases among women who give birth at home in Nigeria and those who never had prenatal care by doctor. The findings also indicated that under-five relative risk was higher (0.34) in rural areas compared to urban areas. However, the risk reduced slightly (0.27) when controlling for the use of maternal and child health services as well

The wealth of the household in which a child grows, reflects the type of nutrition and hygienic conditions the child gets exposed to. Van de Poel et al, (2009) found that higher infant mortality levels were experienced in poorer urban households, but no association was found in rural areas. He also found that in urban areas, child mortality risks were higher in households with no finished floors, but there was not significant association in rural areas. The reason for higher risks in urban areas is associated with slum conditions for these dwellings. The study further shows that children in households with fewer assets had higher mortality risks in urban areas compared to those in rural areas. In 80 less developed countries, growth in the percentage of populations living in urban slum conditions positively affected both infant and child mortality between 1990 and 2005 (Jorgenson 2010). The findings controlled for economic development, fertility rates and other factors. The results were also found to be more pronounced for African countries than the less developed countries in Latin America and Asia. With infant mortality rates declining in Bangladesh, the poorest population most likely found within rural areas indicates a slow decline (El Arifeen 2008). Remittance plays a major role in the economic development of the rural areas in general, through economic growth and investments. Hamilton et al (2009) found that there

were no differences in infant mortality patterns between rural and urban women in Mexico due to remittance. It was also found that rural women who received remittance (from a household member most likely living in the USA) had lower infant mortality rates compared to rural women who did not receive any remittance. The effect of remittance was not pronounced for urban women. Remittance is seen as contributing more to rural (household) incomes where there are fewer income opportunities compared to urban areas.

One of the influential roles of the head of household is to make major decisions affecting the wellbeing of the rest of the members of the household. Hamilton et al (2009) found that the departure or migration of a household member (most likely to be the husband) increases the odds of infant mortality in these Mexican rural areas. The findings also show that infant mortality rates were higher among single and cohabiting mothers compared to those who are married. A study aimed at investigating the family structure in child mortality in 22 sub-Saharan African countries found that generally, the odds of children born to single mothers were higher (1.19) in urban areas compared to single mothers residing in rural areas. Doctor (2011) found household headship in rural Nigeria to be a strong predictor of child mortality after controlling for other variables like mother's age, wealth status, region and place of residence. The study shows that children in female-headed households had 17% less chances of dying as compared to women in male-headed households. This suggests that women in female-headed households are more autonomous and/or knowledgeable to be able to make good decisions for their children. Female-headed household are generally found in rural areas in many African countries due to urban migration of male counterparts. No difference in the effect of polygyny was noticed on child mortality in urban and rural areas (Omariba and Boyle 2007). In both rural and urban areas of South Africa, women who were single, divorced or widowed had

higher (1.34) child mortality compared to those who were married in urban areas (Thomas 2007).

Staying in bigger households might mean that fewer resources are being shared among several members, adding a burden on poor and disadvantaged households. Bigger households are mostly found in rural areas in developing countries. The study by Fosu and Nyarko (2013) in Ghana shows that children in households with a larger number of members have higher odds of dying compared to those with a smaller number of members. The study also shows that the proportion of children dying in rural areas is higher than those for children in urban areas. Andoh et al, (2006) found that the odds of a child's survival in households with 5-7 members was 0.6 less compared to households with the least members, after adjusting for demographic factors.

Access to resources like potable water provides a hygienic environment for child growth in the household. Functional piped waters systems are more likely to be found in urban areas than rural areas in developing countries. Child mortality was found to be 16.6% lower among children living in households with access to piped water (Wood 2007). The study investigating the effect of provision of piped water in Brazil found that piped water reduced the infant mortality rate significantly more at the higher conditional quintile than at the lower conditional quintiles (Gamper-Rabindran 2008). No effect was noticed in cases of extreme underdevelopment. Lower quintiles are characterized by lack of the above mentioned services and higher mortality levels, whereas higher quintiles refer to the opposite. Furthermore, the effect of piped water seems to disappear when the area becomes fully developed. These are likely to be suburbs in urban areas.

Complementing the socio-economic factors, are the bio-demographic factors that influence the health status of the infants or children. Kembo (2009) found that birth order, and preceding birth intervals, maternal age

and type of birth dominated as determinants of infant mortality. The study shows that higher birth order with short spacing resulted in higher infant mortality risks. This has also been evident in several studies conducted in developing countries. First and high birth orders (e.g. fifth birth) were also found to be associated with higher under-five mortality rates in Nigeria, in particular, child mortality (Anitai et al, 2009). High parity of a mother is a concern in many developing countries and it has been associated with lack of: knowledge/education, employment, women autonomy, access to modern contraceptives, etc. Mothers with high number of children are generally found in rural areas as compared to urban areas. With poor socio-economic conditions in the rural areas and lesser household resources, these mothers become unable to provide for their many children. Fosu et al. (2013) found a significant gradual increase in child mortality proportions with the increase in the total number of children born to a woman. However, Franz (2006) argued that the use of total fertility and per capita GDP to explain child mortality in highly heterogeneous communities in both developing and developed countries might yield misleading results due to the socioeconomic factors associated with the those communities.

The age of a woman and associated physiological state plays an important part in giving birth to a healthy baby. Hamilton (2009) found a concave pattern in relation to the age of the mother and infant mortality rates, showing younger and older women to have higher odds of infant mortality. Mothers who were very young at first birth had a negative effect on the child's health outcome for a period in 55 low and middle-income countries (Finlay 2011). The results are attributed to a combination of biological and social factors. Most young mothers are likely to be found in rural areas where literacy levels and attendance of school are relatively lower. This group of women is again not well equipped to care for their children. The study further shows that children born to women 12 to 17 years are significantly more likely to die before

reaching the age of one year, compared to those children born to mothers aged between 27 and 29 years. Doctor (2011) found that among rural Nigerian women, the odds of child mortality increased with the age of women compared to women aged 15 – 24 years. The odds were 3.51 and 8.78 more for women aged 25 – 34 and 35 – 49 years respectively. Child mortality odds were lower for all women aged between 15 and 29 compared to women 30 - 34 in both urban and rural areas in South Africa but the relationship was not significant for women aged 15 – 19 in rural areas (Thomas 2007). Younger mothers are generally found in rural areas where there are lack of information, education systems and health facilities.

Survival of a child through life is also determined by its gender. This can be a result of how the family and the community at large value a certain gender. Rural areas are generally known to favour the wellbeing and survival of boys as compared to girls in developing countries. Stockwell et al, (2005) found that infant mortality was higher among boys compared to girls in Ohio. The pattern was consistent from 1959 to 2001 with boys showing to be more sensitive to household income than girls. Chen et al. (2007) found that in China, where the one-child policy is mainly practised, infant mortality rates are higher for females of second and higher birth order, and again in families where there are no preceding male siblings. This is generally the pattern observed in rural communities where male children are preferred more than girls mainly due to cultural traditions. Although a noticeable reduction in infant mortality has been observed in Bangladesh, the decline has been very minimal among boys (Arifeen 2008). Again the infant mortality levels have been declining sharply in rural areas between 1984 and 2003 but the decline in urban areas has been levelling off from 1987 to 2003. When investigating the Indian ‘missing women’ phenomenon, Sudha and Rajan (20003) noticed that the sex ratio at birth indicated that the odds of female children to be born were increasingly declining between 1981 and 1991 compared to

males. The more modernized (e.g. increased women education, employment and urban residency) India became, the higher the biasness of sex ratio at birth against female children. This is associated with technological advancement dominant in urban areas, making selective abortion more accessible and efficient compared to the historical infanticide method. Urban areas were found to have low female child mortality odds in 1981 and the odds remain less compared to male children in 1991.

Literature shows that socioeconomic determinants seem to be following the same patterns in influencing both infant and child mortality in studied countries as predicted by the theory on 'Determinants of child mortality' by W. Mosley and L. Chen of 1984 (to be explained in the next section). The literature indicates that 'negative' socioeconomic conditions and unfavourable proximate factors contribute to higher infant and child mortality. It is further proved that infant and child mortality risks are generally higher in rural areas compared to urban areas. There are however, some exceptional cases, for example the effects of education as reviewed in the literature above in the studies by Sjurgen (2011).

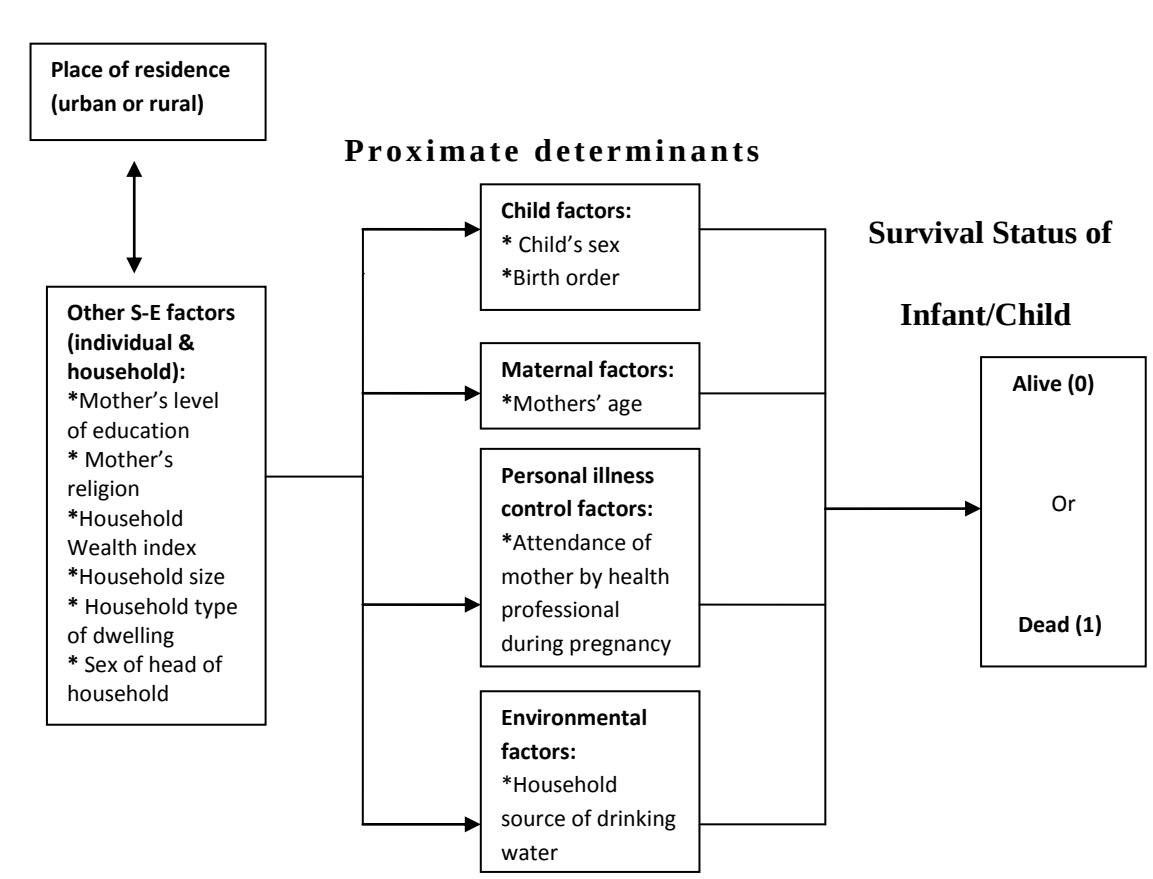
2.2 Theory

The theory adopted in this study is by W. Mosley and L. Chen (1984): based on the premise that "all social and economic determinants of child mortality necessarily operate through a common set of biological mechanisms or proximate determinants to exert an impact on mortality". The theory further states that "in many developing countries, large differences in infant and child mortality have been observed between various regions or between mothers with different educational or social characteristics within a given area". This theory was used for the study of the determinants of child mortality in developing countries. It was

developed with the aim of integrating into one, the measures of diseases (disease progression) and mortality (and related socio-economic factors) as usually investigated by the medical and social scientists respectively. The theory basically argues that death is not a result of a single factor, like a disease, but likely a combination of socio-economic factors and medical factor/s unfolding over some period of time. Surgen (2011) illustrates using education as an example of a social factor that indirectly affects the health of both the child and the mother as it influences the decision-making powers of a woman on whether to get married or have children at a certain age as well as the total number of children she would have. Having children at an early age or a large number of children negatively affects the survival chances of children/siblings.

2.3 Conceptual framework

Figure 1: Conceptual framework adopted from W. Mosley and L. Chen (1984)



As applied to this study, the theory indicates that it is expected that variations in infant and child mortality patterns will exist by type of place of residence in Angola. It is further expected that other independent variables/socio-economic factors (mother's education level, mother's religion, household size, sex of head of household, household type of dwelling and household wealth index), will influence the outcome variables in Angola. These influences will however occur through the direct influence which proximate variables (child's sex, birth order, mother's age, household source of drinking water, and attendance by health care professional during pregnancy) are expected to exert on the risk of disease and ultimately the outcome status (dead or alive) of the infant/child. The study does not investigate the influence of nutrition and injury as part of proximate determinants.

2.4 Hypothesis

H_o: Infant and child mortality are high in rural areas as compared to in urban areas. Rural areas are less socially and economically developed compared to urban areas. Furthermore, infrastructures like schools, health facilities, and businesses in rural areas have been destroyed during severe fighting in rural areas as compared to urban areas (Roque 2008).

H_1: Infant and child mortality is not high in rural areas as compared to in urban areas.

CHAPTER 3: METHODOLOGY

3.0 Introduction

This section outlines the setting of the study, the data source and the study population for the study. The constitution of the sample and its size is explained in details. The variables used in the study are explained, and how they are formulated. The section outlines the tests used to analyse the data as well as the limitations of the analysis.

3.1 Study setting

Angola is the sixth largest country in Africa stretching over 1,246,700 square kilometres. The country is divided into 18 provinces and has over 20 languages being spoken, with Portuguese being the official language (Angola Malaria Indicator Survey 2011). The main ethnic groups in Angola are the Ovimbundu (37%) who are mostly found in the Bie Plateau in central Angola. The Kimbundu contribute one-fourth of the population and are mostly found in northwest and north-central Angola. The last major group is the BaKongo with the majority found in northwest and north-central Angola and spread through the Cabinda province and most parts of the north. These three main ethnic groups are also found in Luanda. People of European descent constitute only 1% of the population (Defense Language Institute Foreign Language Centre, 2011). An estimated 59.2% of Angolans reside in urban areas, while 40.8% live in rural areas (Index Mundi 2013).

3.2 Data source, study population and sample size

This is a cross-sectional analytical study using the Angola Malaria Indicators Survey (AMIS) 2011 dataset. The study population for the research are infants (0 – 11 months) and children (12 – 59 months) born between 2006 and 2011 who were either alive or dead during the interview

period. The respondents to the questions were women who were aged between 15 and 49 in Angola during the survey. Data was ultimately collected on a weighted sample, consisting of 8 524 children aged between 0 and 5 years.

The AMIS is a presidential initiative which was aimed to collect baseline information regarding levels of malaria and its contribution to under-five mortality in Angola. Besides collecting information on malaria, the survey collected most of the information normally found in the Demographic Health Survey (DHS). A three-stage stratified national sample of Angola was designed from the 18 provinces of the country. Municipalities form the second level of administration followed by communes. Urban communes were formed from census segments, which are equivalent to census enumeration areas, while rural communes were formed from the lists of villages with an estimated number of populations. Communes were then grouped by region, sub-region, province and urban or rural areas to form 240 clusters (96 urban and 144 rural). Clusters were then systematically selected with probability proportional to size. A total of 8 000 households were selected for interviews. Data collection was conducted by trained fieldworkers in sampled households between the months of January and June 2011, and a response rate of 95% was achieved. Given the sample composition and responds rate, the findings of the study are generalized as a true representation of the study population in Angola.

3.3 Ethical issues

There are no ethical issues to consider for this study as secondary data is being used. The AMIS conformed to identified protocol and all ethical requirements (Angola Malaria Indicator Survey 2011).

3.4 Study variables

3.4.1 Dependent variables (dichotomous)

- Infant mortality – Alive (0); Dead (1)
- Child mortality – Alive (0); Dead (1)

3.4.2 Key independent variable

- Type of place of residence (1 = Urban; 2 = Rural)

3.4.3 Other independent variables

- Socio-economic factors:

Child factors:

Child's sex

Birth order

Maternal factors:

Mother's highest educational level

Mother's age

Mother's religion

Household factors:

Household wealth index

Sex of head of household

Household size

Household type of dwelling

Environmental factors:

Household source of drinking water

Personal illness control factors:

Attendance by health professional during pregnancy

Table 1: Description of study variables

Variable name	Variable code	Original categories	New categories	Reason for using the variable in the study
Child alive **(Dependent variable)**	b5	0 = No 1 = Yes	0 = Yes 1 = No	This variable is an indication of the outcome status of the child (whether alive at the age of one/five or not)
Type of place of residence **(Key independent variable)**	v025	1 = Urban 2 = Rural	1=Urban 2=Rural	Type of residence has an effect on access to services (like water and electricity), infrastructure (access to school, health facilities, etc.) and economic opportunities the household is exposed to
Sex of child **(Independent variable)**	B4	1 = Male 2 = Female	1 = Male 2 = Female	Sex of child has an effect on how the family or community treats and looks after the wellbeing of the child. In developing countries, boys generally are preferred more than girls
				The order of birth which the child was born has an effect on how the parent/s treats the child. In certain cultures,

Birth order **(Independent variable)**	Bord	1 – 15	1 = 1 2 = 2 - 3 3 = 4 – 6 4 = 7+	first-born children are treated well while in other cultures, the last-born child is given preferential treatment
Mother's age **(Independent variable)**	V013	1 = 15 – 19 2 = 20 – 24 3 = 25 – 29 4 = 30 – 34 5 = 35 – 39 6 = 40 – 44 7 = 45 – 49	1 = 15 – 24 years 2 = 25 – 34 years 3 = 35 years and above	Age of the mother has an effect on the health of the child being born as well as the mother's ability to take care of the child. Giving birth at a very young age or older age is associated with physical depletion of the mother's body and low birth weight of the newly born child
Mother's highest education level **(Independent variable)**	V106	0 = No education 1= Primary education 2 = Secondary education 3 = Higher	0 = No education 1 = Primary education 2 = Secondary & higher education	Mother's highest education level determines the her ability to make decisions on the number of children she wants to have, the timing of marriage, the ability to access information and care for children
Mother's religion **(Independent**		1 = Catholic 2 = Christian / protestant 3 = Islam 4 = Traditional / other religion 5 = No religion	1 = Christianity/ Protestants 2 = Islam 3 = Traditional/Other	Mother's religion has an effect on her autonomy like access to education, age for marriage, major household decisions including the number of children to be born, how to raise the

variable)	v130	96 = Other	3 = No religion	children, etc.
Sex of household head **(Independent variable)**	V151	1 = Male 2 = Female	1=Male 2=Female	Sex of the head of the household has an effect on the wealth of the household and is also a reflection of the main decision maker in the household (e.g. the number of pregnancies/children)
Household size **(Independent variable)**	V136	1 – 20	1 = 1 – 3 members 2 = 4 – 5 members 3 = 6 – 7 members 4 = 8 and more members	The number of household members has an effect on the allocation and sharing of household resources among members/ children. Larger households are likely to have members competing for fewer resources in the household
Wealth index **(Independent variable)**	V190	1 = Poorest 2 = Poorer; 3 = Middle 4 = Richer 5 = Richest	1 = Poor (‘Poorer’ and ‘Poorest’) 2 = Middle 3 = Rich (‘Richer’ and ‘Richest’).	The wealth of the household is associated with the ability of the household to provide shelter, clean water, food, medication and other necessities required to raise a child. The variable encompasses economic variables like individual/ household income, ownership of bicycle, etc.

Household type of dwelling **(Independent variable)**	V127, V128 and V129	**v127-Main floor material** 11 = Clay/sand 12 = Dung 33 = Ceramic/ mosaic/ tiles 34 = Cement 35 = Carpet 96 = Other 97 = Not de jure resident **v128-Main walls material:** 21 = Straw/ mats, 23 = Sticks & mud 24 = Blocks of clay 25=Canes/ palms/ trunks 26 = Used wood 31 = Concrete or stone blocks 32 = Bricks 33=Wooden planks 96 = Other 97 = Not de jure resident.	**Main floor material** 1 = Good if v127 = 33 ceramic/mosaic tiles, 34 cement or 35 carpet 2 = Poor if v127 = 11 clay/sand, 12 dung, 96 other or 97 not de jure **Main wall material** 1 = Good if v128 =31, concrete or stone blocks, 32 bricks or 33 wooden planks 2 = Poor if v128 = 21 straw/ mats, 23 sticks & mud, 24 blocks of clay, 25 canes/ palm/ trunks, 26 used wood, 96 other or 97 not de jure **Main roof material** 1 = Good if v129 = 31 zinc, 32 asbestos shingles, 33 ceramic tiles or 34 concrete 2 = Poor if v129 = 21 palm/ bamboo/ mat, 22 wood planks, 96 other or	

		v129 - Main roof material 21 = Palm/ bamboo/ mat 22 = Wood planks 31 = Zinc metal 32 = Asbestos shingles 33 = Ceramic tiles 34 = Concrete cement 96 = Other 97 = Not de jure	97 not de jure **<u>Formulation of the variable</u>** **Htd:** 1 = Good (all answered '1' for main floor, walls and roof material) 2 =Average (combination of '1' and '2' answers for main floor material, main walls material and main roof materials) 3 = Poor (all answered '2' for main floor, walls and roof material)	The type of dwelling a household occupies is a reflection of its economic status and subsequently its ability to provide necessities like a clean environment and food for the infant/child.
Source of drinking water **(Independent variable)**	v113	11 = Piped water into dwelling 12 = Piped water into yard/ plot 13 = Public tap/ standpipe 21 = Tube well or borehole 31 = Protected well 32 = Unprotected spring 41 = Protected spring	1 = Improved source ('Piped water into dwelling/yard/plot'; 'public tap/standpipe'). 2 = Non-improved source	

		42 = Unprotected spring 43 = River/ dam/ lake/ ponds/ streams/ canal/ iring 51 = Rain water 61 = Tanker truck 62 = Cart with small tank 71= Bottled 96 = Other 97 = Not de jure	('tube well or borehole'; 'protected dug well/protected spring'; bottled water' and 'rain water' 'unprotected dug well'; 'unprotected spring'; 'Surface water' like river/ dam/ lake/ ponds/ streams/canal/iring'; 'tanker truck/cart with small tank', 'other' and 'not de jure').	Water forms an important part of hygiene for the children as it is used for drinking, preparing meals, bathing and generally keeping the environment in which a child is raised, clean and healthy
Attendance by a health professional during pregnancy **(Independent variable)**	Ahp	The variable is formed from the combination of the following aspects (Doctor, nurse/midwife & auxiliary wife). **'m2a' (Doctor):** 1 = yes 2 = no **'m2b' (nurse/ midwife):** 1 = yes 2 = no **'m2c (auxiliary**	**<u>Formulation of the variable</u>** **Ahp:** 1= Yes (all those who answered ' 1' to either 'm2a - doctor, m2b - nurse/ midwife or m2c - auxiliary wife) 2= No (all those who answered '2' to either	Attendance by health professionals during pregnancy provides the mother with required information and support throughout pregnancy to

		midwife): 1 = yes 2 = no	'm2a - doctor, m2b - nurse/ midwife or m2c - auxiliary wife)	ensure that both the mother and the child are safe and healthy.

3.5 Data management

Variables for the study were selected from the child recode file from the AMIS 2011. 'Age at death (month-imputed)' (b7) variable was categorized to separate infants from children. Infants were grouped as those persons aged 0 – 11 months while children are those aged 12 – 59 months. The 'Type of place of residence' (v025) variable remains coded '1' for 'urban' and '2' for 'rural'. The 'child alive' (b5) variable was recoded and option '1' represented successes (all children who are dead) and option '0' represented the failures (alive).

'Sex of child' (v151) options remain '1' for 'male' and '2' for 'female'. 'Birth order' (Bord) was grouped into '1', '2 – 3', '4 – 6' and '7 and more children'. 'Age of mother' (v013) was categorized in to '15 – 24' for young mothers, '25 – 34' (middle-aged mothers) and '35 and above' for older mothers. 'No education' and 'primary education' options remain options '1' and '2' respectively for 'mother's highest education level' (v106) variable, while secondary and higher education are grouped as option '3'. 'Catholics', 'Protestant' and 'Christian' are grouped as option '1' for 'Mother's religion' (v130) variable; 'Islam' option '2', 'Traditional' option '3', 'other beliefs' option '4' and 'No religion' option '5'.

'Sex of head of household' (v151) remains unchanged with option '1' representing 'males and '2' representing 'females'. 'Household size' (v136) variable options were grouped '1 – 3', '4 – 5', '6 – 7', '8 and more household members'. For 'wealth index', option '1', ''poor' includes 'poorer' and 'poor', option '2' is 'middle'. Option '3' 'rich',

includes ‘rich’ and ‘richer’. Household type of dwelling (htd) is a new variable formed by combining ‘main floor material’ (v127), main walls’ material’ (v128) and ‘main roof materials’ (v129). Option ‘1’ which means good quality of dwelling refers to answers ‘1 = good’ to all v127, v128 and v129, while option ‘3’ meaning bad quality of dwelling refers to answers ‘2 = bad’ to all v127, v128 and v129. Option ‘2’ means average quality of dwelling which is formed by the combination of either ‘1’ or ‘2’ answers to v127, v128 and v129.

The ‘Household source of drinking water’ (v113) variable is categorized into ‘1’ for good quality of water and ‘2’ for poor quality of water. Option ‘1’ refers to piped water while option ‘2’ is all other sources of water other than piped water. ‘Attendance by health professional’ (ahp) is a new variable formed from the combination of ‘attendance by doctor’ (m2a), ‘attendance by nurse/midwife’ (m2b) and ‘attendance by auxiliary nurse/midwife’ (m2c) variables. Option ‘1’ refers to all those mothers who answered ‘yes’ to being attended by a doctor, a nurse/midwife or an auxiliary nurse/ midwife. Option 2’ refers to all those mothers who have answered ‘no’ to being attended to by either a doctor, nurse/midwife or axillary nurse/midwife during their period of pregnancy.

3.6 Data analysis

The Cox Proportional Hazards model is used to analyse the AMIS 2011 data using the STATA 12 software. The Cox Proportional Hazards model is chosen because besides computing the ratio of an event (death) from occurring, it takes into consideration the exposure period of the study population to the risks. Descriptive analyses are performed to establish the levels of infant and child mortality per 1 000 live births by type of place of residence as well as other characteristics. An unadjusted model was developed to compute the individual effect of the key independent

variable (type of place of residence) and other dependent variables (socio-economic) on the outcome variable (infant mortality). An adjusted model determining the effect of the key dependent variable (type of place of residence) on the dependent variable (infant mortality) while controlling for other socioeconomic was developed. The significance level of 95% was set to test the relationship between the independent and dependent variables. The hazard ratios/odds were interpreted for the models. A similar process was repeated to develop the adjusted and unadjusted models for child mortality as a dependent variable.

3.7 Limitations

Information on children born to women who died before 2006 in Angola will not be reflected in the findings of this study. The levels of the maternal death are also likely to have increased during this period due to the impact of HIV/AIDS in the country. These might underestimate the infant and child mortality levels hence children born to deceased mothers did not stand a chance of being part of the study. The study is also limited to identifying the actual causes of death in both infants and children.

The AMIS 2011 did not collect information on child vaccination, contraceptive use, birth weight, individual and household income, maternal marital status, migration history of the mother, paternal and maternal occupations as well as maternal health. The effects of independent variables which are not directly or indirectly represented will as such not be measured.

CHAPTER 4: RESULTS

4.0 Introduction

This chapter presents the findings of the study. Descriptive and quantitative analyses are presented using tables respectively which are further explained.

4.1 Descriptive statistics

Table 2: Infant, child and under-five mortality distributions (per 1 000 live births) by characteristics

Characteristic	**Infant mortality (1000)**	**Child mortality (1000)**
Main explanatory variable:		
Place of residence		
Urban	54	45
Rural	**68**	**61**
Sex of infant/child		
Male	**65**	**60**
Female	60	50
Birth order		
1	81	50
2 – 3	49	53
4 – 6	59	53
7+	**82**	**80**
Mother's age		
15-24	68	46
25-34	55	**64**

35+	**69**	57
Highest education level		
No education	65	52
Primary	**67**	**60**
Secondary and higher	35	38
Mother's religion		
Christian/ Protestant/Catholic	**66**	56
Islam	-	-
Traditional	-	**110**
Other	46	54
No religion	25	40
Sex of head of household		
Male	62	54
Female	**69**	**59**
Household size		
1-3	**162**	**108**
4-5	54	47
6-7	53	55
8+	48	48
Wealth index		
Poor	**68**	**61**
Middle	**68**	56
Rich	58	51
Household type of dwelling		
Poor quality	**72**	60
Average quality	65	**62**
Good quality	49	43
Source of drinking water		
Improved	56	37
Not improved	**65**	**62**

Attendance by a health professional during pregnancy		
Yes	49	**36**
No	**61**	31

4.1.1 Infant mortality

Table 2 shows that the number of deaths among infants is very high in rural areas (68 per 1 000 live births) compared to urban areas (54 per 1000 live births). Infant deaths are also higher among boys (65 per 1 000) as compared to girls (60 per 1 000 live births). Children born on the seventh and higher birth order have the highest levels of infant deaths (82 per 1 000 live births) followed by those born in the first order (81 per 1000 live births). Women aged 35 years and older have the highest number of infant deaths (69 per 1 000 live births) while those aged between 15 and 24 have the second highest levels (55 per 1000 live births). The numbers are less (55 per 1 000 live births) among women aged 25 – 34 years. The results also show that the highest number of infant deaths (67 per 1000 live births) occurs among mothers with primary education. The deaths are least (35 per 1 000 live births) among women with secondary and higher education. The highest number of infant deaths (66 per 1 000 live births) is observed among Christian/ Protestant/ Catholic mothers, while only 25 deaths per 100 live births were reported among mothers with no religion.

A higher number of children (69 per 1 000 live births) die in families headed by males compared to those headed by females (62 per 1 000 live births). Households with 1 – 3 members have the highest number of infant mortality levels (162 per 1000 live births). The number of infant deaths declines with a decrease with an increase in the number of household members. Rich households have lower (58 per 1 000 live births) infant mortality levels while poor and middle households have higher (68 per

1000 live births) levels of infant deaths. A high number of infant deaths (72 per 1 000 live births) are found among households living in poor quality dwellings, whereas the least (49 per 1 000 live births) die in households with good quality dwellings. More infants (65 per 1 000 live births) die in households with no improved source of drinking water compared to those (56 per 1 000 live births) in households with improved sources of drinking water. Lastly, more infants die (61 per 1 000 live births) among mothers who were never attended to by a professional during pregnancy compared to those who were attended to by a health professional during pregnancy (49 per 1 000 live births).

4.1.2 Child mortality

Table 2 also again shows that more children (61 per 1 000 live births) die in rural areas compared to urban areas (45 per 1 000 live births). The number of deaths are also higher among boys (60 per 1 000 births) compared to girls (50 per 1 000 live births). Children of the seventh and higher order die more (80 per 1 000 live births) as compared to those born in the lower orders (e.g. 53 per 1000 live births for both 2 – 3 and 4 – 6 birth orders). Women aged 25 – 34 years have the highest number of child deaths (64 per 1 000 live births) while those aged 15 – 24 have the lowest (46 per 1 000 live births). The results also show that the highest number of child deaths (60 per 1000 live births) occur among mothers with primary education. The number of deaths is least (38 per 1000 live births) among women with secondary and higher education. Children born to mothers following traditional beliefs die more (110 per 1 000 live births) while the least (40 per 1 000 live births) die among mothers with no religion.

A slightly higher number of children (59 per 1 000 live births) die in families headed by females compared to those headed by males (54 per

1000 live births). Households with 1 – 3 members have the highest number of child mortality levels (108 per 1 000 live births), while the number is lowest (47 per 1 000 live births) among households with 4 – 5 members. Children residing in poor households die more (61 per 1 000 live births) while those residing in rich households die the least (51 per 1 000 live births). Children who reside in an average quality dwelling die more (62 per 1 000 live births) while fewer (43 per 1 000 live births) die in good quality dwellings. A high number (62 per 1 000 live births) of children die in households with no improved source of drinking water compared to 37 deaths per 1000 live births in households with improved sources of drinking water. Lastly, slightly more children died (36 per 1 000 live births) among mothers who were attended to by a professional during pregnancy, whereas fewer (31 per 1000 live births) die among those mothers who were never attended to by a health professional during pregnancy.

4.2 Multivariate analysis

Table 3: Adjusted and unadjusted association of place of residence with infant and child mortality

Characteristics	Infant mortality		Children mortality	
	Unadjusted (95% CI)	Adjusted (95% CI)	Unadjusted (95% CI)	Adjusted (95% CI)
Main explanatory variable: Type of place of residence				
Ref: *Urban*	*1.00*	*1.00*	*1.00*	*1.00*
Rural	1.23(0.18-1.67)	0.75(0.39-1.44)	1.37(0.95-1.97)	1.03(0.43-2.48)
Sex of infant/child				

Ref: *Male*	*1.00*	*1.00*	*1.00*	*1.00*
Female	0.92(0.70-1.22)	0.57(0.38-0.86)**	0.82(0.59-1.14)	0.68(0.41-1.15)
Birth order				
Ref: *1*	*1.00*	*1.00*	*1.00*	*1.00*
2 – 3	0.60(0.42-0.87)**	0.52(0.28-0.98)**	1.04(0.67-1.62)	3.91(1.53-10.01)***
4 – 6	0.73(0.50-1.05)	0.96(0.44-2.08)	1.06(0.67-1.69)	2.99(0.95-9.43)*
7+	1.01(0.63-1.62)	0.61(0.61-4.26)	1.60(0.92-2.78)	3.27(0.83-12.85)*
Mother's age				
Ref: *14 – 24*	*1.00*	*1.00*	*1.00*	*1.00*
25 – 34	0.80(0.58-1.01)	1.20(0.67-2.16)	1.42(0.98-2.07)	2.11(1.01-4.43)**
35+	1.01(0.70-1.48)	1.30(0.59-2.88)	1.28(0.80-2.05)	1.84(0.68-4.95)
Highest education level				
Ref: *No education*	*1.00*	*1.00*	*1.00*	*1.00*
Primary	1.04(0.77-1.41)	1.05(0.65-1.69)	1.14(0.80-1.64)	1.29(0.68-2.44)
Secondary and higher	0.55(0.30-1.01)	0.48(0.17-1.32)	0.74(0.38-1.42)	1.14(0.37-3.55)
Mother's religion				
Ref: *Christian/ Protestant/ Catholic*	*1.00*	*1.00*	*1.00*	*1.00*
Islam	-	2.50(0)	2.06(-)	2.34(0)
Traditional	-	1.98(0)	1.98(0.28-14.14)	2.16(0)
Other	0.70(0.34-1.42)	0.47(0.15-1.50)	0.97(0.47-1.98)	0.30(0.04-2.15)
No religion	0.38(0.22-1.20)	0.52(0.13-2.14)	0.53(0.17-1.67)	0.84(0.20-3.49)
Sex of household head				
Ref: Male	*1.00*	*1.00*	*1.00*	*1.00*
Female	1.12(0.78-1.61)	1.24(0.77-2.00)	1.10(0.72-1.68)	1.15(0.61-2.17)
Household size				
Ref: *1 – 3*	*1.00*	*1.00*	*1.00*	*1.00*
4 – 5	0.33(0.23-0.49)***	0.76(0.42-1.37)	0.43(0.27-0.69)***	0.12(0.05-0.29)***
6 – 7	0.33(0.22-0.49)***	0.33(0.16-0.67)***	0.49(0.30-0.80)***	0.25(0.11-0.57)***
8+	0.31(0.20-0.47)***	0.35(0.17-0.72)***	0.44(0.26-0.74)***	0.30(0.13-0.71)**

Wealth index				
Ref: *Poor*	*100*	*1.00*	*1.00*	*1.00*
Middle	1.01(0.67-1.51)	1.06(0.52-2.17)	0.88(0.54-1.42)	0.89(0.33-2.39)
Rich	0.86(0.62-1.89)	1.17(0.54-2.51)	0.84(0.58-1.21)	1.32(0.47-3.68)
Household type of dwelling				
Ref: Good quality	*1.00*	*1.00*	*1.00*	*1.00*
Average	1.32(0.91-1.91)	1.72(0.86-3.46)	1.42(0.93-2.17)	1.21(0.49-3.00)
Poor quality	1.47(1.01-2.14)**	1.54(0.56-4.19)	1.41(0.90-2.20)	1.72(0.46-6.38)
Source of drinking water				
Ref: *Improved*	*1.00*	*1.00*	*1.00*	*1.00*
Not improved	1.17(0.84-1.63)	0.96(0.57-1.60)	1.66(1.08-2.55)**	1.66(0.82-3.35)
Attendance by a health professional during pregnancy				
Ref: *Yes*	*1.00*	*1.00*	*1.00*	*1.00*
No	1.24(0.81-1.90)	1.17(0.71-1.93)	0.87(0.47-1.61)	0.75(0.37-1.50)

**= P-value > 95%*

4.2.1 Logistic regression: Unadjusted effects of place of residence on infant mortality

Table 3 shows that although there is an indication that residing in rural areas has 1.23 times more Hazard ratios of dying compared to urban areas, there is insufficient evidence to support this. The Hazard ratios of infant mortality are 0.60 times less likely among infants born of the second and third order as compared to those born of the first order. The Hazard ratios are, however, not significant for other birth orders.

The odds of an infant's dying are 0.33 and 0.31 times less likely in households with 4 – 5/6 – 7 and eight and more members respectively as compared to those residing in households with 1 – 3 members. The Hazard

ratios are 1.47 times more likely among infants born in poor quality dwellings as compared to those residing in good quality dwellings.

Mother's age, mother's highest educational level, mother's religion, sex of head of household, household main source of drinking water, household wealth and attendance by a health professional during pregnancy are all not significant.

4.2.2 Logistic regression: Adjusted effects of place of residence on infant mortality

Table 3 also shows that when controlling for other socio-economic factors, the Hazard ratios of infants dying in rural areas are 0.75 times less likely as compared to those infants residing in urban areas. This result, however, is not significant. Girls have 0.57 times less Hazard ratios of dying at infancy as compared to boys. Second and third birth order remains significantly associated with infant mortality. The hazard ratios of infants born on the second and third order are 0.52 times less likely as compared to infants' born on the first birth order. The hazard ratios are 0.8% lesser when controlling for other factors.

The Hazard ratios of dying among infants are 0.33 and 0.35 times less likely in households with 6 – 7 and 8 and more members respectively as compared to those residing in households with 1 – 2 members.

Household type of dwelling unit is no longer significant when controlling for other socio-economic factors. Unlike in other studies on child mortality in developing countries, the mother's age, mother's highest educational level, mother's religion, sex of household head, household main source of drinking water and attendance by health professional during pregnancy remain insignificant.

4.2.3 Logistic regression: Unadjusted effects of place of residence on child mortality

Table 3 shows that although there is an indication that children residing in rural areas have 1.37 times higher Hazard ratios/odds of dying compared to urban areas, there is insufficient evidence to support this. The Hazard ratios of children dying are 0.43, 0.49 and 0.44 times less likely in household with both 4 – 5, 6 – 7 and eight and more members respectively as compared to those residing in households with 1 – 3 members. The Hazard ratios/odds are 1.66 times more likely among children residing in dwelling units with no improved source of drinking water.

Sex of child, birth order, mother's age, mother's highest educational level, mother's religion, sex of household head, household wealth (wealth index), the type of dwelling unity and attendance by a health professional during pregnancy are all not significant.

4.2.4 Logistic regression: Adjusted effects of place of residence on child mortality

When controlling for other socio-economic factors, table 3 shows that there is an indication that the Hazard ratios/odds of infants dying in rural areas are 1.03 times more likely as compared to those infants residing in urban areas. This result, however, is not significant.

The Hazard ratios of dying among children are 3.91 times more likely among children of second and third birth orders as compared to children of first birth order. This is the opposite of what is observed among infants where the figure is 0.52 times less likely as compared to the reference

group. The Hazard ratios for fourth to sixth birth order as well as the hazard ratios/odds for the seventh and higher birth orders are only significant at 90% level. This is an indication that child mortality might increase with the higher birth order of a child. The Hazard ratios of child mortality are 2.11 times more likely among children born to women aged 25 – 34 years old as compared to children born to mothers aged between 14 and 25 years.

The Hazard ratios/odds of children dying are 0.12 and 0.25 times less likely among children residing in households with 4 – 5 and 6 – 7 members respectively as compared to those residing in households with 1 – 3 members. The Hazard ratios/odds are 0.30 times less likely among children residing in households with eight and more members as compared to those in the reference group. The Hazard ratios/odds for child mortality have decreased in percentages in all categories of sizes of when other socio-economic factors are controlled.

Source of drinking water is no longer significant while birth order and mother's age are now significant when controlling for other socio-economic factors. Unlike in other studies on child mortality in developing countries, sex of child, mother's highest educational level, mother's religion, sex of household head, household wealth (wealth index), type of dwelling and attendance by health professional remain insignificant when controlling for other socio-economic factors.

Chapter 5: Discussions

5.0 Introduction

This section discusses the factors contributing to both infant and child mortality as presented in the results of the study. Conclusions and recommendations are made from the findings of the study. The limitations of the study are also highlighted.

5.1 Infant mortality

Type of place of residence

Although more infants die in rural areas compared to urban areas, the study could not find any relationship between place of residence and infant mortality. This means that by growing up in a rural area does not necessarily disadvantage the child's chances of survival but other factors do play a role. Similar results were observed in other African countries like Cote D'Ivoire (Andoh 2006).

Child factors

Besides the study findings which show that girls have smaller chance of dying compared to boys, literature generally indicates that girls are more likely to die before reaching the age of five in developing countries (Arokiasamy 2004). However, the contradictory pattern unfolding in Angola could be explained by the lack of practice of son preference in the country which gives every child an opportunity to be raised fairly by the family and the society (Andoh 2006). Furthermore, Angolans are rapidly being transforming from the traditional family centrality to a modernised society compounded by urban influences (Rodrigues 2007). Both the patterns and the association between higher birth order and infant mortality are likely to be the results of skew data or outliers as it is

biologically not practical for a mother to have a second and third child within 12 months of birth of the first child.

Household factors

The lowered chances of infant mortality in larger household are likely the results of more adult/older people like grannies and aunts who assist in caring for the children as well as forming part of the human labour force responsible or generating income for the household and providing for basic necessities like food and/ or agricultural products (Andoh 2006; Rodrigues 2007). It is again a general practice in developing countries for families to rely on the agricultural sector for work and subsistence (Sastry 2004).

5.2 Child mortality

Type of place of residence

Although more children die in rural areas as compared to in urban areas, no association between the type of place of residence and child mortality could be found in this study. This means that by growing up in a rural area does not necessarily disadvantage the child's chances of survival but other factors do play a role. Similar results were observed in other African countries like Cote D'Ivoire (Andoh 2006).

Child factors

The association between higher birth order and child mortality is explained by mothers being unable to care for younger siblings due to shortage of household resources like money to provide for food, medication, malaria nets in the case of Angola, etc. (Grein et al 2003; Makepeace and Pal 2007). Short spacing between children is also likely to be a compounding factor on the health of the mother, resulting in low

birth weight and subsequent death of succeeding children (Da Vanzo et al 2008).

Maternal factors

The higher odds of child mortality among women in the middle phase of the reproduction stage are consistent with the results found in Nigeria where rural women aged between 24-34 had higher infant mortality odds (3.51) as compared to those aged 15-34 (Doctor 2011). The results in the current study are likely to be the result of poverty among these women and not necessarily their biological effect on the birth of the child. This group of mothers is likely to be lacking income to provide for food at a stage when the children have passed the phase of breastfeeding as the main form of feeding. Again, the mothers are less likely to provide for other necessities like bed nets to prevent Malaria infections of their growing children (Ghobarah et al 2003; Grein et al. 2003).

Household factors

The lowered chances of child mortality in larger households are likely the result of more adult/older people like grannies and aunts forming part of the extended family and assisting in caring for the children as forming part of the human labour force responsible for generating income for the household and providing other basic necessities like food and/ or agricultural products (Andoh 2006; Rodrigues 2007). It is again a general practice in developing countries for families to rely on the agricultural sector for work and subsistence (Sastry 2004).

5.3 Conclusion

The study aimed to investigate the association between type of place of residence and infant and child mortality. The study finds that more infants and children die in rural areas of Angola as compared to urban

areas, but there is no association between these deaths and type of place of residence. However, child bio-demographic and household economic factors play a role in both infant and child mortality. Being a girl reduces the chances of dying at infancy, but the influence diminishes at childhood years in Angola. Being born in the second and third order increases the chance of child mortality. Being born to middle-aged mothers has a negative effect on child mortality only while residing in large households reduces the chances of both infants and children dying. Environmental factors like source of drinking water and attendance by a health professional during pregnancy have no effect on both infant and child mortality in Angola.

5.4 Recommendations

It is recommended that improvements be made on the current policies aimed at uplifting the lives of women and children in Angola. Firstly the awareness campaign should be revitalized and sustained with the aim to continuously promote and communicate the strategies of government aimed at reducing both infant and child mortality (e.g. National Infant and Child Feeding Strategy and the National Strategy for School Feeding). The campaign should simplify and disseminate the messages using easily accessible modes in order to cover all women especially those with low levels of literacy and rural women who have limited information due to their social and economic conditions. Secondly, policies and programmes developed with the aim of uplifting the economic status of women (e.g. the Rural Women Support Programmes, the Integrated Rural Development and Poverty Reduction Municipal Programme, etc.) should be rolled out equitably across the country to ensure that their economic benefits enables women at the middle reproductive stage and below to be able to provide necessities like healthy meals, regular check-ups and bed nets for their children.

Thirdly, funding should be made available to ensure that the recommended campaign and current policies and programmes are rolled out to cover all regions of the country including remote and rural areas. Lastly, effective monitoring systems should be developed to enable continuous and universal feedback on the success of the programmes.

In general, developing and improving women's social and economic conditions is expected to show an improvement in both infant and child mortality patterns. Lessons should be learned on how bigger households in general manage to keep their infant and child mortality odds lowest given the other conditions surrounding them. More comprehensive data is required to examine the effects of other socio-economic factors (like employment status, parent's occupations, birth weight, etc.) not covered in this study.

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APPENDICES

Appendix 1: Percentage distribution of infant and child mortality by characteristics

Characteristic	Infant mortality (100)	Child mortality (100)
Main explanatory variable:		
Place of residence		
Urban	5.4	4.5
Rural	**6.8**	**6.1**
Sex of infant/child		
Male	**6.5**	**6.0**
Female	6.0	5.0
Birth order		
1	8.1	5.0
2 – 3	4.9	5.3
4 – 6	5.9	5.3
7+	**8.2**	**8.0**
Mother's age		
15 – 24	6.8	4.6
25 – 34	5.5	**6.4**
35+	**6.9**	5.7
Highest education level		
No education	6.5	5.2
Primary	**6.7**	**6.0**
Secondary and higher	3.5	3.8
Mother's religion		
Christian/ protestant/Catholic	**6.6**	5.6
Islam	-	-

Traditional	-	**11.0**
Tther	4.6	5.4
No religion	2.5	4.0
Sex of head of household		
Male	6.2	5.4
Female	**6.9**	**5.9**
Household size		
1 – 3	**16.2**	**10.8**
4 – 5	5.4	4.7
6 – 7	5.3	5.5
8+	4.8	4.8
Wealth index		
Poor	**6.8**	**6.1**
Middle	**6.8**	5.6
Rich	5.8	5.1
Household type of dwelling		
Poor quality	**7.2**	6.0
Average quality	6.5	**6.2**
Good quality	4.9	4.3
Source of drinking water		
Improved	5.6	3.7
Not improved	**6.5**	**6.2**
Attendance by a health professional during pregnancy		
Yes	4.9	**3.6**
No	**6.1**	3.1