EDITORIAL

Differentials in Under-Five Mortality in Zambia: Persistent Gaps in Child Survival Interventions?

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ABSTRACT

Introduction: The Millennium Development Goal (MDG) focused on child mortality aims at reducing the under-five mortality rate (U5MR) by two thirds between 1990 and 2015. For Zambia, this means reducing the 2007 U5MR of 119 to 64 deaths per thousand live births and infant mortality from 95 to 32 deaths per thousand live births. The question facing policy makers in Zambia is how can current child survival interventions be revitalized and effectively contribute to the attainment of the MDG on child mortality in the next decade. To answers this question, secondary data analyses was done..

Methodology: U5MR in Zambia was analyzed using secondary data from Zambia Health and Demographic Surveys 1992, 1996, 2001/2 and 2007 (preliminary data). Other sources of data were Health Management Information System (2004 - 2008) and Censuses 1960, 1970, 1980, 1990 and 2000. Trends in U5MR were mapped for various parameters levels and patterns of U5MR, distribution by geographical areas and cause of death.

Results: U5MR in Zambia has had periods of improvement and regression and is currently estimated at 119 deaths per thousand live births. Thirty four percent (34%) of all deaths among under-five children occur in the neonatal period (0-28 days); while 48% occur in the post-neonatal period and more than a half (53%) of neonates die within the first week of their life. Marked disparities in the levels of under-five mortality between and within provinces exist, raising issues of equity in health services. Although strides have been made to roll out key child survival interventions, large proportions of children under five are still not reached and disparities are observed in coverage. The top five causes of health facility based mortality are due to preventable diseases while malnutrition and HIV/AIDS are both the cause and contributor.

Recommendations: Include need to (i) Routinely review child survival interventions to identify elements that work to reduce child mortality (ii) Undertake operational research grounded in relevant theoretical frameworks which will specify causal pathways linking child mortality rate and its proximal and distal determinants (iii) Design programs aimed at narrowing differentials in U5MR by age and in coverage of child survival interventions

DEFINITIONS

1. **Under-five mortality:** Probability of dying between birth and age 5 expressed per thousand live births;
2. **Neonatal mortality:** Deaths during the first 28 days of life
3. **Post-neonatal mortality**: Deaths between the ages of 28 days and 12 months.
4. **Infant mortality:** Death rate under the age of 1 expressed per thousand live births.
5. **Child mortality:** the probability of dying between 12 months and 59 months of age expressed per thousand live births
6. **Full vaccination:** A child is considered fully vaccinated if he or she receives a BCG vaccination against tuberculosis; three doses of DPT vaccine to prevent diphtheria, pertussis, and tetanus (DPT); at least three doses of polio vaccine; and one dose of measles vaccine. These vaccinations should be received during the first year of life
7. **MDG number 4**: Reduce by two thirds, between 1990 and 2015, the under-five mortality rate

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INTRODUCTION

Currently, eleven million children under the age of five years die annually in the world and over ten million of these are in developing countries. Nearly three quarters of child deaths in third world countries are caused by preventable diseases such as diarrhoea and malaria for which practical, low cost scientifically proven interventions exist. At the moment, 4.8 million children in Sub-Saharan Africa die before the age of five annually[1]. With one-fifth of the world's births, Sub-Saharan Africa currently accounts for 45 % of child deaths[1]. This is the only region in the world where the number of child deaths is rising.

In the decade following independence, economic growth in Zambia was strong with real GDP growth rate at 2.7%, which operated to mitigate the potentially negative influence of high fertility (7 children born/woman) and rapid (3%) population growth on living standards. This economic growth was largely propelled by export earnings from copper which was contributing about 45% of government revenue. After this period of growing prosperity, a number of internal and external factors including a sharp decline in copper prices and sharp increases in oil prices, started to reverse the trend from one of improving to one of declining living standards that continued at least into the 1990s. Trends in copper prices and earnings are currently fluctuating with a potential to influence child mortality negatively.

Child mortality levels in Zambia have largely mirrored these changes in the macroeconomic growth of the country. During the period 1960-1975, Zambia enjoyed a rather impressive and sustained decline in under-five mortality (UMR) from a high of 220 to 165 deaths per thousand live births. During the 1980s however, the decline in under-five mortality was halted and started rising again reaching 197 deaths per thousand live births in 1996. Between 2001/2 and 2007 U5MR declined from 168 to 119 deaths per thousand live births but is still high for Zambia.

Against this background, in September 2000, the United Nations General Assembly adopted the Millennium Development Goals (MDGs) which are a set of 8 ambitious goals aimed at reducing hunger and poverty, lack of education, gender inequality, child and maternal mortality, disease and environmental degradation by the year 2015. MDG number 4 focusing on child mortality aims at reducing the under-five mortality rate by two thirds between the years 1990 and 2015. This MDG is consistent with the 1984 Zambia's national population policy which aimed at reducing infant mortality from 97 deaths per thousand live births in 1980 to 65 deaths per thousand live births by the year 2000 and to 50 by the year 2015. Further, MDG number 4 is in line with the United States Agency for International Development (USAID) Child Survival Initiative which aimed at reducing infant mortality in USAID supported countries including Zambia from the average of 97 deaths per thousand live births in 1985 to less than 75 but were both not achieved. In Zambia as observed in Figure 1, this translates into reducing the 2007 under-five mortality rate of 119 to 56 deaths per thousand live births and infant mortality from 70 deaths per thousand live births in 2002 to 30 by the year 2015.

Objectives and Rationale

Infant and child mortality rates are basic indicators of any country's socioeconomic situation and quality of life, hence faced with the challenge to bring down U5MR, policy makers in Zambia are confronted with the question, "how can current child survival interventions be revitalized and effectively contribute to the attainment of the ambitious MDG on child mortality in the next 5 years?. Answers to this question call for among other things detailed characterization and understanding of under-five mortality and its determinants. Four essential dimensions of under-five mortality that should be understood when identifying and targeting child survival interventions include:

(i) levels of child mortality and how they change over time,
(ii) age pattern of mortality,
(iii) geographical distribution of mortality and
(iv) causes of mortality.

Therefore, the main objective of this paper is to characterize under-five mortality and identify gaps that operate to lower or raise the risk of child death in Zambia and make recommendations to improve child survival interventions.

METHODOLOGY

Information systems such as vital registration are required to meet the standard for collecting information on various dimensions of child mortality but do not exist in Zambia. Therefore, it is necessary to rely on other sources such as surveys, censuses, small-scale studies, and expert and caretakers' opinion to arrive at the best understanding of these four dimensions of child mortality. This paper therefore, used secondary data from the Zambia Demographic and Health Surveys conducted in 1992, 1996, 2001/2 and 2007. Other sources of data included the Census of Population and Housing undertaken in1960, 1970, 1980, 1990 and 2000 as well as the Health Management Information System Statistical bulletins. Analysis focused on levels and patterns of U5MR by age as well as distribution of U5MR between and within geographical areas. .Further, mortality was analyzed by cause of death

RESULTS

Under-Five Mortality in Zambia

Childhood mortality in Zambia has had periods of improvement and regression in the past 48 years. Between 1960 and 1975, Child Mortality Rate (CMR) declined by 25%, from 220 to 165 deaths per thousand live births. Following this period, child mortality increased to 181 by the year 1980 before declining to 95 deaths per thousand live births in 1992, currently stands at 52 deaths per thousand live births.

In the period 1992 to 2007, for which reliable data is available from ZDHSs, mortality among children under five years in Zambia recorded a downward trend but persistently high (Figure 1). Between 2001,2 and 2007, U5MR sharply declined from an estimate of 168 to 119 deaths per thousand live births. IMR also reduced from 95 deaths per thousand live births to 70 deaths per thousand live births while CMR reduced from 81 per live births to 52 per thousand live births.[12]

**Figure 1:** Targeted Reduction in Mortality among Under-Five Years, Zambia 1992-2015
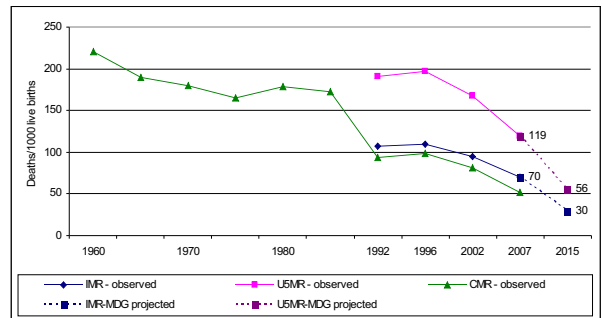
Source: Central Statistical Office, Census of Population and Housing, 2003Central Statistical Office,
Zambia Demographic and Health Surveys, 1992, 1996, & 2001/2, 2007
Zambia Millennium Development Goals Progress Report 2008

Mortality Distribution by age

Understanding of mortality by age is important as it gives clues to the cause of death and points to where targeting of child interventions should focus. Mortality among children under five years in this paper has been broken down into two main categories (i) Infant (Neonatal and Post neonatal) mortality and (ii) Child mortality. According to the ZDHS 2007, a total of 70 out of each thousand live births die as infants before reaching their first birthday and following the first birthday, 119 out of each thousand live births die before reaching their fifth birthday. Of all the infants' deaths, 34 die as neonates in the first 28 days of life while 36 die between 1 to 11 months. This means that, 29% of all deaths among under-five occur in the neonatal period while 30% occur in the post-neonatal period and 44% occur between 1 and 5 years of age (Figure 2).
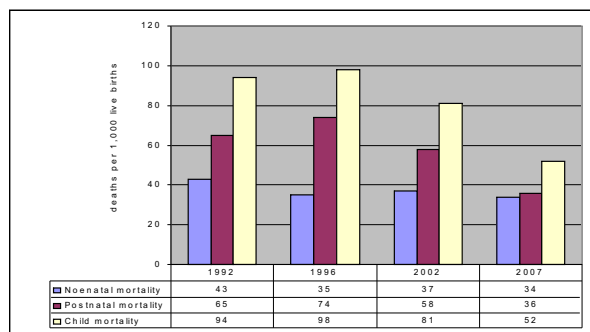
Figure 2: Proportion of Neonatal Deaths by Age in Days in Zambia, 1992-2001/2

	1992	1996	2002
0-6 days	64%	58%	53%
7-30 days	36%	42%	47%
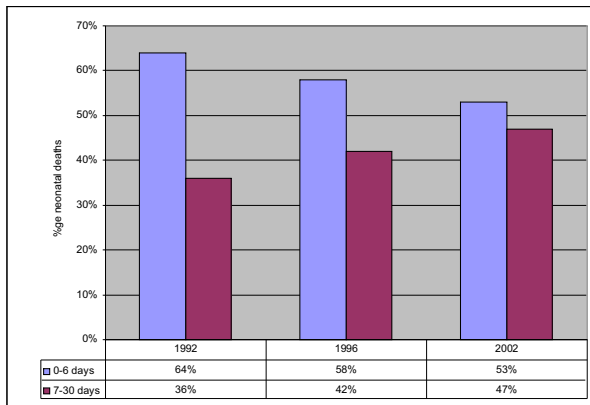
Source: CSO, Zambia Demographic and Health Surveys, 1992, 1996 and 2001/2
Zambia Millennium Development Goals Progress Report 2008

Further analysis of neonatal deaths, shows that between 1992 and 2001/2 neonatal mortality declined from 64% to 53% (Figure 3). But still more than a half (53%) of neonates die within the first week of life neonatal mortality declined slowly. At 53 %, the proportion of infants dying before the age of 7 days is too high and points to the fact that more concerted efforts need to be made towards designing and implementing interventions that would help reduce this high level to one that is more manageable.

Figure 3: Trends in Neonatal, Post-neonatal and Child mortality rates, Zambia 1992-2002

	1992	1996	2002	2007
Noenatal mortality	43	35	37	34
Postnatal mortality	65	74	58	36
Child mortality	94	98	81	52

Source: Central Statistical Office, Zambia Demographic and Health Surveys, 1992, 1996, 2001/2 and 2007
Zambia Millennium Development Goals Progress Report 2008

Mortality Distribution by Geographical Area

Effective targeting of child survival interventions require specific information not only at what age children die but also about where they are dying. Findings of this work show marked disparities in the levels of mortality among children under five years by geographical area (residence, province and district). Mortality is constantly higher in rural areas than in urban areas. For example in 1992, 1996, and 2001/2 under-five mortality in urban areas was 151, 171, and 140 deaths per thousand live births respectively while corresponding figures for rural areas were 201, 205 and 182 deaths per thousand. In general, a similar pattern in rural-urban differentials is observed for neonatal, postnatal and child mortality (Table 1).

Provincial data also show marked disparities in mortality among children under-five years (Table 1). In 2001/2, U5MR ranged from 130 deaths per thousand live births in North-Western province to a high of 248 deaths per thousand live births in Luapula province. But for neonatal deaths, Western Province recorded the highest, 60 deaths per thousand live births, followed by Northern Province with 39 deaths per thousand live births. The lowest neonatal rate was observed in the Copperbelt, the most urbanized province and North-Western Province a predominantly rural and agricultural province at 24 and 25 deaths per thousand live births respectively. However Luapula, Western, and Northern provinces in that order consistently experience highest mortality, while North Western, Lusaka and Copperbelt comparatively lower levels.

Table 1: Childhood Mortality Indicators by Residence and Province, Zambia, 1992 -2001/2

Characteristics	Neonatal mortality(NN)			Post-neonatal mortality(PNN)			IMR per 1,000			CMR per 1,000			UMR per 1,000		
	1992	1996	2001/2	1992	1996	2001/2	1992	1996	2001/2	1992	1996	2001/2	1992	1996	2001/2
Zambia	43	35	37	65	74	58	107	109	95	94	98	81	191	197	168
Residence															
Urban	31.7	32.3	31	46.3	59.7	46	78	91.9	77	78.9	89.6	69	150.8	173.3	140
Rural	47.3	38.6	35	68.5	79.3	68	115.8	117.9	103	96.6	98.1	89	201.2	204.5	182
Province															
Central	50.6	29.6	35	63.5	64.9	57	114.1	94.6	92	108.2	77.3	110	210	164.5	192
Copperbelt	22.3	28.7	24	46.6	53.3	43	68.9	81.9	68	80.8	101.8	71	144.2	175.4	134
Eastern	50.6	49.7	29	63.5	81.4	55	114.1	131.1	84	108.2	120	89	210	235.4	166
Luapula	55.1	32.9	36	93.4	124.8	118	148.5	157.8	154	112.6	114.5	112	244.4	254.2	248
Lusaka	32	35.5	29	44.7	64.8	41	76.8	100.3	70	69.3	82.1	72	140.8	174.1	137
Northern	55.1	36.5	39	93.4	88.8	74	148.5	125.3	113	112.6	85.7	84	244.4	200.2	187
North-Western	59.9	32.8	25	72.1	58.3	49	132	91.1	74	90.2	68.1	60	210.3	153	130
Southern	33.7	26	29	36.8	40.2	47	70.5	66.2	76	68.5	87.9	77	134.2	148.3	148
Western	59.9	55.8	60	72.1	73.3	79	132	129.1	139	90.2	82.8	72	210.3	201.2	201

Source: Central Statistical Office, Zambia Demographic and Health Survey 2001/2002

To examine mortality by district census data for the year 2000 was used as the most recent national data from ZDHS 2007 only permits provincial and not district analyses. Figure 4 shows that there is a belt of low mortality less than 88 deaths per thousand covering all the districts except one in the Northwestern province and winding through few districts, Mpongwe in Copperbelt Province, Chibombo and Kabwe in Central Province, Lusaka, where the capital city is located and Mazabuka in Southern province. Four districts with highest infant mortality (above 155 deaths per thousand live births), are Chiengi, Chilubi, Kaputa, and Kalabo. All these districts, except Chilubi are bordering neighboring countries and are characterized by water/swampy areas.

Figure 4: Infant Mortality by District, Zambia 2000
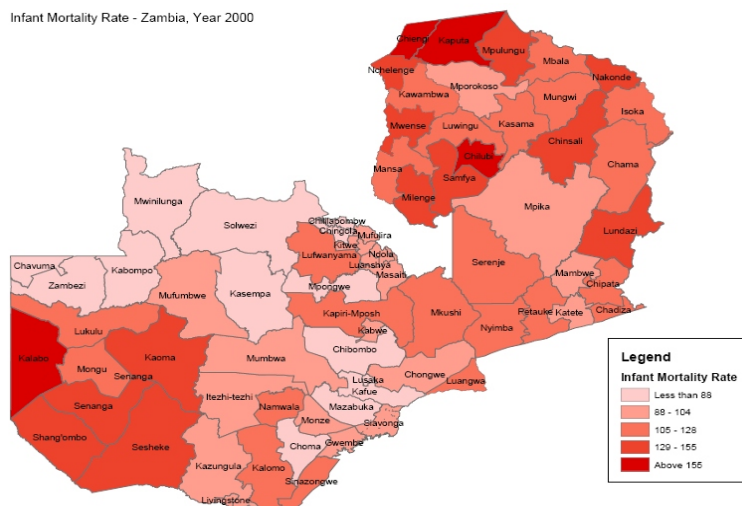
Source: Central Statistical Office, Census of Population and Housing, 2003

Analysis of mortality among children under five years by districts also shows disparities in the distribution of mortality within provinces (Table 2). In Northern Province (with twelve districts), two districts had infant mortality raging between 88 and 104 deaths per thousand live births while another two worst districts had infant mortality above 155 deaths per thousand live births. On the other hand, in Northwestern province almost all districts (six out of seven) had infant mortality less than 88 deaths per thousand live births. This means that some districts have infant mortality levels close to the MDG number 4 target of 56 deaths per thousand live births

Table 2: Percentage Distribution of Districts by Infant Mortality Levels within Province in Zambia 2001/2002

IMR (Deathsperthousand Live Births)		< 88	88 to104	105 to 128	129 to155	155+	No. Districts
		Number of Districts in a Province					
Province	Central	1	2	3	0	0	6
	Copperbelt	3	6	1	0	0	10
	Eastern	0	2	5	1	0	8
	Luapula	0	0	2	4	1	7
	Lusaka	2	1	1	0	0	4
	Northern	0	2	5	3	2	12
	Northwestern	6	1	0	0	0	7
	Southern	2	6	3	0	0	11
	Western	0	0	2	4	1	7
Zambia		**14**	**20**	**22**	**12**	**4**	**72**

Source: Central Statistical Office, Census of Population and Housing, 2003

Major Causes of Mortality among children under five years

Cause of death is difficult to attribute to in most developing countries due to lack of vital registration systems for recording events such as births and deaths, trained medical personnel and the fact that many deaths, especially among children, occur at home. However, available data show that the top five causes of facility based deaths in Zambia are due to preventable diseases.

Latest HMIS data (June 2008) show that Malaria is the major cause of health facility based under-five children deaths, accounting for 28.7 % followed by malnutrition (16.2%) then pneumonia (15%). Other causes are neonatal disorders (13.4%), diarrhoea (10.5%), and anemia (8.3%). AIDS related causes account for 8.0% of deaths among children. It is worth noting that malnutrition is both a cause and a contributor to mortality among children under-five years in 2004 it contributed 42% of under-five mortality.

Further analysis of mortality of children below five years by cause of death between 1999 and June 2008, shows that in general, mortality by all the top five causes is declining, but mortality due to malaria is declining at a much fast rate than mortality due to all other causes. And although HIV/AIDS is not among the top five causes of mortality, it is included in this analysis because like malnutrition it is also both a cause and a contributor of mortality, and between 2007 and 2008 under-five mortality attributable to HIV/AIDS reduced (Figure 5).

Figure 5: Distribution of Child Deaths by cause in Zambia 1999 June 2008
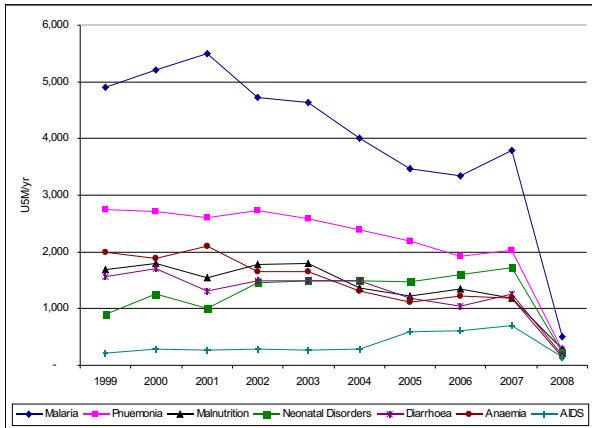

Source: HMIS, Zambia 2004 and 2008

Coverage of key Child Survival Interventions

Zambia is implementing a package of child survival interventions that include child immunization, good nutrition, use of Insecticide Treated mosquito Nets (ITN) and early treatment of illness.

Full vaccination

In 2007, 68% of children aged 12 to 23 months were fully vaccinated as opposed 63% in the period 2001/2. Western province had the highest (80%) number of under-five children fully vaccinated while Northwestern had the lowest (52%). In 2001/2002, Copperbelt Province had the highest (79%) number of child vaccination followed by Southern Province 77%. The lowest was Northern Province, 61%. However, on average and in the period 2001/2 to 2007, Southern Province had the highest (75%) full vaccination rate followed by Eastern Province (70%) and the least was Northern Province (58%) shown in Figure 6.

Figure 6: Percent of children (12-23moths old) fully vaccinated in Zambia 2001/2 to 2007
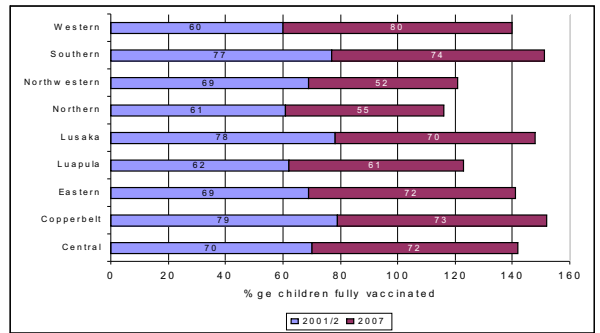
Sources: ZDHS 2001/2 and ZDHS 2007

Treatment of Childhood illnesses

In developing countries, Acute Respiratory Infection (ARI), fever, and dehydration from diarrhoea are some major causes of childhood morbidity and mortality. Table 3 indicates that the proportion of under-five children who were sick and taken to a health provider for treatment two weeks preceding the survey increased between 2001/2 and 2007. For example for fever 52.9% and 64.5% were taken to a health provider in 2001/2 and 2007 respectively.

There were also wide variations between provinces in the proportion of children with diarrhoea who are taken for treatment two weeks preceding the survey. In 2007 for example, 70.4% of children with diarrhoea were taken to a health provider compared to 46.9% in Luapula

In 2007 about six in every ten children (59% to 68%) with symptoms of Acute Respiratory Tract Infection (ARI), fever, or diarrhoea were taken to a health care provider for treatment, this means that four out of ten children where not taken to health facility or health provider for treatment. Great disparities in care seeking behaviour were observed among provinces. For example, in Southern Province 87.8% of children with ARI treated at health facility compared to 56.5% in Northern Province. For diarrhoea in Eastern Province 74.5% of children with diarrhoea were treated at health facility compared to less than 46.9% for Luapula Province.

Table 1: Percentage of illness of U5 children treated in Zambia -2001/2 and 2007

| Province	ARI		Fever		Diarrhoea	
	2001/2	2007	2001/2	2007	2001/2	2007
Central	53.8	75.4	54.6	60.6	31.9	59.3
Copperbelt	76.1	64.3	50.2	57.1	48.6	51.5
Eastern	81.7	77.1	50.8	73.1	51.8	74.5
Luapula	72.3	-	59.2	52.1	53.3	46.9
Lusaka	74.2	66.7	39.1	69.7	34.1	48.7
Northern	61.4	56.5	48.4	52.2	42.4	50.7
Northwestern	64.0	66.1	66.2	66.9	47.3	66.6
Southern	75.9	87.8	62.2	80.9	34.5	70.4
Western	56.0	-	45.3	67.6	40.7	65.8
National Averages	**68.4**	**70.6**	**52.9**	**64.5**	**42.7**	**59.4**

Source: ZDHS 2001/2 and 2007
- means cases where few for inclusion in this analysis

Feeding practices for children

The practice of exclusive breastfeeding under six months is taking root in Zambia. In 2007, more (87%) children aged 0-1 month old were exclusively breastfed compared to 2001/2 (68%) and this pattern remained so until children reached 6 to 8 months. On the other hand, there were no differences in complementary feeding between 2001/2 and 2007 (Figure 8).

**Figure 7:** Infant and young children feeding practices in Zambia 2001/2 and 2007
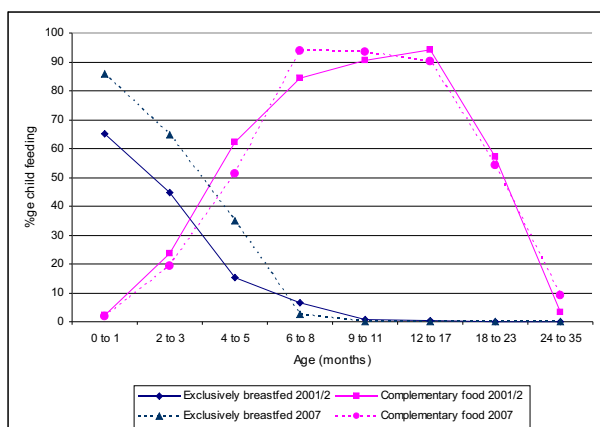
Source: ZDHS 2001/2

2.3.4 Use of mosquito nets for children

Overall, in 2007, more (35%) of children under-five years slept under an untreated net the night before the ZDHS compared to 29% who slept under an ITN (Figure 9). However, is 2007 on the increase, in 2001/2 only 6% of children slept under an INT the night before the ZDHS compared to 29% in 2007. Further, no major differentials are observed in the use of untreated nets or INT between rural and urban areas for the year 2007 (Figure 8)

Figure 8: Use of mosquito nets for infants and young children in Zambia 2001/2 and 2007

	Urban	Rural	Total	Urban	Rural	Total
		2001/2			2007	
Untreated net	22	14	16	35	33	35
ITN	8	6	7	30	28	29
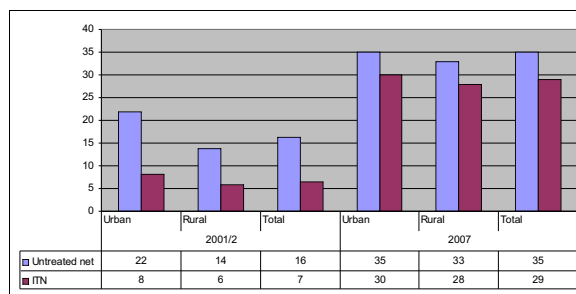
Source: ZDHS 2001/2 and 2007

DISCUSSION

Under-five mortality in Zambia has had periods of improvements and regression in the past 48 years. Between the period, 2001/2 and 2007, U5MR reduced by 29.2% from 168 to 119 deaths per thousand live births, while infant mortality rate (IMR) reduced by 26.0% from 95 to 70 deaths per thousand live births in the same period. These observed declines in U5MR are remarkable public health achievements. However, an U5MR of 119 deaths per thousand live births is still very high, especially considering what is possible in the region and the few (five) years remaining before 2015 when the MDGs are supposed to be met.   In the neighboring Namibia for example, the most recent U5MR is estimated at 69%. At current levels of efforts and reductions in U5MR, Zambia will lag behind and will require twelve years from now to attain the MDG number 4, this will be seven years past the 2015 MDGs target.

In view of this, pertinent questions arise and must be answered to inform child survival interventions. What are the prospects and requirements for reducing the U5MR at a much faster rate than observed? What factors have contributed to the observed declines? Can the positive effects of various child survival interventions be isolated? Therefore, it is imperative to elucidate the mechanisms through which various interventions operate to lower the risk of child death. Failure to specify the causal pathways linking childhood mortality and its proximate and distal determinants can lead to proliferation of child survival initiatives with loosely defined strategies. There is therefore a great need to investigate vigorously the reasons for the success or failure of specific interventions and focus on what works.

The observed declines in U5MR could be partially explained by improvements in coverage of child survival interventions and care seeking behavior for childhood illnesses. Between the period 2001/2 and 2007, improvements include increases in the proportion of children treated for the three major illnesses; diarrhoea, fever and ARI which increased by 16.7%, 11.6% and 2.2% respectively while exclusively breastfed children between 0 and 6 months increased by 20.2%. On the other hand, use of mosquito nets in rural areas increased by an average of 21% while the corresponding proportion for urban areas is 17%.

Despite these achievements challenges remain and have to be overcome, for example large proportions of under five children are still not reached by key child survival interventions being implemented in Zambia. In 2007 71% of children under-five did not sleep under an ITN a night before the ZDHS 2007 survey. At this level, ITN coverage is not adequate to have a significant impact on malaria incidence. Also, about a third (30%) of the children who were sick two weeks before the survey did not receive care from health facilities and 32% of children age 12 to 23 months were not fully vaccinated. In some provinces such as Northwestern and Northern, the situation is worse off with about half (45% and 48% respectively) of under-five children not fully vaccinated.

This points to the fact , that if coverage in the provision of scientifically proven cost effective child survival interventions is increased to effective levels, under-five child mortality from preventable causes could be drastically reduced in Zambia. For example , Aaby found that measles immunization was associated with reductions in total mortality that ranged from 30% to 85%. Increasing measles immunization coverage in developing countries from 74% to 85% would reduce Acute Lower Respiratory Infection (ALRI) deaths by an additional 2% and diarrhoeal deaths by an addition of 3%. Beaton also showed that Vitamin A supplementation could reduce mortality by 23% and 80% coverage of Vitamin A supplementation at population level can result in 60% reduction in mild to moderate xeropthalmia among children aged 6 months to 5 years.

In addition to poor coverage, disparities in the levels of mortality among children under five years by age and geographical areas have been persistent from independence (1964) to date. Mortality is constantly lower in urban than in rural areas. For example in 1992, 1996, and 2001/2 under-five mortality in urban areas was 151, 171, and 140 deaths per thousand live births respectively while corresponding figures for rural areas were 201, 205 and 182 deaths per thousand live births. Plausible explanations for such high child mortality include

the existence of vast inequalities in health care services and poor care seeking behavior for childhood illnesses and poor targeting

Further, huge disparities in IMR exist between and within provinces as well as districts. Luapula province recorded the highest IMR, 154 deaths per thousand live births with Western province recording the second highest IMR, 139 deaths per thousand live births. Under-five mortality in these two provinces, contrast sharply with those observed in the Copperbelt province with low IMR of at 68 deaths per thousand live births. This raises the question: why are there such huge disparities in the level of IMR across provinces and districts in a country where access to equitable quality care is supposed to be free especially among the rural population? Why is IMR very high in Luapula and Western provinces and in particular Chilubi, Chiengi, Kalabo and Kaputa districts? It is also important to determine and understand what is unique about these districts that contribute to the observed IMR. Could it be cultural practices, level of economic development or environmental factors that predispose to such levels of disease burden?

Analysis of early neonatal deaths from 1992 to 2007, reveal that infants face a challenge to survive beyond the age of 6 days as 29% die within the first week of life, this is unacceptably high. A significant reduction in neonatal mortality would result in significant reduction in the overall under-five mortality as this is the most crucial stage in a child's growth.

Various factors contribute to differentials in levels of mortality by age and geographical areas. These include poor targeting and coverage, shortage of human resource for health, inadequate infrastructure mainly for communication poor care seeking behavior especially in the rural areas, cultural practices such as care of the new born and nutritional habits and socio-economic status including education levels.

Finally, it has also been noted that while inequities / differentials by rural and urban areas as well by province are documented and data on under-five mortality levels, age pattern and distribution within districts is non existent. Current analyses focus on a district as a homogeneous unit. As a result there is paucity of data about under-five children mortality dynamics, such as patterns and differentials within the district, yet this is where targeting and implementation of interventions should focus in order to drastically reduce mortality so as to meet the MDG number 4.

CONCLUSION

Zambia is implementing scientifically proven child survival interventions. In the past decade, Zambia has recorded a steady decline in U5MR (168 to 119 deaths per thousand live births) and IMR (70 to 56 deaths per thousand live births). However despite the decline, these levels are still very high and unless Zambia revitalizes its child survival interventions, it will lag behind in meeting the MDG 4. Some of the challenges Zambia faces are high differentials in U5MR by age and geographical areas. Neonates have less chances of surviving compared to children above 4 weeks but less than five years of age. Like other socio-economic indicators IMR and CMR show wide variations by age and geographical area due to equality in the distribution of health care services and applications of child survival interventions. To score more successes, in U5MR, child survival interventions should: i) target specific provinces and districts with high IMR and U5MR, ii) Undertake operational research grounded in relevant theoretical frameworks which will specify causal pathways linking CMR and its proximal and distal determinants iii) Elucidate mechanisms in through which various interventions operate to lower the risk of death and iv) Design specific national and sub-national plans to minimize differentials in U5MR and inequalities in child survival.

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