

The Missing Link Between Maternal Mortality Outcomes and Expanded HIV/Aids Services in Zimbabwe, 2009-2013

Oscar Tapera

Ministry Of Health and Child Care, Zimbabwe

Background: Numerous reports have been made on the worsening maternal mortality rates in Zimbabwe over the past few years. There are strong doubts about the attainment of the Millennium Development Goal 5 by 2015. The aim of this study was to investigate the relationship between maternal mortality rates and HIV/AIDS services from 2009 to 2013 in Zimbabwe. *Methodology:* A retrospective case study involving secondary data analysis of HIV/AIDS service trends as indicated by prevention of mother-to-child transmission (PMTCT) and adult antiretroviral therapy (ART) coverage rates and maternal mortality rates (MMR) in Zimbabwe from 2009 to 2013 was carried out. STATA version 12 package was used to generate evidence for the study. *Research findings:* There was no association ($r = 0$) between MMR and PMTCT coverage rate ($p > 0.05$) and between MMR and adult ARV coverage rate ($r = +0.2$) ($p > 0.05$) in Zimbabwe from 2009 to 2013. Adult ART and PMTCT coverage rates were improved tremendously by 43 and 34 per cent respectively over the five year period. There were some increases of 68 per cent between 2010 and 2011 in MMR. However, a decrease of 51 per cent was recorded between 2011 and 2013. *Conclusions:* The scaling up of HIV/AIDS services in developing countries is a notable public health intervention which requires integration with the health system in order to achieve and sustain low MMR. Health policy reforms aimed at integrating disease-specific interventions with the health systems are imperative in low-and middle income countries.

Key Words: Zimbabwe, maternal mortality rate, PMTCT, ART, HIV/AIDS, health policy, health system, MDGs.


Introduction

Many developing countries particularly in Africa are struggling to achieve Millennium Development Goal (MDG) 5, of reducing maternal mortality rates (UNDP, 2013; Hogan et al., 2010). Recent data suggests that most developing countries are unlikely to achieve their targets of reducing under-5-child and maternal mortality rates (MDG 4 & 5) by 2015 (Bosch-Capblanch et al., 2012). The incidence of HIV/AIDS, increase in tuberculosis cases and malaria morbidity and mortalities have complicated the public health matrix (UNDP, 2013). Poverty and other politico-social factors have been noted as crucial impediments to the achievement of most MDGs with women and children more vulnerable (Pandolfelli et al., 2014; Muldoon et al., 2011). However, while some countries have made some progress to attain the United Nations set goals; most developing countries have not achieved most the expected targets (UNDP, 2013). Maternal mortality outcomes have deteriorated in some countries like Zimbabwe since the ratification of the MDGs in 2000 (UN, 2013). Health systems strength have been associated with improved public health outcomes, however the implementation of vertical or horizontal interventions particularly in sub-

Saharan Africa has emanated in mixed impacts (Muldoon et al., 2011).

Zimbabwe, a low-income developing country in the sub-Saharan region, has populations of about 12.75 million and a life expectancy of 54 years (WHO, 2013). The gross domestic product for the nation was estimated at US\$12.80 billion in 2013¹. The nation is recovering from one of the most devastating politico-social and macroeconomic milieu which peaked in 2008 and resulted in weakened health service delivery countrywide (Nyazema, 2010). Maternal mortality outcomes worsened by 28 per cent in the country from 1990 to 2010 (UN, 2013). While significant strides have been made to improve antenatal clinic visits and skilled birth deliveries, the maternal mortality outcomes have remained poor. This was due to poor quality of maternal care in the public health sector (UN, 2013). There have been rapid scaling up

Corresponding author. Oscar Tapera, National Microbiology Reference Laboratory, Ministry of Health and Child Care. P.O Box ST 749 Southerton, Harare, Zimbabwe, Email: oscar.tapera@gmail.com

 This article is distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use and redistribution provided that the original author and source are credited.

of HIV/AIDS services in the last 5 years and notable improvements such as increases in adult antiretroviral (ARV) and prevention of mother-to-child transmission (PMTCT) coverage rates have been achieved. There was an increase of 34 per cent in PMTCT coverage rate and 43 per cent in adult antiretroviral coverage rate respectively from 2009 to 2013 (NAC, 2013). However, little is known on the association of maternal mortality outcomes and expanded HIV/AIDS services in Zimbabwe in the post-dollarised era. This research sought to bridge that knowledge gap.

Finding ways to leverage the huge investment in HIV/AIDS programmes to address significant public health challenges is a priority of many governments and global donors (McNairy et al., 2011). In many countries with high HIV prevalence rates such as Zimbabwe, the PMTCT was the first choice of interventions in order to reduce HIV incidence rates. In 2009, 56 per cent of HIV-positive pregnant women received ARVs for PMTCT while 35 per cent of HIV exposed children received prophylactic antiretroviral therapy for PMTCT (UNICEF, 2010). With increasing emphasis on health systems strengthening and the integration of disease-specific interventions within the primary care, now is the time to critically examine HIV/AIDS services and maternal and child health platforms in developing countries. In 2009, US\$15.9 billion was invested in HIV responses by governments and donors. This has resulted in expanding of PMTCT, adult ARV coverage rates, HIV testing and counselling services (McNairy et al., 2011). In Zimbabwe, approximately US\$1 billion was invested in HIV/AIDS interventions from 2009 to 2013. Of this investment 13 per cent was from domestic resources, mainly AIDS levy, while 87 per cent was from global donors (Tapera, 2014; NAC, 2013). While policy gaps exist to improve domestic resource mobilization to ensure sustainable interventions, integration of the disease-specific interventions with the entire health system is a feasible starting point.

Maternal mortality presents a devastating medical complication and a developmental impediment in many societies. It has been recognised that complications of childbirth and pregnancy are the leading causes of death amongst women of reproductive age (Evince et al., 2013). While the rest of the world registered a 5.4 per cent decrease in maternal mortality rates between 1990 and 2005, sub-Saharan Africa only recorded a meagre 1.8 per cent decrease (WHO, 2007). Worldwide, there were about 535 900 maternal deaths in 2007, with sub-Saharan Africa and Asia accounting for 50 and 45 per cent of the cases respectively (Hill et al., 2007). There are several causes of maternal mortality and they vary from one place to another depending on the prevailing

contextual circumstances. In a study by Ramos et al (2007) in Argentina, they noted that the most common causes of maternal deaths were abortion complications, haemorrhage, sepsis and hypertension. In another study by Gil-Gonzalez et al (2006), it was discovered that maternal deaths due to obstructed labour, unsafe abortion and haemorrhage were under-reported in most scientific publications between 2000 and 2004. These reported causes were not the same as those in southern Africa were the leading causes in Malawi were reported as postpartum haemorrhage, postpartum sepsis and HIV/AIDS accounting for direct and indirect causes of maternal death (Evince et al., 2013). In some studies in Senegal, Guinea Bissau and Nigeria the leading causes of maternal death were puerperal sepsis, haemorrhage, eclampsia and abortion complications (Igberease et al., 2007; Hoj et al., 1999; Evince et al., 2013). In Tanzania the leading causes of maternal death have been noted as haemorrhage, sepsis, HIV/AIDS and eclampsia (Evince et al., 2013). In Zimbabwe the leading causes of maternal mortality were HIV/AIDS related (25.5%), eclampsia (13.1%), postpartum haemorrhage (14.4%), puerperal sepsis (7.8%), abortion complications (5.8%), malaria (5.8%), obstructed labour (3.3%) and ectopic pregnancy (2%). Risk factors for maternal deaths included place of delivery, mode of delivery, delivery by non-skilled persons and religious affiliations (MOHCW, 2007).

The strengthening of HIV/AIDS services for pregnant women especially in countries with a high burden of HIV infection is crucial in reduction of HIV related and unrelated maternal mortality rates. There are more than 2 million pregnancies in HIV infected women in the world and the majority of these are in sub-Saharan Africa where access to HIV services remains limited (Moodley et al., 2011). Some studies have shown close associations in sub-Saharan Africa between increasing burden of HIV infection and the simultaneous increase in maternal deaths (Evince et al., 2013; Hogan et al., 2010). There is also increasing evidence that HIV/AIDS is becoming the leading cause of maternal mortality in resource-constrained settings. Lack of complete data on the causes of maternal deaths limits the quantification of risk of HIV/AIDS and /or the accuracy in measuring the amount of maternal deaths that can be averted by strengthening HIV services for pregnant women (MOHCW, 2007; Evince et al., 2013; Moodley et al., 2011). In Zimbabwe, there exist a knowledge gap on the relationship between maternal mortality outcomes and HIV/AIDS services. Hence policy formulation and adjustment remains limited to holistically address the contemporary maternal mortality crisis in the country.

In South Africa, the *Saving Mothers report*² based on data collected from 2005 to 2007 showed

that 43.7 per cent of facility based maternal deaths were due to HIV/AIDS and the risk for maternal death was ten-fold for HIV infected women. HIV-related indirect causes of maternal mortality have surpassed obstetric causes (hypertension, sepsis and haemorrhage) in South Africa (Moodley et al., 2011). Independent facility-based audits have also revealed that HIV-infected women had higher risks of maternal death than uninfected women. There was a 32-fold increased risk for maternal death for TB-HIV co-infected women than uninfected women. Women infected with HIV were more likely to die from co-infections such as tuberculosis, pneumonia and meningitis (Khan et al., 2001; Ramogale et al., 2007). In a 5 year review of maternal deaths in Johannesburg, HIV infected women had a 6.2 fold higher risk of maternal death than uninfected women (Black et al., 2009). In another study by Grange et al., (2010), it was noted that tuberculosis which has been fuelled by HIV epidemic is responsible for one third of death amongst women of child bearing age in sub-Saharan Africa. In KwaZulu Natal, the HIV sero-prevalence at prenatal clinics was 40 per cent with dramatic increases in maternal mortality (Adhikari, 2009). The huge impact of HIV infection rate in sub-Saharan Africa is now being felt even in Europe and the number of women who die from tuberculosis during pregnancy has been increasing in the UK (Knight et al., 2009; Grange et al., 2010). Therefore, expanding HIV services to reduce opportunistic infections has a significant impact in reducing maternal mortality in developing countries as well as developed countries. Little is known on the impact of HIV related opportunistic infections and maternal mortality outcomes in Zimbabwe.

Developing countries particularly in southern Africa are faced with huge health system weaknesses which need addressing as a matter of urgency (Samb et al., 2010). Health infrastructure, financing, commodities, information services, workforce and governance are limited in numerous ways to cope up with the increasing demand posed by increasing burdens of both communicable and non-communicable diseases (WHO, 2013). Most global health initiatives are disease-specific and while improvements have been made in addressing HIV/AIDS, tuberculosis and malaria, in some developing countries health systems have been weakened. The divergent opinions, lack of consensus on what constitute health system strengthening and limited rigorous evaluations on different approaches have undermined the efforts to focus on health systems as a means of improving population health (Sherr et al., 2013). In a Kenyan study, Yego et al (2013) noted that socio-demographic, clinical and health system factors were possible contributors to the country's poor progress towards reducing maternal mortality.

Despite preventive and treatment initiatives for HIV infection in South Africa, the retroviral infection remains responsible for an estimated 40 per cent mortalities amongst African pregnant women and children (Sprague et al., 2011). While vertical transmission has been reduced to about 2 per cent in other countries like Botswana (Luo et al., 2007), South Africa has achieved little success in this regard due to health system constraints (Sprague et al., 2011). Nyamtema et al (2011) noted in their study that there was no single 'magic bullet' intervention for reducing maternal mortality in resource-limited settings. However, the integration of multiple programmes to strengthen the health system was more likely to have significant positive impact on maternal outcomes (Nyamtema et al., 2011).

Most of Africa's population is still confined to rural settings where lack of health care system infrastructures limits access to maternal care (Chinkhumba et al., 2014). Inequities within countries have also been found to impede good maternal outcomes in developing countries (Zere et al., 2012). Skilled birth attendance is correlated with lower maternal mortality rates in sub-Saharan Africa (Buor & Bream, 2004). In 2006 and 2011 Zimbabwe had averages of 66 and 68 per cent respectively of birth attendance by skilled personnel. However, urban women were more likely to have their deliveries attended by a health professional and in a health facility (86 per cent) as compared to rural women (58 per cent) (Zimbabwe National Statistics Agency, 2011). There remains a huge gap to be filled in addressing maternal health inequalities in developing countries in order to reduce mortalities. In Zimbabwe, improvements in workforce through task-shifting, infrastructure, quality of care, medical products, financing, integration of disease-specific interventions with the primary care system and formulation of evidence-based policies are some of the immediate steps that can be taken. The abolition of user fees for maternal care has been found to improve health seeking behaviours amongst African women and has the potential to reduce maternal deaths (Fabienne et al., 2013). However, despite the implementation of the Health Transition Fund to mobilise resources for strengthening key health areas such as maternal and child care in 2011³, Zimbabwe is yet to fully implement the user fee abolition policy. Equity focused approaches are also key in addressing the inequities in maternal health care between urban and rural settings. Despite improved antenatal deliveries maternal mortality continues to increase unabatedly in developing countries pointing to the need for holistic horizontal interventions (Zere et al., 2012). Therefore identifying the relationship between HIV/AIDS services and maternal mortality

outcomes in the demonetised era in Zimbabwe is a priority policy area.

Methods

A secondary data analysis was carried out of PMTCT, adult ARV coverage rates and maternal mortality rates in Zimbabwe between 2009 and 2013. Data on PMTCT and adult ARV coverage rates were obtained from M & E department of the National AIDS Council in Zimbabwe, while maternal mortality rates were obtained from various sources including Ministry of Health and Child Care reports, World Bank, World Health Organization and United Nations publications. A data collection matrix table was used during the literature search for the study. The study followed a retrospective case study of post-dollarised Zimbabwe, from 2009 to 2013.

Data sources and setting

Zimbabwe is a low-income country in the sub-Saharan region and it has been going through devastating political and socio-economic challenges since the early 2000s (Nyazema, 2010). The country has a population of about 12.75 million and its gross domestic product was USD12.8 billion in 2013⁴. For administrative purposes the country is divided into ten provinces, 59 districts and 1200 wards (ZimStats, 2011). The nation is made up of 98% Africans (Shona 82%; Ndebele 14%; others 2%) and 2% Asians, whites and mixed races⁵. The health system is organised in such a way that there are primary care facilities, secondary, tertiary and quaternary (referral) health institutions in the country.

Data for this study was mainly obtained from paper and online publications of the Ministry of Health, ZimStats, National AIDS Council, WHO, UN and the World Bank. Online search engines used included Google, Google Scholar, PubMed and PLoS. Some of the key phrases used during the online searches included; “Maternal mortality rate in Zimbabwe 2009-2013”; “Causes of soaring maternal mortality rate in Zimbabwe”; “HIV/AIDS services and maternal outcomes in sub-Saharan

Africa” and “Zimbabwe Demographic and Health Survey Reports 2006 and 2011”.

Descriptive variables

Information extracted from National AIDS Council on HIV service indicators included PMTCT and adult (15-49 years) ARV coverage rates. Yearly coverage rates of both variables were recorded on the data matrix table for analysis.

Information on maternal mortality outcomes was recorded from Ministry of Health, ZimStats, WHO, UN and World Bank publications. Since maternal mortality rates are difficult to measure accurately, most of the reported rates were estimates calculated using regression models.⁶ However, Demographic and Health Surveys provided better estimates of maternal outcomes although they are only carried out once in five years in Zimbabwe.

Statistical Analysis

A secondary analysis of published data between 2009 and 2013 provided information on HIV service expansion as measured by PMTCT and adult ARV coverage rates and maternal mortality rates in Zimbabwe. Data were used to calculate degree of association using Pearson's product moment correlation coefficient, linear regression to determine the coefficient of variation and student t-test to calculate p-values to determine statistical significance. STATA version 12 was used in all statistical analyses. This study did not require ethical approval because it used publicly available data.

Results

The table below shows the trends in maternal mortality rate, PMTCT and adult ARV coverage rates in Zimbabwe between 2009 and 2013. Maternal mortality rates generally decreased from 725 to 470 deaths per 100,000 live births between 2009 and 2013 respectively. However, there was a significant increase from 2010 to 2011 before phenomenally reducing in 2012 and 2013.

Table 1: Trends in MMR, PMTCT and adult ARV coverage rates from 2009 to 2013 in Zimbabwe

Year	MMR (per 100,000 live births)	PMTCT coverage rate (%)	Adult ARV coverage rate (%)
2009	725	59	34
2010	570	46	59
2011	960	86	72
2012	525	85	79
2013	470	93	77

Sources: MOHCW, 2007, 2009-2013; World Bank, 2013; NAC, 2013; ZimStats, 2006; 2011; World Health Statistics 2013.

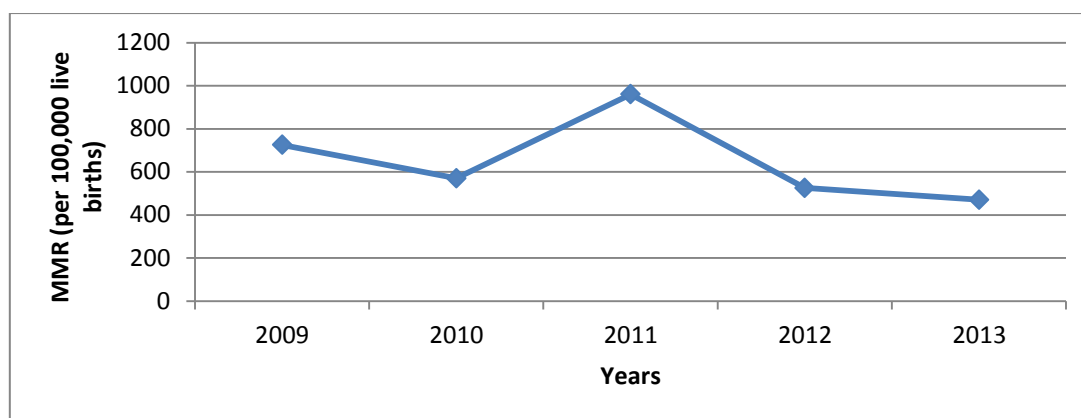


Figure 1: Trends in MMR in Zimbabwe, 2009-2013.

Figure 1, shows the dynamics of MMR in Zimbabwe from 2009 to 2013, with general reduction by 35 per cent over the 5 year period. However, there was a significant increase by 68 per

cent from 2010 to 2011. The downward trend continued after 2011 to 470 maternal deaths per 100,000 live births by end of 2013.

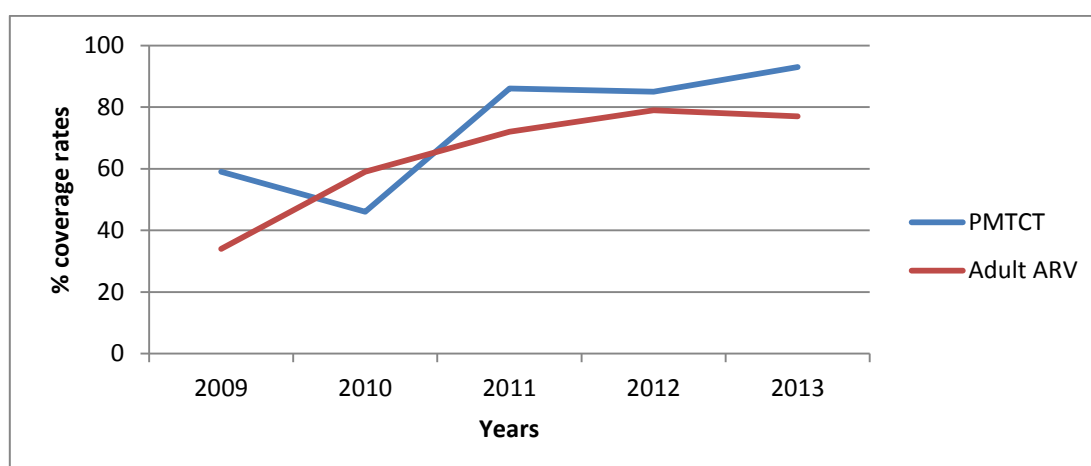


Figure 2: Trends in PMTCT and adult ARV coverage rates in Zimbabwe, 2009-2013.

The figure above shows the changes in both PMTCT and adult ARV coverage rates in post-dollarised Zimbabwe. There were significant increases of 34 and 43 per cent in PMTCT and adult ARV coverage rates respectively in the country. This shows significant strides in scaling up HIV responses in Zimbabwe.

There was however, no linear association between MMR and PMTCT coverage rate ($r=0$) ($p>0.05$). The Pearson product-moment correlation coefficient (r) between MMR and adult ARV coverage rate was $+0.2$ showing no linear association between the two variables ($p>0.05$). The coefficients of determination (R^2) for both analyses were 0 and 0.04, showing no associations between expanded HIV services and maternal outcomes in Zimbabwe between 2009 and 2013.

Discussion

This study provided information about the non-linear relationship between expanded HIV services and maternal mortality outcomes in Zimbabwe over a 5 year period from 2009 to 2013. By conducting a secondary data analysis of maternal mortality rates and HIV services as measured by PMTCT and adult ARV coverage rates this study was able to demonstrate that maternal mortality outcomes were not linearly correlated to expanded HIV responses in post-dollarised Zimbabwe, 2009-2013. The findings of this research are crucial in informing policy on the importance of integration of disease-specific interventions with the health systems as well as providing evidence on the pertinence of improving maternal care in the country.

The findings of this research disagree with some of the results of studies carried out in sub-Saharan Africa with respect to the relationship between HIV services and maternal mortality outcomes (Evince et al., 2013; Hogan et al., 2010; Moodley et al., 2011; MOHCW, 2007). While these earlier studies point to HIV/AIDS as one of the leading direct and indirect causes of maternal deaths, this present study point out that maternal outcomes are impacted indirectly by HIV service expansion. While these studies also found out that HIV infection was influencing maternal mortality in developing countries, there was indirect impact in the post-dollarised Zimbabwean context. The level of HIV scaling up was not commensurate to the maternal outcomes obtained from 2009 to 2013, indicating that major determinants of maternal outcomes were not directly associated with disease-specific interventions. This shows that expanding HIV services alone will not improve maternal outcomes in developing countries implying the need to integrate vertical interventions with the primary health system, improving the quality of maternal care and reducing socio-economic inequities.

In 2011, the maternal mortality rate was 960 deaths per 100,000 live births in Zimbabwe, showing a rise of 68 per cent from 2010 figure. This rise can be explained by the weakening of the health services that peaked in 2008 (Nyazema, 2010). However, the situation improved after 2009 following the stabilization of the economy as a result of dollarization and political settlements. This demonstrates the sensitivity of maternal outcomes to socio-economic, political and health systems challenges in developing nations like Zimbabwe. The maternal mortality rate was in 194 per 100,000 live births in 1980 in Zimbabwe (MOHCW, 2007), and over the past 33 years after independence the maternal outcomes have deteriorated due to socio-economic, political and structural and functional challenges in the health system. The HIV epidemic has also worsened maternal outcomes (Moodley et al., 2011; Hogan et al., 2010; Evince et al., 2013; MOHCW, 2007), although not much is known on the direct and indirect impact of HIV/AIDS on maternal outcomes in Zimbabwe.

Over the last five years Zimbabwe has received approximately USD1 billion to expand HIV services, which saw the PMTCT and adult ARV coverage rates increasing by 34 and 43 per cent respectively. However, little progress has occurred to maternal outcomes in order to achieve the MDG 5 target by 2015. This implies that HIV service scaling up has had little or indirect effects on maternal deaths in Zimbabwe between 2009 and 2013. The organization and capacity of the health system following years of huge socio-economic challenges were too weak to improve maternal

outcomes in just five years. Despite huge donor contributions to scaling up HIV services and strengthen the health system, domestic resources remain constrained making sustainability of interventions improbable (Tapera, 2014; Chevo & Bhatasara, 2012). The presence of user fees also influence service utilization and this negatively impacts maternal outcomes given that dollarization of the economy further entrenched socio-economic inequities in Zimbabwe (Febienne et al., 2013; Chirwa et al., 2013). With increasing out-of-pocket financing due to limited fiscal space for increasing public health expenditure in the country people have been predisposed to catastrophic health expenditures (Bredenkamp et al., 2010) and this has the potential of further worsening maternal outcomes (Febienne et al., 2013). Policies to boost the national economy, create jobs and increase industrial productivities are thus implied in order to increase public health expenditure.

The poor linkages between HIV responses and maternal health outcomes shown by this study reveal mixed impacts of disease specific interventions relative to the strength of health systems. Studies in sub-Saharan Africa have shown that health systems have been strengthened and in some cases weakened by vertical interventions (Chevo & Bhatasara, 2012; Buve et al., 2003; Rabkin et al., 2009). These findings are supported by the outcomes of this research. Several mechanisms of how HIV/AIDS programmes have destabilized fragile health systems in sub-Saharan Africa include the attraction of skilled and experienced healthcare staff from the general health care to donor-supported disease –specific programmes. This has negative implications in the access and quality of maternal care in developing countries. Other reasons include the catalysis of programmes to obtain quick successes by donors, increased number of HIV infected people needing care and treatment, increase in the number of HIV-defining chronic diseases like cancers (Rabkin et al., 2009; Buve et al., 2003; Nyakabau, 2014). Mozambique, a sub-Saharan African country successfully integrated HIV/AIDS programmes within its primary healthcare which has resulted in strengthening of the systems (Pfeiffer et al., 2010).

High health professionals' attrition is a major barrier to access and quality of maternal care in Africa. A limitation in human resources for health has been cited as one of the major constraints to the achievement of MDG 5 in Africa (Yego et al., 2013; Berhan & Berhan, 2014; Gupta et al., 2011). The HIV/AIDS pandemic has also been identified as a factor influencing the number and distribution of health professionals in developing countries (Siril et al., 2011). Skilled birth attendances in Zimbabwe in 2006 and 2011 were 65 and 68 per cent respectively, showing no major changes between the pre- and post-dollarised era (ZimStats,

2006; 2011). However, harsh political and socio-economic circumstances in the 2000s caused mass exodus of health professionals to other countries, resulting in critical shortages and mal-distribution of human resources for health (Nyazema, 2010; Todd et al., 2009). The attainment of a very high maternal mortality of 970 deaths per 1000 live births in 2011 could be explained by the high health professionals' emigration to other countries. Socio-economic, health systems and clinical factors could also have attributed to the astronomical rise. Zimbabwe is unlikely to achieve its MDG 5 goal of 70 per 100,000 live births by 2015⁷, however, the lessons learnt to date and from other sub-Saharan countries could be leveraged on to improve and sustain low maternal outcomes in the post-MDG era. Institutional memory and knowledge capital acquired over the years could be used to inform strategies like the formulation of policies to improve the quality of maternal care, leveraging on donor-supported disease-specific interventions to strengthen health systems, task-shifting to increase skilled birth attendances and integration of disease-specific interventions with health systems. Pro-poor health policies are imperative in sub-Saharan Africa as part of the equity based approaches to eliminate barriers to prenatal and postnatal healthcare. The scrapping of user fees for maternal services is also another progressive policy which requires urgent implementation although sustainable domestic sources of health financing are required to ensure accessible and good quality maternal care in public health institutions.

This study has its limitations which are important to mention. Firstly, the research focused on a 5 year period which may be a short time to draw generalizable results in Zimbabwe given the political and socio-economic dynamics. A ten year study is thus recommended as a follow-up to this present study. Secondly, maternal mortality rates are difficult to measure in developing countries due to poor health systems, hence this study relied on estimates obtained using regression models. Ideal maternal outcome estimates can be obtained from demographic and health surveys which take place once in five years in Zimbabwe. Lastly, but not the least, the indicators used to measure expansion of HIV responses are influenced by WHO guidelines which are subject to change over time. Hence fluctuations due to adoption of different WHO guidelines may affect the interpretation of findings.

Conclusions

Developing countries in the sub-Saharan region have received substantial investments in HIV scaling programmes in the last few years. This has resulted in numerous improvements in public health outcomes. However, other countries like Zimbabwe have experienced little positive spill

over effects from substantial HIV service expansion on maternal outcomes. This is indicative of discordance between HIV scaling up responses and the strength of primary health care systems. Urgent attention is thus required to ensure proper coordination and management of disease-specific intervention to reduce disharmony with health systems. Policies aimed at integrating disease-specific interventions, improvement of quality of maternal care, task shifting in human resources for health, strengthening of health systems and reducing poverty are imperative. It is also critical that developing countries improve their economic growth through sound and practical policies in order to sustain increasing public health expenditures from domestic resources. This reduces donor dependence on financing crucial public health services to ensure the sustainability of interventions in volatile global economic environments. Pro-poor policies are also implied as part of the equity based approach to improving access and quality of maternal healthcare in developing countries. Global donor driven disease-specific interventions should be leveraged on to strengthen health systems to improve and sustain low maternal outcomes in the post-MDG era.

Declarations

The author declares no conflict of interest and that the findings of this study do not represent the views of the Ministry of Health and Child Care, Zimbabwe but his own scholarly views.

Acknowledgements

I am grateful to Mr Amon Mpfu, the Director of M & E at the National AIDS Council for providing me with access to reports and other sources of information used in this research. I am also greatly indebted to Mr Saidi for his critical review and commenting on this manuscript.

Notes

1. <http://www.tradingeconomics.com/zimbabwe/gdp>
2. National Department of Health (2009). National Committee for Confidential Enquiries into Maternal Deaths, Saving Mothers 2005-2007: Fourth Report on Confidential Enquiries into Maternal Deaths in South Africa. Pretoria
2. www.unicef.org/zimbabwe/ZIM_resources_htfoutline.pdf
4. <http://www.tradingeconomics.com/zimbabwe/gdp>
5. http://www.indexmundi.com/zimbabwe/ethnic_groups.html
6. www.who.int/healthinf/statistics/indmaternalmortality/en/
7. www.countryoffice.unfpa.org/zimbabwe/2010/12/13/2934/zimbabwe_pledges_to_accelerate_efforts_to_reduce_maternal_mortality

References

- Adhikari, M. (2009). Tuberculosis and tuberculosis/HIV co-infection in pregnancy. *Semin Fetal Neonatal Med*, 14(4):234-40.
- Berhan Y, Berhan A. (2014). Reasons for the persistently high maternal and perinatal mortalities in Ethiopia: Part 1-Health System factors. *Ethiop J Health Sci.*, 24(2014):105-118.
- Black V, Brooke S, Chersich MF. (2009). Effects of human immunodeficiency virus treatment on maternal mortality at tertiary center in South Africa:a 5 year audit. *Obstet Gynecol* , 114:292-9.
- Bosch-Capblanch X, Lavis J, Lewin S et al. (2012). Guidance for Evidence-Informed Policies about health systems:Rationale for and challenges for Guidance Development. *PLoS Med*, 9(3):e1001185.doi:10.1371/journal.pmed.1001185.
- Brendenkamp C, Mendola M, Gragnolati M. (2010). Catastrophic and impoverishing effects of health expenditure: new evidence from the Western Balkans. *Health Policy and Planning*, 26(4)349-356.
- Buor D, Bream K. (2004). An analysis of the determinants of maternal mortality in sub-Saharan Africa. *J Women's Health* , 13(8):929-938.
- Buve A, Kalibala S, McIntyre T. (2003). Stronger health systems for more effective HIV/AIDS prevention and care. *Int J Health Plann Mgmt*, 18:S41-S51.
- Chevo T, Bhatasara S. (2012). HIV and AIDS Programmes in Zimbabwe: Implications for the Health System. *International Scholarly Research Notices Immunology*, (2012):ID 609128,11 pages .
- Chinkhumba J, De Allegri M, Muula AS et al . (2014). Maternal and perinatal mortality by place of delivery in sub-Saharan Africa: a meta-analysis of population based cohort studies. *BMC Public Health*, 14:1014.
- Chirwa Y, Sophie W, Munjoma M et al. (2013). The human resources implications of improving financial risk protection of mothers and newborns in Zimbabwe. *BMC Health Services Research* , 13:197.
- Evanse I, Mbaruku G, Maanja H et al. (2013). Causes and risk factors for maternal mortality in rural Tanzania-Case of Rufiji Health and Demographic surveillance site (HDSS). *Afr J Reprod Health* , 17(3):119-130.
- Fabienne R, Matthieu A,Sophie W et al. (2013). Fee Exemption for Maternal Care in Sub-Saharan Africa: A review of 11 countries and lessons for the region. *Global Health Governance* , 6(2):52-72.
- Gil-Gonzalez D, Carrasco-Portino M,Ruiz MT et al. (2006). Knowledge gaps in scientific literature on maternal mortality: a systematic review. *Bulletin of the World Health Organization*, 84(11):903-9.
- Gupta N, Maliqi B, Franca A et al. (2011). Human resources for maternal,newborn and child health: from measurement and planning to performance for improved health outcomes . *Human Resources for Health*, 9:16.
- Hill K, Thomas K, AbouZahr C et al. (2007). Estimates of maternal mortality worldwide between 1990 and 2005: an assessment of available data. *Lancet* , 370(9595):1311-9.
- Hogan MC, Foreman KJ, Naghavi M et al. (2010). Maternal mortality for 181 countries ,1980-2008:a systematic analysis of progress towards Millennium Development Goal 5. *The Lancet*, 375(9726):1609-1623.
- Hoj L, Stensballe J, Aaby P(1999). Maternal mortality in Guinea-Bissau:the use of verbal autopsy in a multi-ethnic population. *International Journal Epidemiology*, 28(1):70-6.
- Igberease GO, Ebeigbe PN. (2007). Maternal mortality in rural referral hospital in the Niger Delta,Nigeria. *Journal of Obstetrics and Gynaecology*, 27(3):275-8.
- Khan M, Pillay T,Moodley JM et al. (2001). Maternal mortality associated with tuberculosis-HIV-1 co-infection in Durban,South Africa. *AIDS*, 15:1857-63.
- Knight M, Kurinczuk JJ, Melson-Piercy C et al. (2009). Tuberculosis in pregnancy in the UK. *BJOG*, 116(4):584-8.
- Luo C, Akwara P,Ngongo N et al. (2011). Global progress in PMTCT and paediatric HIV care and treatment in low-and middle-income countries in 2004-2005. *AIDS Research and Therapy*, 8:10.
- McNairy ML, Melaku Z,Barker PM et al. (2011). Leveraging progress in prevention of mother-to-child transmission of HIV for improved maternal,neonatal and child health services. *J Acquir Immune Defic Syndr*, 57:S83-S86.
- Ministry of Health and Child Welfare. (2007). *Maternal and Perinatal mortality study*. Harare: MOHCW.
- Ministry of Health and Child Welfare. (2009). *Annual Report*. Harare: MOHCW.
- Ministry of Health and Child Welfare. (2010). *Annual Report*. Harare: MOHCW.
- Ministry of Health and Child Welfare. (2011). *Annual Report*. Harare: MOHCW.
- Ministry of Health and Child Care. (2013). *Annual Report*. Harare: MOHCC.
- Ministry of Health and Child Welfare. (2012). *Annual Report*. Harare: MOHCW.
- Muldoon KA, Galway LP, Nakajima M et al. (2011). Health system determinants of infant,child and maternal mortality: A cross-sectional study of UN member countries. *Globalization and Health* , 7:42.
- National AIDS Council. (2013). *Annual Report*. Harare,Zimbabwe: NAC.
- Nyamtema AS, Urassa DP,van Roosmalen J. (2011). Maternal health interventions in resource-limited countries: a systematic review of packages,impacts and factors for change. *BMC Pregnancy and Childbirth*, 11:30.
- Nyazema, N. (2010). The Zimbabwe Crisis and the provision of social service: Health and Education. *Journal of Developing Societies*, 26(2):233-261.
- Pandolfelli LE, Shandra J, Tyagi J. (2014). The International Monetary Fund, Structural Adjustment, and women's health: A cross-National Analysis of Maternal Mortality in Sub-Saharan Africa. *The Sociological Quarterly*, 55:119=142.
- Rabkin M, El-Sadr WM, De Cock KM. (2009). The impact of HIV scale up on Health Systems: A Priority Research Agenda. *J Acquir Immune Defic Syndr* , 52:S6-S11.
- Ramogate MR, Moodley J,Sebilane MH. (2007). HIV-associated maternal mortality-primary causes of death at Kind Edward VIII Hospital ,Durban . *S Afr Med J*, 97:363-6.
- Samb B, Desai N,Nishtar S et al. (2010). Prevention and management of chronic disease: a litmus test for

- health system strengthening in low-income and middle-income countries. *The Lancet*, 376(9754):1785-1797.
- Sherr K, Requejo JH, Basinga P. (2013). Implementation research to catalyze advances in health systems strengthening in sub-Saharan Africa: the African Health Initiative. *BMC Health Services Research* , 13 (Supp2):S1.
- Siril H, Hirschhorn LR, Hawkins C et al. (2011). Stress, motivation and professional satisfaction among health care workers in HIV care and treatment centres in urban Tanzania: A cross sectional study. *East Afr J Public Health* , 8(1):17-24.
- Sprague C, Chersich MF, Black V. (2011). Health system weaknesses constrain access to PMTCT and maternal HIV services in South Africa: a qualitative enquiry. *AIDS Research and Therapy*, 8:10.
- Tapera, O. (2014). Insensitivity of infant mortality rates to improved HIV/AIDS financing: Evidence from post-dollarized Zimbabwe (2009-2013). *International Journal of Developing Societies*, 3(2):24-31.
- Todd C, Ray S, Madzimbamuto F et al. (2010). What is the way forward for health in Zimbabwe. *The Lancet*, 375(9714):606-609.
- United Nations . (2013). *Maternal Mortality in Zimbabwe: Evidence, Costs and Implications*. New York: UN.
- United Nations Development Programme. (2013). *MDG Report 2013: Assessing Progress in Africa towards the Millennium Development Goals*. New York: UNDP.
- World Health Organisation . (2013). *World Statistics 2013*. Geneva: WHO.
- World Health Organization. (2007). *Estimates of Maternal mortality in 2005*. Geneva: WHO, UNICEF, UNFPA.
- Yego F, Williams JS, Byles J et al. (2013). A retrospective analysis of maternal and neonatal mortality at a teaching and referral hospital in Kenya. *Reproductive Health* , 10:13.
- Zere E, Kirigia JM, Duale S et al. (2012). Inequalities in maternal and child health outcomes and interventions in Ghana. *BMC Public Health*, 12:252.
- Zimbabwe National Statistics Agency . (2006). *Zimbabwe Demographic and Health Survey Preliminary Report 2005-2006*. Harare: ZimStats.
- Zimbabwe National Statistics Agency . (2011). *Zimbabwe Demographic and health Survey 2010-2011 Preliminary Report*. Harare: ZimStats.