

HEALTHCARE INVESTMENTS IN ZAMBIA: THE CASE OF SIDA.

By

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A Dissertation submitted to the University of Zambia in partial
fulfilment of the requirements for the award of the Degree of
Master of Arts in Economics.

DEPARTMENT OF ECONOMICS
THE UNIVERSITY OF ZAMBIA
LUSAKA

2020.

DECLARATION

I, **Daughtry Mulenga**, hereby declare that this dissertation presents my work and that it has not been previously submitted for the award of a degree or any other qualification to the University of Zambia or any other institution. All references have been adequately acknowledged.

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APPROVALS

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ABSTRACT

Background: Improving reproductive, maternal, newborn, and child health (RMNCH) services and increasing coverage for primary health care services is the focus of many developing countries. In this agenda, external funds play a crucial role in health service delivery, including RMNCH services. Skilled attendants assist in about 66% of births worldwide. In Zambia, 80.4% of women are attended to by qualified health providers, with disparities between rural (73.4%) and urban areas (93.1%). Hence the response by the Swedish International Development Cooperation Agency (SIDA) to invest in bettering the health of women, children, and adolescents in Southern and Eastern provinces in Zambia. This study assessed the effect of SIDA's health care investments on skilled deliveries in Eastern and Southern province of Zambia.

Methods: The study used a combination of controlled interrupted time series (ITS) analysis and qualitative analysis. The study used administrative data compiled from 72 Health Management Information System (HMIS) monthly data points for each district in the two provinces from January 2013 to December 2018. Four (4) districts from the 22 SIDA funded, which included two (2) best and two (2) least performing districts were sampled to obtain qualitative insights.

Quantitative Results: The study showed significant shifts in the trend of skilled deliveries following the interventions in fourteen (14) out of twenty-two (22) recipient districts in the two (2) provinces. However, controlled ITS analysis showed a significant increase in skilled deliveries of about 1.52 ($p < 0.01$) in Chadiza, 0.8 ($p < 0.05$) in Mambwe, and a reduction of about 2.7 ($p < 0.01$) in Vubwi in Eastern province. For Southern province, there appeared to be an increase in the percentage of skilled deliveries of about 0.44 ($p < 0.01$) in Gwembe, and 0.51 ($p < 0.01$) in Siavonga. The results also recorded decreases of about 1.9 ($p < 0.05$) in Chikankata, 1.1 ($p < 0.01$) in Livingstone, and 0.75 ($p < 0.01$) in Mazabuka following the intervention.

Qualitative Results: Factors such as recruitments and training, human resource development, infrastructure development, transport system improvements, and integrated outreach services (at both facility and district level) appeared to be facilitators of skilled deliveries in the two provinces. On the other hand, delayed disbursement of funds, inadequate staffing levels, and insufficient infrastructure appeared to be inhibitors of skilled births.

Conclusion: Therefore, this study recommends that the primary intervention should provide all the essential inputs. Input provision should also be timely and sufficient to avoid slow progress and sub-optimal performance.

Keywords: *Controlled, ITS, Analysis, Facilitators, Inhibitors, Intervention, HMIS*

DEDICATION

I dedicate this work to my parents, Annette Mutale Mulenga and Moses Mulenga, who are an epitome of excellent parenthood and without whom I would not have achieved anything academically. Their unwavering spiritual, emotional and financial support is much appreciated.

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to the Almighty, ever faithful, glorious God for His continued abounding mercy and love that He keeps showing in my life. I would also like to thank my supervisor, Dr Chitalu M. Chama - Chiliba for her tireless constructive guidance rendered to me throughout the course of this work. I also owe a lot of thanks to Clinton Health Access Initiative (CHAI) for the financial and logistical support through out this research; Lindsey Heyman and Mbaita Maka, thankyou for providing that extra niche that this research needed. Olatubosun Akinola, thanks for being so insightful. To the entire CHAI staff, thanks for being so accommodating. Special thanks to all my family and friends for their support and encouragements. Furthermore, my special regards go to Mulemba Ndonji, Maimbolwa Namuchana for their moral support. Finally, I would like to thank my course mates for making this academic journey adventurous.

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ACRONYMS

ANC	Antenatal Care
CAS	Complex Adaptive Systems theory
CSO	Central Statistics Office
DAH	Development Aid for Health
DFID	Department for International Development
DHOs	District Health Officers
DHS	Demographic and Health Surveys
EmOC	Emergence Obstetric Care
EU	European Union
G2G	Government - to - Government
GRZ	Government of the Republic of Zambia
GST	General Systems Theory
HMIS	Health Management Information System
ITSA	Interrupted Time Series Analysis
JICA	Japan International Cooperation Agency
MDGs	Millenium Development Goals
MoF	Ministry of Finance
MoH	Ministry of Health
NHCs	Neighbourhood Health Committees
PHC	Primary Health Care
RBA	Result Based Aid
RBF	Result Based Funding
RMNCAHN	Reproductive, Maternal, New-born, Child and Adolescent Health and Nutrition
SDGs	Sustainable Development Goals
SIDA	Swedish International Development Cooperation Agency
SMAGs	Safe Motherhood Action Groups
THE	Total Health Expenditure
UHC	Universal Health Coverage
UNAIDS	Joint United Nations Programme on HIV and AIDS
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations International Children's Emergency Fund
UNZA-REC	University of Zambia Research and Ethics Committee
USAID	United States Agency for International Development
USG	United States Gypsum Corporation
WB	World Bank
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

The purpose of this study was to assess the effect of the Swedish International Development Agency (SIDA) healthcare investments towards skilled deliveries in Eastern and Southern provinces of Zambia. Previous research indicates positive effects of donor funding on skilled births as well as general improvements in health care service delivery in recipient countries, (Campbell et al., 2005; Mize et al., 2008). On the other hand, suggesting otherwise, other studies such as Wayte et al., (2007) showed a noticeable decline in the number of births attended to by qualified health providers in the woman's waiting homes.

The relationship between health aid and changes in population health among aid recipients remains unknown (Bendavid & Bhattacharya, 2016). While there have been definite improvements in the health status of the African region during the past two decades, whether the gains can be attributed to the healthcare aid is inconclusive (Negeri & Halemariam, 2016). Despite the empirical research results we have in the literature on the effect of foreign assistance, the evidence is scarce that deals with the impact of health-targeted aid. Within the available research itself, there is also a lack of consensus concerning the effect of health aid in developing countries (ibid). On one side, researchers argue that health-specific funding leads to improved health outcomes in developing countries by relaxing resource constraints and directly improving health service delivery (Chauvet et al., 2009). Scholars argue that health aid interventions appear to be associated with improvements, although small, in maternal health outcomes (Gyimah-brempong, 2015). On the other side, literature indicates that such reliable empirical evidence supporting the claimed positive effect of health aid on health outcomes does not exist (Negeri &

Halemariam, 2016). They argue that funds going to the health sector have no impact on the level of health status indicators across countries (Gomanee et al., 2005).

Proponents of development aid argue that the world's poorest nations are trapped in a cycle of poverty and ill-health. Therefore, external funding can propel those nations into a period of development. They argue that health aid targeted to a particular disease or program on outcome in that sector or plan (e.g., child- and maternal- mortality) is effective. Contrary to the opponents of health aid, there seems to be a general agreement in the literature that, targeted health aid significantly improves health outcomes in the targeted area. Gomanee et al. (2005) found that aggregate funding decreases infant mortality, and the benefit of external assistance on human welfare is higher at lower income levels. Other studies conclude that total aid improves outcomes, including health outcomes, only in countries with good governance or policy environment (Chauvet et al., 2009). Nonetheless, there is no consensus in the literature on whether aggregate aid affects health outcomes in recipient countries. Other studies conclude that aggregate aid inflow has no significant impact on health outcomes in recipient countries. Boone (1996) finds that total aid has no significant impact on any development outcome, including maternal and child mortality. Similarly, "Easterly (2003) conclude that external aid has no significant effect on development outcomes, including health, whether one accounts for better governance/policy environment or not" (Gyimah-brempong, 2015).

Similarly, in the aggregate aid effectiveness literature, there is no consensus on the effectiveness of development aid for health (DAH) on health outcomes. While some studies find a positive effect, others find no effect. However, there are concerns that DAH increases have not resulted in increased spending on health at the country level (Alvarez et al., 2016). This is because DAH may be fungible (government substitution of its resources across sectors and within the health sector) resulting from the recipient government decreasing its contribution to the health sector as a result of external funding. Dieleman et al. (2013) found that development assistance for health channelled to governments remains significantly fungible.

Alvarez et al. (2004) found evidence of substitution of government funds at the health sector and sub-sector levels taking place through two mechanisms: the resource allocation process and macroeconomic factors. However, the main conclusion by various scholars is that the fungibility of external funds may not necessarily be detrimental and not a significant concern. It only distracts attention from what donors can do to ensure that more of their aid is allocated to areas that they want to support [(McGillivray et al., 2000), (Alvarez et al., 2004), (Leiderer, 2012)].

Nonetheless, one solution to the fungibility problem is that donors could tie their assistance to an overall public expenditure program (of the recipient country) that provides adequate resources to crucial sectors (Devarajan & Swaroop, 1998).

However, the general perception is that external funds can enhance improvements in health care outcomes. This perception could be the reason why the flow of resources channelled through development assistance characterises healthcare expenditures in developing countries in the 21st century. External funds for health in the majority of member nations of the World Health Organization (WHO) African region accounts for nearly 20% of total health expenditure (THE) (World Health Organization, 2013). Some states, such as Malawi, Burundi, and Tanzania, face exceptional circumstances where donor funding accounts for more than 40% of total health care expenditure (Ibid).

Similarly, donor funding accounted for about 42% on average, in terms of sources of current total health expenditure for Zambia over the period 2013 to 2016 (Ministry of Health, 2018). External inflows for health care increased steeply after the introduction of the Millennium Development Goals (MDGs). These funds account for around 0.7% of the resources spent by high-income countries on health care (Institute for Health Metrics and Evaluation, 2015). Although this may seem small in proportion to the national commitments of rich countries, for low-income countries at the receiving end of the transfers, these resources are substantial (ibid). The theory is that development assistance for health, if appropriately targeted and managed, has the potential of improving health outcomes in the recipient countries.

With the global health agenda shifting to sustainable development goals (SDGs), universal health coverage (UHC) for all spell the central theme for the worldwide economy. For developing countries, this entails an explicit focus towards improving healthcare services such as reproductive, maternal, newborn, and child health (RMNCH) services as well as increasing the coverage for primary health care services. Over 60% of the Zambian population live in rural areas where the provision of public services is severely limited in comparison to urban areas. Rural areas have about 70 clinical health workers per 100,000 people, compared with 159 per 100,000 population in urban areas (Association of Chartered Certified Accountants, 2013). There are severe shortages of qualified clinical staff, especially in more remote areas. Access to healthcare care is restricted by long distances, the critical lack of equipment, drugs, blood products, and medical supplies, partly due to budget deficits of about 40% annually (Ibid).

According to UNICEF Zambia (2016), in 2011, the Zambian government funding allocation to health as a percentage of GDP was 8.3%. Although this figure increased to 9.3% in 2019 (UNICEF Zambia, 2019), it is still very minimal to tackle the magnitude of health challenges faced at both district and facility levels. Therefore, to increase funds available at the district/facility level, the Swedish government agreed with the Government of the Republic of Zambia (GRZ) in December 2015 to fund districts directly. The aim was to help expand and improve reproductive, maternal, newborn, child, and adolescent health and nutrition (RMNCAH&N) service delivery in targeted provinces over five years by supporting integrated primary health care service delivery at the district and facility level. In this respect, when we consider SIDA funding to Southern and Eastern provinces of Zambia, two (2) things particularly stand out;

- In 1993, Zambia was among the first countries to adopt the sector-wide approach (SWAp) model. This model uses a single policy and strategy to coordinate and manage all resources in a sector under government leadership (Walt et al., 1999). The use of the SWAp ended in 2009 following a corruption scandal within the Zambian Ministry of Health (MoH). This led to donors freezing their funds and withdrawing support directly to the government (Chansa & Negin, 2015). Alternatively, donors began channelling funds outside of the government structure, through parallel channels such as United Nations agencies (Usher, 2015). Therefore, the RMNCAH&N program started by SIDA in 2015 was the first government-to-government (G2G) contribution in the aftermath the 2009 corruption scandal (Bergman, 2017).
- The magnitude of the funding involved and the scale of operation in Southern and Eastern provinces is enormous. For all the 22 districts in Southern and Eastern provinces, SIDA spends about \$4,345,409.24 (ZMW 60,834,903.67) budgets for each performance year, as shown in figure 1.1 below.

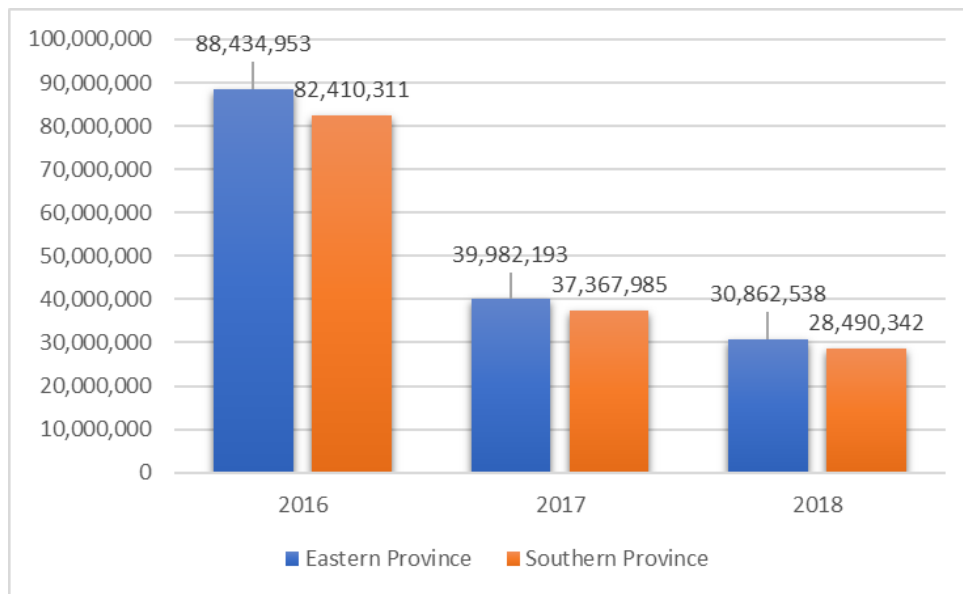


Figure 1.1: SIDA Funding in Eastern and Southern Province (currency: ZMW)
 Source: Author (Compiled from RMNCAH&N External Results Verification, 2017).

Each district in the province received, on average, ZMW 5,508,745.4, and each facility receiving, on average, ZMW 1757259.5. All the thirteen (13) individual districts in Southern province received, on average, about ZMW 3,383,404.4 for each performance year between 2016 and 2018. These funds track the five (5) health indicators, namely; antenatal care, postnatal care, immunisation, modern contraceptive methods, and skilled deliveries. Through the SIDA model of funding, the 22 districts have adequate room to innovate, identify programs and actions, develop work plans and follow out those work plans to achieve the desired change in the targeted indicators. The programs and activities included the following; construction of mother's shelters, maternity annexes, laboratories and renovation of labour wards. Procurement of Ambulances and acquisition of non-medical equipment and supplies. Purchase of non-monetary incentives for community volunteers such as Bicycles. Another part of the funds was directed towards trainings such as emergency obstetric and new-born care (EmOC) and recruitments of skilled health personnel such as Midwives and Nurses. By giving the recipients district more discretion and autonomy to innovate and adapt their activities, the districts take ownership of the funding and innovate to improve health outcomes. Thus, substantial advances in the five incentivised indicators as a result of SIDA healthcare investments are required.

1.1.1 Facility Delivery in Africa and Zambia

Facility deliveries significantly contribute to improved maternal and child health outcomes. In sub-Saharan Africa, where 66% of the global maternal mortality occurred, only 56% of all births take place in health facilities. In Nigeria, for example, less than 40% of births occur in health facilities (Adedokun & Uthman, 2019). The expected proportion of health facility delivery in Malawi was 30.11%, 34.79% for Namibia, 19.31% for Tanzania, and 24.38% for Zambia (Doctor & Nkhana-salimu, 2018). This shows that, for the entire sub-Saharan African countries, less than 40% of births occur in facilities. Implying that, a significant proportion of births occurring outside health facilities are not assisted by skilled health personnel.

Ideally, by the international target, skilled birth attendants should assist in about 90% of all births (Nyongesa et al., 2018). However, about 20% of all deliveries have no skilled birth attendant (Lwamba et al., 2018). This gap means that approximately 25 million births occur at home every year without qualified health personnel. Sub-Saharan Africa, South East Asia, and the Caribbean are furthest away from the ideal situation.

1.1.2 Consequences of not Delivering in Facilities

Obstetric complications and maternal deaths can be prevented. Facility-based delivery significantly reduces maternal mortality by increasing women's access to skilled personnel attendance. However, in sub-Saharan Africa, most births take place without skilled attendants and outside health facilities. Utilization of facility-based delivery is affected by socio-cultural norms and several other factors, including cost, long-distance, accessibility, and availability of quality services (Yaya et al., 2018). While most pregnant women who choose to have planned home births deliver without complications, research shows that planned home births are associated with a higher risk of infant deaths and seizures than planned hospital births. Woodcock et al. (1994), in a matched cohort study of planned home and hospital births, showed a similar result of more third stage complications in the home birth group. Another survey by Dali et al. (2003) indicated very high perinatal mortality of 65.9/1000 home births as compared to only 29.4/1000 births in hospital delivered cases. Therefore, these studies indicate that home births are associated with a high risk of obstetric complications and perinatal deaths than facility births.

1.2 Problem Statement

20% of all annual births in Zambia occur without the assistance of skilled health personnel [(Central Statistical Office (CSO) [Zambia] et al.,2019)]. Implying that, of the estimated total annual births of nearly 696,305 (Central Statistical Office (CSO) Zambia, 2018), 139,261 births occur without help from skilled birth attendants. According to Henry et al., (2018), the proportion of health facility delivery in Zambia is about 24.38%, meaning that about 75% of total births in Zambia are not facility deliveries. Research shows that non-facility births are associated with a higher risk of infant deaths and seizures than facility births. According to Tuladhar et al. (2005), non-facility births are commonly associated with third stage complications like postpartum haemorrhage and retained placenta. This is so because facility births have access to assistance from certified nurse-midwife, practising obstetric doctors, and a plan for emergence transport to the nearest hospital.

Health aid support, as well as government efforts (i.e., deployment of health personnel and budgetary support), account for about 42.2% and 40.7% of current health expenditures as a percentage of total health expenditure on average, respectively (Ministry of Health, 2018). However, the skilled delivery indicator has only increased to 80% over time (Central Statistical Office (CSO) [Zambia] et al., 2019), as shown in Figure 1.2 below. The slow progress in the indicator means that the country is still below the international target to have skilled birth attendants assisting in 90% of all births (Adegoke & Van Den Broek, 2009).

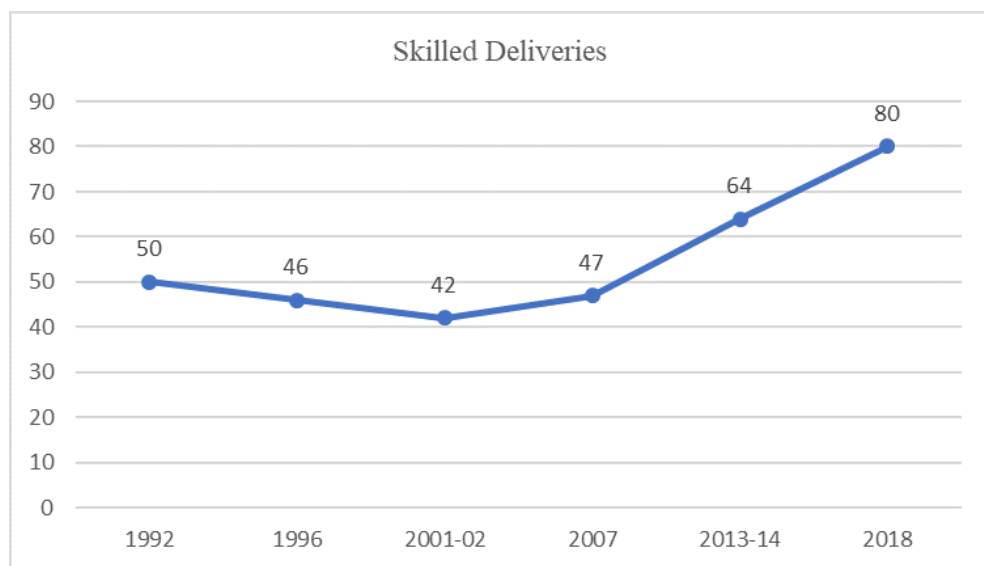


Figure 1.2: Overall Skilled Deliveries in Zambia
Source: CSO et al., (2019)

Many provinces in Zambia lag behind on the indicator, in the case of Eastern and Southern regions, respectively, the total estimated number of annual births stands at 82,098 and 79,345 (Central Statistical Office (CSO) Zambia, 2018). With skilled delivery rates standing at 84.2% and 82.1% for the two provinces, respectively (Central Statistical Office (CSO) Zambia et al., 2019), this means that approximately 12,971 and 14,203 yearly births in Eastern and Southern provinces, respectively, are not assisted by skilled birth attendants. The two regions have some of the highest estimated numbers of annual births in the country, only exceeded by Lusaka and Copperbelt provinces (Central Statistical Office (CSO) Zambia et al., 2019; Central Statistical Office (CSO) Zambia, 2018). Thus, if left unchecked, these births are likely to be assisted by traditional birth attendants, other unskilled birth attendants, or just no one. As a result, the lives of the mother and child are at risk during childbirth due to obstetric complications, which are preventable or manageable if women have access to skilled birth attendants.

The problem of unskilled delivery, in this case, is complex and networked. Therefore, simple cause-effect relationships will not apply because there are many contributing causes and influences. The causes and impacts may include characteristics of the mother and her family, health service and environmental aspects such as distance to the nearest health facility, the quality of care provided at that facility, number of hospitals, staff, patients, suppliers and funding partners (Gabrysch et al. 2011, The Health Foundation, 2010) to any outcome. On the other hand, one action may lead to a multiplicity of consequences and effects. Thus, SIDA intervenes to improve the health of women, children, and adolescents in Southern and Eastern provinces of Zambia through direct funding to all the 22 districts in the two regions since 2016 across five incentivised health indicators, including skilled deliveries. However, the intervention may have led to a multiplicity of positive effects as well as consequences over time since various complexities characterise the health system. This study, therefore, intends to assess the impact of SIDA's healthcare investments on skilled deliveries in Eastern and Southern provinces of Zambia. By doing so, this paper seeks to answer the following questions;

1. Has SIDA's healthcare investment contributed to an increase in skilled deliveries in Eastern and Southern provinces of Zambia?
2. What are the inhibitors and facilitators of skilled births in the SIDA funding recipient districts?

1.3 Objectives

1.3.1 General Objectives

- To assess the effects of SIDA’s healthcare investments on skilled deliveries in Eastern and Southern provinces of Zambia.

1.3.2 Specific Objectives

- To investigate the changes in skilled delivery following financial investments by SIDA.
- To identify the best and least improving districts overtime.
- To explain the facilitators and inhibitors of skilled delivery in the districts.

1.4 Hypothesis

- H0: Districts that received SIDA healthcare funding did not attain significant increase in skilled deliveries as a percentage of expected deliveries.
- H1: Districts that received SIDA healthcare funding achieved significant increase in skilled deliveries as a percentage of expected deliveries.

1.5 Rationale of Study

The global strategy for women’s, children’s and adolescents’ health, 2016–2030 is aligned with the SDG targets, and advances universal health coverage (UHC) for all (WHO, 2018). Therefore, the government, as well as the donor community, understands the importance of concerted efforts in meeting the set out sustainable health-related goals by 2030. This study, therefore, outlines changes in skilled delivery following SIDA’s investments, identifies the least and best-improving districts over time, and explains the facilitators and inhibitors of skilled births following the interventions. The study contributes to the generation of knowledge on the best use of donor financial investments to improve skilled deliveries as well as the general health of women, children, and adolescents in the communities and the nation at large. Thus, the results of this research are also crucial to informing the national health budget policy, guidance, and tools.

CHAPTER 2

OVERVIEW OF THE HEALTH SYSTEM OF ZAMBIA

2.1 Introduction

Health systems comprise all the organisations, institutions, and resources that are devoted to producing health actions. This chapter gives a summary of the health system in Zambia, health sector donor support, the current SIDA funding model in Zambia and concludes by showing the context of SIDA funding in Eastern and Southern provinces of Zambia.

2.2 Organisation of the Health System in Zambia

The health system in Zambia has a pyramid structure made up of public and private healthcare providers (Ministry of Health, 2018)). Private for-profit and private, not-for-profit health providers constitute private facilities. Most of the individual, non-profit health providers are faith-based and deliver health services in close collaboration with the Ministry of Health. The health system consists of three levels. (i) The district-level which provides primary healthcare (PHC) services through health posts, health centres, and district hospitals. (ii) The secondary level consists of secondary level referral hospitals. They provide healthcare services such as internal medicine, paediatrics, obstetrics, gynaecology, and general surgery. (iii) The tertiary level which provides specialised healthcare. By the end of 2017, Zambia had a total of 2,922 public and private health facilities (Ibid). The government has nearly 80% of the total figure of health facilities in the country and provides about 80% of all healthcare services (op. cit).

In this respect, the health care system in Zambia is a system with various levels of complexities. It involves decision-makers, policy-makers, and groups of people in institutions, establishments, and agencies that shape the provision of health care to society. It encompasses different levels of care, from providing services for the prevention of diseases to providing palliative/end of life care. Multiple health professionals, such as physicians, nurses, social workers, occupational therapists, pharmacists, and many other types of professionals, provide healthcare services in the health system.

2.3 The Health Sector Donor Support in Zambia

The Zambian health sector is hugely dependent on foreign assistance. External sources of funding to the health sector have grown in Zambia over the past two decades, accounting for around one third (32%) of total health sector expenditure in 2012 (Chita & Dick, 2015). The high degree of donor support is one explanation for why the Zambian government has been able to attain relatively high levels of health spending (Ibid). In recent years, Zambia has aimed to expand the provision of health services through the public sector. Between 2006 and 2013, government health expenditure as a share of total health expenditure (THE) increased from 38 to 58% (Fagan & Zeng, 2015). External resources contributed to a great extent and have remained relatively stable, accounting for 34% of THE in 2013 (Ibid), as diagrammatically shown in figure 2.2 below.

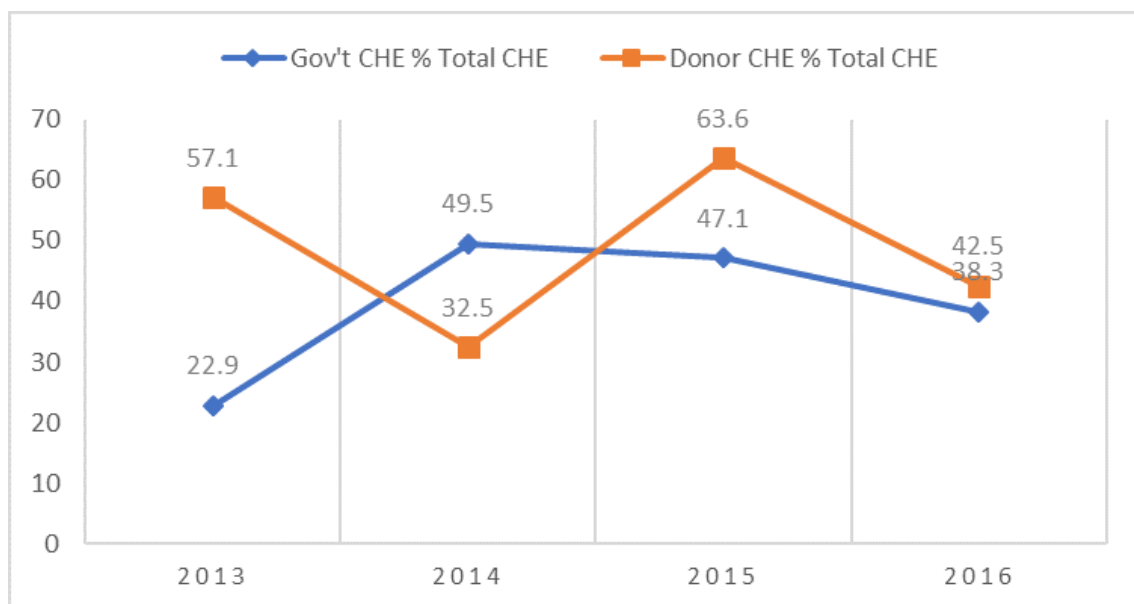


Figure 2.1: External Sources of Healthcare Support in Zambia.
Source: National Health Accounts (NHA) Report (2018).

Over the years, Zambia has seen a considerable number of donor agencies intensify their operations in priority areas. The priority areas include improving health for women, children, and adolescents, comprehensive sexuality education, scaling-up nutrition, and nutrition interventions at community and district levels, inclusive education for disabled children in Zambia, preparedness surveillance and response. Other donor agencies support the implementation of comprehensive sexuality education programs to promote human rights and gender equality, strengthen the delivery of detailed plans for marginalised adolescent girls, including safe spaces for those at risk of child marriage. These projects are crucial for improving essential healthcare services and healthcare management in the country.

2.4 The SIDA Financing Model in Zambia

SIDA defines agreements differently according to the type of recipient. Usually, the partner may be a private contractor, a non-governmental organisation, or a public entity. SIDA makes a distinction between results-based funding (RBF) and results-based aid (RBA). RBF is the additional funding given to the districts based on the improvements scored after verification of results. Whereas, RBA is "agreements with a state entity or a government, linked to outcomes, though in many cases, a proxy indicator measures output" (Sida, 2015). In that way, by linking additional funding to a higher level of results, the instrument/donor deliberately leaves more space for the recipient/implementer to choose the actions to achieve the selected results. Government/state counterparts often implement the support as agreement partners. This approach gives the partners greater flexibility to choose implementation methods and shifts the responsibility for outcomes and risk from the development agency to the partner.

SIDA implements both input and result-based financing in Zambia. Results based funding is 30% of the total RMNCAH&N grant given to the districts as an award based on the progress made on the outcome indicators. Input funding, on the other hand, is implemented through the GRZ resource allocation formula that is need-based. Since the Zambian health sector institutions and coordinating framework anchors the RMNCAH&N intervention, the MoH takes the overall responsibility for policy formulation, service delivery, and coordination. The implementation of these interventions occurs at all levels of the health system, including national, provincial, district, and community levels. Figure 2.2 below shows the flow of SIDA funding from MOH to the recipient districts.

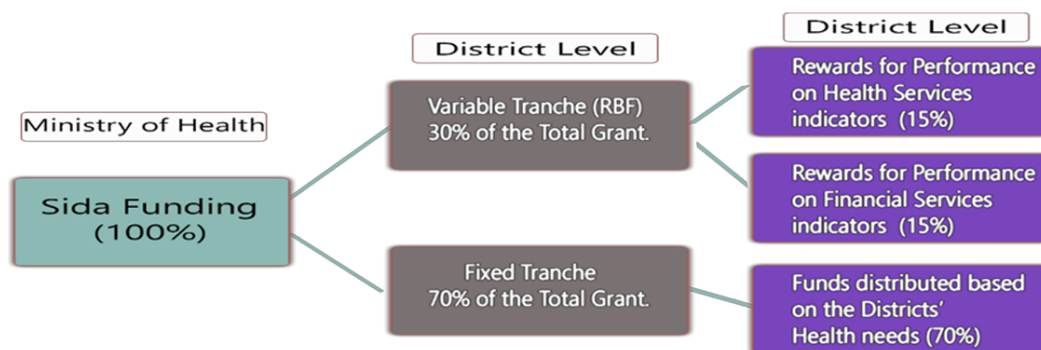


Figure 2.2: Framework for SIDA Grant Flow for Zambia.
Source: Authors construction from SIDA Grant break down figures.

Some assumptions of the SIDA funding model include;

- The focus on results will improve accountability to the beneficiaries for enhanced service delivery.
- The agreement gives recipients discretion to innovate and adapt their activities.
- Enhance the availability of adequate services for RMNCAH&N in the districts.
- Increased community and clients' demand and the uptake of RMNCAH&N services in the targeted provinces.
- Strengthening the health system's capacity to enable the effective delivery of health services at all levels of the health system.

2.5 The Context of SIDA Intervention in Zambia

In December 2015, the Swedish government agreed with the government of the republic of Zambia to fund the districts directly. The aim was to provide financial support towards Reproductive, Maternal, New-born, Child, and Adolescent Health and Nutrition (RMNCAH&N) services. The support covers 22 districts in Southern and Eastern provinces of Zambia. The ministry of health (MOH) receives the funds and channels it to the district health office. The district health offices have the autonomy to decide how to use the money for RMNCAH&N goals by creating their work plans.

Thus, the annual budgets of the districts in Southern and Eastern provinces during the intervention period covered activities such as renovation and construction works. The construction and rehabilitation works included building of mother's shelters, maternity annexes, laboratories and renovation of labour wards. The districts also budgeted for the procurement of vehicles,

Ambulances, and motorbikes as well as the acquisition of non-medical equipment and supplies. Purchase of non-monetary incentives for community volunteers such as Bicycles, Torches, Gumboots carried a portion of the districts' budgets. They further planned to conduct monthly community sensitisation in RMNCAH&N activities. Nonetheless, a large share of the districts' budgets went towards basic emergency obstetric and newborn care (EmOC) across the seven signal functions, and recruitments of skilled health personnel such as Midwives and Nurses.

The total contribution for SIDA's RMNCAH&N intervention amounted to a maximum SEK 400 million (Usher, 2015), which is about 59,531,205.50 Zambian kwacha equivalent. The SIDA funding intervention was rolled out at the district level in all the 22 districts of southern and Eastern provinces of Zambia since 2015. However, the districts received the first funding disbursement meant for the initial implementation of the work plans in the fourth quarter of 2016 due to some programme delays. All the 22 districts funded were non-randomly selected.

CHAPTER 3

LITERATURE REVIEW

3.1 Introduction

To understand the nature of this study and appreciate the content, we review various literature brought up by previous scholars on healthcare investments or health care aid interventions both theoretically and empirically.

3.2 Theoretical Review

Systems Theories

A systems theory is an interdisciplinary theory. The theory explains a framework by which one can investigate and describe any group of objects that work together to produce results. The system could be a single organism, an organisation or society, or any electro-mechanical or informational artefact. There are many systems theories in the study of healthcare intervention, such as the General Systems Theory (GST). It was developed by Bertalanffy in 1972, who viewed a system as “a set of elements standing in interrelation among themselves and with the environment” (Von Bertalanffy, 2013). Some other useful systems theory is the Complexity theory. This theory, on the other hand, is not a theory per se but instead a loose set of concepts, heuristics, and analytic instruments (Manson, 2001). Both the general systems and complexity theories argue that health care service delivery consists of numerous simple and sophisticated “systems” or processes. These processes range from those that are deterministic to those with features of randomness. Both theories acknowledge that change in health outcomes happens within a systems framework. Therefore, the existing system facilitates the implementation of healthcare interventions. Nevertheless, this study concentrates on other systems theory known as the Complex Adaptive Systems (CAS) theory. An in-depth description of the theory with its

direct application to this study is highlighted below.

The Complex Adaptive Systems (CAS) Theory

There are many definitions of a complex adaptive system. Kaisler & Madey (2009,) defines a complex system as any system that involves a (large) number of elements arranged in structure(s) that can exist on many scales. These elements interact locally. Each part connects to other components of the system. Even indirectly, structures go through a process of change, not describable by a single rule. This process of change is not reducible to one level of explanation, and features emerge that are unpredictable from the current description of the structure(s).

However, based on the work of John Holland, a complex adaptive system is a dynamic network of agents acting in parallel, continually reacting to what the other agents are doing, which in turn influences behaviour and the network as a whole (Holland, 1992). Control tends to be dispersed and decentralised, and the overall response of the system is the result of many decisions continuously made by individual agents. In a complex adaptive system, order emerges rather than being predetermined. It is not possible to reverse the system's history, and the future is often unpredictable (Holland, 1999). In its purest form, complex adaptive systems are a way of thinking about and analysing things by recognising complexity, patterns, and interrelationships rather than focusing on cause and effect.

According to Grisogono (2006), a system is complex when:

- Causality is complex and networked: i.e., Simple cause-effect relationships don't apply – there are many contributing causes and influences to any one outcome, and conversely, one action may lead to a multiplicity of consequences and effects
- The number of plausible options is vast: so, it is not possible to optimise (in the sense of finding the one best solution in a reasonable amount of time),
- System behaviour is coherent: there are recurring patterns and trends, but
- The system is not fixed: the patterns and trends vary, for example, the 'rules' seem to keep changing – something that 'worked' yesterday may not do so tomorrow, and
- Predictability is reduced: for a given action option it is not possible to accurately predict all its consequences, or for a desired set of outcomes it is not possible to precisely determine which actions will produce it.

The bone of contention here is that the interplay between complex health conditions, complex patient circumstances, and complex health care systems, contributes to the overwhelming challenge that is currently being faced by health systems. Health practitioners' resources and skills may be challenged in multiple ways as a result of complexity, for example, when making difficult diagnoses and clinical decisions, when planning care for patients with complex needs, and when engaging with the complex situations within which individuals live. Likewise, the resources and capacity of health care services are challenged by the fact that there are multiple potential responses to complexity (Safford et al., 2007).

Ironically, the health service system itself quickly becomes a source of complexity, and more significant resourcing of that system does not necessarily result in reduced complexity. Sometimes increased services and practitioners can contribute to complexity by creating confusing pathways, uncoordinated responses, duplication, and gaps in the health care continuum. To manage such complexity, practitioners and providers require versatile, flexible skills and new ways of thinking to enhance their interactions with the health system's components. Therefore, the key message is that complex adaptive systems thinking is an approach that challenges simple cause and effect assumptions and instead sees the healthcare system as a dynamic process in which interactions and relationships of different components simultaneously affect and are shaped by the system (The Health Foundation, 2010).

The lens of CAS opens up a deeper understanding of how to effect change in health systems, including the pathways for increasing and sustaining coverage of effective interventions. It suggests a switch in thinking from the models which revolve around linear, predictable processes to models that embrace uncertainty, non-linear processes, the uniqueness of local context, and emergent characteristics (Paina & Peters, 2012). Through the lens of CAS theory, an 'intervention' can be viewed as combinations of technologies, inputs into service delivery, organisational changes and modifications in processes related to decision making, planning, and service delivery, as well as scaling up of interventions previously implemented using novel processes to influence change in health outcomes.

Through its emphasis on interactions, the CAS theory offers a unique and useful lens for considering how diverse professionals (agents) collectively act through the phenomenon referred to as "self-organisation." Through positive self-organisation, social structures emerge which better address the challenges at hand, such as the changing needs and capacities of agents in the

system or the changing demands and opportunities of the environment (Comfort, 1994). This is one of the principles of the SIDA funding model. This principle gives the districts enough room to self-organise, innovate, identify programs and activities, develop work plans and implement them to attain the desired change in the targeted indicators. Therefore, SIDA investments act as a stimulus to the recipient districts to self-organise and take ownership and initiative to bring about the desired changes in the districts.

CAS is sensitive to small changes, calling forth the principle of non-linearity. Meaning a slight modification of a system's components can lead to substantial/little/no change at the system level. SIDA investments are introduced into health systems as innovations, incorporating new ideas, patterns, objects, or institutional systems. Thus, complex adaptive systems change and adapt in response to endogenous and exogenous actions, disturbances or triggers (Plsek & Greenhalgh, 2001). In this case, SIDA healthcare investments in Eastern and Southern provinces of Zambia are an exogenous effort or a trigger of change in the health system. This process of change can either be complicated or less complicated. For example, SIDA healthcare investments can be a trigger to scaling up of less complex interventions such as immunization/vaccination for childhood illnesses involving the use of new technologies or innovations in a selected client group.

The intervention can be delivered by one or more health professionals, at a single occasion or a limited number of occasions at regular intervals. Hence, its compatibility with the existing health system is more readily apparent, as are the perceived benefits (a child immunised) or adverse effects (reaction to the vaccine). On the other hand, integrated maternal and child health programs encompass a variety of indicators such as maternal mortality, skilled birth attendance, under five (5) mortality, and neonatal mortality. The intervention is provided at different levels of the health system to a range of stakeholders by a multidisciplinary group of health workers. As such, an integrated maternal and child health program is more complicated than vaccinations.

The CAS theory also helps us to understand the changing role of local health system managers, such as district health directors, planners, and program coordinators. At first glance, the CAS theory may seem to diminish their positions. However, in a well-functioning CAS, their role is not diminished, but it is changing. They now hold the substantive task of functioning as facilitators, creating the conditions, and setting up an infrastructure that enables self-organising to take place. These health care agents in the local system manage their budgets and determine how they allocate resources, unlike in some publicly financed health and social care system

where decisions on budgets and the apportionment of funds happens outside the local system (Choi et al., 2001). Agents in the local system need both the responsibility and the capability to act. Similarly, SIDA gives the funding recipient districts enough room to self-organise and innovate, budget for resources, and allocate resources to the most urgent local needs to facilitate change.

Another aspect of the SIDA healthcare investment in influencing health outcomes in Southern and Eastern provinces that the CAS theory helps us to understand is the aspect of program integration. The CAS theory notes that program integration can occur at different levels of the health system; local, district, regional, or national, depending on the current governance arrangements concerning critical health system functions. The essential functions including, among other things, governance, financing, planning, service delivery, Monitoring and Evaluation, and demand generation (Atun et al., 2010). Therefore, the systems theory enhances this study to predict that SIDA healthcare investments contributed to improvements in health outcome indicators such as skilled deliveries. These improvements could have occurred through the set-out SIDA intervention programs and activities carried out at both district and facility levels because that is where the integration of the SIDA funding intervention happened.

3.3 Conceptual Framework

Health outcomes are challenging to assess since they represent a complex theoretical construct. This study adopted the CAS theory in understanding interventions such as SIDA funding to the Zambian health sector to influence health care outcomes such as skilled deliveries. According to the CAS theory, the health care system is a CAS with the diversity of players who are connected, interdependent, and always learning. CAS theory suggests that the capacity to self-organise for integrated healthcare delivery is integral in the collective intelligence of participants or agents within the complex system as agents interact and connect. Through the interactions, agents can adapt or build new structures to achieve an intended result or otherwise, some unintended effects.

The interaction of agents in CAS results in two (2) patterns of change. The non-complex transformation which revolves around linear and predictable processes, and the complex transformation that embraces uncertainty, non-linear processes, the uniqueness of local context, and new characteristics. The interaction of agents in the system is key to understanding how to effect change in health systems, including the pathways for increasing and sustaining coverage of effective interventions. Figure 3.1 depicts this interaction of agents in the health system to

produce intended outcomes.

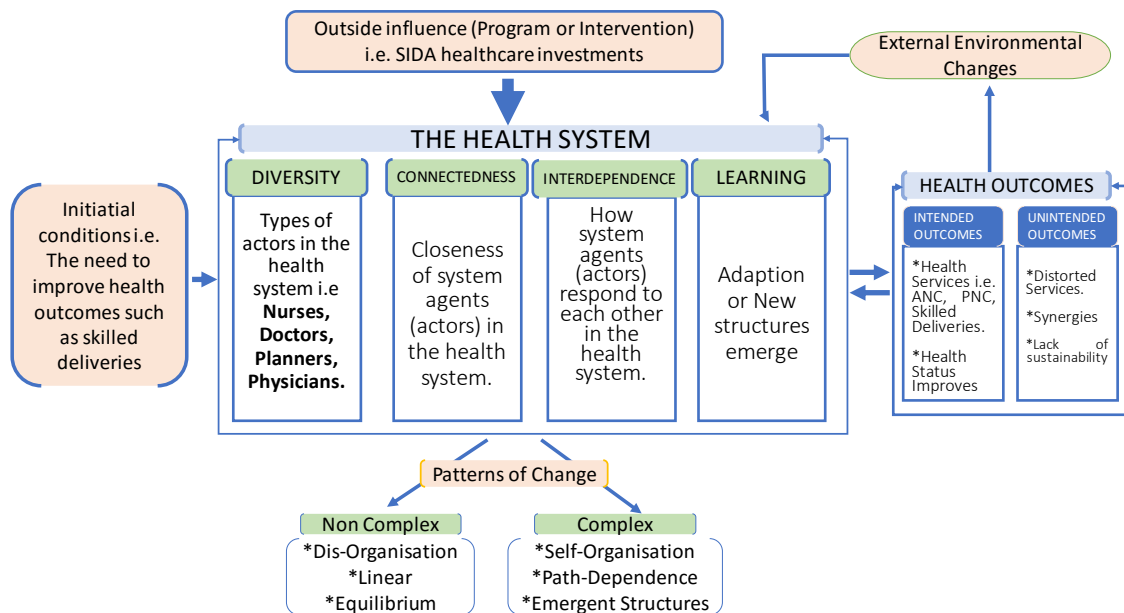


Figure 3.1: Conceptual Framework.
Source: Author (Adapted from CAS Theory).

The complexity of the healthcare system is defined by institutional or system factors and how they interact to transform investments into outputs and likely outcomes. These factors are governed by various elements determined in the form of relationships and associations which may facilitate or constrain the efficient use of investment resources to produce desired outcomes or otherwise unintended outcomes. The unexpected results will, at a later stage, become the initiating conditions, and the system components will again begin to adjust and self-organise around the existing problems. Hence, the system itself is dynamic and unpredictable. Figure 3.1 illustrates the interplay of agents in a health system to produce intended health outcomes such as improvements in antenatal care, postnatal care, skilled deliveries, and overall health status. Otherwise, unintended consequences emerge, such as distorted services. Since the health system is complex, it is characterised by the diversity of actors (system agents) who operate jointly and interdependent. The interrelation of system agents facilitates learning. learning, in turn, leads to the formation of new structures or otherwise adaptation to the existing structures aimed at producing intended outcomes through a process known as "self-organisation." Therefore, an intervention enters the system as a trigger for self-organisation around some initial conditions of society. The self-organisation of system agents, around the existing problems and opportunities of society is what influences health outcomes, thus, initiating change to the external environment.

For example, Figure 3.1 above shows that complexity begins with the initial conditions. The initial conditions can be in the form of complex health conditions, complex patient circumstances and complex health care systems such as chronic illnesses, diagnoses, and clinical decisions, planning care for patients with complex needs as well as improving the overall population health. According to Lipsitz (2012), in dealing with such complex issues, the first property of a complex system requires effective interactions among patients, families, physicians, and hospital and skilled nursing facilities staff to reach mutual objectives such as skilled deliveries, high-quality, affordable care. These objectives cannot be achieved if hospitals, skilled nursing facilities, and physician practices are reimbursed or funded only for episodes of care, tests, or procedures that occur in one setting or another. Instead, by providing a global payment for the care of a given patient across environments or management of health programs, clinicians and health care practitioners can experiment. Experimentations enable them to assess what works and what does not. This brings about self-organization (the second property) in a fashion that may better achieve a shared objective because the number of plausible options is vast. With shared goals and incentives in place, some simple rules (the third property) may be necessary to constrain costs. These constraints could include payment limits based on the average historical prices for a similar patient or programme.

3.4 Empirical Review

Many studies have found mixed results of foreign aid to the health sector. Several scholars argue that funding is positively correlated with the percentage increase in skilled deliveries in the countries on the receiving end, whereas others argue otherwise. Hence, drawing varying conclusions on the general line of reasoning that external funds enhance changes in skilled births. Scholars that assent for the assertion that aid improves health outcomes suggest that aid interventions might be associated with some positive changes in the target areas of intervention (Taylor et al., 2011). However, Taylor et al. warn that this conclusion should be interpreted with caution because the claims are of association rather than causality. Additionally, Taylor et al. observed that the data are not comparable across the studies which cover different countries and periods, and reporting of confounding factors and alternative explanations are generally weak. Therefore, we cannot be confident that changes are happening because of how aid is delivered.

Nonetheless, Hatt et al. (2007) using pooled demographic and health surveys (DHS) data from 1986–2002, examined trends in the percentage of births assisted by health professionals. The Authors tested for the effects of the economic crisis of 1997 using logistic regression. The results showed that aid for health improved access to professional delivery care for the poorest people in Indonesia through village midwifery programs. The study identified two key trend indicators of maternal health; (i) Percentage of births attended by a trained provider and (ii) Percentage of cesarean sections (as a proxy for access to emergency obstetric care). The results showed that Indonesia's strategy to increase skilled birth attendance through investments in training and deployment of midwives was successful in reaching the poor. The study reported that skilled delivery care reached over 40% of the poor in rural areas.

The findings according to Hatt et al. (2007) strongly suggest that the strategy of investing external/donor funding in training and deployment of more midwives, especially in the rural areas can enhance access to primary health care such as skilled deliveries. However, Hatt et al. (2007) did not discuss the inhibitors of skilled births. And as such, he suggested more research into the barriers in accessing skilled deliveries and emergency obstetric care and how to overcome the obstacles.

More than 99% of maternal deaths occur in developing countries. The majority of women in developing countries run a lifetime risk of dying from pregnancy-related complications due to non-institutional births and without skilled birth attendants, about 250-fold higher than women in developed countries. Of the 210 million women who become pregnant each year, close to 30 million or nearly 15% develop complications, which are fatal in 1.7% of cases, resulting in 529,000 maternal deaths per year (De Bernis et al., 2003). This point emphasises the impact that skilled deliveries have on both the life of the mother and child. The findings by (Hounton et al., 2008) on the effect of financial aid interventions towards improvements in health outcomes, which included skilled deliveries in Burkina Faso, speaks volumes concerning the assertion by De Bernis et al. Hounton et al. (2008) concludes that, pregnancy-related mortality risk decreased with increasing proportions of women attending antenatal care ($P = 0.032$) or giving birth in an institution ($P = 0.065$).

This view indicates that women who attend antenatal care and give birth in an institution are more likely to have a low pregnancy mortality risk. Mainly because, they are more likely to be assisted by skilled health personnel. Thus, knowing how to prevent and manage pregnancy-related

complications is cardinal to meeting the SDGs. On the other hand, equipping health personnel with the necessary skills, drugs, supplies, equipment, and back-up can help to increase access to skilled healthcare services by pregnant women during and immediately following childbirth. This is probably where SIDA investments come in handy to promote the healthcare-related goals in Zambia.

Researchers argue that aid-funded health care interventions increase the opportunity for underprivileged women to benefit from qualified care providers during pregnancy. To attain this, they support that, safe motherhood programs, deployment of a requisite number of skilled birth attendants, facility upgrades, etc., are essential because such programmes remove barriers that hinder women from accessing specialised help before, during, and after childbirth. Campbell et al. (2005) affirm this argument by concluding that the safe motherhood program intervention in Egypt contributed to a 50% increase in the percentage of deliveries presided over by a skilled attendant from 40.7% in 1992/3 to 60.9% in 2000. This view reiterates the findings of Mize et al. (2008) in the final evaluation report on improving maternal and newborn health in Timor-Leste. He documented an increase in the percentage of children (aged 0–23 months) whose last delivery was assisted by a skilled birth attendant in the program districts. The author concluded that district-level data for 2006, 2007, and 2008 showed an increase in the mean level of monthly home deliveries in Remexio district. However, the study did not investigate the factors that led to an increase in home deliveries in Remexio district. Those factors are particularly significant because they are inhibitors of skilled births. The idea is that, when home deliveries are increasing, the chances of being assisted by trained health personnel diminish.

Furthermore, the findings by Mize et al. (2008) point to health care funding interventions leading to improvements in health outcomes such as skilled deliveries. However, the authors did not demonstrate what facilitated the documented increase in the number of children assisted by skilled delivery attendants. Nonetheless, Mize et al.'s findings agree with the results of three correlation studies [(Shiffman et al., 2004), (Barnett & Bennet, 2007) and (COWI et al., 2007)]. The authors examined the effect of aid-funded interventions on health outcomes using qualitative evaluation approaches. The studies reviewed multiple sources of information, such as conducting interviews, document reviews, etc., to minimise bias and establish common patterns of causality. Altogether the three (3) studies reported aid intervention programs delivering a higher ratio of births assisted by skilled health personnel from 41% in 2000 to 71.5% in 2004 (Shiffman et al., 2004), 36% in 1999 to 46% in 2004/5 (Barnett & Bennet, 2007) and 45% in 1989/90 to 61% in

1998 (COWI et al., 2007). However, These studies did not highlight the factors that could have led to those improvements in skilled birth deliveries as a result of external healthcare funding.

Since health care interventions are complex and administered at different levels of the health system, we also see different methods used in their assessment. Hossain & Ross (2006) and Ensor et al.(2014) used a quasi-experimental approach to evaluate the effect of a complex community-based intervention to draw comparisons between the intervention and control groups. Unlike previous studies, the authors performed significance tests. Hossain & Ross (2006) concluded that an intervention area had an 8.1% increase in skilled delivery ($p < 0.01$ 95% CI 7.2–9.0). Ensor et al. (2014) also concluded that 75% of births took place at a health care facility after the intervention compared with 49% before. In general, there were improvements in all six intervention districts in the proportion of deliveries that involved a skilled birth attendant, and that took place at a healthcare facility. Notably, the percentage of births involving a skilled birth attendant increased in all districts; only the increase in Mkushi district was not significant (Ibid).

The studies indicate that facility-based aid-funded intervention programmes and activities such as facility upgrades and community programmes resulted in a noticeable increase in skilled deliveries in the intervention areas. These findings show that health care investment results in improvements in skilled deliveries as a healthcare outcome.

In contrast to the quasi-experimental approach used by Ensor et al. (2014) and Hossain & Ross (2006), Brenner et al. assess the effects of results-based financing mechanisms on maternal health care services in Malawi using a mixed methods explanatory design (Brenner et al., 2014). The approach by Brenner et al. (2014) combined a traditional quasi-controlled experimental design with an explanatory mixed methods model. Thus, permitting for an additional assessment of organisational and behavioural changes affecting complex processes. This method is essential because it creates robust evidence measures for the outcome of interest and generates insights on how and why the investigated interventions produce specific intended and unintended effects. It also allows for a more in-depth evaluation approach. In this context, this study's interest is not only in assessing the impact of SIDA healthcare investments but also discovering the inhibitors and facilitators of skilled deliveries in Southern and Eastern provinces of Zambia.

Summary of Empirical Review

Following the review of the empirical literature, five (5) pertinent issues stand out;

- There is variability in methodological approaches used to investigate the effect of healthcare aid intervention on health outcomes due to the complex nature of healthcare interventions.
- The evidence shows a positive correlation between healthcare external financial investments and health outcomes, particularly skilled deliveries.
- Some empirical literature explained how the positive changes in skilled births came about, whereas other empirical research did not.
- Studies that demonstrate positive changes in skilled births cited various factors and those factors varied by the geographical location where the studies occurred.
- In the districts with a documented decline in skilled births, there is limited evidence highlighting the inhibitors of skilled deliveries perpetuating the observed decline.

Based on the identified gaps in literature, the study attempted to assess the effect of SIDA's health care investments on skilled deliveries in Eastern and Southern provinces of Zambia. The study further aimed to identify the facilitators and inhibitors of skilled births in the Eastern and Southern regions of Zambia.

CHAPTER 4

METHODOLOGY

4.1 Type of Research Design

This study used an explanatory sequential design proposed by Brenner et al. (2014). The study took in an ITS analysis approach illustrated by (De Allegri et al., 2019); Lagarde, 2012) in the first stage and employed qualitative analysis steps by (O'Connor & Gibson, 2003) in the second phase. The use of mixed methods ensures that qualitative analysis explains how the quantitative mechanisms might have worked.

4.2 Sampling Design

4.2.1 Study Population and Sample Size

This study targeted a population of all 22 SIDA funding recipient districts from Southern and Eastern province of Zambia. The study used a sample of 72 monthly data points for skilled delivery from January 2013 - December 2018 because data before 2013 was reported to include other data elements, i.e births assisted by other health cadres. For qualitative analysis, the study purposively sampled four (4) districts from the 22 SIDA funding recipient districts comprising two (2) best and two (2) least improving districts.

4.3 Data Collection

4.3.1 Type of data

This study used time-series data given that interrupted time series analysis requires data collected regularly over time and organised at equally spaced intervals.

4.3.2 Data sources

a) Secondary data

The study used administrative data extracted from the district health information system version-2 (DHIS2) of the health management information system (HMIS) on skilled delivery for quantitative analysis.

a) Primary Data

Primary data was collected through interviews from the district health offices (DHOs). The target population comprised of district health directors (DHDs), Planners and Program coordinators. These are responsible for facilitating health care service delivery as well as budgeting and resource allocation at the district level.

4.4 Data Preparation and Analysis

4.4.1 Data Extraction and Cleaning

For each district, monthly data points were extracted from the district health information system version-2 (DHIS2) for a total period of 72 consecutive months from January 2013 to December 2018. During data preparation, all data points with missing values were replaced with the mean values of the outcome variable, because the mean gives the closest estimation of a value. Nevertheless, the proportion of missing values only accounted for less than 5% of the data, hence could only have very minimal effect on the overall findings of the study.

4.4.2 Data Analysis

The study used descriptive and inferential statistics to assess SIDA's healthcare investments towards skilled delivery to improve health outcomes. Estimations were performed by using STATA 15.1. After that, qualitative data were employed to explain the quantitative sub-analysis results regarding the changes in skilled deliveries in Eastern and Southern provinces. The districts received their first funding disbursement in October 2016. However, the actual implementation of the SIDA interventions in the districts took place between October and December 2016. Nonetheless, on a general perspective, by December 2016, all the districts had initiated their intervention programs. Thus, the study defined one interruption point (December 2016) for aggregate data analysis. However, for sub-level (individual district) data analysis the interruption points differed because the districts initiated the intervention in different months i.e., October, November and December 2016.

The interrupted time series models performed in this study estimates the respective coefficients by Ordinary Least Squares (OLS) regression. The regression uses Newey-West standard errors to handle autocorrelation and potential heteroskedasticity. The Cumby-Huizinga test for autocorrelation demonstrated the presence of serial autocorrelation for some districts data. Hence, the models were adjusted accordingly. On the other hand, both the Im-Pesaran-Shin unit-root test and the Fisher-type unit-root test led to reject the null hypothesis that some units contained unit-roots.

4.5 Model

The primary objective of this study was to assess the effect of SIDA healthcare investments towards improving skilled delivery in Southern and Eastern provinces of Zambia. Therefore, this study applied both single and multiple (controlled) interrupted time series models consecutively.

4.5.1 Estimation Technique and Regression Simulation

The study used both single group ITS model (4.1) and multiple group ITS model (4.2) in assessing the effect of SIDA health care investments on skilled deliveries in Eastern and Southern provinces of Zambia. Model (4.1) produces estimates without controlling for the effects of confounding variables, whereas model (4.2) incorporates control variables.

$$Y_t = \beta_0 + \beta_1 Time_t + \beta_2 Intervention_t + \beta_3 Postslope_t + \varepsilon_t \quad (4.1)$$

Where β_0 is the starting level of the outcome variable at time (t) = 0. β_1 is the level change in the outcome variable occurring with Time. β_2 is the slope of the outcome variable until the introduction of the intervention. β_3 is the change in the level of the outcome that occurs in the period immediately following the introduction of the intervention. ε_t is the error term.

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 z + \beta_3 zT + \beta_4 x_1 + \beta_5 x_1 T_t + \beta_6 z x_1 + \beta_7 z x_1 T_t + \varepsilon_t \quad (4.2)$$

Where Y_t represents the skilled deliveries outcome variable measured at each monthly time point t, T is a continuous variable representing the months since observation started and x is a dummy variable representing each study period (x = 0 for t in the pre-intervention period; x = 1 for t in the early and late post-intervention periods; z is a dummy variable representing the treatment group (0 = control, 1 = SIDA recipient district).

β_2 and β_3 indicate the estimated differences in level (intercept) and slope (trend), between treated and controls. β_6 and β_7 represent the estimated difference in differences in level and slope, respectively, attributable to the intervention.

4.6 Variable, Definitions and Measurements

Table 4.1: Variables, Definitions and Measurements

Variables	Definition	Measurement
SIDA Investments	SIDA Funding to the districts.	Measured as a DUMMY Variable i.e. 1 if SIDA funding is received and 0 otherwise
Skilled Delivery	Proportion of births attended by skilled health personnel.	The number of births attended by skilled health personnel as a percentage of the total number of expected Deliveries.

4.7 Ethical Considerations

Before conducting this study, we obtained ethics approval from the University of Zambia Research and Ethics Committee (UNZA-REC) as well as the National Health Research Authority (NHRA). The Ministry of Health also granted us the authority to interview its key informants. All participants in the interview consented to the study. They were also free to withdraw from the study at any point if they so wished. The interviews were held at a convenient place and did not take more than 30 minutes. We stored data used in this study on a password secured device/computer, with the password only known to the researcher. We also conducted all interviews anonymously and used codes to identify recordings. All recordings were executed with the respondents' consent. Transcription of information did not turn out any names or titles of the participants.

CHAPTER 5

PRESENTATION OF FINDINGS AND ANALYSIS

5.1 Introduction

This chapter presents the results of the study. The study assessed the effect of the Swedish international development cooperation agency (SIDA) healthcare investments on skilled deliveries in Eastern and Southern provinces of Zambia. The study had three sub-aims - the first to investigate the changes in skilled deliveries following SIDA healthcare investments, the second to identify the best and least improving districts over time, and the third to identify the facilitators and inhibitors of skilled deliveries in Eastern and Southern provinces of Zambia. All these aspects have been highlighted in the previous chapter that presented the methodology. This chapter provides the summary features of the sample, and after that, aggregate data results will be displayed using provinces as units of analysis. The section also highlights findings based on sub-level data analysis using districts as units of analysis. It provides qualitative perspectives to explain the quantitative sub-level phenomena, and a conclusion will be drawn.

5.2 Sample Characteristics

Table 5.1: Sample Distribution and Characteristic

Characteristics	Eastern Province			Southern Province		
	Intervention	Control	Total	Intervention	Control	Total
Total No. of districts	9	5	14	13	9	21
Total Observations	648	640	1288	864	636	1500
Total No. of Facilities	293	128	421	319	194	513
Mean, (SD)	56.96(19.64)	62.83(13.35)	59.05(17.87)	55.02(17.62)	54.96(12.69)	54.99(15.71)
Pre-intervention	54.71(18.83)	61.25(13.25)	57.05(17.33)	52.07(17.51)	52.93(12.49)	52.43(15.59)
Post intervention	61.45(20.49)	65.99(12.99)	63.07(18.28)	60.9(16.34)	58.92(12.16)	60.06(14.72)

*Difference in means is statistically significant at 5% level (based on two-group t-test).

Sample characteristics are shown in table 5.1 above. All the nine (9) SIDA funded districts in Eastern province were treated as intervention (treatment) districts. Similarly, All the thirteen (13) SIDA funded districts in Southern province were treated as intervention (treatment) districts. The study identified 14 districts, unexposed to SIDA's RMNCAH&N program in Southern and Eastern provinces or a similar program, to serve as control districts. The 14 districts were also either semi-urban or rural districts to match the intervention districts. Then, one to one matching criterion was performed to determine comparability with the intervention districts on both the baseline level and trend of the outcome variable. Comparability, in this case, meant having $p < 0.20$. HMIS data were available on the indicator under investigation over the 72 months. A total of 2,508 complete observations was extracted from the DHIS2 system and included in the analysis. This total number of observations covered a total number of 934 facilities. The mean percentage of skilled deliveries per month differed significantly between the Eastern province and its control districts ($p < 0.05$) based on the two-group t-test. However, there appeared to be a non-significant difference in the average percentage of skilled deliveries between Southern province and its control districts.

5.3 Aggregate Data Analysis

This section provides aggregate data results. It begins by presenting the single-group interrupted time series (ITS) results drawn from the analysis of aggregate data for all the nine (9) intervention districts in Eastern and thirteen (13) treatment districts in Southern provinces of Zambia. After that, the section will proceed to present the results drawn from the analysis of aggregate data only for the districts with statistically significant shifts in the post-intervention trend.

5.3.1 Aggregate Data Results for all the Districts

Table 5.2: Aggregate Results for all Districts in Eastern and Southern Provinces

Parameters	Eastern Province	Southern Province
Pre- Trend (β_1)	0.251***(0.0761)	0.493***(0.104)
Post- Level Change (β_2)	-1.577 (2.318)	- 2.944 (2.127)
Post- Trend Change(β_3)	-0.158 (0.143)	- 0.519***(0.134)
Post- Trend ($\beta_1 + \beta_3$)	0.093 (0.122)	- 0.026 (0.082)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 5.2: Provides estimates of the parameters for aggregate data on skilled deliveries as a percentage of expected deliveries for Southern and Eastern provinces in Zambia. This section used provinces as units of analysis.

Table 5.3: SIDA Intervention Timeline

	Eastern Province	Southern Province
Inception	December 2015	December 2015
Time of Intervention	October 2016	October 2016
Estimated cut point	December 2016	December 2016

Table 5.3 Gives the formal time when SIDA intervention began in Eastern and Southern province of Zambia, the time of the intervention signifying the time when districts started receiving the funds and the estimated cut point at which the effect of the intervention initiates the change in skilled deliveries.

Table 5.2 further shows the differences in the estimates of skilled deliveries as a portion of expected deliveries, pre- and post-change point, with the most informative rows of Table 2 corresponding to the two standardised effect sizes: change in level and change in the slope. The level change is negative and statistically non-significant for both Eastern and Southern province, indicating that skilled deliveries as a percentage of expected deliveries drop at the change point (Figure 5.1 below) and that the drop does not statistically differ from zero. The estimated trend changes are also negative for both provinces, although statistically significant (at $\alpha = 0.01$) for Southern province.

The slope decreases after the estimated change point for Southern province and increases for Eastern province, implying a more flattened out post-intervention point for southern province. Therefore, for every one month increase in time, there is a smaller estimated increase in the

percentage of skilled deliveries following the intervention in Southern province in comparison to the pre-intervention phase. On the other hand, there appears to be a relatively more considerable estimated increase in the proportion of skilled births in Eastern province in contrast with the pre-intervention stage. However, both are not statistically significant from zero at all three (3) levels of significance.

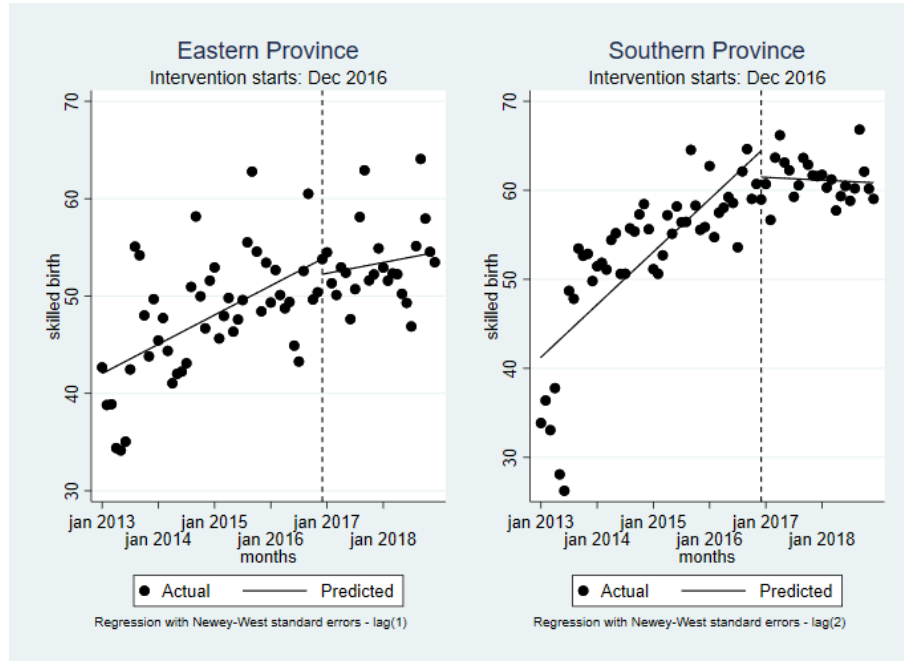


Figure 5.1: Visual Display of Aggregate Results for Eastern and Southern Provinces.

5.3.2 Aggregate Results for Districts with Significant Post-Trend Change

As a follow up to subsection 5.3.1, this subsection used aggregate data for districts with significant changes in the post-trend to observe overall changes in the percentage of skilled deliveries. Hence, the study noted the following results.

Table 5.4: Single Group ITS Analysis for Eastern and Southern Provinces

Parameters	Southern Province	Eastern Province
Pre- Trend (β_1)	0.467***(0.089)	0.284***(0.098)
Post- Level Change (β_2)	- 2.045(2.234)	- 3.712(2.883)
Post- Trend Change(β_3)	- 0.645***(0.138)	- 0.007(0.174)
Post- Trend ($\beta_1 + \beta_3$)	- 0.178*(0.105)	0.2767*(0.1449)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 5.4 indicates that the pre-intervention trend is positive for both Eastern and Southern provinces. Implying that skilled deliveries as a percentage of expected deliveries increased

significantly in both provinces monthly before the intervention. However, the level change for both provinces is negative and statistically non-significant. Implying that skilled deliveries as a percentage of expected deliveries drop at the change point for both provinces and the drop in skilled births in both provinces does not differ significantly from zero. The estimated trend change is negative for both provinces, although statistically significant for Southern province and non-significant for Eastern province.

Additionally, through visual inspection of figure 5.2, the results show that the slope of skilled deliveries decreases after the estimated change point for Southern province and increases for Eastern province, proposed by a downward post-intervention slope for Southern province and an upward post-intervention slope for Eastern province. Therefore, for every one month increase in time, there is an estimated decrease in the percentage of skilled deliveries following the intervention in Southern province in comparison to the pre-intervention phase and an estimated increase in the percentage of skilled births in Eastern province in comparison to the pre-intervention phase. Though this time around, both estimated changes in skilled deliveries as a percentage of expected deliveries are statistically significant from zero at a 10% level of significance only.

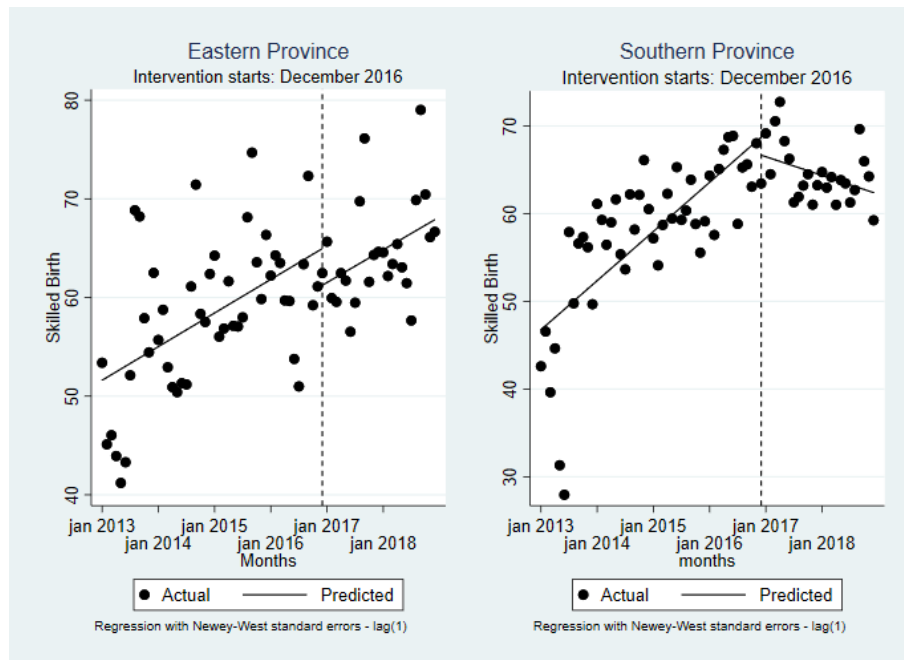


Figure 5.2: Visual Display of Results for Eastern and Southern Provinces.

The results so far indicate statistically significant changes in the post-intervention trend of skilled deliveries as a percentage of expected deliveries in both provinces at a 10% level of significance. We see an overall statistically significant drop in skilled deliveries in Southern province and an increase in Eastern province at the estimated change point, potentially following the implementation of the intervention. Hence the study performed a controlled interrupted time series analysis as a follow up to the findings mentioned above.

Based on the criteria highlighted in Section 5.1, suitable controls were selected. The control and intervention districts were comparable at a 5% level of significance. Therefore, the study limited the analysis to only those districts comparable on both the baseline level and trend of the outcome variable. Thus, table 5.5 below shows the results of a controlled interrupted time series analysis for aggregate data of the districts that showed statistically significant changes in skilled deliveries following the intervention in the two (2) provinces.

Table 5.5: Multiple Group ITS Analysis for Eastern and Southern Provinces

Parameters	Southern Province	Eastern Province
Control Pre-Trend ($\beta_1 T$)	0.251**(0.110)	0.251**(0.110)
Treatment vs Control Pre-Level Difference ($\beta_4 Z$)	3.3925 (4.505)	8.874* (4.505)
Treatment vs Control Pre-Trend Difference ($\beta_5 ZT$)	0.217(0.141)	0.0332(0.147)
Control Post-Trend Change ($\beta_3 XT$)	- 6.426*** (2.285)	- 6.426 *** (2.285)
Treatment vs Control Post-Level Change Difference ($\beta_6 ZX$)	0.101(0.168)	0.101(0.168)
Treatment vs Control Change in level Difference Pre- to Post ($\beta_7 ZXT$)	4.381(3.197)	2.714 (3.678)
Treatment vs Control Change in Slope Difference Pre- to Post ($\beta_7 ZXT$)	- 0.746*** (0.217)	- 0.108(0.242)
Difference of intervention vs control in post-trend change	- 0.53*** (0.165)	- 0.0748(0.192)

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Both table 5.5 and figure 5.3 shows an increase in the pre-intervention trend of skilled births in all the control districts. The increase is statistically significant, indicating that the percentage of skilled deliveries increased significantly per month before the implementation of the intervention in the controls in both provinces. The treatment over control pre-intervention level and the

pre-intervention trend differences between the treated and control groups are all statistically non-significant at 1% and 5% levels of significance, confirming that, the controls are sufficiently comparable.

The results further indicate that; during the intervention period, there was an overall statistically significant decrease in the slope of skilled deliveries as a percentage of expected deliveries of about 0.746 ($p < 0.01$) in Southern province and a non-significant slope reduction in the percentage of skilled births of 0.108 in Eastern province monthly. These effects were preceded by a statistically non-significant immediate increase in the percentage of skilled deliveries following the intervention of about 4.381 for Southern province and 2.714 for Eastern province.

Overall, the statistically significant differences between the treated and control units indicate a decrease in skilled deliveries as a percentage of expected deliveries of about 0.53 ($p < 0.01$) in Southern province and a non-significant reduction in the percentage of skilled births of about 0.075 in Eastern province following the intervention. These effects imply that, overall, skilled deliveries as a percentage of expected deliveries decreased overtime in the two (2) provinces. However, the decrease was only statistically significant for Southern province. Figure 5.3 below provides a visual display of the results.

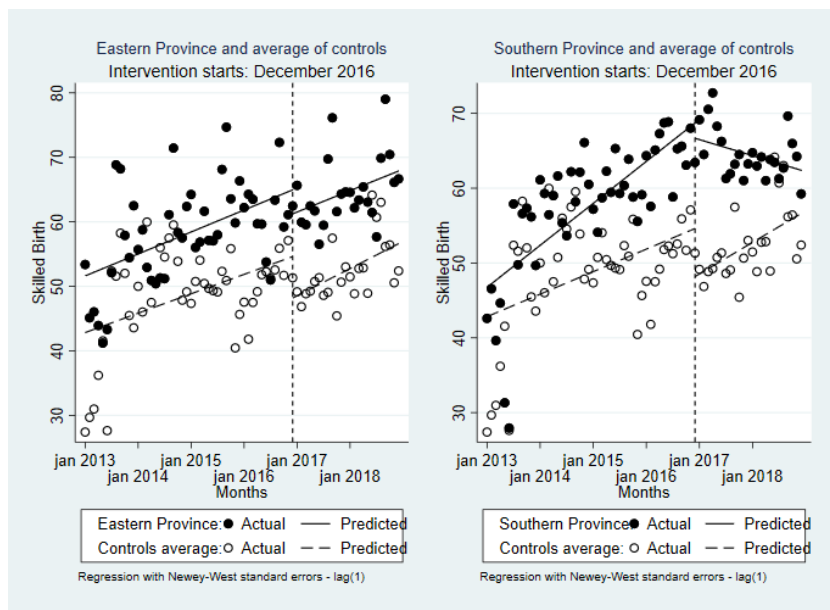


Figure 5.3: Visual Display of Controlled Results for Eastern and Southern provinces.

The findings presented above may appear to be as reflected primarily because, the study used aggregate data for all the nine (9) districts in Eastern province, and the thirteen (13) districts in Southern province. Due to that, two (2) issues may arise. Firstly, aggregated data does not show sub-level differences. Secondly, even though all districts in both provinces received the first funding by October 2016, they did not start implementing SIDA programs at the same time. As a result, the variances, as mentioned earlier in the two provinces may have occurred.

5.4 Sub-Level (District Data) Analysis

5.4.1 Sub-Level (District Data) Analysis for Eastern Province

This subsection uses districts as units of measurement and hence, district-level data to analyse the changes in skilled deliveries as a percentage of expected births in Eastern and Southern provinces of Zambia. Table 5.6 below shows results from the single group interrupted time series model and gives estimates of the parameters of concern to this study for all the districts in Eastern province with a significant shift in the post-intervention trend of skilled deliveries. The parameter estimates of the two (2) districts, Chipata and Peatuke, with non-significant changes in the post-intervention trend of skilled deliveries, are given in table 6.1 of appendix (A). The two districts will be discussed at a later stage in the qualitative analysis to understand further the phenomenon under investigation.

Table 5.6: Single Group ITS Estimates for Eastern Provinces

Parameters	Chadiza	Katete	Lundazi	Mambwe	Nyimba	Sinda	Vubwi
Pre- Trend (β_1)	0.17(0.12)	-0.23(0.14)	0.06(0.06)	0.21***(0.08)	0.54***(0.17)	0.27*(0.15)	0.98***(0.14)
Post- Level Change (β_2)	-14.45***(4.20)	-0.11(4.66)	-0.49(1.37)	-4.28**(1.62)	-4.87(4.00)	-10.78**(4.98)	8.38(5.27)
Post- Trend Change(β_3)	1.42***(0.28)	0.89***(0.23)	0.29***(0.06)	0.66***(0.11)	-0.12(0.24)	0.45*(0.27)	-3.74***(0.37)
Post- Trend ($\beta_1 + \beta_3$)	1.42***(0.29)	0.89***(0.23)	0.29***(0.08)	0.66***(0.11)	-0.12(0.24)	0.45*(0.27)	-3.74***(0.37)

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5.6: Provides estimates of the parameters for skilled deliveries as a percentage of expected deliveries for Southern and Eastern provinces in Zambia using individual districts as units of analysis.

Table 5.7: SIDA Intervention Timeline for Eastern Province

	Chadiza	Katete	Lundazi	Mambwe	Nyimba	Sinda	Vubwi
Inception of Program	Dec 2015	Dec 2015	Dec 2015	Dec 2015	Dec 2015	Dec 2015	Dec 2015
Time of Intervention	Oct 2016	Oct 2016	Oct 2016	Oct 2016	Oct 2016	Oct 2016	Oct 2016
Estimated cut point	Nov 2016	Dec 2016	Dec 2016	Dec 2016	Dec 2016	Dec 2016	Dec 2016

Table 5.7 above gives the formal time of intervention and implementation at which the effect of the intervention initiates the change in skilled deliveries in the respective districts in Eastern province.

Table 5.6 shows that the level change is negative and statistically non-significant for Katete, Lundazi, and Nyimba. Indicating that skilled deliveries as a percentage of expected deliveries drop at the change point (see figure 5.4 below) and that the drop does not statistically differ from zero. The level change for Vubwi district is positive but also non-significant, indicating an increase in the percentage of skilled deliveries following the implementation of the intervention and that the rise does not statistically differ from zero. On the other hand, the level change in the percentage of skilled deliveries for Chadiza($p < 0.01$), Mambwe($p < 0.05$), and Sinda($p < 0.05$) were negative and statistically significant. Implying that the percentage of skilled deliveries dropped following the start of the intervention implementation.

The estimated trend change is positive for Chadiza ($p < 0.01$), Katete ($p < 0.01$), Lundazi ($p < 0.05$), Mambwe ($p < 0.05$) and Nyimba ($p < 0.1$), and statistically significant. The estimated trend change for Vubwi was negative and statistically significant ($p < 0.01$), and that of Nyimba was negative and statistically non-significant. The slope increases after the estimated change point for Chadiza ($p < 0.01$), Katete ($p < 0.01$), Lundazi ($p < 0.01$), Mambwe ($p < 0.01$), Nyimba ($p < 0.05$) and Sinda ($p < 0.01$); and that of Vubwi ($p < 0.01$) decreases, implying a downward flattened post-intervention trend in comparison to the other districts.

Thus, for every one month increase in time, there is a statistically significant estimated drop in the percentage of skilled deliveries following the intervention in Vubwi district in comparison to the pre-intervention phase. On the other hand, there appears to be an estimated increase in the percentage of skilled births in Chadiza, Katete, Lundazi, Mambwe, and Sinda districts of

Eastern province in comparison to the pre-intervention phase. Figure 5.4 below provides a visual display of the results discussed above.

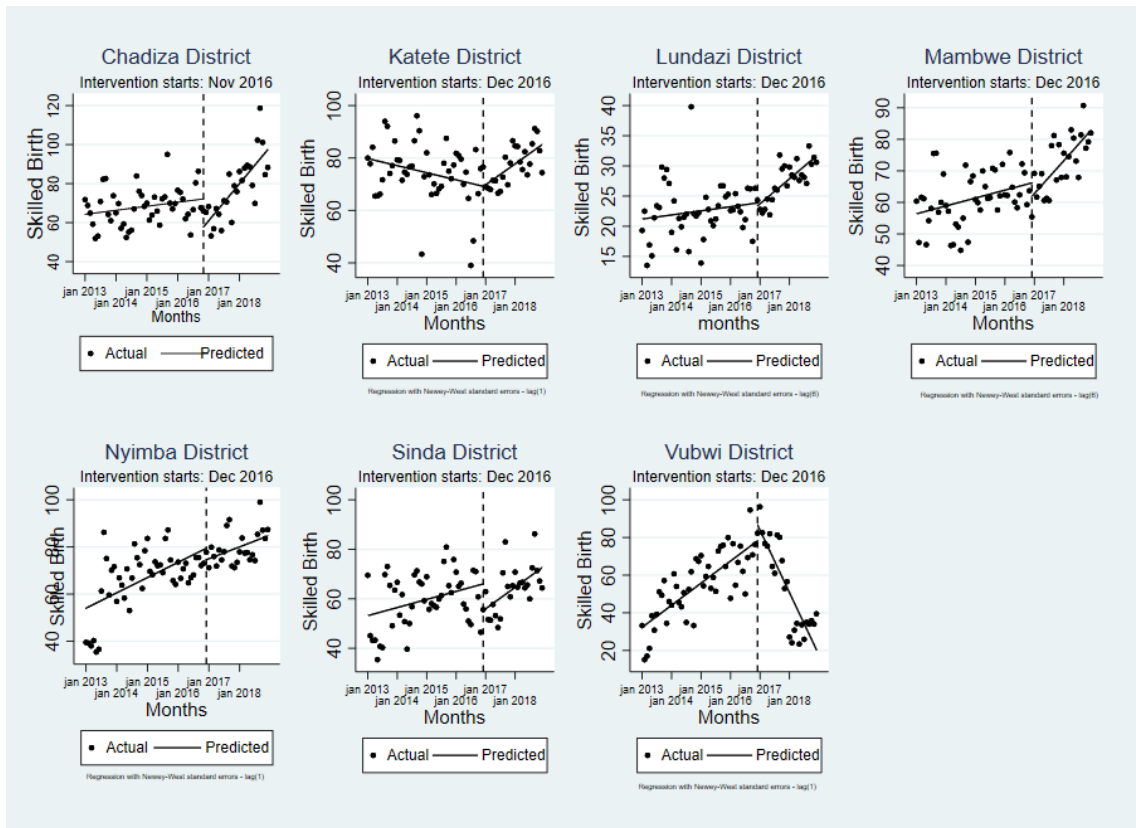


Figure 5.4: visual Display of Single Group ITS Analysis for Districts in Eastern Province.

The results above indicate statistically significant changes in the post-intervention trend of skilled deliveries following the intervention in seven (07) out of the nine (09) districts in Eastern province. The seven (07) districts are further subjected to controlled interrupted time series analysis to control for the effect of confounding variables. Thus, following the same procedure of selecting controls outlined in section 5.2, this study limited the following analysis under this section to only those districts comparable on both the baseline level and trend of the outcome variable.

The study performed a one to one matching criterion and found matched control districts for Chadiza, Mambwe, Nyimba, Sinda, and Vubwi districts at the level of significance ($p < 2.0$). However, the study did not find control matches for Lundazi and Katete districts. Hence, we dropped the two (2) districts from the controlled interrupted time series analysis in this section. Table 5.8 below shows the results of the controlled interrupted time series analysis for the five (5) districts.

Table 5.8: Multiple Group ITS Estimates for Eastern Province

Parameters	Chadiza	Mambwe	Nyimba	Sinda	Vubwi
Control Pre-Trend ($\beta_1 T$)	0.16(0.16)	0.25(0.23)	0.31*** (0.12)	0.29*** (0.10)	0.65*** (0.15)
Treatment vs Control Pre-Level Difference ($\beta_4 Z$)	2.52(5.80)	1.79(7.80)	0.87(6.38)	0.08(5.22)	-10.49*(6.17)
Treatment vs Control Pre-Trend Difference ($\beta_5 ZT$)	0.01(0.20)	-0.05(0.24)	0.23(0.21)	-0.01(0.18)	0.33(0.21)
Control Post-Level Change ($\beta_2 X$)	-4.81(4.40)	-5.60(8.18)	-4.65(4.30)	-8.71** (3.67)	-2.30(5.26)
Control Post-Trend Change ($\beta_3 XT$)	-0.10(0.23)	-0.18(0.45)	-0.33(0.27)	0.19(0.28)	-0.71*** (0.26)
Treatment vs Control Post-Level Change Difference ($\beta_6 ZX$)	-9.64(6.06)	1.31(8.34)	-0.22(5.84)	-2.06(6.13)	11.37(7.45)
Treatment vs Control Change in Slope Difference Pre- to Post ($\beta_7 ZXT$)	1.51*** (0.36)	0.84*(0.46)	0.21(0.36)	0.26(0.38)	-3.03*** (0.45)
Difference of intervention vs control in post-trend change	1.52*** (0.30)	0.80** (0.40)	0.43(0.29)	0.24(0.34)	-2.70*** (0.40)

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5.8 above provides controlled ITS estimates of the parameters for skilled deliveries as a percentage of expected deliveries for the five (5) districts in Eastern provinces with matched controls.

As shown in both the regression table 5.8 and as can be verified upon visual inspection of Figure 5.5, the results show an increase in the pre-intervention trend of skilled births in all the control districts. However, the rise is statistically non-significant in the controls for Chadiza and Mambwe and statistically significant ($p < 0.01$) in the controls for Nyimba, Sinda, and Vubwi. Hence, the results indicate that skilled deliveries as a percentage of expected deliveries increased significantly per month in the controls for Nyimba, Sinda, and Vubwi districts during the pre-intervention phase.

The treatment over control pre-intervention level differences for Chadiza, Mambwe, Nyimba, and Sinda, are all non-significant at all three (3) levels of significance, and that of Vubwi is significant at $\alpha = 10\%$ level. The pre-intervention trend differences between the treated and control groups are all statistically non-significant at all levels of significance. This implies that the control districts are sufficiently comparable with the intervention districts on both the baseline and trend levels at all levels of significance. However, the controls are only sufficiently comparable to Vubwi district at ($p < 0.01$) and ($p < 0.05$) levels.

The results further indicate a statistically significant slope increase in the percentage of skilled births of about 1.509 ($p < 0.01$) in Chadiza, and 0.841 ($p < 0.1$) in Mambwe districts per month.

Vubwi district had a statistically significant slope reduction in the percentage of skilled deliveries of 3.029 ($p < 0.01$) per month. Nyimba and Sinda districts had a statistically non-significant increase in the slope of skilled births as a percentage of expected births per month. Chadiza, Nyimba, and Sinda districts appeared to have an immediate reduction in the percentage of skilled births that can be attributed to the intervention of about 9.6, 0.22, and 2.1, respectively. Mambwe and Vubwi districts had an immediate increase in skilled deliveries as a percentage of expected deliveries attributable to the intervention of about 1.3 and 11.4, respectively. These treatment effects, however, are not statistically significant.

Therefore, the statistically significant differences between the treated and control districts indicate an increase in skilled deliveries as a percentage of expected deliveries of about 1.52 ($p < 0.01$) in Chadiza, 0.8 ($p < 0.05$) in Mambwe and a reduction in the percentage of skilled births of about 2.7 ($p < 0.01$) in Vubwi district following the intervention in Eastern province. However, Nyimba and Sinda districts had non-significant post-intervention trend differences in skilled deliveries as a percentage of expected deliveries with the controls. Figure 5.5 below shows the Visual display of the results mentioned above.

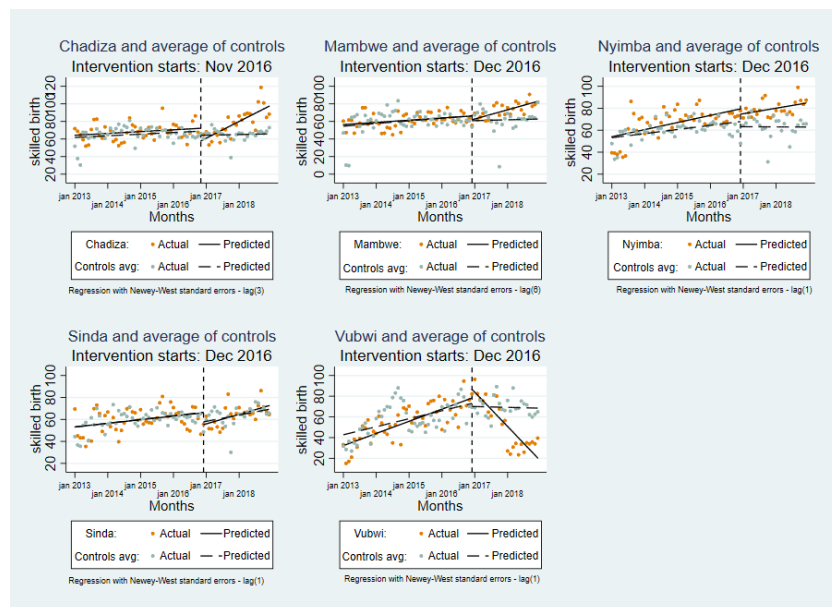


Figure 5.5: Visual display of Controlled ITS Results for Districts in Eastern Province.

5.4.2 Sub-Level (District Data) Analysis for Southern Province

Southern province, on the other hand, had twelve (12) SIDA funding recipient districts; out of those twelve (12) districts, there was a statistically significant shift in the post-intervention level trend in seven (07) districts. Five (05) out of the thirteen (13) districts showed a statistically non-significant change in the post-intervention level trend of skilled deliveries. Hence, this part as well focuses on the seven (07) districts, i.e. Chikankata, Choma, Gwembe, Livingstone, Mazabuka, Monze, and Siavonga, with a significant shift in the trend of skilled deliveries following the intervention. Nonetheless, the other districts (Pemba, Sinazongwe, Kalomo, Kazungula, Namwala, and Zimba) with a non-significant shift in the trend of skilled deliveries following the intervention are shown in table 6.2 of appendix (B). These results will be discussed in the qualitative analysis to investigate further the phenomenon. Therefore, table 5.9 below shows the results of single-group interrupted time series estimates for the seven (7) districts discussed above with their probability values and standard errors.

Table 5.9: Single Group ITS Estimates for Southern Provinces

Parameters	Chikankata	Choma	Gwembe	Livingstone	Mazabuka	Monze	Siavonga
Pre- Trend (β_1)	0.80***(0.24)	0.80***(0.14)	0.26(0.24)	0.12(0.80)	0.55***(0.18)	0.55***(0.20)	0.22(0.14)
Post-Level Change (β_2)	24.27**(11.81)	-12.7*** (4.1)	-10.79**(5.20)	-0.43(2.72)	-5.24(4.15)	-6.06(3.91)	- 3.10(3.16)
Post- Trend Change(β_3)	- 2.79*** (0.82)	-0.44** (0.21)	0.13(0.26)	-0.45** (0.19)	-1.01*** (0.22)	-0.25(0.22)	0.24(0.19)
Post- Trend ($\beta_1 + \beta_3$)	- 1.10*** (0.73)	0.35** (0.15)	70.39*** (0.10)	-0.33** (0.160)	0.30*** (0.11)	0.30*** (0.11)	0.46*** (0.12)

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 5.9: Provides estimates of the parameters for skilled deliveries as a percentage of expected deliveries for Southern province in Zambia using individual districts as units of analysis.

Table 5.10: Time of SIDA Intervention and Implementation

	Chikankata	Choma	Gwembe	Livingstone	Mazabuka	Monze	Siavonga
Inception of Program	Dec 2015	Dec 2015	Dec 2015	Dec 2015	Dec 2015	Dec 2015	Dec 2015
Time of Intervention	Oct 2016	Oct 2016	Oct 2016	Oct 2016	Oct 2016	Oct 2016	Oct 2016
Estimated cut point	Dec 2016	Dec 2016	Nov 2016	Dec 2016	Dec 2016	Dec 2016	Dec 2016

Table 5.10: Gives the formal time of intervention and implementation at which the effect of the intervention initiates the change in skilled deliveries.

Table 5.9 shows that the slope of skilled deliveries as a percentage of expected deliveries was increasing in all the seven (7) districts under observation during the pre-intervention period in Southern province. However, the increase in the slope was only statistically significant for Chikankata, Choma, Mazabuka, and Monze districts. The level change is negative and statistically non-significant for Livingstone, Mazabuka, Monze, and Siavonga districts, indicating that skilled deliveries as a percentage of expected deliveries drop at the change point (see figure 5.6 below) and that the drop does not statistically differ from zero.

The level change for Chikankata district is positive and statistically significant, indicating an increase in the percentage of skilled deliveries following the implementation of the intervention and that the rise statistically differs from zero. The level change for Choma and Gwembe is also negative and statistically significant. The level change for Livingstone, Mazabuka, Monze, and Siavonga is also negative but not statistically different from zero. Thus, the results indicate that skilled deliveries as a percentage of expected deliveries drop at the change point in all the districts except for Chikankata district and that the drop statistically differs from zero for Gwembe and Choma districts only.

The estimated trend change, on the other hand, is negative and statistically significant for Chikankata ($p < 0.01$), Choma ($p < 0.01$), Lundazi ($p < 0.05$), Livingstone ($p < 0.05$) and Mazabuka ($p < 0.01$). The estimated trend changes for Gwembe district is positive but statistically non-significant, and that of Monze and Siavonga districts were negative and statistically non-significant. The slopes increase after the estimated change point for Choma, Gwembe, Mazabuka, Monze, and Siavonga districts. The slopes for Chikankata and Livingstone drop after the estimated change points, implying a downward flattened post-intervention trend in comparison to the other districts (Figure 5.6 below). However, all the post-intervention slopes estimates are statistically significant.

Therefore, Chikankata and Livingstone districts appeared to have a statistically significant drop in the percentage of skilled deliveries following the intervention in comparison with the pre-intervention phase, for every one month increase in time. On the other hand, there is a statistically significant estimated increase in the percentage of skilled deliveries following the intervention in Choma, Gwembe, Mazabuka, Monze, and Siavonga districts as compared to the pre-intervention phase. Figure 5.6 below provides a visual display of the results discussed above.

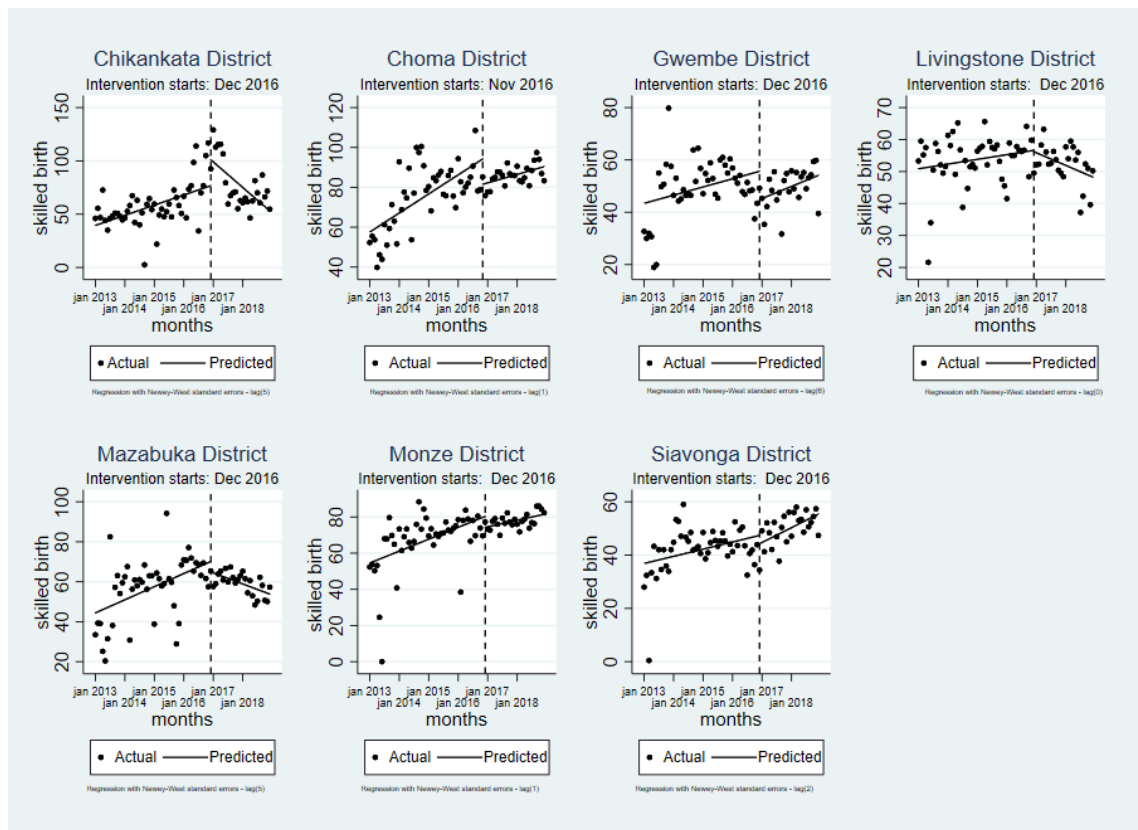


Figure 5.6: Visual display of ITS Results for Districts in Southern Province.

The results above indicate statistically significant changes in the post-intervention trend of skilled deliveries following the intervention in seven (07) out of the thirteen (13) districts in Southern province. The study thus performed a one to one matching criterion and found matched control districts for Gwembe, Chikankata, Livingstone, Mazabuka, Monze, and Siavonga districts at the level of significance ($p < 2.0$). However, no controls matched Choma. Hence Choma district was dropped from the controlled interrupted time series analysis in this section. Table 5.11 below shows the results of a controlled interrupted time series analysis for the six (6) districts with matched controls in Southern province.

Table 5.11: Controlled ITS Estimates for Districts in Southern Province

Parameters	Gwembe	Chikankata	Livingstone	Mazabuka	Monze	Siavonga
Control Pre-Trend ($\beta_1 T$)	0.23*(0.13)	0.65***(0.19)	0.242*(0.13)	0.38***(0.11)	0.37***(0.09)	0.41***(0.11)
Treatment vs Control Pre-Level Difference ($\beta_4 Z$)	-2.08(7.26)	-3.35(8.69)	-2.95(4.98)	-3.90(6.27)	2.79(6.47)	0.15(5.50)
Treatment vs Control Pre-Trend Difference ($\beta_5 ZT$)	0.07(0.27)	0.15(0.31)	-0.12(0.16)	0.17(0.21)	0.18(0.22)	-0.19(0.18)
Control Post-Level Change ($\beta_2 X$)	7.02*(3.94)	-3.0(5.17)	-11.22***(4.11)	-7.09*(3.82)	-3.70(5.50)	-1.52(2.42)
Control Post-Trend Change ($\beta_3 XT$)	-0.27*(0.15)	-0.71**(0.28)	0.527*(0.29)	-0.09(0.26)	-0.47(0.40)	-0.46***(0.15)
Treatment vs Control Post-Level Change Difference ($\beta_6 ZX$)	-19.1***(6.34)	27.26**(12.90)	10.78**(4.91)	1.85(5.58)	-2.36(6.75)	-1.57(3.96)
Treatment vs Control Change in Slope Difference Pre- to Post ($\beta_7 ZXT$)	0.37(0.30)	-2.08**(0.86)	-0.98***(0.35)	-0.92***(0.34)	0.23(0.45)	0.70***(0.24)
Difference of intervention vs control in post-trend change	0.44***(0.14)	-1.93***(0.75)	-1.10***(-1.10)	-0.75***(-0.25)	0.40(0.39)	0.51***(0.16)

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5.11 provides controlled ITS estimates of the parameters for skilled deliveries as a percentage of expected deliveries for Southern province of Zambia using individual districts as units of analysis.

As presented in regression table 5.11 and as can be verified upon visual inspection of figure 5.7, the results show an increase in the pre-intervention trend in all the control districts. The increase is statistically significant; indicating that, skilled deliveries as a percentage of expected deliveries increased significantly per month before the implementation of the intervention in all the control districts for the treated districts in Southern province. The treatment over control pre-intervention level differences is non-significant. The pre-intervention trend differences between the treated and control groups are also statistically non-significant, implying that the control districts are sufficiently comparable with the intervention districts on both the baseline and trend levels.

The results further indicate that; during the intervention period, there was a statistically significant slope decrease in skilled deliveries as a percentage of expected deliveries of about 2.1 ($p < 0.05$) in Chikankata, 0.98 ($p < 0.01$) in Livingstone and 0.75 ($p < 0.01$) in Mazabuka districts per month. Siavonga district had a statistically significant slope increase in the percentage of skilled deliveries of about 0.7 ($p < 0.01$) per month. Gwembe and Monze districts had a statistically non-significant increase in the slope of skilled births as a percentage of expected births per month.

The changes mentioned above followed the immediate improvements in skilled deliveries of about 27.26 ($p < 0.05$) in Chikankata and 10.78 ($p < 0.05$) in Livingstone. Gwembe district had an immediate reduction in skilled deliveries as a percentage of expected deliveries of about 19.17 ($p < 0.01$). Mazabuka, Monze, and Siavonga all had immediate non-significant changes in the percentage of skilled births following the intervention.

Therefore, the statistically significant differences between the treated and control districts indicate an increase in skilled deliveries as a percentage of expected deliveries in Southern province of about 0.44 ($p < 0.01$) in Gwembe, and 0.51 ($p < 0.01$) in Siavonga, and statistically significant reductions in the percentage of skilled deliveries of about 1.9 ($p < 0.05$) in Chikankata, 1.1 ($p < 0.01$) in Livingstone and 0.75 ($p < 0.01$) in Mazabuka following the intervention. However, Monze district had non-significant post-intervention trend differences in skilled deliveries as a percentage of expected deliveries with its controls.

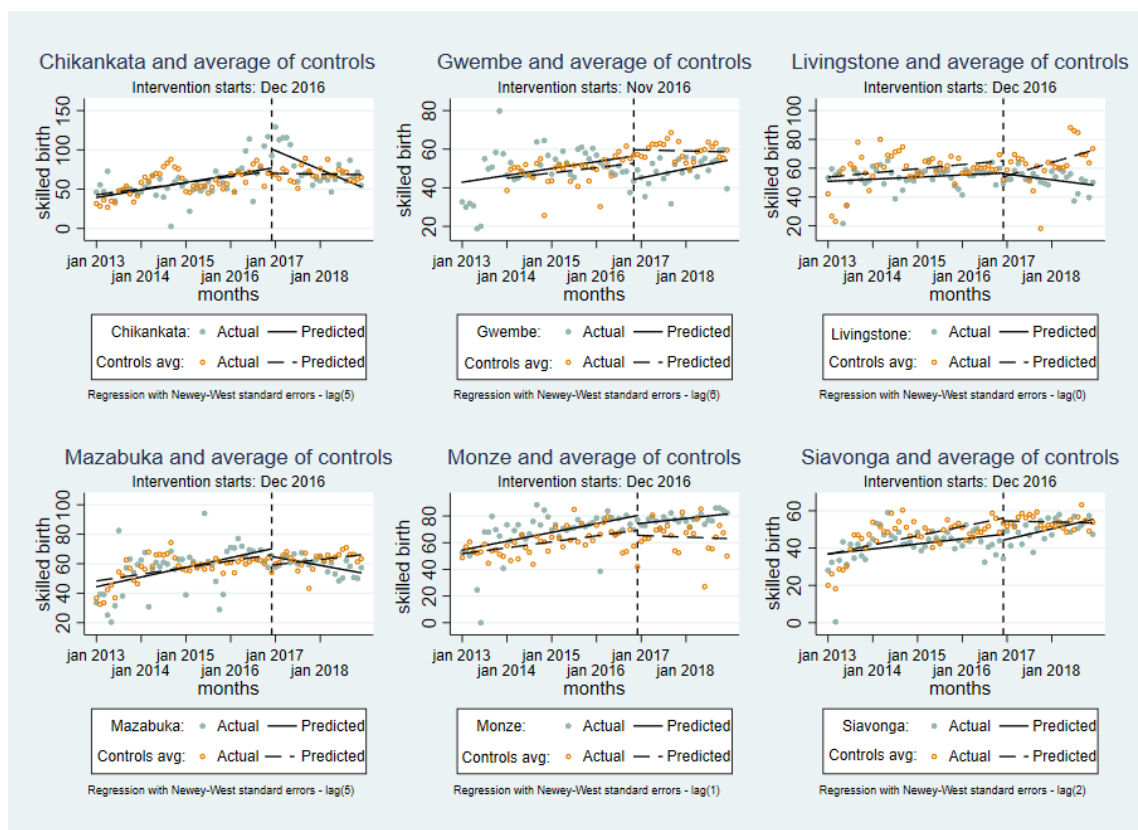


Figure 5.7: Visual Display of Controlled ITS Results for Districts in Southern Province.

5.5 Qualitative Data Findings

So far, the results show changes in skilled deliveries as a proportion of expected births that can be attributed to SIDA's healthcare investments in Eastern and Southern province of Zambia. Section 5.5 presents qualitative data findings as a follow-up in an attempt to explain how the quantitative results might have come about. The common themes arising are given below and can further be grouped into two (2) main thematic areas, i.e., facilitators and inhibitors of skilled deliveries in Southern and Eastern provinces of Zambia.

Recruitments and Training

Human Resource: : Before SIDA intervention, there were only a few trained staff. However, with SIDA support, training and recruitment of qualified staff has been on-going in the recipient districts. For example;

“Petauke district trained 15 midwives in 2017 and ten (10) more in 2018. Katete district trained seven (7) skilled health personnel (2 Midwives and 5 General Nurses) and put them under SIDA payroll. Choma district recruited five (5) midwives through SIDA funding” key informants.

Therefore, nearly all facilities in the districts sampled appeared to have at least a skilled health personnel for each health facility to conduct deliveries. Training such as essential and newborn care, emergency and obstetric care (EmOC), neighborhood health committees (NHCs), and safe motherhood action groups (SMAGs) were also vital to ensuring enhanced skills in facilities.

According to some key respondents, “Petauke districts trained more than 800 SMAG members while Gwembe district trained five (5) people in EmOC and 11 Staff in essential newborn care. They also trained 30 staff to help newborn babies to breathe and 100 SMAGS in five (5) facilities. Katete district trained eight (8) groups of SMAGS”.

These trainings are vital in improving skilled deliveries in the provinces. EmOC and essential newborn care training improved staff capabilities in identifying and referral of emergency cases as well as other challenges encountered when conducting deliveries. SMAGs and NHCs are a link between the communities and facilities. They sensitise communities on good practices such as early ANC bookings, institutional deliveries as well as tracking of expecting women right from pregnancy up to childbirth. EmOC training is essential for correct identification and proper referral of emergency cases as well as other challenges encountered when conducting deliveries.

However, such training as EmOC is costly. Thus, districts only trained inadequate personnel for such cardinal health services.

Infrastructure Development

Delivery should be private. However, inadequate deliver space or proper infrastructure for delivery compromise privacy. Thus, through SIDA support Eastern and Southern provinces have both benefited from the construction of maternity annexes and mothers waiting shelters (mothers' shelters). Mothers shelters are cardinal in improving skilled deliveries because of the distances that have to be covered to reach the delivery facility, especially in rural areas. With mothers' shelters, expecting mothers from distant places are enabled to have access to institutional delivery services. The picture below shows expecting mothers accommodated at a mother's shelter in Petauke district. However, the mother's shelter is inadequate to cater for all women including those coming from surrounding areas. Hence, it's overcrowded. This stresses the need to construct more mothers waiting homes.



Figure 5.8: One of the Mothers' Waiting Shelters in Petauke.

According to one key respondent, *“Construction of mothers shelters, labour rooms and maternity annexes as well as renovating of old maternity annexes and mothers waiting shelters has been one of the priority areas for SIDA healthcare investments.”*

In this respect, another key respondent noted that *“Katete district constructed three (3) maternity annexes with support from SIDA”*.

Another respondent added that *“Petauke district has built, maternity annexes at Kalindawalo, Mumbwe, Mwanajabantu, Mankungwe, and manyane. In addition to that, they have renovated staff houses, as well as installation of solar systems for lighting in facilities without electricity. This was achieved with support from SIDA”*.

These efforts are vital in ensuring that women, especially in rural areas, access skilled delivery service during and after child birth. Long-distances to health facilities hinders access to skilled birth attendants in rural areas. As such, construction of mother’s shelters at facilities can increase accessibility to specialised delivery services.

Transport Systems Improvements

Another factor that might explain the positive changes in skilled deliveries in Eastern and Southern provinces of Zambia is the improvement in the healthcare transport systems.

“Through SIDA investments, Choma district has acquired an ambulance and two (2) utility vehicles. The vehicles are used to help out in areas which are at least 12km and more from the facilities. Gwembe district also procured motorbikes for outreaches and an ambulance as well as a utility vehicle. A utility vehicle is used to reach areas that are at least 100km and more from the facilities. Whereas, Katete district purchased 17 motorbikes for outreaches, an ambulance as well as two (2) utility vehicles used in areas which are at least 100km and more from the facilities”, key respondents.

Due to an inadequate number of needed ambulances coupled with the distances of facilities from hospitals. i.e., UKwimi in Petauke, which is about 84Km from the first level hospital. Implying that, if a woman is bleeding in Ukwimi, it will take not less than 1 hr 30 min to reach the first level hospital. Therefore, ambulatory services through SIDA support have played an essential role in scaling up efforts to improve healthcare indicators such as skilled deliveries.

Integrated Outreach Services (at both facility and district level)

These services include sensitisations and involvement of traditional leaders in improving skilled deliveries as well as facility deliveries by encouraging the communities and villages to deliver in facilities. Traditional leaders such as chiefs, headmen are sensitised on the importance of skilled births and the dangers of home deliveries. Therefore, communities begin to see and identify the risks of home deliveries. They come up with by-laws in their areas to discourage home deliveries.

Hence, at the community level, they begin to identify problems amongst them and plan on how to handle those problems. For example, training of traditional leaders as change champions. The traditional leaders who are trained as safe motherhood champions are engaged through community programs such as men take action programme (MTAP). through the formation of such groups, men are brought on board to help and encourage women in antenatal care, family planning, and facility delivery. SIDA fully funds all these integrated healthcare programmes on the ground in the two (2) SIDA investments recipient provinces. A key respondent noted that;

“With GRZ funding, there was no deliberate planning to coordinate activities on the ground, but this is one of the many priority areas under SIDA healthcare intervention.”

Input Procurements

One respondent observed that, *“when expecting mothers are coming to the facility for delivery, they need to know that everything is there and they will not be asked to purchase anything. That gives them a lot of confidence to deliver from a health institution.”*

Therefore, the procurement of medical equipment and other types of linen by the SIDA recipient districts could have been vital for the best-improving district on the indicator in question. Equipment such as delivery beds, delivery sets, penguin suckers, still beds, delivery packs, resisters, heamacues, ambubags, thermometers, urinalysis and blood pressure (BP) machines are very cardinal, and SIDA support enhanced the procurement of such in the recipient districts.

Another respondent observed that, *“other inputs are also made readily available as a result of SIDA healthcare support. Every month, for example, there are allocations to support outreach activities. Fuel is procured every month for obstetric emergence. Many women die due to loss of blood. However, through SIDA support, many districts have been able to support the blood bank, which is not funded by the government”.*

Thus, these inputs are critical in improving skilled deliveries, reducing maternal mortality and neonatal deaths, and can be the difference between the best and least improving districts on the indicator under investigation.

Incentives

Community volunteers such as NHCs, Traditional leaders are a link between the facilities and the various communities. However, they do not get any pay for the work they perform in and for the districts. Thus, it is cardinal to provide them with incentives to keep them active in their localities to improve maternal healthcare service delivery. According to a key respondent,

“Through SIDA funding, procurement of incentives such as bicycles, chitenges, gumboots, etc is done by the districts for community volunteers”.

This support for community volunteers who are on the ground is key to improving skilled deliveries in the districts. On the other hand, home deliveries increase the risk of maternal and child mortality. Thus, increasing institutional deliveries is the focus in the districts. When institutional deliveries are increasing, all things being equal, skilled births will also improve. Hence, incentives designed for women can be an important to influence many women’s choices to deliver from a facility or not. A key respondent noted that,

“Incentivising women to deliver in health facilities through MAMA packs is crucial. Providing mothers with t-shirts and caps or baby packs for traveling from their various communities to deliver in a facility can improve institutional deliveries as well as skilled deliveries.”

Furthermore, during the qualitative process of probing the phenomenon under discussion, other factors emerged and are classified as inhibitors of skilled deliveries in the SIDA healthcare investment recipient districts in Eastern and Southern province of Zambia. The common themes included the following:

Delayed Disbursement of Funds

Timely disbursement of funding is essential to improving health outcomes such as skilled birth. Funds are input in operations to enhance skilled deliveries. However, in the case of SIDA funding, the transfers were characterized by delays. As a result,

“It was challenging to prioritise specific programs because of the process of seeking authority to do certain activities which is time-consuming. Hence, programs planned for a particular time were affected. Additionally, many of the items budgeted for did not come on time; budgeting took place in 2016; however, many of the items planned for did not come on time. Instead, they came

in 2018. This lapse crippled a lot of activities and making it difficult to measure progress/achievements on certain activities” key respondent.

Another key informant argued that,

“As a result of delayed funding disbursement, programmes that planned for specific periods were postponed, leading to a lot of authority seeking to accomplish them and ultimately resulting in program implementation delays.”

Inadequate Staffing Levels

Even though staffing levels have risen in the districts in Southern and Eastern provinces of Zambia overtime, the levels are still below the expected numbers. Key respondents noted that inadequate staffing levels are still a problem and thus an inhibitor of improvements in skilled deliveries. For example;

“In Gwembe, out of 18 facilities, only five (5) have got SMAGs. Gwembe district only trained five (5) staff in basic obstetric emergencies. Katete has only about ten (10) midwives, and these are concentrated only in highly populated areas or large facilities. Thus, some facilities do not still have trained staff” key respondents.

Inadequate Infrastructure

Despite the achievements made in the construction and rehabilitation of maternity annexes and delivery rooms across districts in Eastern and Southern provinces of Zambia through SIDA support, the physical structures are still inadequate. This limits improvements in skilled deliveries and further suggests that, facility delivery still remains unattractive to some women. A key respondent also noted that,

“Due to inadequate maternity annexes as well as delivery rooms, the privacy of expecting mothers is compromised. Thus, many women would not want to go to health facilities for delivery.”

In addition to that, another key respondent stated that,

“There is inadequate infrastructure where activities such as early antenatal booking, family planning, etc., can be done, especially in rural areas. Thus, health personnel resort to using churches or just sit under a tree in worse circumstances”.

These factors make it unattractive for women to go for early antenatal booking or access maternal health services, and thus impedes efforts to improve maternal and child health services in the districts.

Bad Road Network

Bad road networks, coupled with inadequate transport, is another challenge that impedes accelerated efforts to improve skilled deliveries. For example,

“Gwembe district one of the least improving districts on the indicator under investigation. The district is a valley, and that makes movements difficult. Further, the district has only one (1) ambulance and one (1) utility vehicle to cater for 18 facilities.” key informant.

Network Connectivity

Cellular network connectivity is another factor that might have harmed skilled deliveries in Eastern and Southern provinces. As the case for Gwembe district;

“Most of the facilities do not have a cellular network, especially rural and remote facilities. Thus, one has to move about twenty (20) KM to find a good network and be able to call for an ambulance,” narrated a respondent.

CHAPTER 6

DISCUSSIONS AND RECOMMENDATIONS

6.1 Discussion

SIDA healthcare intervention in Eastern and Southern province of Zambia covered all the districts in the mentioned provinces. The investments were entirely managed through the Zambian public health system through the Government - to - Government (G2G) financing mechanism. The choice of this funding mechanism and design may have influenced the need to give the SIDA support recipient districts autonomy to innovate, plan, and implement programs. The perception is that, through this funding mechanism, the districts would influence skilled deliveries using the existing structures as well as creating new ones.

The study employed a sequential explanatory design to investigate the changes in skilled deliveries following SIDA health care investments in Eastern and Southern provinces of Zambia. In the first phase of the design, the study used interrupted time series analysis and qualitative analysis in the second stage. Interrupted time series analysis also had two steps. The first step demonstrated the use of single-group interrupted time series analysis without controlling for confounding effects. Whereas, the second step showed the use of multiple group interrupted time series analysis accounting for the effects of confounders. The study performed single and multiple interrupted time series analysis for both aggregate data for the two (2) provinces and sub-level data (district-level data).

Single group ITS results showed a declining slope of skilled deliveries after the estimated change point for Southern province and appeared to increase after the estimated change point in Eastern province. However, both changes were not statistically different from zero. This could be because aggregate data used district averages. Hence may not account for the individual differences of districts in skilled deliveries. Therefore, to account for district variances in skilled birth in both provinces, the study used aggregated data for districts with statistically significant shifts in the post-intervention trend of skilled deliveries.

The results showed that, overall, the slope of skilled deliveries dropped after the estimated change point (December 2016) in both provinces. However, the drop was only statistically significant in Southern province. Implying that, for every one month increase in time, there appeared to be a decrease in the percentage of skilled deliveries following the intervention in the two (2) provinces compared to the pre-intervention phase. These predicted changes in skilled deliveries as a percentage of expected deliveries were only statistically significant from zero at 10% level of significance.

Furthermore, the results of controlled (multiple group) interrupted time series analysis showed that, overall, there appeared to be statistically significant differences between the treated and control units for Southern province only. The results indicated a significant decrease in skilled deliveries as a percentage of expected births of about a 0.53 ($p < 0.01$) in Southern province and a non-significant reduction in the percentage of skilled births of 0.075 in Eastern province. In simple terms, this implied that, following the intervention, skilled deliveries as a percentage of expected deliveries decreased in Southern province over time.

Up to this point, the study used aggregated data to try and show the overall changes in skilled deliveries in Eastern and Southern province of Zambia. However, aggregate data does not indicate the sub-level differences in skilled deliveries in individual districts. Secondly, individual districts initiated the interventions in different months, and this could have contributed to the differences in skilled delivery improvements in the respective districts. Therefore, in an attempt to observe the changes in skilled deliveries as per individual districts, the study used sub-level data (district data). To that effect, single-group interrupted time series analysis preceded multiple-group interrupted time series analysis.

The single group interrupted time series results indicated significant changes in skilled births in fourteen (14) out of the twenty-two (22) SIDA recipient districts. Out of the fourteen, three (3) districts (Choma, Lundazi and Katete) were not comparable with the controls on both the baseline and level trend of the outcome variable, hence the districts were dropped from multiple group ITS analysis. Nonetheless, multiple-group interrupted time series analysis showed a significant increase in skilled deliveries of about 1.52($p<0.01$) in Chadiza, 0.8($p<0.05$) in Mambwe, 0.44($p<0.01$) in Gwembe, and 0.51($p<0.01$) in Siavonga districts. There appeared to be reductions in the percentage of skilled deliveries of about 1.9 ($p<0.05$) in Chikankata, 1.1 ($p<0.01$) in Livingstone, 0.75($p<0.01$) in Mazabuka and 2.7 ($p<0.01$) in Vubwi district. However, Nyimba, Sinda and Monze districts had non-significant post-intervention trend differences in skilled deliveries as a percentage of expected deliveries with its controls. These results appear to indicate two (2) statistically significant effects following the intervention in the two provinces, namely, the immediate changes and the changes happening over time.

The Immediate and Over Time Effects of the intervention

Some districts indicated an immediate drop in skilled deliveries following the intervention. Mambwe, Chadiza, Nyimba, Sinda, Gwembe, and Siavonga are some of the districts which experienced an immediate reduction in skilled births following the intervention. However, for the mentioned districts, the trend of skilled deliveries begun to improve for every one-month passage in time following the intervention. This immediate drop in skilled deliveries could be attributed to the various factors such as late disbursement of funds/inputs from the Ministry of Health (MOH) to the districts. There were delays in the payment of funds from MOH to the districts (Bergman, 2017). She further stated that adding to delays in the transfer of funds from SIDA to MOH; there were delays in the transfer of funds from MOH to Southern and Eastern PHOs, and hence to the districts.

In this view, late disbursement of funding may suggest the loss of some programme gains to districts. The loss of benefits is due to the delay in financing meant to support a significant expansion of essential health programs such as maternal and child health programs for a while (Erwin, Mays, & Riley, 2012). As a result, the delays may have negatively affected health service delivery and community health. The delays could be a contributing factor to a noticeable immediate drop in skilled deliveries in some districts following the intervention. Mainly because local public health expenditures (funding) are inputs transformed into public health programs to produce outputs, leading to improved health outcomes (ibid).

Many factors influence the care that skilled birth attendants provide towards expecting mothers during childbirth. These include access to staff numbers and workloads, adequate infrastructures such as well-organised healthcare facilities with water, electricity, transport, road network, and network connectivity. Lack of these factors cripples a lot of activities and makes it difficult to measure progress/achievements on specific events. As such, they impede accelerated efforts to improve skilled deliveries in the districts.

The lack of access to proper roads makes movements so tricky and negates the efforts through interventions, thereby enhancing the health system to produce unintended outcomes. The lack of equipment, drugs, supplies, and the infrastructure to manage healthcare, electricity and water supplies, and adequate space and amenities on maternity wards limits skilled birth attendants' ability to provide quality care (Munabi-Babigumira S, Glenton C, Lewin S, & Fretheim A, 2017). In Munabi-Babigumira et al. 's view, these factors reduce skilled birth attendants' morale, increase their workload and infection risk, and make them less efficient in their work. A lack of transport sometimes makes it difficult for skilled birth attendants to refer women to higher levels of care. Thus, the lack of these factors encourages women to develop negative perceptions of the health system and could make them reluctant to accept referrals or deliver from a facility. The lack of such factors might have led to a sustained drop in facility deliveries over time and could explain the drop in skilled deliveries overtime in Vubwi, Chikankata, Livingstone, and Mazabuka districts.

On the other hand, the initiative to provide women with some incentives for delivering at a facility seems to be a pivotal strategy to directly improve skilled deliveries in the districts in the short run. Overall, incentives such as baby kits influence institutional deliveries (Massavon et al., 2017), and hence skilled deliveries. The initiative by some districts such as Petauke to introduce MAMA packs (baby kits, T-shirts, and caps) for women delivering at a facility can improve skilled deliveries in the districts. The initiative is an effort to incentivise women to deliver from facilities. Procuring items such as bicycles, chitenges, and gumboots through SIDA support was another excellent strategy for improving skilled deliveries in the districts. These items are primarily for community volunteers who act as a link between health facilities and the communities.

According to Massavon et al. (2017), incentives such as baby-kits and the transport-voucher schemes increase the service coverage of institutional deliveries at the intervention facilities and hence skilled deliveries in the short run. Therefore, such initiatives can lead to immediate improvements in skilled deliveries in the districts. However, they should be followed by long run intervention programs for sustainable improvements in the outcome variable.

We see, on the other hand, that there appears to be a rise in the trend of skilled deliveries overtime. The increase in skilled births could be due to the implementation of skilled delivery intervention programs such as the emergence and organisation of grass-root structures such as NHCs, SMAGs, MTAP coupled with the training of traditional leaders as safe motherhood champions. These programs are designed to focus on the education and empowerment of women in communities for them to utilise facilities for delivery. Therefore, these programmes were identified as critical strategies for improving skilled deliveries. The programmes enhanced community participation, provided a link between the communities and health facilities. They also facilitate increased linkages, interdependence, learning, and interactions for change agents within the health system to improve skilled deliveries in the districts.

Concerning the aforementioned, intervention programs such as the Safe Motherhood Program implemented at population and institutional level tends to lead to an overall increase in maternal health service utilisation (Metcalf & Adegoke, 2013). The authors further argue that socio-demographic variables and women's education had a more significant impact. Therefore, such programs could be the contributing factors to the improvements in skilled deliveries overtime in some districts of Eastern and Southern provinces following the immediate drop of the outcome variable.

Furthermore, short term training such as essential and new-born care, emergence, and obstetric care (EmOC) is essential in improving skilled deliveries in the districts. These improve correct detection, handling, and timely referral of complicated obstetric cases to reduce maternal mortality. Thus, over time, creating a conducive environment for sustained improvements in skilled deliveries in the districts. Additionally, training in EmOC is provided in many countries to ensure healthcare providers working in maternity care recognize quickly women who have complications during pregnancy or childbirth (Ameh, Mdegela, White, & Van Den Broek, 2019). This training is vital to prevent and manage obstetric complications effectively such that maternal and perinatal morbidity and mortality are reduced (ibid). These training packages are designed

for healthcare provider cadres such as nurse, midwives, general medical doctors, anaesthetists and specialist obstetrician-gynaecologists. These programs are critical strategies in improving skilled deliveries in the districts and as such, may explain the noticed improvements in skilled deliveries in Eastern and Southern province during the qualitative sub-analysis. However, such training as EmOC is expensive and can only be provided at small scale overtime.

6.2 Policy Implications

The presence of a skilled health professional (doctor, nurse, or midwife) during delivery is crucial in reducing maternal and child deaths in developing countries where about 20% of all births are unskilled. Having a skilled birth attendant around during deliveries can be the difference between life and death of both the child as well as the mother. The persistent gaps in the access to skilled birth attendants by women during child delivery in the districts in Zambia are primarily due to inadequate delivery infrastructures, insufficiently qualified personnel, bad road networks, bad cellular network, lack of transport, delays of funding and delays in input procurements. These factors prevent maternal healthcare services such as skilled delivery services from being accessed by every woman during child delivery. Hence, both the mother and the child are exposed to the risk of obstetric complications, which can be avoided. This may help to explain why this study noted a drop in skilled deliveries in some districts overtime following the intervention.

Improving facility deliveries improve access to skilled birth attendants. That, in turn, improves maternal health of women, children, and adolescents. This sense should, therefore, drive the need to remove the barriers limiting women's access to facilities during childbirth. Consequently, investments in mothers' shelters can effectively increase access to skilled birth personnel by allowing women to travel and lodge at mother's shelters near to a facility. EmNOC training and other training such as essential and new-born care improves the time recognition, handling, and referral of obstetric emergencies. Hence, they are critical strategies for enhancing skilled deliveries. Recruiting the required number of qualified health personnel per facility is vital to reduce workloads of the skilled birth attendants and improve access to quality of care during childbirth. The time taken to refer an obstetric case from one facility to the next level facility is a hindrance to accessing skilled delivery services. Hence, investments aimed at improving the transport networks, cellular network connectivity and road network can be vital in removing the barriers in accessing skilled delivery services in Zambia.

The key message is that interventions to improve skilled deliveries have to be innovative, explore opportunities that include culturally specific programs, and target particular groups. Policies must focus on eliminating the barriers highlighted above. At the same time, strengthening the depth of the facilitators of skilled deliveries also discussed above.

6.3 Limitations of the Study

This study inevitably suffers from some limitations. Given that the districts invested part of the SIDA funding into capital projects such as infrastructure, its effect on skilled deliveries could not have been fully estimated since such investments take long to mature. Therefore, it is plausible to assume that SIDA healthcare investments produced broader impacts on overall skilled deliveries not accounted for in this study.

Secondly, this study relied on the HMIS data, which suffers from several issues relating to data quality. Thus, other research relying on different data sources is recommended. However, the quality of the data produced in Zambia has improved over time, with reporting rates of over 95%. As such, there are minimal biases, possibly due to non-reporting from public facilities.

Thirdly, non-observed confounders could have biased the estimates. For instance, other programmes capable of inducing changes in skilled deliveries such as the UN-UNICEF support for RMNCH service delivery. However, the implementation of the intervention was only in one (1) out of the nine (9) SIDA intervention districts in Eastern province. And in two (2) out of the thirteen (13), SIDA intervention districts in Southern province, but seven (7) control districts..

Fourthly, uncontrolled effects of government interventions such as the deployment of skilled health personnel during the period of the intervention. However, as opposed to government interventions that are implemented countrywide, SIDA healthcare intervention is concentrated in Eastern and Southern provinces only. As such, the share of government investments, such as the deployment of midwives per district is relatively small to cause significant bias in the results. Notwithstanding this, it is plausible that there could be an upward bias in estimating the actual effect of SIDA interventions as a result of the limitations cited.

Lastly, the choice of the cut-off point for aggregate data could have masked out the effects of the intervention given that districts started implementation at different dates.

6.4 Recommendations

Even though SIDA intervention funding is critical in improving health outcomes such as skilled deliveries in the recipient districts, the intervention may only work best if essential health system components such as qualified staff, equipment, supplies are readily provided. Thus, before kick-off, the primary intervention should ensure to provide all the essential inputs such as health workers, drugs, and medical equipment and provide these timely and sufficiently for better organisation of the health system. In the absence of these, progress would be slow and sub-optimal.

On the other hand, governments in the intervention recipient countries must ensure that infrastructures such as those for network connectivity, road network, and other necessary inputs are adequately provided. This is so because, most of the external interventions come in to supplement government efforts.

6.5 Conclusion

The study aimed at assessing the effect of SIDA's healthcare investments towards skilled deliveries in Eastern and Southern Province using a mixed-method approach. There appeared to be observable changes in the outcome variable in both provinces following the SIDA healthcare investments. However, the changes were only significant in five (5) districts in Eastern province and five (5) district in Southern province. Further, after controlling for confounders, the study revealed that in four (4) out of the ten (10) districts of the two provinces, the increases in skilled deliveries could be attributed to SIDA healthcare investments. The study also noted that several factors that work for and against improvements in skilled deliveries in both provinces. Factors such as recruitments and training, human resource development, infrastructure development, transport systems improvements, integrated outreach services (at both facility and district level), sufficient and timely input procurements, and incentives are facilitators of skilled deliveries in the provinces. While factors such as delayed disbursement of funds, inadequate staffing levels, inadequate infrastructure, bad road network, and network connectivity are inhibitors of improvements in the outcome indicator. Hence the need to ensure that before interventions such as SIDA healthcare investments are implemented, the necessary system's components are sufficiently and readily available. This will enhance accelerated improvements in the outcome indicator.

REFERENCES

- Adedokun, S. T., & Uthman, O. A. (2019). Women who have not utilized health Service for Delivery in Nigeria: who are they, and where do they live? *6*, 1–14.
- Adegoke, A. A., & Van Den Broek, N. (2009). Skilled birth attendance-lessons learnt. *BJOG: An International Journal of Obstetrics and Gynaecology*, *116*(SUPPL. 1), 33–40. <https://doi.org/10.1111/j.1471-0528.2009.02336.x>
- Alvarez, M. M., Borghi, J., Acharya, A., & Vassall, A. (2016). Social Science & Medicine Is Development Assistance for Health fungible? Findings from a mixed-methods case study in Tanzania. *159*, 161–169.
- Ameh, C. A., Mdegela, M., White, S., & Van Den Broek, N. (2019). The effectiveness of training in emergency obstetric care: A systematic literature review. *Health Policy and Planning*, *34*(4), 257–270. <https://doi.org/10.1093/heapol/czz028>
- Association of Chartered Certified Accountants. (2013). Key health challenges for Zambia. *Online Journal of Issues in Nursing*, 1–29. Retrieved from <https://www.accaglobal.com>.
- Atun, R., De Jongh, T., Secci, F., Ohiri, K., & Adeyi, O. (2010). Integration of targeted health interventions into health systems: A conceptual framework for analysis. *Health Policy and Planning*, *25*(2), 104–111. <https://doi.org/10.1093/heapol/czp055>
- Barnett, C., & Bennet, J. (2007). Evaluation of DFID Country Programmes, Country Study: Final Report Indonesia. DFID Evaluation Report EV680.
- Bendavid, E., & Bhattacharya, J. (2016). *HHS Public Access*. *174*(6), 881–887. <https://doi.org/10.1001/jamainternmed.2014.292>.
- Bergman, R. (2017). Aid for Health with a Results-Based Twist: A Case Study of Program Implementation in Zambia. Department of Health Economics, Policy and Management, Karolinska Institute, Sweden.

- Brenner, S., Muula, A. S., Robyn, P. J., Bärnighausen, T., Sarker, M., Mathanga, D. P., & De Allegri, M. (2014). Design of an impact evaluation using a mixed methods model - An explanatory assessment of the effects of results-based financing mechanisms on maternal healthcare services in Malawi. *BMC Health Services Research*, 14(1). <https://doi.org/10.1186/1472-6963-14-180>
- Campbell, O., Gipson, R., Issa, A. H., Matta, N., El Deeb, B., El Mohandes, A., & Mansour, E. (2005). National maternal mortality ratio in Egypt halved between 1992-93 and 2000. *Bulletin of the World Health Organization*, 83(6), 462–471.
- Central Statistical Office (CSO) [Zambia], Ministry of Health (MOH) [Zambia], and I. I. (2019). Demographic and Health Survey: 2018 Key Indicators. Rockville, Maryland, USA: Central Statistical Office, Ministry of Health, and ICF. Retrieved from <http://www.zamstats.gov.zm>
- Central Statistical Office (CSO) Zambia. (2018). Zambia in Figures 2018. Central Statistical Office; Information, Research and Dissemination Division Nationalist Road, (5). <https://doi.org/10.30687/el/2420-823x/2018/01>
- Chansa, C., & Negin, J. (2015). Key donors to reinstate health funding to Zambia. *The Lancet*, 386(10008), 2054–2055. [https://doi.org/10.1016/S0140-6736\(15\)00967-8](https://doi.org/10.1016/S0140-6736(15)00967-8)
- Chauvet, L., Gubert, F., & Mesplé-Somps, S. (2009). Are remittances more effective than aid to improve child health? an empirical assessment using inter and intra-country data. *Revue d’Economie Du Developpement*, 23(4), 41–80. <https://doi.org/10.3917/edd.234.0041>
- Chita, B. M., & Dick, J. (2015). Universal Health Coverage Assessment: Zambia. Global Network for Health Equity (GNHE), (December), 1–16. Retrieved from <http://gnhe.org/blog/wp-content/uploads/2015/05/GNHE-UHC-assessment-Indonesia.pdf>
- Choi, T. Y., Dooley, K. J., & Rungtusanatham, M. (2001). Supply networks and complex adaptive systems: Control versus emergence. *Journal of Operations Management*, 19(3), 351–366. [https://doi.org/10.1016/S0272-6963\(00\)00068-1](https://doi.org/10.1016/S0272-6963(00)00068-1)
- Comfort, L. K. (1994). Public Management Research Association; Self-Organization in Complex Systems. *Journal of Public Administration Research and Theory: J-PART*, Vol. 4, No. 3. Oxford University Press, 4(3), 393–410.

- COWI, Goss Gilroy Inc, & EPOS. (2007). Joint external evaluation of the health sector in tanzania: 1999-2006. In Health (San Francisco).
- De Allegri, M., Chase, R. P., Lohmann, J., Schoeps, A., Muula, A. S., & Brenner, S. (2019). Effect of results-based financing on facility-based maternal mortality at birth: An interrupted time-series analysis with independent controls in Malawi. *BMJ Global Health*, 4(3). <https://doi.org/10.1136/bmjgh-2018-001184>
- De Bernis, L., Sherratt, D. R., AbouZahr, C., & Van Lerberghe, W. (2003). Skilled attendants for pregnancy, childbirth and postnatal care. *British Medical Bulletin*, 67, 39–57. <https://doi.org/10.1093/bmb/ldg017>
- Devarajan, S., & Swaroop, V. (1998). The Implications of Foreign Aid Fungibility for Development Assistance, Shanta Devarajan and Vinaya Swaroop. (October).
- Dieleman, J. L., Graves, C. M., & Hanlon, M.,(2013). The Fungibility of Health Aid: Reconsidering the Reconsidered. *The Journal of Development Studies*, 49(12), 1755–1762. <http://doi.org/10.1080/00220388.2013.844921>
- Doctor, H. V., & Nkhana-salimu, S. (2018). Health facility delivery in sub-Saharan Africa: successes, challenges, and implications for the 2030 development agenda. 1–12.
- Ensor, T., Green, C., Quigley, P., Badru, A. R., Kaluba, D., & Kureya, T. (2014). Mobilizing communities to improve maternal health: results of an intervention in rural Zambia. *Bulletin of the World Health Organization*, 92(1), 51–59. <https://doi.org>.
- Erwin, P. C., Mays, G. P., & Riley, W. J. (2012). Resources that may matter: The impact of local health department expenditures on health status. *Public Health Reports*, 127(1), 89–95. <https://doi.org>.
- Fagan, T., & Zeng, W. (2015). Health Financing Profile Figure 2: Comparative Health Expenditure (2013) References and Works Consulted. IHME. World Health Organization Global Health Observatory, (May).
- Gabrysch, S., Cousens, S., Cox, J., & Campbell, O. M. R. (2011). The influence of distance and level of care on delivery place in rural Zambia: A study of linked national data in a geographic information system. *PLoS Medicine*, 8(1). <https://doi.org>.

- Gomanee, K., Girma, S., & Morrissey, O. (n.d.). Aid, Public Spending, and Human Welfare: Evidence from Quantile Regressions. (03).
- Grisogono, A. (2006). State of The Art And The State of The Practice: The Implications of Complex Adaptive Systems Theory for C2.
- Gyimah-brempong, K. (2015). Do African Countries Get Health from Health Aid? 1. 83–114.
- Hatt, L., Cynthia Stanton, K. M., Asri Adisasmita, E. A. & C. R. (2007). Did the strategy of skilled attendance at birth reach the poor in Indonesia? *Bulletin of the World Health Organization*, 85(February), 660–667. <https://doi.org/10.2471/BLT>
- Hossain, J., & Ross, S. R. (2006). The effect of addressing demand for as well as supply of emergency obstetric care in Dinajpur, Bangladesh. *International Journal of Gynecology and Obstetrics*, 92(3), 320–328. <https://doi.org/10.1016/j.ijgo.2005.09.029>
- Hounton, S., Sombié, I., Meda, N., Bassane, B., Byass, P., Stanton, C., & De Brouwere, V. (2008). Methods for evaluating effectiveness and cost-effectiveness of a Skilled Care Initiative in rural Burkina Faso. *Tropical Medicine and International Health*, 13(SUPPL. 1), 14–24. <https://doi.org>.
- Institute for Health Metrics and Evaluation. (2015). *Financing Global Health 2014; Funding as the MDG Era Closes*. Seattle, WA: IHME.
- Kaisler, S. H., D.Sc, & Madey, G. (2009). *Complex Adaptive Systems: Emergence and Self-Organization Tutorial Presented at HICSS-42 Big Island , HI Greg Madey*.
- Lagarde, M. (2012). How to do (or not to do)...assessing the impact of a policy change with routine longitudinal data. *Health Policy and Planning*, 27(1), 76–83. <https://doi.org>.
- Leiderer, S. (2012). Working Paper No . 2012 / 68 Fungibility and the Choice of Aid Modalities The Red Herring Revisited.
- Lipsitz, L. A. (2012). Understanding health care as a complex system: The foundation for unintended consequences. *JAMA - Journal of the American Medical Association*, Vol. 308, pp. 243–244. <http://doi.org/10.1001/jama.2012.7551>
- Lwamba, C., Mehra, V., Misunas, C., Mizunoya, S., Murphy, P., Murray, C., & You, D. (2018). *Progress for Every Child*. UNICEF Data and Analytics Section Division of Data, Research and Policy 3 UN Plaza, New York, NY 10017. Retrieved from www.data.unicef.org

- Manson, S. M. (2001). Simplifying complexity: a review of complexity theory. *Geoforum*, 32(2001), 405–414. Retrieved from <http://www.sciencedirect.com/science/article>
- Massavon, W., Wilunda, C., Nannini, M., Majwala, R. K., Agaro, C., De Vivo, E., & Criel, B. (2017). Effects of demand-side incentives in improving the utilisation of delivery services in Oyam District in northern Uganda: A quasi-experimental study. *BMC Pregnancy and Childbirth*, 17(1), 1–13. <https://doi.org>.
- Metcalf, R., & Adegoke, A. A. (2013). Strategies to increase facility-based skilled birth attendance in South Asia: a literature review. *International Health*, 5(2), 96–105. <https://doi.org>.
- Ministry of Finance. (2017). The 2018 National Budget; Budget Speech Delivered to the National Assembly. In Ministry of Finance (MOF), Lusaka, Zambia; 29th September, 2017. Retrieved from <http://www.parliament.gov.zm>
- Ministry of Health. (2018). Zambia National Health Accounts 2013 to 2016 Estimates; Lusaka: Ministry of Health (MOH).
- Mize S, Harrison M, Hoekman N, Mercer M, & Thompson S, (2008). Health Alliance International, Improving Maternal and Newborn Health in Timor Leste Project Location. Seven Districts in the Democratic Republic of Timor Leste; Cooperative Agreement, Project Dates: September 30 , 2004.
- Munabi-Babigumira S, Glenton C, Lewin S, & Fretheim A, N. H. (2017). Factors that influence the provision of intrapartum and postnatal care by skilled birth attendants in low- and middle-income countries: a qualitative evidence synthesis (Review). *Cochrane Database of Systematic Reviews*, (11). <https://doi.org>.
- Negeri, K. G., & Halemariam, D. (2016). Effect of health development assistance on health status in sub-Saharan Africa. *Risk Management and Healthcare Policy*, 9, 33–42. <http://doi.org/10.2147/RMHP.S101343>
- Nyongesa, C., Xu, X., Hall, J. J., Macharia, W. M., Yego, F., & Hall, B. (2018). Factors influencing choice of skilled birth attendance at ANC: Evidence from the Kenya demographic health survey. *BMC Pregnancy and Childbirth*, 18(1), 4–9. <https://doi.org>.

- O'Connor, H., & Gibson, N. (2003). A Step-by-Step Guide to Qualitative Data Analysis. *Pimatiziwin: A Journal of Aboriginal and Indigenous Community Health* 1(1), 1(1).
- Paina, L., & Peters, D. H. (2012). Understanding pathways for scaling up health services through the lens of complex adaptive systems. *Health Policy and Planning*, 27(5), 365–373. <https://doi.org/10.1093/heapol/czr054>
- Plsek, P. E., & Greenhalgh, T. (2001). Complexity science: The challenge of complexity in health care. [Article 1 in series of 4]. *BMJ (Clinical Research Ed.)*, 323(7313), 625–628. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1121189/pdf/625>.
- Safford, M. M., Allison, J. J., & Kiefe, C. I. (2007). Patient Complexity: More Than Comorbidity. *The Vector Model of Complexity*. 382–390. <http://doi.org/10.1007/s11606-007-0307-0>
- Shiffman, J., Stanton, C., & Salazar, A. P. (2004). The emergence of political priority for safe motherhood in Honduras. *Health Policy and Planning*, 19(6), 380–390. <https://doi.org>.
- Sida. (2015). Results Based Financing Approaches (RBFA) – what are they? Retrieved from www.sida.se/publications
- Taylor, E., Hayman, R., Crawford, F., Jeffery, P., & Smith, J. (2011). The impact of aid on maternal and reproductive health: A systematic review to evaluate the effect of aid on the outcomes of Millennium Development Goal 5. In *PloS one*. Retrieved from <http://dx.plos.org/10.1371/journal.pone.0056271.g006>
- The Health Foundation. (2010). Complex adaptive systems. In *Evidence Scan: Complex Adaptive Systems*. <http://doi.org/10.1007/3-540-26869-3-16>.
- Tuladhar, H., Dali, S. M., & Pradhanang, V. (2005). Complications Of Home Delivery: A Retrospective Analysis. 87–91.
- UNICEF Zambia. (2016). Review of budget performance and 2016 allocations. Retrieved from www.unicef.org/zambia
- UNICEF Zambia. (2019). Zambia Health Budget Brief. 1–13. Retrieved from www.unicef.org/zambia
- Usher, A. D. (2015). Key donors to reinstate health funding to Zambia. *The Lancet*, 386(9993), 519–520. [https://doi.org/10.1016/S0140-6736\(15\)61463-5](https://doi.org/10.1016/S0140-6736(15)61463-5)

- Von Bertalanffy, L. (2013). The History General and Status of Systems Theory. *The Academy of Management Journal*, 15(4), 407–426.
- Walt, G., Pavignani, E., Gilson, L., & Buse, K. (1999). Managing external resources in the health sector: Are there lessons for SWAps? *Health Policy and Planning*, 14(3), 273–284. <https://doi.org/10.1093/heapol/14.3.273>
- Wayte, K., Barclay, L., & Kelly, P. (2007). Improving Access to Care: Birth Facilities and Maternity Waiting Homes in Timor-Leste. (December).
- WHO. (2004). Making pregnancy safer the critical role of the skilled attendant: a joint statement by WHO, ICM and FIGO. Geneva: World Health Organization (WHO). Department of Reproductive Health and Research (RHR).
- WHO. (2018). Survive , Thrive , Transform current status and strategic priorities Special theme: early childhood development. 55.
- World Health Organization. (2013). The African Health Monitor: Key Determinants for Health in the African Region. *The African Health Monitor*, 1(16), 1–194. Retrieved from <http://www.aho.afro.who.int/sites/default/files/ahm/issues/27/ahm-issue-14.pdf>
- Yaya, S., Bishwajit, G., Uthman, O. A., & Amouzou, A. (2018). Why some women fail to give birth at health facilities: A comparative study between Ethiopia and Nigeria. 1–11.

APPENDICES

Appendix A.

Table 6.1: Single Group ITS Analysis for Eastern Province (Non-Significant Results)

Parameters	Petauke	Chipata
Pre- Trend (β_1)	0.45***(0.08)	0.06(0.07)
Post- Level Change (β_2)	2.0 (3.33)	2.50(2.40)
Post- Trend Change(β_3)	-0.53***(0.20)	-0.01(0.09)
Post- Trend ($\beta_1 + \beta_3$)	-0.08(0.18)	0.05(0.06)

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix B.

Table 6.2: Single Group ITS Analysis for Southern Province(Non-Significant Results)

Parameters	Kalomo	Kazungula	Namwala	Pemba	Sinazongwe	Zimba
Pre- Trend (β_1)	0.458***(0.145)	0.303*(0.163)	0.519***(0.143)	0.849***(0.116)	0.117(0.182)	0.903***(0.155)
Post- Level Change (β_2)	-9.734*(5.172)	-0.107(4.660)	-5.239(3.700)	-3.948(4.262)	12.00*(6.808)	-
Post- Trend Change(β_3)	-0.117(0.304)	0.892***(0.233)	-0.298(0.249)	0.695***(0.253)	0.0789(0.332)	-
Post- Trend ($\beta_1 + \beta_3$)	0.341(0.27)	0.005(0.186)	0.167(0.160)	0.153(0.222)	0.1958(0.274)	0.186(0.181)

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix C.

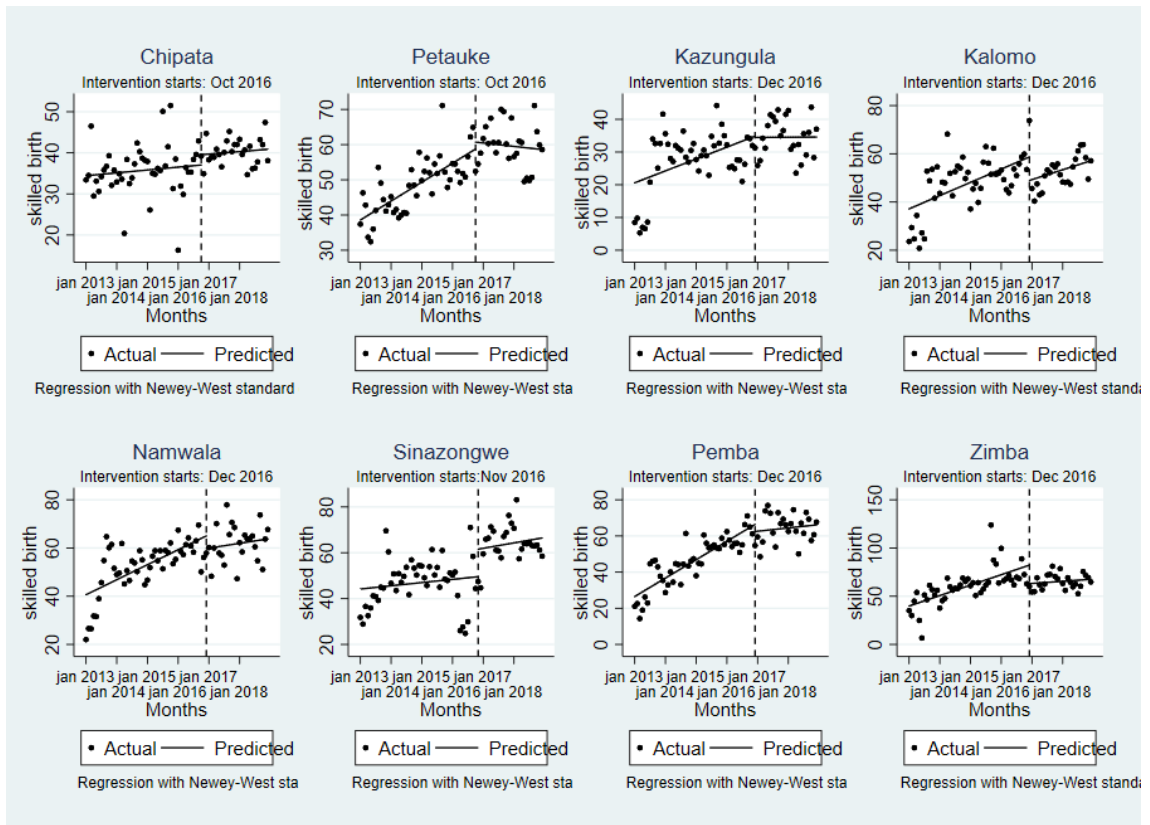


Figure 6.1: Combined Visual Display of Non-Significant Results

Appendix D.

Research Topic

Assessing the effect of SIDA's healthcare funding towards skilled delivery in Southern and Eastern provinces of Zambia.

QUESTIONS GUIDE

Q1 • Briefly describe the programs activities that have been implemented as a result of funding from SIDA to improve skilled delivery in the district?

Q2 • Was each program activity implemented as planned?

- ✓ **Q3b.** If changes were made,
 - what changes were made?
 - why were the changes necessary?

Q3 • Were the anticipated personnel for the planned programs available?

- ✓ **Q3b.** Did they participate as anticipated?
- ✓ **Q3c.** Did they have the required skills and experience?

.....
Q4 • Do staff participate in any skill development for enhanced skilled delivery?

- ✓ **Q4b.** What skills or knowledge did they acquire?
- ✓ **Q4c.** On average, how many staff participate in skills development in a year?
- ✓ **Q4d.** How did they implement what they learned in program activities?

.....
Q5 • Through funding from SIDA, what categories/groups of people in the districts the programs might have especially targeted?

- ✓ **Q5b.** What activities were implemented for those groups?
- ✓ **Q5c.** On average, how many people are reached through the target program activities.
- ✓ **Q5d.** How well did the activities of the program meet the needs of targeted groups in the district?

Q6 • How did participants in the program activities evaluate the activities;

- (a). in terms of effectiveness?
- (b). in terms of accessibility?

Q7 • How has SIDA funding influenced skilled deliveries in the district?

.....
Q7-i. How has SIDA funding enhanced infrastructure development for skilled delivery in the district?

Q7-ii. How has SIDA funding enhanced the availability of skilled personnel for skilled delivery in the district?

Q7-iii. How has SIDA funding enhanced the availability of inputs for skilled delivery in the district?

Q8• Could there be any other notable improvements in skilled delivery related outcomes in the District other than the ones mentioned, after the implementation of the SIDA funded program activities?

- (a) If yes, what are those improvements?
- (b) What was the state of the outcomes before SIDA funded program activities?
- (c) How do the improvements affect skilled delivery?

.....
Q9• The data shows that; this district recorded the lowest/most Improvement on skilled delivery, why do you think the district was the lowest/most improving?
.....

Q10• How often do you have a skilled delivery personnel around in the maternity wards in the district facilities?

Q11• On average how many EMOC services are conducted yearly in the district as a result of funding from SIDA?

Q12• On average, how many maternal deaths are recorded yearly in the district even when EMOC services are used?

.....
Q13• What other outcomes were achieved as a result of the implementation of the SIDA funded program activities?

Q14• What challenges to planned program implementation were encountered?

Q15• How were the planned programs modified to accommodate the challenges?

Q16• What kind of assistance has been recommended towards overcoming those challenges?