Service Delivery in Fragile States: The Case of Health Sector in Zimbabwe

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Working Paper FW-008

Bringing Rigour and Evidence to Economic Policy Making in Africa

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Published by: The African Economic Research Consortium
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Contents

List of tables

List of figures

Abstract

This study examines the effect of fragility on health service delivery in Zimbabwe, during a period when the country displayed characteristics that mirror the definitions of a fragile state. Using the Zimbabwe Demographic and Health Survey (DHS) 2015 complemented with data from Afrobarometer survey round 6 of 2014 Measures of fragility are found not to be statistically significant, whether measured by trust in institutions or economic conditions, but have the expected sign. We observe that this result could mainly be attributed to the fact that while macroeconomic and political instability negatively affected government's contribution to the health sector, it did not affect health infrastructure and the contribution by other stakeholders to the health sector

1. Introduction

Access to quality services like health, has been recognised as fundamental for wellbeing and economic development (World Bank, 2003). Inadequate service delivery is reflected in poor outcomes in terms of health and the low level of wellbeing. One challenge cutting across most African countries irrespective of their strength is the provision of services to citizens. This is intensified in the so-called fragile states. Such states are considered weak or ineffective and are not able to effectively provide basic services to their citizens. When a state begins to fail to do this, questions on its capacity and legitimacy arise. The capacity and legitimacy of several states in developing countries, in particular Africa have been questioned, thus attracting research on the effects of fragility. In areas where states are weak or fragile, the provision of basic services break down and the state is unable to play its full role. In such cases, service provision is largely inadequate due to lack of effective delivery modalities[1].

In Africa, many indicators for services like health are dismal. Given the rate of progress, current trends have compromised these countries' ability to meet the Millennium Development Goals (MDG) targets and the Sustainable Development Goals (SDGs). According to the WHO (2008), strengthening service delivery is a key strategy to achieve the MDGs especially in the area of education, health and water. While low government expenditure has been one of the major reasons for the poor service delivery, budget allocations alone are a poor indicator of the actual quality of services in countries with weak institutions and systematic service delivery failures (Gauthier, Bold, Svensson and Wane 2009).

There is growing interest on fragile states due to their inability to address the challenges facing their citizens as reflected in poverty, adverse economic effects the countries have on neighbouring countries, and global spill overs that may follow (IEG, 2006). Fragile states are important because they are home to an increasingly concentrated proportion of the World's poor. They are also more susceptible to instability, with potential regional and global consequences.

Service delivery outcomes are determined by the interplay of government, providers, and citizens, making the roles of the government important. Adequate financing, infrastructure and human resources are important, reinforcing the need for a well-functioning government. Proper institutions and governance structures are also important in providing adequate incentives to the service providers. In service delivery, governments set the overall policies, allocate resources, and design rules

and systems for service providers (Gauthier, Bold, Svensson and Wane 2009). All these underlines the importance of a well-functioning state. This study analyses the effect of fragility on the delivery of health services in Zimbabwe where such state functions were undermined by state fragility. Various studies IMF (2012), Makochekanwa and Kwaramba (2009), Fund for Peace (2016), OECD (2013), among others, show that the problems facing Zimbabwe include among other things, hyperinflation, political violence and social trauma, complete breakdown of basic public utilities and services, massive people and capital flight, and hyper-unemployment. These characteristics mirror the definitions of a fragile state.

Unlike the boom years of the early 1980s when the country's health system was said to be among the best in Africa, during the period 2000-2008, the country experienced the worst political and economic crisis in its history and so does its public service delivery. Zimbabwe became one of the fragile states in Africa with all these developments affecting the delivery of health services. During the crisis period, the country witnessed an unprecedented and crippling flight of skilled professionals across all sectors of the economy in response to economic hardships. Skill areas affected included, but not limited to, doctors, nurses, teachers, university lecturers, engineering, surveying, architecture, audiology, veterinary as well as forensic sciences.

The central role played by the state in service provision justifies studying service provision in fragile states, since definitions of fragile states emphasise the lack of capacity and/or willingness of government to perform key state functions for the benefit of all. Public services underpin the social contract between state and citizens and, as such are an indicator of the health of a society. Indeed, quality and availability of services are key measures of governance, and inadequate service delivery signal fragility.

This study examines the effect of fragility on health service delivery. This is important for several reasons. One major reason is that a wide range of policies and practices have been followed in fragile states. The efficacy of these policies in terms of what works and what does not in different fragile states is little, if at all documented. In line with this, the study focuses on the main services of health.

2. State fragility and the health sector in Zimbabwe

OECD (2013) defines a fragile state as a state significantly susceptible to crisis in one or more of its subsystems. According to OECD (2013) a fragile state is defined as one whose state power is unable and/or unwilling to deliver core functions to most of its people. Such functions include security, protection of property rights, basic public services, and essential infrastructure.

UN-WIDER (2008) on the other hand defines fragility as a situation where the government cannot or will not provide an environment for households to reduce, mitigate or cope with poverty and other risks to well-being. According to UN-WIDER (2012), a fragile economy is one that is particularly vulnerable to internal and external shocks as well as domestic and international conflicts. Vallings and Torres (2005), argues that while there is no universally agreed definition of fragility, a nation is conventionally considered fragile if the government is unable to deliver core functions to the people, especially the poor. Other studies have identified some key indicators of state fragility. These include but not limited to: (1) The inability of state organisations to provide basic security to the population and cushion them against organized violence to people and property – including violence emanating from the state itself (DfID, 2010); (2) The lack of ability of state organisations to self-sustain their basic functions by generating revenue through selling of its products to the market (UNU-CPR, 2016); (3) The lack of willingness, ability and dedication of the state in ensuring that all its citizens have access to basic services (USAID, 2009); (4) Failure to bring equitable distribution and allocation of resources without favour and discrimination (USAID, 2013).

According to OECD (2013), fragile states or economies further lack the ability to develop mutually constructive relations with society and neighbour states, and often have a weak capacity to carry out basic governance functions manifested in the inability to enact binding legislation, exercise coercive force over its sovereign territory, provide core public goods, and provide a stable and secure environment for its citizens. Fragile situations matter because they are home to an increasingly concentrated proportion of the World's poor. They are also more susceptible to instability, with potential regional and global consequences. In a fragile state, institutional arrangements clearly illuminate the conditions of crisis, which can be revealed in various dimensions (Makochekanwa and Kwaramba, 2009).

Fragility in Zimbabwe

a)   *Political context*

The genesis to Zimbabwe's economic crisis can be traced to the period 1997 to 2000. Kairiza (2009) and Coomer and Gstraunthaler (2011) provide a detailed explanation. They cite some factors that created serious macroeconomic imbalances for the country. Firstly, the crisis began following the military adventurism which led the government in 1998 to send 11,000 troops to the Democratic Republic of Congo (DRC) to support the beleaguered President Laurent Kabila. Estimates indicate that the intervention cost Zimbabwe around USD 1.3 billion per month in 1998 (Kairiza, 2009). This contributed to the fiscal burden. Secondly, government succumbed to pressure to redistribute land without compensation after the British government failed to honour their promise to provide the financial support for compensation. Buigut (2015) indicates that the land invasions spanned over 5 million hectares and in 2000, the net effect was an increase in uncertainty and a reduction in agricultural production. The mayhem around the land redistribution led to almost total collapse of agriculture, an outcome which also had ripple effects in terms of declining export earnings, government revenues and loss of investor confidence. The journey to economic recovery from a disastrous hyperinflation experienced between 2000 and 2009 gives some hope to the Zimbabwean citizens affected by high levels of poverty (Reserve Bank of Zimbabwe, 2014). However, the economy remains fragile and highly sensitive to any shocks, with any slight fluctuation having an enormous ripple effect on the country's GDP (OECD, 2014).

The political hostility and economic crises bedevilling the Zimbabwean economy contributed to the near compete demise of its gross domestic product (GDP), raising poverty rates to more than 72%, with a fifth of the population in extreme poverty (World Bank, 2014). In the recent past, the political landscape changed with the replacement of long-time president Robert Mugabe with his former vice president in 2017. Though this is seen as ushering in a new political dispensation, political tensions remain as the country goes to the first post-Mugabe general election in July 2017.

b)   *Macroeconomic imbalance*

Zimbabwe has undergone a long period of economic decline, accompanied by a worsening socio-economic and political situation. The country's economic decline is illustrated by the hyperinflationary environment, officially estimated at more than 4000 million per cent at the end of October 2008. Higher inflation eroded the purchasing power of citizen leading to an increase in the number of poor households. These, together with some imprudent business practices resulted in most development cooperation partners and foreign investors seeing Zimbabwe as a high-risk investment destination leading to very low levels of foreign direct investment and donor funding.

In addition, the fast-declining economic environment resulted in huge fiscal deficits which led to increased money supply hence inflation. The economic crisis together with the political instability led to a near collapse of the public sector. The result, among others, has been that the delivery of services like health virtually collapsed. This contrasted with the period during the 1980s when Zimbabwe's record of service delivery in health, basic services and infrastructure, and public sector growth in civil service, parastatals was impressive.

To resolve the crisis, the government introduced a multi-currency system in 2009, with the US dollar as the main currency (dollarization). This contributed towards a more stable macroeconomic environment, although recently, because of the shortage of the US dollar resulting from poor export performance, the government introduced the bond note but on the understanding that they would refrain from printing without adequate foreign exchange backing of the note.

As a result of dollarization, inflation averaged -2.4 per cent in 2015. This is actually an artificially low inflation rate and there is increasing pressure for the rate to increase. Shortages of the bond note have led to the emergence of a parallel market in which the note is depreciating against the US dollar. According to the Reserve Bank of Zimbabwe (RBZ, 2015), the economy grew by 1.1% in 2015, down from 3.8% recorded in 2014. The low growth performance has been due to a combination of factors, including fall of mineral commodity prices, decline in demand by some of Zimbabwe's trading partners, decline in agriculture and mining which are the mainstay of the economy. These pressures have led to closure of many companies, resulting in thousands of workers being retrenched since 2010. Capacity utilisation in the manufacturing sector fell from 57.2 per cent in 2011 to 34.3 per cent in 2015 (World Bank. 2016). At the same time, Zimbabwe's current account deficit remains much larger than those of comparable countries in the region, and exports currently amount to just over half of imports (World Bank, 2016). This was attributed to a decline in global prices for gold, platinum, and other mineral commodities, coupled with unresolved supply-side constraints, which reduced the value of mining exports. Though Zimbabwe has benefited from lower global oil prices, the benefits of low oil prices have been offset by rising import demand, with imports growing by 13.7 percent in 2015 before declining by 13.4 percent in 2016 (World Bank, 2017).

As a way of addressing macroeconomic challenges and boosting trade and investment, the Reserve Bank of Zimbabwe (RBZ) in 2015 authorized use of several foreign currencies besides South African rand, Botswana pula, and US dollar as legal tender. In mid-2015, the Zimbabwean dollar was faced out and parallel currency in the form of dollar-denominated bond notes (of $2 and $1) were introduced, with the introduction of $5-denominated debt in 2017 (RECP, 2018). Hanke and Kwok (2009) track the trajectory of hyperinflation in Zimbabwe. Over the period 2007-2008, inflation escalated to levels that were unprecedented not only for the country but globally. The annual inflation rate rose from 2,200.2 per cent in March 2007 to 66,212.30 per cent in December 2007. By June 2008, it had risen to 11,268,758.90 per cent (Hanke and Kwok, 2009). The inflation spiral was fuelled by speculative

activities following successive depreciations of the Zimbabwe dollar, coupled with the collapse of production following the land redistribution as well as the decision by the International Monetary Fund and the European Union to withdraw support which further worsened the situation (Noko, 2011). However, interventions in the economy through dollarization ensured stability in prices leading to annual inflation rate declining to 3.7 percent in 2012 and to -0.2 in 2014 (ZIMSTAT, 2015).

The country's income distribution is more equal than in the period of economic disruptions of 2000s, with the Gini index declining from 48.9 in 2001 to 42.3 in 2011 and poverty declining from 41 percent in 2001 to 23 percent in 2011 (World Bank, 2016). The World Bank (2016) estimates Zimbabwe's total public and publicly guaranteed external debt at US$7.1 billion (51 percent of GDP) as of September 2015, with external arrears occupying a large share at US$5.6 billion (79 percent of total external debt). The net effect of this huge public debt is the increase in the cost of capital and the economy at large. It also limits the country's access to longer term and concessional development financing. Zimbabwe has entered into agreements with the International Monetary Fund and other multilateral financial institutions with regards to settling its debt, in the hope that this will contribute towards the country's economic recovery. In addition, political uncertainty and the conflicts between the ruling and opposition parties have created an environment that is not conducive to growth and development hence, the economic stagnation might persist. The delivery of health services is therefore being managed in such an environment in which there are resource constraints and diminished capacity particularly in the context of the public sector. An interesting point for research is to understand the role of the state of fragility on the delivery of health in the country.

c)   *Real sector collapse and poverty*

The government medium-term development plan of 2009-2012 resuscitated the economy to an average economic growth rate of 8.7% p.a. With the IMF Staff Monitored Program in place and the multilateral arrears paid, the economy saw inflation rates stabilized leading to growth in economic reserves (IMF, 2014). The country's recent economic recovery has been underpinned by the mining and agriculture sectors, which accounted for 93.5% of export revenues between 2009 and 2013 (AfDB, 2015). Mining however has weak linkages to the rest of the economy despite generating over 60% of the country's export earnings. It is also capital intensive with limited employment creation opportunities. The manufacturing sector saw decreased activity between 2011 and 2014. On top of this, more than 80.0% of workers are employed in the informal sector (World Bank, 2016).

Ease of Doing Business index for Zimbabwe deteriorated to 155 in 2015 from 153 in 2014. According to the World Bank (2016) report on Ease of Doing Business, Zimbabwe averaged 163 from year 2008 until 2015, reaching an all-time high of 171 in 2011 and a record low of 153 in 2014. The ease of doing business index ranks countries against each other based on how the regulatory environment is conducive to business. Figure1

shows the growth trajectory of the country between 2010 and 2015. Real GDP growth rate declined from 9 per cent in 2010 to 5.1 per cent in 2013. Since then, the rate fell to 3.8 and 1.6 per cent in 2014 and 2015, respectively. The decline in growth since 2012 has been explained by weak domestic demand, rising public debt, the tight liquidity crunch, poor infrastructure and an overvalued exchange rate (African Development Bank, 2016).

Figure 1: Zimbabwe GDP growth trends (%) 2011-2015

Source: Based on data from African Development Bank. Africa Economic Outlook 2012 and 2016

Service delivery failure

With the challenges facing the Zimbabwean economy, there were failures in service provision. WHO (2014) observes that many social services like health, education and other basic services collapsed, resulting in the Zimbabwean Human Development Index (HDI) standing at 173 out of 187 countries. This was also aided by a lengthy isolation from the international community of the Zimbabwean government, which restricted the flow of foreign currency and resulted in build-up of arrears to multilateral and bilateral partners (World Bank, 2011). With the fiscal challenges, the country could not effectively support service delivery.

The proportion of recurrent health expenditure to government expenditure increased from 7.9 percent in 2009 to 15.7 percent in 2012 before declining to 13.1 percent and 8.2 percent in 2013 and 2014 respectively (ZIMSTAT, 2015). Over the same period, health personnel in post also increased from 22,054 in December 2009 to 29,954 in December 2013 before declining to 28,758 in December 2014,

Performance of the health sector 2011-2015

According to the Zimbabwe National Health Strategy 2016-2020, the delivery of health services deteriorated during the periods of economic hardship, most notably during 2000 to 2008. However, with economic recovery starting in 2009, some improvements

were recorded, albeit at a slow pace. This can be read from improvement in some health indicators. For instance, life expectancy improved from 34 years in 2006 to 58.5 years in 2015, with women at 61.3 years compared to men at 56.2 years (NHS, 2016). According to the World Health Organisation (2015), infant mortality rate (per 1000 live births) increased from 50.4 in 1990 to 61 in 2000 but declined to 55 in 2013, and the under- 5 mortality rate (probability of dying by age 1 per 1000 live births) also increased from 74.6 in 1990 to 102.5 in 2000 but dropped to 88.5 in 2013 (WHO, 2015).

There was also an improvement in maternal mortality ratio which declined from 960 in 2011 per 100,000 to 614 per 100,000 in 2014. This could be a reflection of the positive spin-offs from the economic turnaround which started from 2009. However, the rate is still too high and below targets of the expired Millennium Development Goals (MDGs).

Consideration of health infrastructure and facilities shows that although Zimbabwe has a decentralized and diversified health structure, its effectiveness has been affected by the economic challenges and state fragility which the country has faced since 2000, though there are improvements since 2009. As per the Zimbabwe Service Availability and Readiness Assessment (ZSARA) report 2015, none of the provinces had facility densities above the ZSARA benchmark of 2 facilities per 10,000 population. The densities of facility ranged from less than 1 health facility per 10,000 in Harare and Bulawayo provinces to 1.7 per 10 000 in Manicaland and Matabeleland South provinces. The facilities also had a shortage of basic amenities and service availability. From a survey of 275 health facilities from all levels, 49% of both urban and rural facilities had a power source (grid, generator or solar), and power was established to be available in hospitals (50%) with public clinics having the lowest 44% (ZSARA 2015).

The ZSARA 2015 report also provides overall basic equipment availability score during assessment, diagnostic capacity and availability of 24 essential drugs. The overall basic equipment availability score during assessment was reported at 87%, and the diagnostic capacity showed that capacity was high in HIV/AIDS-related tests and communicable diseases, but relatively low capacity to conduct urine test for pregnancy and haemoglobin (ZSARA 2015). The report also indicates that most facilities scored very high in HIV-related programs such as HTC, PMTCT and ART while they scored relatively low in provision of services for non-communicable diseases such as diabetes and cervical cancer. Although mission hospitals were better equipped, most hospitals lacked modern high level diagnostic equipment expected at this level of care. One area of concern is the lack of advanced diagnostic equipment in hospitals where only 14% had an ECG machine and 1% had a CT scan machine (ZSARA, 2015). It was particularly worse for rural facilities where the mean availability advanced diagnostic equipment was generally half of the urban facilities.

Performance of the health sector also depends on its financing. The Zimbabwean health system is still recovering from the country's economic difficulties and continues to face serious obstacles: reduced budget allocations to cover services provided to catchment areas; reduced funds for procuring quantities of health commodities; and outmigration of health staff, particularly clinical and senior-level administrators,

who leave the system for positions with internationally supported health programs or positions in neighbouring countries that offer higher wages and reliable payment of wages (USAID, 2011:12). The upturn in the economy since 2009 led to some improvements in the health sector. Zimbabwe's adoption of the US dollar as the country's currency in February 2009 has led to the stabilization of the value of health budgets, wages, and general prices for health commodities. However, critical issues remain for improving the funding and overall financial support of Zimbabwe's health system.

The crisis experienced in Zimbabwe led to exodus of skilled public sector healthcare workers in 2006-08, prompting an increase in health sector wages in 2009 and thereafter, resulting to huge wage bill compared to capital investment and non-wage current expenditure (World Bank, 2016). According to the National Health Strategy 2016-2020 (MoHCC, p52), the country has failed to meet the Abuja Declaration commitments (which calls for spending 15% of total government expenditure on health) from the time it was signed up, but the government has been making efforts to ensure that health remains a priority Ministry, as it always received the third biggest allocation when compared to other ministries. However, 80% of this has been absorbed mainly by salaries and has fallen short of the WHO recommendation of $86 per capita. Public hospitals are generally underfunded, which has contributed towards the inefficiency in delivery and quality of services. For example, according to the NHS 2016-2020, in September 2015, Harare Central Hospital only received $560,000 out of a budget application of $17,500,000. Overall, the health sector is underfunded and largely dependent on external funding for service delivery (over 40% Overseas Development Assistance – ODA - in 2012) given that most of government expenditure on health goes to salaries.

Through funding from the Health Transition Fund, there has been significant improvement in human resources, equipment, and medicines. The Results Based Financing approach has supported some improvements in quality-of-service delivery. However, this improvement has not fully extended to the district hospital and community health worker levels.

From the key informant interviews conducted during this study, macroeconomic imbalance was said to be the most direct way through which the crisis affected the delivery of health services in the country. The respondents explained that the economic meltdown crippled the economy, reduced revenues, and led to cuts in health funding. It also diminished the capacity of the government to expand or maintain health infrastructure and to continue with the policy of free health for the low-income group. Inflation further eroded the value of funds. The situation has increased government's dependence on external funding. The crisis also led to the closure of many companies including those producing or supplying medical equipment and drugs. This created a severe shortage in medical supplies, thus contributing to the crisis in health service delivery and attainment of outcomes.

3. Literature review: Service delivery and state fragility

Many states classified as fragile are also post-conflict (Witter, 2012), hence such countries must have experienced service infrastructure destruction making them worse off in-service delivery. Service delivery is important for countries to come out of fragility and signals or measures state performance (McLoughlin, 2015). The components of fragility in service delivery include the extent of delivery of essential services, resource management, financing, accountability, critical data needs and security as identified by Newbrander et al. (2011) in a study on health systems. Although states vary regarding these components, usually they can be analysed according to their current condition and the direction in which they are moving (that is, towards greater or reduced fragility).

The key aspects that must be addressed regarding service provision are allocation, production, distribution and financing (Newbrander et al., 2011). In line with these factors and with reference to the health system, Newbrander et al. (2011) considers the delivery of health services, organization and production of health services, the target beneficiaries, and payment for health services and to providers as the most important. Though the approach is more on intervention on service delivery, these issues are important when analysing service delivery in fragile states as these countries either lack the services or have poor and inadequate services. In situations where the services are available, the delivery mechanism is an important factor to consider. Basing their analysis on the literature of health system as social and political institutions, Kruk et al. (2010) outline how health systems may contribute to health status and enhance state-building and enhanced prospects for peace. They note that post-conflict states are faced by high mortality and morbidity, some of which are conflict-related hence require reliable and integrated health services which are key in reducing disparities in access to care.

One aspect that needs attention in fragile states is the extent to which service delivery address inequalities. This is key because a certain group of citizens are likely to be more disadvantaged in access to basic services either due to the cost of accessing those services or due to unavailability as the state is constrained in providing the services. The design of service delivery should be such that it conveys social and political values to the state (Kruk et al., 2010), thus it supports social inclusion and state legitimacy. This is important since service delivery can either reinforce or help overcome inequalities depending on how it is structured. Equitable service delivery

and inclusiveness are important for state-building, peace-building and state legitimacy (Ndaruhutse et al., 2011). As pointed out by Kruk et al. (2010), the interaction of health system and the communities it serves contributes to reconstruction process in post-conflict states. To achieve this, financing of service provision is crucial. For instance, measures should be placed to ensure that the marginalized members of the society in a fragile state have access to the basic services by ensuring the services are affordable. This can be a big challenge for a fragile state as access to financing for service provision may be difficult.

Service delivery has been linked to state legitimacy in the institutional model literature (Brinkerhoff, Wetterberg & Dunn, 2012; McLoughlin, 2015). This strand of literature argues that state performance in service delivery improves state legitimacy. Fragile states with weak or absent legitimacy lack citizens' acceptance and support, deliver poor public goods and services, and are vulnerable to conflict (Brinkerhoff, Wetterberg & Dunn, 2012). They note that illegitimacy is both a cause and a consequence of fragility. While the literature has focused on a linear relationship between service delivery and state legitimacy, McLoughlin (2015) find a nonlinear relationship between state's performance in delivering services and its degree of legitimacy. This is due to, among other factors, the shifting expectations of citizens on what the state should provide, subjective way in which they assess impartiality and distributive justice, and technical and political characteristics of the service. Expectations shift as citizens have subjective interpretations of quality and effort, and over time, might change from concerns on access to those of quality and cost (McLoughlin, 2015), expectations on access and demand for services may increase leading to unmet expectations (Ndaruhutse et al., 2011). This is common in fragile states where starting from a situation where services are not available, access to services will be given prominence but those who then access the services will then focus on the cost and quality of the services. While effective service delivery contributes to improving legitimacy, legitimacy also depends on state capacity and track record with equitable distribution and fair and accountable procedures for service provision (Brinkerhoff, Wetterberg & Dunn, 2012).

The literature has also linked service delivery to effects of state-building and peace-building processes with the effect of service delivery depending on how it is undertaken (Ndaruhutse et al., 2011). This literature focus on how the government can be strengthened to deliver services rather than the role of service delivery process. The argument put forward is that capacity of the government to deliver services determines the availability and quality of services offered. Hence, building the capacity of the government in a fragile state ensures that services will eventually be delivered (Practical Action Consulting, Save the Children, and CfBT Education Trust, 2011). The role of the state in each sector is diverse, however, within each sector, the state sets policy, writes legislation, monitor standards and/or deliver services. In fragile states with weak capacity the indirect roles of the government are generally poorly undertaken, and even where non-state provision is available, they are rarely controlled or supported by any systematic intervention (Batley and Mcloughlin 2010). Given the

challenge of service provision in most fragile states, the question is whether the focus should be on state-building in which case the role of government to deliver services is strengthened. State-building improves the capacity of states to deliver services but then delays access to public services, hence may lead to worsening of fragility. In such situations, non-state actors may be engaged to provide services, especially where the market has failed to offer such services, with the government taking an indirect role (Batley and Mcloughlin 2010).

Service delivery in fragile states can also act as mechanisms to restore accountability. In a study on rebuilding health systems in post-conflict countries, Kruk et al., (2010) argue that health systems can also be viewed as a social institution which restores accountability in fragile states, especially where outside organizations are involved in service provision.

4. Methodology

Methodological approach

The study employs two approaches in analysing health service delivery in Zimbabwe. In the first approach, we use quantitative data to run regressions of health outcomes against selected explanatory variables. This is done using cross-sectional data from the Zimbabwe Demographic and Health Survey (ZDHS) for 2015 complemented with data from Round 6 Afrobarometer Survey of 2014. Afrobarometer data is used to construct an indicator of fragility, which is then used together with the ZDHS 2015 data in establishing the impact of fragility on health outcomes.

The second approach utilises qualitative technique by collecting information through key informant interviews from policy makers, health providers and other key actors in the health sector in Zimbabwe. This enables us to establish how stakeholders view or perceive fragility and its consequences for the health sector, the contribution of key players in the health sector during the crisis, identify the challenges faced in the health sector given the state of the economy and the issues that need attention as well as providing an understanding of the developments in the health sector in Zimbabwe. A combination of the two approaches is necessary since qualitative information complements quantitative approach by providing insights into the results obtained from the latter.

Analytical framework

Health service provision and hence health service delivery considers both health inputs, health outputs, and health outcomes. Health inputs refer to resources that are necessary to produce health outputs thus deliver health services, health output is the actual use of health services by individuals (e.g., hospital visits, bed occupancy, number treated e.t.c), while health outcomes are the impact of provision of health services to individuals (e.g., reduction in morbidity and mortality rates). Provision of health services requires investment in health by having in place health facilities and equipment (such as hospitals, beds, and health equipment), human resources (such as nurses, doctors, etc.), and drugs. It includes the expertise from health professionals, financing, materials, and facilities for provision of health. Health inputs can be provided either by the government (as in the case of public health provision) or non-public agents (e.g., case of non-state health provision). Government policies

and governance structures affect input provision for the health sector, and social and physical environment[2]. For example, the education system determines skills of health personnel. A fragile state may not have adequate financing to support health provision thus affecting inputs into the health system.

The extent of government participation in health service provision is defined by the budgetary allocations to health, health policies and other policies that may directly or indirectly affect health outcomes. In fragile states, the capacity of the government to carry out these functions is constrained (World Bank, 2003), which affects both health inputs and the social and physical environment of individuals, thus affecting achievement of the objectives of health services.

Health inputs are transformed into health outputs such as number of visits to health facilities, number of individuals treated, bed occupancy, number of inpatients and outpatients etc. Achievement of health outputs depends on the inputs to the health system. At the interplay between health inputs and outcomes are the social environment (e.g., income, education) and physical environment (e.g., air quality) factors and individual behaviour (e.g. whether an individual is smokes, takes alcohol) which affect the extent to which individuals benefit from available health services hence the eventual impact. Health outputs are transformed into health outcomes through this interplay (Kindig and Stoddart, 2003).

Health outcomes capture the specific results or by-products of the health system that are achieved in a country. They are the specific results that come out of the health system in a country thus captures the objective of the health sector in a country. Health outcomes include improved survival through reduction in mortality rates, reduced morbidity, improved equity in health provision, and improvement in quality of life. These therefore measure the extent of health service provision in a country. Improved health outcomes and equity therefore reflects the impact of the health system on the population. Due to challenges faced by fragile states in health provision, the health outcome indicators are normally worse than other countries.

The conceptual framework for health service delivery which is based on a modified framework for population health by Kindig and Stoddart (2003) is presented in Figure 2.

Figure 2: Framework for health system provision
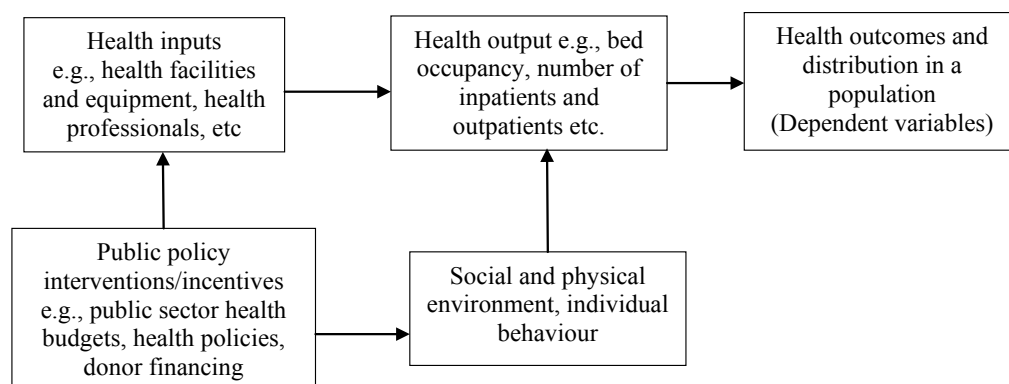
Source: Author's construction based on Kindig and Stoddart (2003).

The study considers child health as a measure of health service provision. Mosley and Chen (1984) categorize the determinants child health into environmental factors, maternal factors, nutritional status, injuries and personal illness control. These factors interact to determine child health and hence the status of health service delivery of children. The study is based on such general framework and more specifically used Rosenzweing and Schultz's (1983) analytical framework of child survival and health production to analyse child mortality. The Rosenzweing and Schultz (1983) model consider a household maximizing utility defined as

$$U = f(X, Y, H) \tag{1}$$

where X is a good that yields utility but has no effect on health, Y is health-related consumption good, and H is health status of the child. The child health production function is assumed to be a linear function and given as (Schultz, 1984).

$$H = f(Y, Z, K, \mu) \tag{2}$$

where Z is inputs that affect child health, K is health knowledge possessed by the household, and μ is child health endowment. The household choose Y in such a way that it maximizes the chances of child survival. However, maximization of child health also depends on household preferences, child health endowment, market prices, household wealth and physical environment (Schultz, 1984). The household therefore maximizes (1) given (2) subject to the budget constraint;

$$I = P_x X + P_y Y + P_z Z \tag{3}$$

where I is household income, P_x, P_y, and P_z are respectively the prices of consumption good that has no direct effect on health, the price of health-related goods, and price of child investment good.

Empirical model

A binary dependent variable model is used to examine the determinants of child mortality. The probability of either state occurring can be expressed as: $Prob(y = 1|\mathbf{x}) = G(\beta_0 + \mathbf{x}\beta)$, and $Prob(y = 0|\mathbf{x}) = 1 - G(\beta_0 + \mathbf{x}\beta)$, where $\mathbf{x} = x_1, x_2, \ldots\ldots\ldots\ldots\ldots, x_p$ (Wooldridge, 2016). To derive the logit model, we start

from an underlying latent variable model, y*, which is unobservable, and can be expressed as:

$$y^* = \beta_0 + \mathbf{x}\boldsymbol{\beta} + \varepsilon, y = 1[y^* > 0]$$

However, there is an indicator variable, y, which takes the value of 1 if $y^*>0$, and zero if $y^*\leq 0$. The error term is independent of **x** and has a standard logistic distribution (Wooldridge, 2016). The response probability for y is:

$$P(y = 1|\mathbf{x}) = (P(y^* > 0|\mathbf{x}) = P[\varepsilon > -(\beta_0 + \mathbf{x}\boldsymbol{\beta})|\mathbf{x}]$$

$$= 1 - G[-(\beta_0 + \mathbf{x}\boldsymbol{\beta})] = G(\beta_0 + \mathbf{x}\boldsymbol{\beta})]$$

The cumulative distribution function for a standard logistic variable is represented as:

$$G(z) = \frac{\exp(z)}{1 + \exp(z)} = \Lambda(X)$$

where G is between zero and one for all real numbers z (Wooldridge, 2016). The estimable logit model is therefore presented as:

$$logit(\pi_i) = log(\pi_i/(1 - \pi_i)) = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_p x_{pi} \qquad (4)$$

Equation 4 provides the log of the odds of mortality happening. From this, we get the predicted probability as a function of the linear predictor. Estimation of the logit model is done using the Maximum Likelihood (ML) approach. We use the penalised likelihood approach of Forth (1993) to estimate the logit model as this enables us to reduce the small sample bias that may arise from the classification of the dependent variable. The choice of variables used as determinants of child mortality is based on Mosley and Chen (1984) and include a measure of fragility.

Data and variables

The study is based on Zimbabwe Demographic Health Surveys ZDHS 2015. ZDHS 2015 covered a national representative sample of 9,955 women aged 15-49 and 8,396 men aged 15-54. A comparison of health indicators in ZDHS 2010-11 and ZDHS

2015 shows that under 5 mortality rate declined from 84 per 1,000 to 69 per 1,000 over the period, while infant mortality declined from 57 per 1,000 to 50 per 1,000. The nutritional status of the children also improved with the proportion of stunted children under age five declining from 32% to 27% between the two surveys. We use the Birth Recode file of the ZDHS 2015, which contains birth histories of all women interviewed, and data for the mother of each of the children. The variables used in the study and their measurement are presented in Table 1. The summary statistics are presented in Appendix Table A1.

Table 1:   Variables used in analysis of infant and child mortality

Variable	Coding categories	Description/definitions
Infant mortality	1: Infant related death;	A binary variable capturing the death of young children under one year old.
	0: Otherwise	
Child mortality	1: Child death; 0: Alive	A binary variable capturing the death of children between the ages of 1 and 5 years (i.e., from 12 months to 59 months).
Under-five mortality	1: Under-five related death;	A binary variable capturing the death of children aged below 5 years (i.e., 60 months and below).
	0: Otherwise	
Residence	1: Urban; 0: Rural	Place of residence
Gender	1: Male; 0: Female	Gender of the child
Age group	15-24; 25-34; 35-44; and 45-49	Age in completed years of the mother
	Categories coded 1 if true, 0 otherwise	
Mother's work status	1: Working; 0: Not working	Whether the mother is working or not
Education level	None; Primary; Secondary; Tertiary	Highest education level attained by the mother
	Categories coded 1 if level of education is true, 0 if not true	
Parity	Parity0 (none); parity1 (1-2); parity2 (3-4); parity3 (5-6+)	Number of living children a mother has including the current live birth or pregnancy
	Categories coded 1 if true, 0 otherwise	
Fragile	Range from 0 – 1. 0: Lowest fragility; 1: Highest fragility. Two measures are used:	Fragility index constructed from Afrobarometer data.
	• Fragile1 (Trust in institutions index)	Perceptions on trust in institutions (president, national assembly, elected local government, ruling party, police, and courts).
	• Fragile2 (Economic conditions index)	Perceptions on economic conditions (present economic condition, present living conditions, living conditions and country's economic conditions).

The mean values of the dependent variables in the descriptive statistics show that the proportion of events that occur (that is, occurrence of mortality) is low. The number of deaths recorded for infant, child and under five are 1048, 409 and 1486 respectively. In this case, use of logit would lead to coefficients which underestimate the probability of the event occurring since the statistical property of binary models are variant to the unconditional mean of the dependent variable (King and Zeng, 2001). We use a multivariate rare event logit regression method, the penalised likelihood approach of Firth (1993) which reduce small-sample bias in maximum likelihood estimation (Williams, 2018), to establish the net effect of the explanatory variables on the dependent variables[3] (infant, child and under-five mortality). In estimation of the models, we include a measure of fragility constructed using Round 6 Afrobarometer of 2014 to establish its effects on mortality.

Measures of fragility are calculated by modifying the framework of Baliki et al. (2017)[4] since we are using cross sectional data. Once an index of fragility is calculated, we get the mean index values of fragility by region. Since the samples of Afrobarometer 2014 and ZDHS are not similar, we use the regional mean fragility index with the ZDHS data by assuming that households in the same region experience the same level of fragility. This enables us to infer the extent of fragility at the regional level. Two measures of fragility are calculated; the first is based on responses on trust in institutions, and the second is based on people's perception on economic conditions.

We report the odds-ratios of the variables which captures the likelihood of infant, child and under-five mortality respectively. The coefficients of model estimation are presented in the appendix section.

5. Estimation results and discussion

Infant mortality

The infant mortality odds ratio results for penalised MLE are presented in Table 2, showing the probability of infant mortality. In each case, the odds ratio is interpreted in relation to the reference variable. The model specification test indicates a good model fit.

Education of the mother is statistically and significantly associated to reduction in infant mortality at all levels of education compared to those with no education. The odds ratio for infant mortality is reduced by a factor of 0.6, 0.4 and 0.2 for mothers who attained primary, secondary, and tertiary education respectively compared to those with no education. It is expected that educated women are well informed and thus seek pre-natal and antenatal care and have basic information to ensure the wellbeing of the infant. Grep and Bharadwaj (2015) find the effect of increased mother's education on child survival in Zimbabwe is through fertility and economic outcomes. Education is also related to income levels in most developing countries and therefore more educated women are likely to have a stable source of income and thus ability to access/pay for health care. More educated women with higher ability to pay for health services may access hospital facilities that offer better pre-natal and antenatal care compared to the less educated, leading to reduction in infant deaths for such women. The reduction in the likelihood of infant mortality occurring is much higher for women who have attained primary level of education showing the effect of basic education on infant mortality.

The place of residence, that is, whether one resides in urban or rural area, is significantly related to infant mortality. Odds ratio o-f infant mortality is reduced by a factor of 0.75 for those residing in urban areas compared to those who reside in rural areas. In most cases, urban areas tend to have better health facilities compared to rural areas hence providing access to quality health services. The gender of the child is also an important determinant of infant mortality. Being a male infant increases the odds ratio of infant mortality by 1.18, meaning male infants are likely to face higher mortality rates compared to female infants.

Table 2: Odds ratio for infant mortality (Penalised MLE): Dependent variable infant mortality

	Baseline	Trust in institutions	Economic conditions
Education: None (Ref)			
Primary	0.637*	0.638*	0.639*
	(-2.52)	(-2.51)	(-2.50)
Secondary	0.410**	0.409**	0.413**
	(-4.91)	(-4.92)	(-4.86)
Tertiary	0.200**	0.200**	0.202**
	(-6.30)	(-6.31)	(-6.27)
Residence: Rural (Ref)			
Urban	0.753**	0.742**	0.758**
	(-3.64)	(-3.66)	(-3.49)
Mother work status: Not working (Ref)			
Working	1.053	1.052	1.053
	(0.77)	(0.75)	(0.77)
Gender: Female (Ref)			
Male	1.184**	1.184**	1.184**
	(2.59)	(2.59)	(2.59)
Parity: 0 (Ref)			
1 - 2	0.023**	0.023**	0.024**
	(-12.70)	(-12.71)	(-12.68)
3 - 4	0.010**	0.010**	0.010**
	(-15.36)	(-15.36)	(-15.34)
5 - 6+	0.008**	0.008**	0.008**
	(-15.86)	(-15.87)	(-15.85)
Age group: 15-24 (Ref)			
25-34	1.697**	1.696**	1.694**
	(4.52)	(4.51)	(4.50)
35-44	2.311**	2.309**	2.307**
	(6.68)	(6.68)	(6.67)
45-49	1.681**	1.679**	1.678**
	(3.28)	(3.27)	(3.27)
Fragility measure		1.256	0.665
		(0.62)	(-0.48)
Constant	4.542**	4.170**	5.756**
	(4.35)	(3.83)	(2.90)
No. of Obs.	20791.00	20791.00	20791.00
Wald chi-square	399.29(0.00)	399.76(0.00)	399.32(0.00)
Specification	416.85(0.00)	416.81(0.00)	417.54(0.00)

Note: z statistics in parentheses. Significance levels at 1% and 5% are indicated by ** and * respectively. For specification test the probabilities are in parentheses.

Parity has a statistically significant effect on infant mortality. The odds ratio of infant mortality is reduced by a factor of 0.02 by having 1-2 children compared to those with no child and by a factor of 0.01 by having 3-4 children. The results show increased levels of infant mortality risk at higher parity. Age of the mother was statistically and significantly associated with infant mortality. The odds of infant mortality are increased by a factor of over 1.7 for being in either of the age groups other than the age group 15-24. Being in the age group 25-34 has an odds ratio of about 1.7. The change in the odds ratio increases as one moves to a higher age group, showing the fact that the likelihood of infant mortality increases with the age of the mother. From the results, an increase in infant mortality is expected with advancement in age of women. While women of advanced age maybe well informed and able to handle infants well, the likelihood of their infants dying before their first birthday is high.

Considering the variable of interest, we established that the measure of fragility was not statistically significant in determining the probability of infant mortality though it has the expected sign when fragility is measured using trust in institutions. While fragility in itself may be an issue as regards health provision and access, the type of fragility did not have any impact on infant mortality. We observe that this may be based on the nature of fragility experienced in Zimbabwe (presented in section two of this report) which may not have affected health infrastructure and hence infant mortality. This observation can be supported by perceptions of the key informant interviews that the effect of the crisis on the health sector in did not include destruction of health infrastructure.

According to the information gathered from the key informant interviews, while the economic collapse had a negative impact on government revenue and led to cuts in budget allocations to the health sector, health sector financing in Zimbabwe now heavily relies on donor funding. Such donor funding included United Nations agencies and bilateral donors as well as private sector like mission hospitals, which ensured that certain aspects of health care were not affected by the crisis. There was consensus among the participants that the crisis increased the cost of health services with the private sector playing a significant role in the provision of specialized care. Some responses from the key informant interviews further illustrate the fact that the health sector in the country survived the crisis partly because of the critical role played by bilateral and multilateral funding agencies and also the Non-Governmental Organisations:

> *"Bilateral/multilateral institutions were key as they provided resources to procure medicines/vaccines, rehabilitated health facilities and built new health facilities among other key activities".*

> *"One can say that the private health institutions and Mission hospitals have played a great role and contributed much".*

From secondary information, the main health indicators do not show negative developments during the period of study. According to the Zimbabwe Demographic and Health Survey 2015 (Zimbabwe National Statistics Agency and ICF International, 2016), the Under-5 mortality shows a downward trend, declining from 84 deaths per 1,000 live births in 2010-11 period to 69 deaths per 1,000 live births in 2015. Similar patterns are observed for infant mortality rates. Infant mortality shows a steady decline from 65 deaths per 1,000 live births in 1999 to 57 in 2010-2011 to 50 deaths per 1,000 live births in 2015. The 2015 DHS further shows that 76% of all the children aged between 12-23 months received all basic vaccinations, an increase from 65% in the year 2011.

Other factors likely to affect the outcome in terms of infant mortality include the place of delivery as well as skilled assistance during delivery. The Zimbabwe DHS 2015 results show that while institutional deliveries were 65% during the 2010-2011 period, this increased to 77% in 2015. On the other hand, home deliveries declined 34% to 20% during the same period. Skilled assistance to deliveries increased from 66% in 2010-2011 to 78% during the 2015 period (Zimbabwe National Statistics Agency and ICF International, 2016). At the same time, among the newborns in the two years before the 2015 DHS survey, 73% received post-natal checks within two days as recommended

Child mortality

It is important to consider child heath when looking at health service provision. In a fragile state, the provision and quality of care becomes an issue, and this has an effect on child health. In establishing whether fragility has influenced child health in Zimbabwe, we consider the correlates of child mortality (a measure of quality of health) using ZDHS 2015. The odds ratio of child mortality is presented in Table 3. The model specification test shows that the models are well specified. Several factors are associated with child mortality: mother's highest education level, age of the mother, gender of the child, and parity.

Mother's education level has a significant but inverse relation to likelihood of child death. Only children of mothers with secondary and tertiary education face a significant reduction in likelihood of child mortality. Having secondary education decreases the odds of child death by 0.48 while that of tertiary education reduces odds ratio of child death by 0.08. This shows that the likelihood of child mortality is lower for adults with secondary and tertiary education compared to those with no education. The type of residence is statistically significantly associated with child mortality. Residing in an urban area reduces the odds of child death by between 0.54 and 0.56. Urban areas have better health facilities and infrastructure hence the likelihood of child death is lower in such situations compared to those in rural areas. This means that children raised in urban areas get better care compared to those in rural areas, hence less mortality.

We also find that mother's work status is important in determining the child death. The odds of child death increase by about 1.4 for mothers who are working

compared to non-working mothers, implying an increase in the risk of child death for employed mothers. This finding is in line with those of Kishor and Parasuraman (1998) for India and Shahraki et al. (2016) for Iran. As established by Shahraki et al. (2016), the possibility of low birth weight among children borne of employed mothers' increases due to malnutrition. While it is expected that working mothers have a source of income and thus can provide care for the child, this is not the case. Being in employment reduces the amount of time a mother spends with the child as the child is left under the care of someone else, hence this may affect the quality of childcare. This therefore increases the likelihood of deaths for such children.

Parity is also significantly related to child mortality, with the odds of child mortality declining with parity. In this case, odds of child death declines by 0.12 for parity 1-2, and by 0.05 and 0.03 for parity 3-4 and parity 5 and above respectively. The likelihood of child deaths therefore reduces with parity though the effect declines for higher levels of parity.

Age is an important determinant of child mortality. The age of the mother is statistically and significantly associated with child mortality. The likelihood of child death increases as a mother moves from a lower age group to a higher age group. The odds ratio of child death increases by a factor of 3 for mothers in the age group 25-34, by 5.4 for mothers in age group 35-44, and by 5.5 for those in age group 45-49.

Table 3: Odds ratio for child mortality (Penalised MLE): Dependent variable child mortality

	Baseline	Trust in institutions	Economic conditions
Education: None (Ref)			
Primary	0.800	0.798	0.819
	(-0.82)	(-0.82)	(-0.73)
Secondary	0.478**	0.480**	0.498*
	(-2.65)	(-2.64)	(-2.50)
Tertiary	0.076**	0.076**	0.079**
	(-4.68)	(-4.68)	(-4.61)
Residence: Rural (Ref)			
Urban	0.539**	0.548**	0.564**
	(-4.84)	(-4.54)	(-4.41)
Mother work status: Not working (Ref)			
Working	1.366**	1.368**	1.374**
	(3.02)	(3.03)	(3.07)
Gender: Female (Ref)			
Male	1.096	1.096	1.097
	(0.91)	(0.91)	(0.92)

Table 3 Continued

	Baseline	Trust in institutions	Economic conditions
Parity: 0 (Ref)			
1 - 2	0.115**	0.116**	0.118**
	(-6.49)	(-6.47)	(-6.38)
3 - 4	0.049**	0.049**	0.050**
	(-9.04)	(-9.03)	(-8.94)
5 - 6+	0.029**	0.029**	0.030**
	(-10.19)	(-10.17)	(-10.07)
Age group: 15-24 (Ref)			
25-34	2.991**	2.994**	2.961**
	(4.74)	(4.74)	(4.69)
35-44	5.378**	5.382**	5.310**
	(7.09)	(7.09)	(7.03)
45-49	5.487**	5.495**	5.445**
	(6.40)	(6.40)	(6.37)
Fragility measure		0.772	0.067
		(-0.44)	(-1.96)*
Constant	0.158**	0.174**	0.747
	(-3.98)	(-3.43)	(-0.32)
No. of Obs.	20791.00	20791.00	20791.00
Wald chi-square	221.10(0.00)	221.04(0.00)	224.33(0.00)
Specification	212.27(0.00)	212.45(0.00)	214.84(0.00)

Note: z statistics in parentheses. Significance levels at 1% and 5% are indicated by ** and * respectively. For specification test the probabilities are in parentheses.

Just as in the case of infant mortality, the measure of fragility was not statistically significant in determining the probability of child mortality using economic conditions as a measure of fragility. However, it is statistically significant when fragility is measured by economic conditions with unexpected sign and very low effect. This fragility measure was generated from individual perceptions about living and economic conditions. Thus, this again may be related to the nature of fragility experienced in Zimbabwe. Information from the ZDHS 2015 shows that child mortality in the country declined from 99 per 1,000 live births during the period 2005-2010 to 69 during the period 2010-2015. At the same time, under five mortality rate dropped from 84 per 1,000 live births to 69 per 1,000 live births in 2015.

The results for estimation using under-five mortality (Table 4) are like those of infant and child mortality with odds ratios which are not materially different. This shows that the determinants of child health are the same. From the under-five mortality regression, fragility increases the odds of under five deaths, though not statistically significant as in the previous regressions.

According to the Zimbabwe DHS (Zimbabwe National Statistics Agency and ICF International 2016), the under-5 mortality rate was 92 per 1,000 live births in the rural areas, compared to 60 per 1,000 live births in the urban areas during the period preceding the survey showing variation in mortality by residence. The under-five and child mortalities also seemed to be lower at higher household wealth levels, with the lowest quantile having the highest under-5 and child mortality at 102 and 37 respectively, compared to the highest quantile with under-5 and child mortalities of 52 and 9 respectively over the same period. A plausible explanation for this can be found in the effect of fragility on government expenditure on health.

The poverty income consumption and expenditure survey by Zimbabwe Ministry of Health and Childcare (2016) showed that 50.5% of the extremely poor and 43.3% of the non-poor households' access health services through public facilities. This contrasts with 8% of the extremely poor households and 18.8% of the non-poor household who access health services through private facilities. Majority of the poor therefore depended more on public health facilities. Hence as a result of the reduction in government health budgets, the poorest households therefore appear to have been mostly affected by the budgetary cuts in the health sector.

Table 4: Odds ratio for under five mortality (Penalised MLE): Dependent variable under five mortality

	Baseline	Trust in institutions	Economic conditions
Education: None (Ref)			
Primary	0.669**	0.669**	0.676**
	(-2.64)	(-2.63)	(-2.56)
Secondary	0.417**	0.417**	0.425**
	(-5.65)	(-5.64)	(-5.51)
Tertiary	0.151**	0.151**	0.154**
	(-8.22)	(-8.22)	(-8.14)
Residence: Rural (Ref)			
Urban	0.652**	0.652**	0.666**
	(-6.31)	(-6.07)	(-5.89)
Mother work status: Not working (Ref)			
Working	1.147*	1.147*	1.149*
	(2.40)	(2.40)	(2.43)
Gender: Female (Ref)			
Male	1.164**	1.164**	1.164**
	(2.73)	(2.73)	(2.73)

Table 4 Continued

	Baseline	Trust in institutions	Economic conditions
Parity: 0 (Ref)			
1 - 2	0.005**	0.005**	0.005**
	(-9.55)	(-9.55)	(-9.55)
3 - 4	0.002**	0.002**	0.002**
	(-11.12)	(-11.11)	(-11.11)
5 - 6+	0.001**	0.001**	0.001**
	(-11.72)	(-11.72)	(-11.71)
Age group: 15-24 (Ref)			
25-34	2.125**	2.124**	2.116**
	(6.94)	(6.94)	(6.90)
35-44	3.233**	3.232**	3.218**
	(10.25)	(10.25)	(10.21)
45-49	2.690**	2.690**	2.682**
	(7.22)	(7.22)	(7.20)
Fragility measure		1.014	0.294
		(0.04)	(-1.66)
Constant	26.430**	26.274**	53.973**
	(5.64)	(5.51)	(-5.52)
No. of Obs.	20791	20791	20791
Wald chi-square	461.31(0.00)	461.24(0.00)	463.66(0.00)
Specification	473.64(0.00)	473.64(0.00)	479.48(0.00)

Note: z statistics in parentheses. Significance levels at 1% and 5% are indicated by ** and * respectively. For specification test the probabilities are in parentheses.

This is further corroborated by information from the key informant interviews where 50% of the respondents indicated that one of the key channels through which the health sector was affected by the crisis was financially. According to the respondents, this affected access to high quality services in public facilities while at the household level, the financial crisis meant that households prioritised purchase of food rather than paying for health services. The other result was the overreliance of the health sector on international development partners to finance it.

The ZDHS 2015 further shows that infant mortality, child mortality and under-5 mortality seem to vary with the level of education of the mother. These mortalities are highest with the mother's education being primary and lowest for mothers with more than secondary education. It therefore appears that fragility in the country did not affect everybody equally.

Other factors which can explain the results include certain aspects of maternal health. In terms of antenatal coverage, the 2015 ZDHS results show that 93% of the

women aged 15-49 who gave birth in the five years before the survey received antenatal care from skilled provider. At the same time 77% of live births in the period took place in a health facility, while 73% of the new-borns received post-natal check up in the first two days after delivery. These factors contribute to improved health for both infants and children. From the key informant interviews, it was further observed that one of the key policy measures in the health sector in the country during the crisis period was to improve access to healthcare for pregnant women, a move that was likely to reduce both infant and child mortality.

6. Summary and emerging conclusions

We have examined the determinants of infant, child and under-five mortality in Zimbabwe using ZDHS 2015 using multivariate rare event logistic regression analysis. The aim of the study was to establish how state fragility affects health service provision and leads to deterioration in quality of health. From the introduction section, we noted that state fragility was initially high in Zimbabwe before 2015 though improved thereafter. Fragility was mainly manifested through political and economic instability. We found that mother's education level, residence, gender of the child, parity and mother's age were significantly associated with infant, child and under-five mortality.

Measures of fragility are found not to be statistically significant, whether measured by trust in institutions or economic condition. We observe that this result could mainly be attributed to the nature of fragility experienced in the country. While macroeconomic and political instability negatively affected government's contribution to the health sector, it did not affect health infrastructure and the contribution by other stakeholders to the health sector, possibly due to the robust health infrastructure which the country built over the years. We therefore conclude that the nature of fragility has a role in determining its effect on the delivery of health services in the country.

Among the key issues identified by key informants as ways through which health sector services can be improved focused on economic, social and human capital aspects. These are introduction of a better funding model to increase health financing, put in place strategies to enhance preventive programs, involvement of private sector in health service provision through public-private partnerships, addressing staff shortages and putting in place measures that improving health staff retention.

The government should also consider making further investments in health infrastructure especially in poor urban communities and rural areas where both quantity and quality of health facilities are still inadequate. Investments in improving the conditions of living in poor urban areas and in rural areas will also improve health outcomes as the it has been established that mortality is influenced by the residence of the mother, with higher rates in the case of women in rural areas.

Notes

1. Bold, T. Collier, P and Zeitlin, A. (2009). `The Provision of Services in Fragile States: Independent Service Authority as a New Modality'. Centre for the Study of African Economies, University of Oxford

2. Health outcomes have been linked to politics with arguments that politics define the policies followed and this has an effect on health outcomes (Navarro et al., 2006). Specifically, they find that policies aimed at reducing social inequalities affect infant mortality and life expectancy at birth.

3. A bias adjusted approach of King and Zeng (2001) also address the small-sample bias in maximum likelihood estimation. The results from King and Zeng (2001) and Firth (1993) approaches were similar, hence we only report results based on Firth (1993) approach.

4. Baliki et al. (2017) measure fragility at the micro-level through individuals' experiences of manifestations of fragility, termed as "exposure to fragility", focusing on state functions and institutional capacities. The fragility exposure index is $FEI_{it} = 100 \times \text{Norm}(D_{it})$, where $D_{it} = Norm(\sum_{j=1}^{N} X_{ijt}) + Norm(\sum_{j=1}^{M} Y_{ijt}) + Norm(\sum_{j=1}^{O} Z_{ijt})$, and X, Y and Z represent the three domains of human security, economic inclusion and social cohesion. Normalisation is achieved by $X_{it} = \frac{x_{ijt} - \min (x_{ijt})}{\max (x_{jt}) - \min (x_{jt})}$, and i, j and t denote individual, sub-indicator and time period. The Afrobarometer survey was not designed to capture fragility, hence we develop fragility measure focusing only on trust in institutions and economic conditions aspects captured by the data.

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Appendix

Table A1: Summary statistics of the variables

Variable	Number	Mean	S.D.	Min	Max
Infant mortality	20791	0.050	0.219	0	1
Child mortality	20791	0.020	0.139	0	1
Under five mortality	20791	0.071	0.258	0	1
Age group: 15-24	20791	0.111	0.314	0	1
25-34	20791	0.385	0.487	0	1
35-44	20791	0.386	0.487	0	1
45-49	20791	0.118	0.322	0	1
Gender: male	20791	0.503	0.500	0	1
Marital status: never married	20791	0.026	0.160	0	1
married/living with partner	20791	0.816	0.388	0	1
widowed/divorced/separated	20791	0.158	0.365	0	1
Education: no education	20791	0.023	0.150	0	1
primary	20791	0.337	0.473	0	1
secondary	20791	0.577	0.494	0	1
tertiary	20791	0.063	0.242	0	1
Residence: urban	20791	0.364	0.481	0	1
Mother's work status	20791	0.477	0.499	0	1
Parity: parity0 [0]	20791	0.003	0.057	0	1
parity1 [1&2]	20791	0.295	0.456	0	1
parity2 [3&4]	20791	0.451	0.498	0	1
parity3 [5&6+]	20791	0.251	0.434	0	1
Fragile1	20791	0.413	0.098	0.283	0.619
Fragile2	20791	0.602	0.040	0.556	0.672

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