JPRM
Journal of Preventive and Rehabilitative Medicine

2021; 3(1): 104-113
PublishedOnline:01/10/2021
(https://journals.unza.zm/index.php?journal=medicine)
DOI: 10.21617/jprm2021.326

ISSN: 2415-038X (Print)

ORIGINAL ARTICLE Open Access

Effects of Direct Healthcare Financing on Strategic Health Indicators in Rural Health Facilities of Chikankata District of Zambia: 2014 – 2018

Webby E. Phiri[1] Fredrick Mulenga Chitangala[2*]

[1]Department of Business studies , Graduate School of Business, University of Lusaka, Lusaka, Zambia [2]Department of Public Health, School of Medicine and Health Sciences, , University of Lusaka, Lusaka, Zambia.

*Corresponding author: fredmc@chitangala.org

Abstract

To cite: Phiri WE, Chitangala FM,. Effects of Direct Healthcare Financing on Strategic Health Indicators in Rural Health Facilities of Chikankata District of Zambia: 2014 – 2018. JPRM 2021, 3(1): 104-113. doi: 10.21617/jprm2021.326

Healthcare financing is the process of utilizing financial inputs necessary for health interventions. Health facilities do not routinely access the monthly government grant due to challenges in the access and utilization process. It is unclear if the lack of grant receipt affects strategic health indicators and thus access quality healthcare provision in rural Zambia. This study aimed at investigating the effect of funding access on health facility performance. The study analyzed data for 15 health facilities in Chikankata district from 2014 to 2018. Data was collected from the health management information system and analyzed against accounting records to determine if facilities performed better in antenatal care, Immunization and Institutional deliveries when they received their monthly grants. Grant receipt had a statistically significant (p=0.04) association with performance in maternal and child health indicators, measured by a mean composite score OR 1.46, 95% CI [1.03, 2.08]. The association between grant receipt and indicator performance was most significant on institutional deliveries OR 1.75, 95% [1.13, 2.73]. Grant receipt by the facilities was associated with an improvement in maternal and child health indicators. This demonstrates the need for effective healthcare financing mechanisms that consider the monthly grant in improving performance by facilities. Performance Based Financing mechanisms should however be combined with direct financing mechanisms to holistically improve primary healthcare. The implications of these findings are that as much as practical, funding disbursement modalities must ensure that all health facilities receive some funding.

Keywords: *Direct health care financing, strategic health indicators, rural health facilities*

JPRM
Journal of Preventive and Rehabilitative Medicine

Received: *27 November 2020* ***Accepted:*** *04 December 2020* ***Published:*** *1 January 2021*

INTRODUCTION

Healthcare financing is an aspect of the healthcare system where financial resources are utilised as inputs necessary for health interventions [1]. The world has committed to universal health coverage, which strives to afford equitable and quality healthcare to all people, regardless of their ability to pay [2]. Health financing is one of the six building blocks of a good health system. The other building blocks include service delivery, healthy workforce, information, medical products, including vaccines and technologies, as well as leadership and governance [3].

Health financing involves revenue collections, pooling of resources and purchasing of health services from the providers who are the health facilities and staff [5]. These stages ensure that financing is made available, equitably distributed and efficiently used in providing healthcare services to the population. The predominant funding mechanism in most of the low and middle-income countries is direct financing, used for salaries and grants, without linkage to performance and this does not readily stimulate performance improvement [5]. The WHO, acknowledges the central role played by healthcare financing in health systems strengthening [1].

"…the purpose of health financing is to make funding available, as well as to set the right financial incentives to providers, to ensure that all individuals have access to effective public health and personal health care" [1]

The Ministry of Finance (MoF) in Zambia is the main body responsible for coordinating public financial management [6]. The Government of the Republic of Zambia, through the MoF, raises funding for health from total government revenue, including taxes [7]. Healthcare facilities then receive direct funding from the government, through the MoF, as a monthly grant meant for operations. Healthcare workers are paid fixed salaries directly from the MoF. There is no additional revenue from user fees, which were abolished in 2006 [8].

Although a trial of results-based financing in Zambia showed an improvement in health system performance [9], the health system still relies on input financing. Some authors have advocated for the universal adoption of RBF, while other authors suggest that empirical evidence in support of results-based financing is insufficient and encourage further research [10].

Rural Health facilities in Zambia receive monthly grants from the MoF, through the District Health Office (DHO) after meeting specific conditions as outlined in Figure 1.

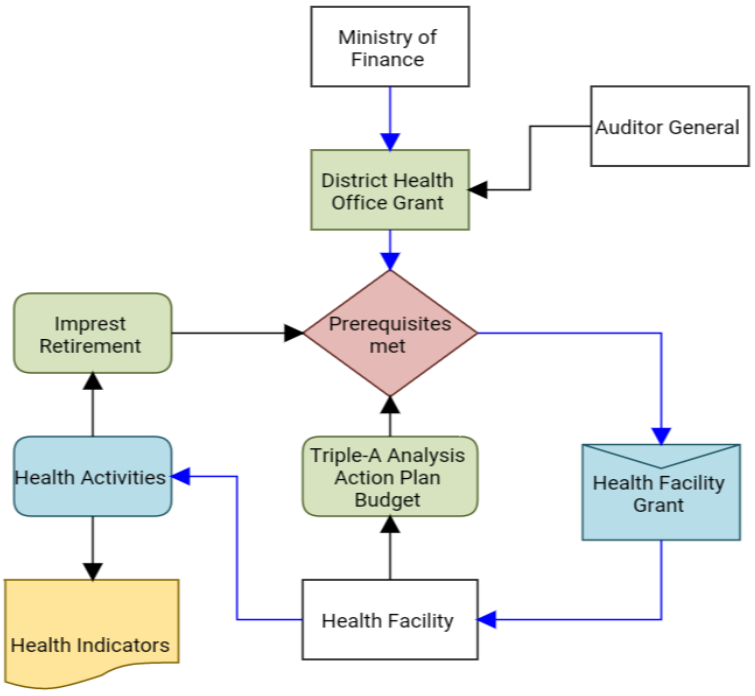

Figure 1: Flow of funding from Ministry of Finance to the Health Facilities via District Health Office.

For a health facility to receive its monthly grant, three conditions have to be met:

1. District Health Office must have funding received from Ministry of Finance
2. Health Facility must have retired imprest
3. Health Facility must produce Triple A analysis, Updated Action Plan and Budget

Despite health facilities accessing funding, there seems to be a marginal improvement in health indicator performance [9]. An assertion can, therefore, be drawn that the generally poor health facility performance might be caused in part by the way they access grants. Once funding is accessed, the health facility can then conduct health activities which are then measured via performance indicators.

Health facility performance is often analyzed from an indicator perspective only, without incorporating financial and human resource information. Most health facilities do not routinely access the monthly grant, due to challenges in the grant access and utilization process. In an ideal situation, health facilities should access an equitable grant each month, and retire it according to government procedures. In the current case in Zambia, the health facilities do not receive the funding consistently. When they do, it is not correlated to performance indicators as the current platforms do not integrate this information for analysis. Thus, there is no information to provide feedback to managers and policy makers about the effectiveness and efficiency of the current financial management policies and subsequently no incentive for better usage of finances to stimulate performance. It is unclear if grant access directly affects strategic health indicators, and thus, community access to quality healthcare in rural Zambia. The government continues to disburse funding in the traditional input financing modes, without analytical reviews thus risks financial inefficiency in a resource-constrained health system. This study investigated the effects of funding access on health facility performance, as current systems do not correlate financial information with health management information systems.

METHODS AND MATERIALS

This was a retrospective longitudinal study, analysing data for 15 Health Facilities in Chikankata District from January 2014 to December 2018. The target population was all 23 Health Facilities in Chikankata District. This study analyzed data for 15 health facilities in the district from January 2014 to December 2018. Sixty months of data were collected per health facility, resulting in 900 months of observation for the study. Census sampling was used; all health facilities that were operational in Chikankata District and satisfied the inclusion/exclusion criteria were included in the study. Data was collected by the researcher from the Ministry of Health, Health Management Information Systems (HMIS) administrative databases using a Microsoft Excel data entry sheet. Population data was also collected from the HMIS.

The accounting information was collected through a template by the District Accountant, using accounting records to ascertain grant disbursement data. Human Resources files and establishment details were used to collect information regarding staff placements over the five years. Information was collected by the Human Resource Management Officer at Chikankata District Health Office. Similarly, distances to health facilities were determined by official records from the Transport Officer at Chikankata District Health Office. No identifiable staff or patient information were collected as part of the study. A Microsoft excel was used to extract and organize the data from the database. STATA version 15 was used. The data reflected standard performance indicators which have standard case definitions. The same definitions were used by all health facilities, according to the national standards. Data was independently verified by the Health Information Officer from the HMIS

RESULTS

This study investigated the effects of direct healthcare financing on strategic health indicator performance in rural health facilities of Chikankata District from 2014 to 2018. The study considered facility remoteness, catchment population, staffing levels on the relationship between grant access and facility performance.

Health Facility Staffing, Geographical and Population distribution of the health facilities

Riverside RHC is closest to DHO situated 3km away, whereas Chikombola is the furthest facility, situated 90km from DHO. Facilities located 30km or further from DHO were twice as likely OR 2.13 95% CI [1.60, 2.85] to have a population of 3,800 or more people and this was statistically significant ($p < 0.01$). Most facilities had an improvement in the number of health workers except Cheeba RHC and Chikani RHP that had the same level of staffing over the five-year study period. Nansenga RHC had the most remarkable improvement in staffing, from only five in 2014 to 20 in 2018.

Effect of grant receipt on 1st ANC Coverage

In table 1. there was no statistically significant effect of the grant access or amount on 1st ANC coverage. Facilities located 30km or more from DHO were 1.93, 95% CI [1.39, 2.68] times more likely to have higher performance in 1st ANC

coverage ($p < 0.01$) than facilities located within 30km.

Table 1: Effect of grant receipt on 1st ANC coverage analysed using Mantel-Haenszel Odds Ratios

	OR	[95% Conf. Interval]		P
Grant Receipt				
Yes	1.15	0.77	1.72	0.5
Grant Amount				
< K1,600	1.43	0.8	2.53	0.23
K1600 +	0.98	0.58	1.65	0.93
Distance				
30km or more	**1.93**	**1.39**	**2.68**	**0**
Catchment Population				
3800 or more	1.1	0.79	1.52	0.58
Staffing Level				
Two staff	1.36	0.9	2.05	0.14
Three or more staff	1.31	0.88	1.95	0.19

Effect of grant receipt on 1st ANC before 14 weeks coverage

There was no statistically significant effect of the grant on 1st ANC before 14 weeks coverage. However, facilities located 30km or more from DHO were 32%, less likely 95% CI [6%, 52%], to have high 1st ANC before 14 weeks (p = 0.02). Facilities having three or more staff where twice as likely to have high performance OR 2.04, 95% CI [1.32, 3.15]. When both distance and staffing were analyzed, the combined model showed that facilities located 30km or more were 38% less likely 95% CI [13%, 56%] to have high performance. Having two staff OR 1.88, 95% CI [1.16, 3.04] or three or more staff OR 2.15 [1.38, 3.33] were both associated with a statistically significant increase in indicator performance ($p \leq 0.01$). See table 2.

Table 2: Effect of grant receipt on 1st ANC before 14 weeks coverage analysed using Mantel-Haenszel Odds Ratios and Logistic Regression Analysis

	Univariate analysis				Multivariate analysis			
	OR	P	[95% Conf. Interval]		OR	P	[95% Conf. Interval]	
Grant Receipt								
Yes	1.35	0.15	0.9	2.05				
Grant Amount								
< K1,600	1.13	0.7	0.6	2.14				
K1600 +	1.51	0.1	0.92	2.5				
Distance								
30km or more	**0.68**	**0.02**	**0.48**	**0.94**	**0.62**	**0.01**	**0.44**	**0.87**
Catchment Population								
3800 or more	0.72	0.08	0.5	1.04				
Staffing Level								
Two staff	1.58	0.05	1	2.51	**1.88**	**0.01**	**1.16**	**3.04**
Three or more staff	**2.04**	**0.0**	**1.32**	**3.15**	**2.15**	**0**	**1.38**	**3.33**

Effect of grant receipt on Institutional Deliveries

Health facilities were 1.79 times more likely 95% CI [1.18, 2.70] to have higher performance on institutional deliveries when they received the grant ($p = 0.01$). A higher grant amount (K1,600+) was associated with a 1.86 times 95% CI [1.13, 3.09] higher likelihood of high institutional deliveries indicators ($p = 0.02$). Grant receipt was associated with a 1.79 times higher likelihood 95% CI [1.13, 2.73] of higher institutional deliveries performance. With a catchment population of 3800 or more, health facilities were 6.17 times more likely 95% CI [3.77, 10.09] to have higher performance on institutional deliveries rate ($p < 0.01$). Having three or more staff was associated with higher likelihood OR 2.78, 95% CI [1.76, 4.41] of higher institutional deliveries performance. See table 3.

Table 3: Effect of grant receipt on Institutional Deliveries analysed using Mantel-Haenszel Odds Ratios and Logistic Regression Analysis

	Univariate analysis				Multivariate analysis			
	OR	***P***	**[95% Conf. Interval]**		**OR**	***P***	**[95% Conf. Interval]**	
Grant Receipt								
Yes	**1.79**	**0.01**	**1.18**	**2.7**	**1.75**	**0.01**	**1.13**	**2.73**
Grant Amount								
< K1,600	1.67	0.1	0.91	3.09				
K1600 +	1.86	0.2	1.13	3.09				
Catchment Population								
3800 or more	**5.34**	**0**	**3.61**	**7.9**	**6.17**	**0**	**3.77**	**10.09**
Staffing Level								
Two staff	1.19	0.51	0.71	2.01	**0.46**	**0.02**	**0.24**	**0.86**
Three or more staff	**2.78**	**0**	**1.76**	**4.41**	0.78	0.42	0.42	1.44

Effect of grant receipt on fully immunized under 1 coverage

As Table 4 shows, there was no significant association between grant receipt and performance on fully immunized under 1. It would still be difficult to assume performance was due to the grant, even if there was an association. Health facilities with a catchment population of 3,800 or more were 45% less likely 95% CI [20%, 62%] to perform higher on fully immunized under 1. Multivariable analysis was not performed for this indicator as there was only one significant finding in the univariable analysis.

Table 4: Effect of grant receipt on fully immunised under one coverage analysed using Mantel-Haenszel Odds Ratios

	OR	**[95% Conf. Interval]**		***P***
Grant Receipt				
Yes	1.09	0.71	1.65	0.7
Grant Amount				
< K1,600	0.92	0.48	1.76	0.79
K1600 +	1.21	0.72	2.01	0.47
Distance				
30km or more	0.84	0.61	1.17	0.31
Catchment Population				
3800 or more	**0.55**	**0.38**	**0.8**	**0**
Staffing Level				
Two staff	1.18	0.78	1.78	0.44
Three or more staff	1.02	0.68	1.52	0.94

Effect of Grant on the Composite Score

Health facilities were 1.49 times more likely 95% CI [1.05, 2.11] to score high on the composite score when they received the grant (p

= 0.02). A higher grant amount (K1,600+) was not associated with a statistically significant increase in high performance on the composite score. However, a grant of less than K1,600 was associated with a statistically significant ($p = 0.03$) increase in likelihood of a higher composite score OR 1.8, 95% CI [1.07, 3.02]. Distance of 30km or more from DHO and Catchment population of 3800 or more were both associated with a statistically significantly higher likelihood of a higher composite score ($p < 0.05$). These two factors however were not associated with a statistically significant effect in the multivariable model.

After adjusting for catchment population, distance to DHO and staffing, health facilities had a 1.46 times higher likelihood 95% CI [1.03, 2.08] of a high composite score ($p = 0.04$). Having two or more staff was associated with a higher likelihood of a high composite score ($p \leq 0.01$). Having two staff had an OR of 1.91 95% CI [1.31, 2.79], whereas having three or more staff had an OR of 1.75, 95% CI [1.19, 2.58]. See Table 5.

Table 5: Effect of grant receipt on the composite score analysed using Mantel-Haenszel Odds Ratios and Logistic Regression Analysis

	Univariate Analysis				Multivariate Analysis			
	OR	***P***	**[95% Conf. Interval]**		**OR**	***P***	**[95% Conf. Interval]**	
Grant Receipt								
Yes	**1.49**	**0.02**	**1.05**	**2.11**	**1.46**	**0.04**	**1.03**	**2.08**
Grant Amount								
< K1,600	**1.8**	**0.30**	**1.07**	**3.02**				
K1600 +	1.32	0.21	0.86	2.03				
Distance								
30km or more	**1.32**	**0.04**	**1.01**	**1.72**	1.12	0.42	0.85	1.49
Catchment Population								
3800 or more	**1.77**	**0.0**	**1.34**	**2.34**	1.36	0.06	0.98	1.88
Staffing Level								
Two staff	**2.23**	**0.0**	**1.57**	**3.17**	**1.91**	**0**	**1.31**	**2.79**
Three or more staff	**2.13**	**0.0**	**1.52**	**2.99**	**1.75**	**0.01**	**1.19**	**2.58**

DISCUSSION

Overall, this study demonstrated a difference in Maternal and Child Health (MCH) indicator performance when health facilities accessed the grants, compared to when they did not. Although the performance was invariably affected by factors such as facility remoteness, catchment population and staffing levels, some performance improvement was noted with receipt of the monthly grants. Understanding this finding has important implications for the functionality of the Zambian health care system. The current health systems do not readily integrate this information, and thus this study has provided some perspectives that have previously been unexplored.

Chikankata district health office recorded a notable improvement in the key maternal and child health indicators over the five-year period 2014-2018. The composite score, which was derived as a mean of the four study indicators, showed a positive trend, implying an overall improvement in the key maternal and child health indicators for the health facilities. MCH forms quite a significant component of primary healthcare provision, and thus the basis of the four indicators picked for this study.

Effect of the grant on indicator performance

The most significant association observed between grant receipt and indicator performance was on the rate of institutional deliveries. While institutional deliveries are largely influenced by demand side factors, supply side factors such as a motivated workforce and supplies status which need funding [10]. When facilities received the grant, they were 1.75 times more likely to score a higher coverage in institutional deliveries. This finding has a very important implication. In the recent years, Zambia has strongly dedicated to improving maternal mortality through safe motherhood, which

includes institutional deliveries. When health facilities receive their grant, they use some of the funds to procure facility supplies such as cleaning materials, which possibly this translates into more hospitable and inviting delivery environments for the pregnant women as demonstrated in India and Nigeria [12] [13]. The finding shows that the grant seems to exert a pull effect on the pregnant mothers to deliver at the health facility. Therefore, this exemplifies potential impact of institutional service quality on health seeking behaviors. It was even further shown that a higher grant amount had an even higher likelihood of leading to more institutional deliveries.

Receipt of the grant did not have a statistically significant effect on the other maternal health indicators: 1st ANC, 1st ANC before 14 weeks and fully immunized under one coverage. There was some statistically insignificant increased likelihood of higher performance with the grant in these three indicators, however there would be need for a larger study to be conducted to investigate these associations further. This finding agrees with other studies that have not demonstrated strong evidence for PBF in improving maternal health indicators [14]. The three described ANC and immunization indicators influenced quite extensively by the level of outreach services and is also considerably affected by campaigns such as the Child Health Week, which boost the numbers recorded through the routine immunization services [15]. The finding of insignificance however appears paradoxical, as the grant would be expected to be used for outreach purposes, such as paying meal allowances for staff and procurement of fuel, thus improving indicator performance. An alternative explanation could also provide that partner support for outreach services could have dampened the observed effect of the grant on ANC and immunization coverage.

Effect of the Grant on the Composite Score

The composite score was derived to provide a general measure of performance, through a mean of the four maternal and child health indicators studied as influence on MCH indicators is multifactorial [16]. This indicator is non-standard, and was created for the purposes of this study only, to understand an overall effect of the grant on health facility performance. Receiving the grant was associated with a statistically significant higher likelihood of a better composite score. This finding can be considered to be one of the most important results of this study, as it shows that in a general sense, health facilities are more likely to perform better on the key maternal and child health indicators when they receive the grant, than when they do not. In Tanzania, this aspect of the impact of Direct Health Facility Financing is being currently evaluated [17]. This provides insights to governments considering PBF models.

An improvement agenda addressing maternal and child health indicators will have to consider the impact of the missing grants, and explore opportunities in enhancing performance through improved grant access. As outlined in the introduction, there are factors above the facility level that impact grant access such as a low level of funding from central government, or lack of disbursement from the DHO. Facility level factors include the lack of retirement of previous imprest that hinder the health facility from accessing a new grant. These processes would have to be reviewed in detail, and analyzed how the processing of grants can be made faster to enable enhanced performance in health facility indicators with Direct Health Facility Funding [16].

Effect of Distance to DHO, Catchment Population and Staffing on performance

This study found that the three confounders investigated in this study had some effect on the performance of the facilities to varying extents Several factors could affect health indicator performance aside from access to funding. Some of these are related to staff attitudes, human resources challenges, geographical barriers, auxiliary support from NGOs and other factors [18]. These factors are important aspects as governments try to distribute healthcare financing equitably.

In most countries, the largest population densities are often in peri-urban slums, where overcrowding is rife, against often poor health and sanitation amenities [19]. Sometimes, though large population densities have been shown to increase coverage indicators [20], such as observed with institutional deliveries in this study. However, larger population densities present a challenge of limited coverage and poor quality of health services. Human resource insufficiency compounds this problem in most of the rural areas [21] and the level of human resource density can affect healthcare performance. Generally, having two or more staff was associated with higher likelihood of high performance in 1st ANC before 14 weeks, institutional deliveries and the composite score. Having three or more staff was associated with a 2.15 times higher likelihood 95% CI [1.38, 3.33] of a high performance on early booking. Therefore, to improve on early booking for pregnant women, the number of staff becomes very important as it means that they will need to

see more visits of women over the duration of their pregnancy, demanding more staff contact hours. Studies have shown that communities that have higher human resources for health have correspondingly better performance indicators [22]. Geographical barriers can have an impact on healthcare, either by enhancing or having a detrimental effect on healthcare service provision [23]. Facilities that were located 30km or more from DHO were found to have larger populations too. Therefore, some effect which may have been thought to be arising from distance to the health facility, could have been affected by the catchment population. Furthermore, geographical distances may not be truly reflective of facility remoteness. Facilities located 30km or more from DHO were associated with an almost twice likelihood of higher performance on 1st ANC Coverage ($p < 0.01$).

Institutional deliveries were most strongly associated with a larger population. When the catchment population was 3,800 or more, there was a 6.17 times higher likelihood 95% CI [3.77, 10.09] of a higher rate of institutional deliveries ($p < 0.01$). Primary healthcare programs that are targeting to improve the rate of institutional deliveries must have a strong focus on the facilities with large catchment populations, but must also target to develop strategies to improve rates in low catchment populations. Paradoxically, the reverse held for fully immunised under one coverage, with the facilities that had large catchment populations having a 45% less likelihood of higher coverage ($p < 0.01$). This could be a demonstration of the effect of barriers in rural areas with large catchment populations, the same barriers that threaten universal health coverage. Catchment population therefore does not always have a positive effect on coverage indicators, but could have a dual effect.

Implications of study findings

Overall, this study has found a positive association between grant receipt and health facility performance. This finding, therefore, supports the development of efficient mechanisms within the Ministry of Health, that will improve grant delivery to the health facilities and provision of support to minimize health facility level impediments to retirement.

Some studies in Africa have focused on understanding Results Based Financing (RBF) and Performance Based Funding (PBF) in MCH, including systematic a systematic review in Malawi that did gather strong enough evidence to support full scale implementation of PBF models (5). The findings also support the development of funding mechanisms that can be dual, or diagonal in nature incorporating direct financing and performance-based funding for some indicators, like other authors have also advocated. A 'diagonal approach' which would combine PBF and Direct Funding for Health, such as in managing Malaria in Ethiopia in 2005 [24]. This approach suggests the provision of direct financing, but a certain portion of the funds being determined by health performance [25].

As noted, there was no significant effect of the grant on ANC and immunization coverage, perhaps suggesting a need for performance-based funding mechanisms in these areas which are outreach dependent, whereas direct financing can be used to support wholly local health facility services such as the improvement in the coverage of institutional deliveries. The findings from this study also provide deeper insights into the influences of health financing operations in Zambia and thus grounds for further research.

CONCLUSION

Because the direct monthly grant to the health facilities is associated with an improvement in health indicator performance, it demonstrates the need for effective healthcare financing mechanisms that consider the monthly grant in improving performance by facilities. Performance Based Financing mechanisms should however be combined with direct financing mechanisms to holistically improve primary healthcare. The implications of these findings are that as much as practical, funding disbursement modalities must ensure that all health facilities receive some funding.

Recommendations for further research

To provide more generalizable information, this study should be conducted prospectively, tracking donor and grant funding, and monitor staff deployments. This would generate information that would assure greater confidence. Another approach would be to conduct a randomized control trial of health facilities, some with direct grant funding, and others with performance-based funding, then monitor performance and analyze the factors that influence positive and negative performance.

Program recommendations for the Ministry of Health

The MoH in Zambia should conduct a reform of the current financing mechanisms for health facilities. In their current form, grants may not be achieving the immediately expected outcomes of improving health indicators. There is

need to conduct reviews and reforms, and develop mechanisms that will institute diagonal approaches which use both direct and performance-based financing for primary healthcare. As the country develops the National Social Health Insurance, it will be cardinal to ensure that funds made available are used in the most effective and efficient ways to improve healthcare.

The MoH in Zambia needs to implement Enterprise Resource Planning (ERP) software on a wide scale. This development will ensure continuous correlation of financial records with HMIS in real time, enabling healthcare managers to analyze healthcare financing efficiency. This will enable good decision making. Furthermore, Implementation of HRIS would make sure accurate HR records are kept and used in analysis of the effective deployment of HR.

Limitations and Challenges

One of the limitations was on the number of variables collected as part of the study. There were several other variables such as donor support measures, material supports and other auxiliary resources that would require more complex data collection methodology that would extend beyond the scope of this study. Other variables may not be collected with a quantifiable approach. This study however only collected quantitative information. Attributes such as staff attitude have an impact in both grant retirement processes which affect grant receipt and performance in the indicators [26]. Qualitative approaches, or mixed method approaches could be suitable for further investigation of the effect of these on health facility performance.

Indicator information used in this study is official HMIS data and cannot be altered. Non-parametric measures and approaches such as medians and percentiles were used in the cut offs and statistical testing to circumvent the challenge and minimize the disruptive effect of the outliers. There was a lack of human resources information systems, and this presented a difficulty in verifying historic staffing levels. Unlike the HMIS which is an electronic, cloud-based database, there was no database which had human resource information. The official payroll management and establishment control does not correlate with staff present at the facility. Finding human resource information relied on a combination of reviewing personnel files for transfer letters and recall by the human resource management officer who completed the staffing levels tool for this study. This approach is prone to errors due to recall bias.

Chikankata is a relatively small, rural district. This might limit the applicability of study findings to the rest of the country. To achieve greater generalizability, a large data set must be analyzed. This study needs expansion to the entire country, with random selection of districts.

REFERENCES

1. WHO. Healthcare Financing System [Internet]. Healthcare Financing. 2018 [cited 2019 Jan 28]. Available from: http://www.aho.afro.who.int/profiles_information/index.php/Zambia:Health_financing_system

2. World Bank. UNIVERSAL HEALTH COVERAGE. 2021.

3. Manyazewal T. Using the World Health Organization health system building blocks through survey of healthcare professionals to determine the performance of public healthcare facilities. Arch Public Health [Internet]. 2017 Aug 31;75:50. Available from: https://pubmed.ncbi.nlm.nih.gov/29075485

4. Wiysonge CS, Paulsen E, Lewin S, Ciapponi A, Herrera CA, Opiyo N, *et al.* Financial arrangements for health systems in low-income countries: an overview of systematic reviews. Cochrane Database Syst Rev [Internet]. 2017 Sep 11 [cited 2021 Jan 5];(9). Available from: http://doi.wiley.com/10.1002/14651858.CD011084.pub2

5. Brenner S, Muula AS, Robyn PJ, Bärnighausen T, Sarker M, Mathanga DP, et al. 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 Serv Res [Internet]. 2014 Apr 22;14:180. Available from: https://pubmed.ncbi.nlm.nih.gov/24751213

6. National Assembly of Zambia. THE PUBLIC FINANCE MANAGEMENT ACT, 2018. Zambia; 2018.

7. Masiye F, Chansa C. Health Financing in Zambia. 2019.

8. Masiye F, Seshamani V, Cheelo C, Mphuka C, Odegaard K. Health Care Financing in Zambia: A Study of the Possible Policy Options for Implementation. 2007 Jun 26;

9. Zeng W, Shepard DS, Nguyen H, Chansa C, Das AK, Qamruddin J, et al. Cost-effectiveness of results-based financing, Zambia: a cluster randomized trial. Bull World Health Organ [Internet]. 2018/08/29. 2018 Nov 1;96(11):760–71. Available from: https://pubmed.ncbi.nlm.nih.gov/30455531

10. Turcotte-Tremblay A-M, Spagnolo J, De Allegri M, Ridde V. Does performance-based financing increase value for money in low- and middle-income countries? A systematic review. Health Econ Rev [Internet]. 2016/07/29. 2016 Dec;6(1):30. Available from: https://pubmed.ncbi.nlm.nih.gov/27472942

11. Ekirapa-Kiracho E, Waiswa P, Rahman MH, Makumbi F, Kiwanuka N, Okui O, et al. Increasing access to institutional deliveries using demand and supply side incentives: early results from a quasi-experimental study. BMC Int Health Hum Rights [Internet]. 2011 Mar 9;11 Suppl 1(Suppl 1):S11–S11. Available from: https://pubmed.ncbi.nlm.nih.gov/21410998

12. Rahman S, Choudhury AA, Khanam R, Moin SMI, Ahmed S, Begum N, et al. Effect of a package of integrated demand- and supply-side interventions on facility delivery rates in rural Bangladesh: Implications for large-scale programs. PLoS One [Internet]. 2017 Oct 26;12(10):e0186182–e0186182. Available from: https://pubmed.ncbi.nlm.nih.gov/29073229

13. Onah HE, Ikeako LC, Iloabachie GC. Factors associated with the use of maternity services in Enugu, southeastern Nigeria. Soc Sci Med [Internet]. 2006;63(7):1870–8. Available from: http://www.sciencedirect.com/science/article/pii/S0277953606002280

14. Zizien ZR, Korachais C, Compaoré P, Ridde V, De Brouwere V. Contribution of the results-based financing strategy to improving maternal and child health indicators in Burkina Faso. Int J Health Plann Manage [Internet]. 2019 Jan 1;34(1):111–29. Available from: https://doi.org/10.1002/hpm.2589

15. Fiedler JL, Mubanga F, Siamusantu W, Musonda M, Kabwe KF, Zulu C. Child Health Week in Zambia: costs, efficiency, coverage and a reassessment of need. Health Policy Plan [Internet]. 2014 Jan;29(1):12—29. Available from: https://doi.org/10.1093/heapol/czs129

16. Opwora A, Kabare M, Molyneux S, Goodman C. Direct facility funding as a response to user fee reduction: implementation and perceived impact among Kenyan health centres and dispensaries. Health Policy Plan [Internet]. 2010 Sep 1;25(5):406–18. Available from: https://doi.org/10.1093/heapol/czq00

17. Kapologwe N, Kalolo A, Kibusi S, Chaula Z, Nswilla A, Teuscher T, et al. Understanding the implementation of Direct Health Facility Financing and its effect on health system performance in Tanzania: A non-controlled before and after mixed method study protocol. Heal Res Policy Syst. 2019 Jan 30;17.

18. Mosadeghrad AM. Factors influencing healthcare service quality. Int J Heal policy Manag [Internet]. 2014 Jul 26;3(2):77–89. Available from: https://pubmed.ncbi.nlm.nih.gov/25114946

19. Stokols D. A Social-Psychological Model of Human Crowding Phenomena. J Am Plan Assoc - J AMER PLANN ASSN. 1972 Mar 1;38:72–83.

20. Hanlon M, Burstein R, Masters SH, Zhang R. Exploring the relationship between population density and maternal health coverage. BMC Health Serv Res [Internet]. 2012 Nov 21;12:416. Available from: https://pubmed.ncbi.nlm.nih.gov/23170895

21. Gow J, George G, Mutinta G, Mwamba S, Ingombe L. Health worker shortages in Zambia: An assessment of government responses. J Public Health Policy [Internet]. 2011 Jan 5;32(4):476–88. Available from: http://www.jstor.org/stable/41342699

22. Gupta N, Maliqi B, França A, Nyonator F, Pate MA, Sanders D, et al. Human resources for maternal, newborn and child health: from measurement and planning to performance for improved health outcomes. Hum Resour Health [Internet]. 2011 Jun 24;9:16. Available from: https://pubmed.ncbi.nlm.nih.gov/21702913

23. Swift EK. Guidance for the National Healthcare Disparities Report [Internet]. K.Swift E, editor. Washington DC; 2002. Available from: https://pubmed.ncbi.nlm.nih.gov/25057628/E

24. Low-Beer D, Afkhami H, Komatsu R, Banati P, Sempala M, Katz I, et al. Making Performance-Based Funding Work for Health. PLoS Med. 2007 Sep 1;4:e219.

25. Fan VY, Duran D, Silverman R, Glassman A. Performance-based financing at the Global Fund to Fight AIDS, Tuberculosis and Malaria: an analysis of grant ratings and funding, 2003–12. Lancet Glob Heal [Internet]. 2013 Sep 1 [cited 2021 Jan 5];1(3):e161–8. Available from: https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(13)70017-2/fulltext#.X_ReboI6ROU.mendeley

26. Mannava P, Durrant K, Fisher J, Chersich M, Luchters S. Attitudes and behaviours of maternal health care providers in interactions with clients: a systematic review. Global Health [Internet]. 2015 Aug 15;11:36. Available from: https://pubmed.ncbi.nlm.nih.gov/26276053