Original Article

Availability of Essential Antihypertensive and Antidiabetic Medicines in Public Health Facilities in Lusaka District, Zambia

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ABSTRACT

Background: The non-communicable disease (NCD) burden in Zambia remains quite high. Providing access to essential medicines for hypertension and diabetes remains a major challenge in low-middle income countries, Zambia is no exception in this regard.

Aim: The aim of this study was to determine and describe the availability of essential antihypertensive and antidiabetic medicines in selected public health facilities in Lusaka district.

Methods: A descriptive, cross-sectional study was undertaken in Lusaka district involving 15 randomly selected public health facilities. Data on availability of five (5) essential antihypertensive medicines and three (3)essential antidiabetic medicines was collected for the period January to June 2016 at each health facility, including the central Medical Stores. Quantitative data was analyzed using SPSS version 22.

Results: In the 15 public health facilities surveyed, overall availability of essential antihypertensive and antidiabetic medicines in public health facilities was 58.2% and 44.7% respectively during the period reviewed. Stock-outs were high for parenteral Frusemide (92%), Hydralazine (83%), Insulin short-acting (83%) and long acting (69%) preparations, respectively. Parenteral Frusemide and Hydralazine were only available in less than 40% of facilities while less than 40% of facilities did not have any Insulin preparations available. About 40% of facilities did not have a medical doctor present, 86.7% did not have a pharmacist and 80% did not have medical licentiates present. Majority of facilities had at least Nurses, Clinical Officers, Pharmacy Technologists and Pharmacy Assistants.

Conclusion: Availability of essential antihypertensive and antidiabetic medicines in public health facilities in Lusaka district continues to be a challenge with less than 60% of facilities surveyed experiencing stock-outs over six months. This could be significantly affecting effective management of patients with hypertension and diabetes mellitus in the district and requires to be addressed.

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1. INTRODUCTION

Globally, non-communicable diseases (NCDs) have become the leading threat to human health and national economic development as they cause over 60% of all deaths worldwide [1]. In response to the global burden of non-communicable diseases (NCDs), the World Health Organization (WHO) developed a Global Action Plan that includes a voluntary medicines target of 80% availability and affordability of essential medicines for the prevention and treatment of diabetes, cardiovascular disease and respiratory disease both in public and private health facilities [2]. Despite the commitment by the Zambian government to ensure the supply of the essential medicines at primary health level, supply of antihypertensive and antidiabetic medicines has been a challenge [3].

The majority of the Zambian population access healthcare services through the public sector where health services are provided free at the point of care [3].In Lusaka district, the population is estimated to be over 1. 7 million [4]. The district is serviced by 37 health facilities that comprise 5 first level hospitals, 22 health centers and 10 health posts [5].A study by Goma that determined the prevalence of hypertension in Lusaka Urban district revealed that the prevalence for hypertension was 34.8% (38.0% of males and 33.3% of females) [6].The number diabetes mellitus cases in Zambia was estimated at 70,000 in 2000 and is expected to increase to 186, 000 by 2030 [2].Clearly, access to quality, safe and affordable essential medicines for management of NCDs such as hypertension and diabetes is a must for Zambia.

Access to health care is a fundamental human right, enshrined in international treaties and recognized by governments throughout the world. However, without equitable access to essential medicines for priority diseases the fundamental right to health cannot be fulfilled. Access to essential medicines is also one of the United Nations' Sustainable Development Goals (SDGs). The Ministry of Health (MOH) in Zambia, makes great effort to ensure that medicines are available at primary health level to ensure service provision as close to the family as possible [3]. However, due to various challenges, facilities may not always have adequate stock to supply all diabetic and antihypertensive clients with all their prescribed medication. Providing universal access to essential medicines is a major challenge in low and middle income countries (LMICs) [7].

Although there is reasonably sufficient information from the developed countries regarding access to essential medicines, the data from LMICs is often weak and fragmented [8].Moreover, there is currently limited evidence on the availability of essential medicines for hypertension and diabetes mellitus in public health facilities. Such important information is required to inform health system managers, policy discourse and strategic planning. The purpose of this study was to describe the availability of antidiabetic and antihypertensive medicines at various levels in public health facilities in Lusaka district. Additionally, we also assessed the stock status and storage practices for medicines.

2. METHODOLOGY

2.1. Study Design:

This was a descriptive cross-sectional study conducted in Lusaka district.

2.2. Sampling Technique:

Multi-stage stratified sampling was used for facility selection. Fifteen (15) public health facilities were randomly selected. The sample selection was distributed as follows: 5 First Level Hospitals, 5 Medium Health Centers, and 5 Small Health Centers in the district.

2.3. Data collection tools:

Data was collected using a structured check list and interviewer-administered questionnaire. The tools were used to capture: (i) demographic characteristics of the respective health facilities;(ii) availability and stock-status of selected essential antihypertensive and antidiabetic

medicines; and (iii) storage practices. Medicines of interest included five(5) generic anti-hypertensive medicines: Atenolol, Nifedipine, Amiloride-Hydrochlorothiazide, Frusemide and Hydralazine, and three(3) generic anti-diabetic medicines: Insulin, Glibenclamide and Metformin. These medicines are listed as essential in the Zambia National Formulary & Essential Medicines List for Zambia.

2.4. Data collection:

Interviews were conducted with facility in-charge officers and pharmacy personnel at each facility, including the senior pharmacist at Medical Stores Limited. Quantitative data on availability of medicines, stock status,and storage practices was collected for the period January to June 2016. Field data collection was undertaken in October 2016.At facility level, stock status was determined using physical inventory and electronic Stock Control Cards kept at the pharmacy. Secondary data sources included stock requisition forms and supply vouchers at each health facility. The checklist was used to determine storage of medicines in accordance with standard guideline of First Expiry First Out (FEFO).

2.5. Data Analysis:

Availability was defined as the presence of the medicine in the stated dosage form at any point in each month during the period under review. This was quantified as number of days in stock. The availability of individual medicines under survey was expressed as percentages (%). Mean (average) percentage availability of all the medicines under survey wasalso calculated (i.e. % availability of anti-hypertensive or anti-diabetes medicines respectively).Non-availability was determined using stock-out days which were retrospectively measured and the duration of stock-out for each medicine of interest recorded. Medicines order fulfilment rate was expressed as a percentage for each product across all facilities. The stock-out positions were categorized as follows: 0 days, 1-15 days, 16-30 days and >30 days. Statistical Package for Social Sciences (SPSS) version 22*(IBM Inc. USA)* was used for data analysis and charts were generated using Microsoft Excel 2013.

2.6. Ethical Considerations:

Official permission to conduct the study was granted by Ministry of Health through the management at Lusaka District Health Office. Informed consent from Facility In-charge officers was obtained to collect data at each respective facility. All data collected was confidentially maintained and used only for purposes of this study. For purposes of quality improvement, permission was granted to use facility names in this publication.

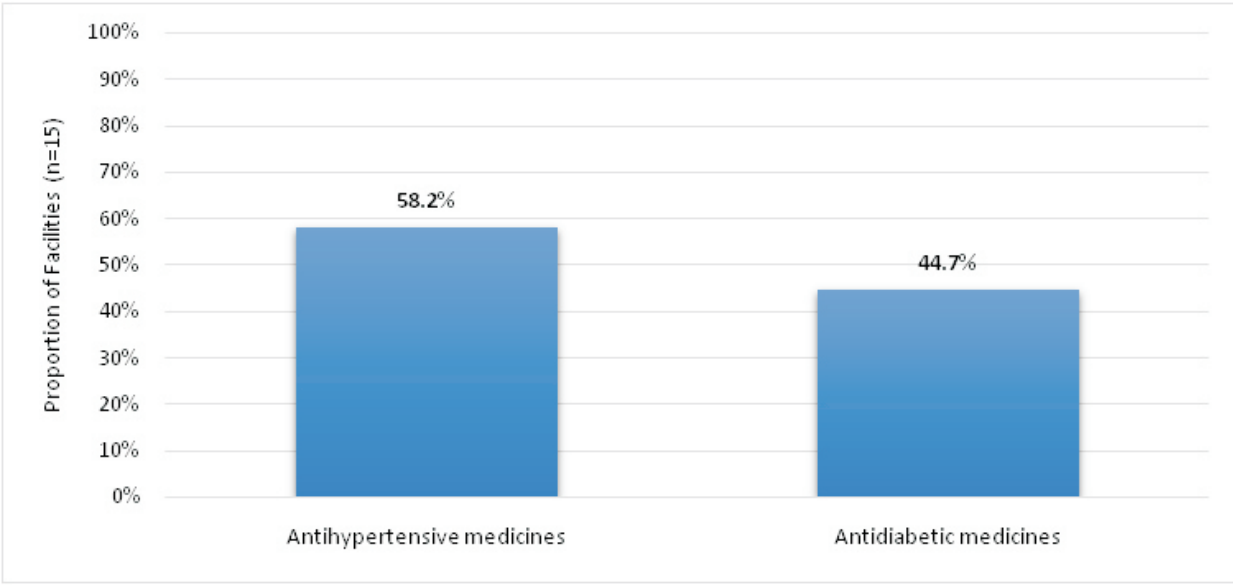
3. RESULTS

A total of 15 facilities under Lusaka district were selected and included in the study, which included five first level hospitals: Kanyama, Chawama, Chipata, Chilenje, Matero referral; five medium sized health centers namely Bauleni, George, Kabwata, Mtendere, Ngombe; and five small sized health centers comprising of Airport, Central Prisons, St. Agness, Chaisa and Railway clinics, respectively

3.1. Availability of antihypertensive and antidiabetic medicines

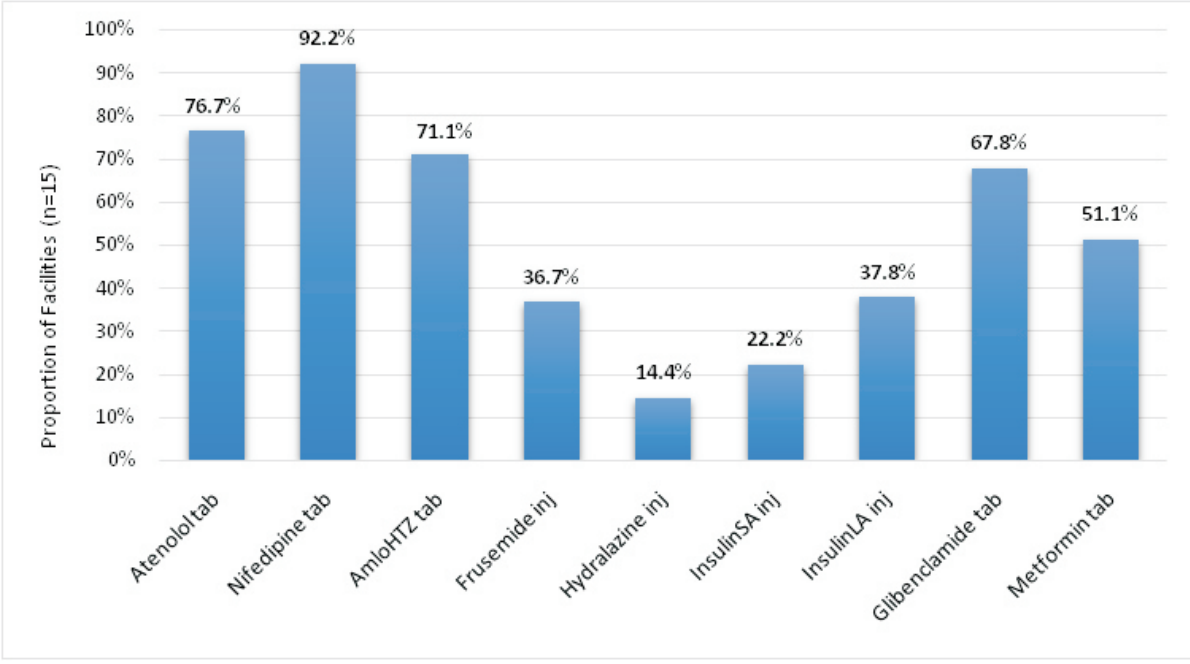
Overall availability of antihypertensive and antidiabetic medicines was found to be 58.2% and 4.7% respectively*(Figure 1)*.

Figure 1: Availability of medicines by pharmacological classification



For antihypertensive medicines, more than 70% of facilities had oral Atenolol, Nifedipine, and Amiloride-Hydrochlorothiazide tablets whereas less than 40% had parenteral Frusemide and Hydralazine. For antidiabetic medicines, less than 40% of facilities had Insulin and just over 50% had Glibenclamide and Metformin tablets respectively during the period January to June 2016 *(Figure 2)*.

Figure 2: Availability of indvidual antihypertenstive and anti-diabtetic medicines

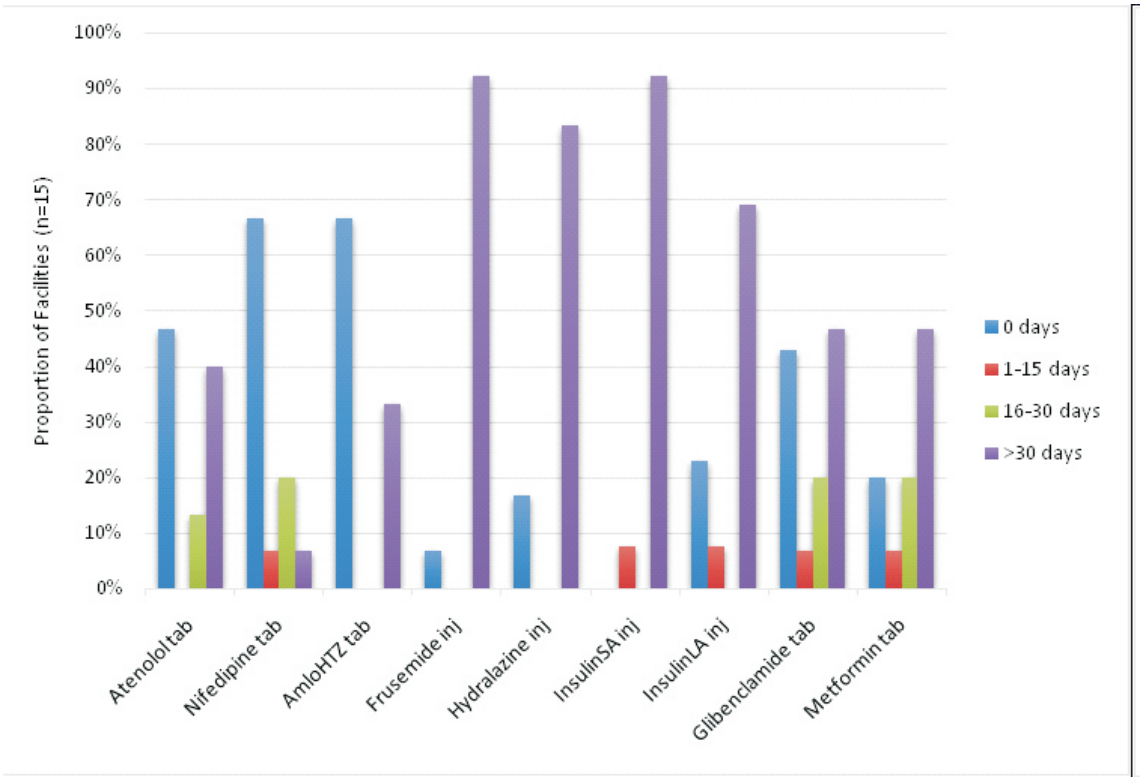


Key: tab = tablet, AmloHTZ = Amiloride-Hydrochlorothiazide, inj = injection, SA = short-acting, LA = long acting

3.2. Stock-outs of antihypertensive and anti-diabetic medicines

The stock out position was assessed for the individual medicines. The antihypertensive medicines that stocked-outs for a period of more than 30 days was found to be: Frusemide injection (92%), Hydralazine injection (83%), Atenolol tablets (40%), Amiloride-Hydrochlorothiazide tablets (33%) and Nifedipine tablets (7%) whereas for antidiabetic medicines: Insulin short-acting (92%), Insulin long-acting (69%), Glibenclamide tablets (47%), and Metformin tablets (47%), respectively*(Figure 3)*.

Figure 3: Stock-out position (Jan - June 2016)



Key: tab = tablet, AmloHTZ = Amiloride-Hydrochlorothiazide, inj = injection, SA = short-acting, LA = long acting

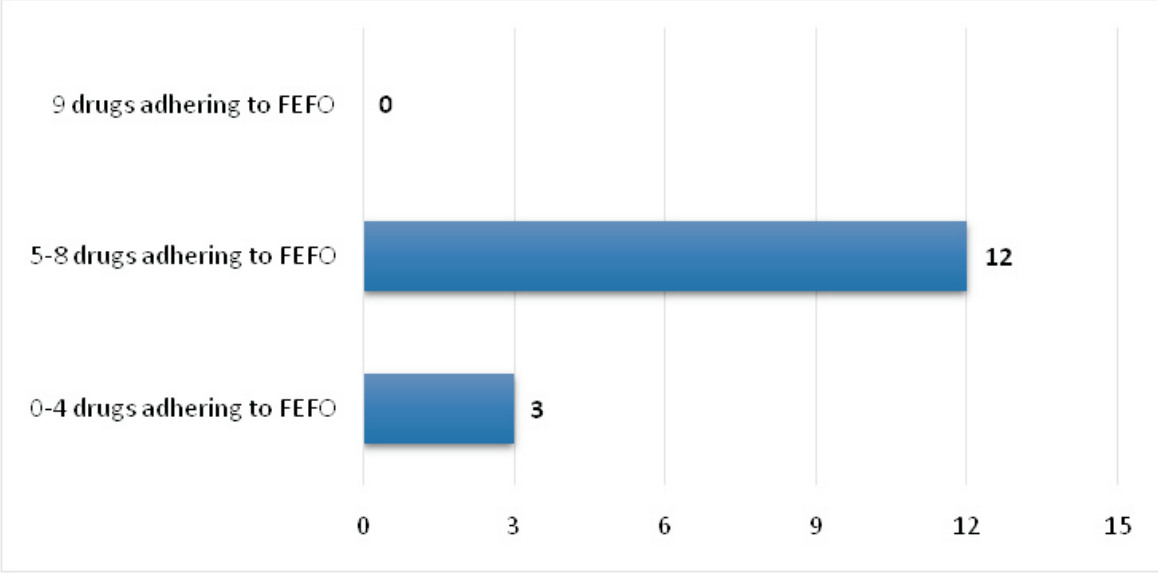
3.3. Availability of essential antihypertensive and antidiabetic medicines at central Medical Stores

Since all public health facilities received their supplies from Central Medical Stores, availability of the antihypertensive and antidiabetic medicines of interest in this study was assessed at central level for the period under review. Among the antihypertensive drugs, Hydralazine injection was stocked out in all the 6 months (January-June 2016) reviewed whereas Frusemide was only reported to have been in stock for one month. Nifedipine tablets were reported to have been in stock during the entire period under review. Atenolol tablets were stocked out for two months at central level. Among the anti-diabetic drugs, Insulin (both short and long acting preparations), and Glibenclamide tablets were reported to have been in stock at Medical Stores during the entire period under review. Metformin tablets were stocked out for two months at central Medical Stores.

3.4. Storage and inventory management

Storage guidelines demand that medicines be arranged according to their expiry dates using the general principle of 'First Expiry First Out' (FEFO). *Figure 4* shows assessment of the proportion of health facilities adhering to FEFO guidelines for storage of essential anti-hypertensive and anti-diabetic medicines.

Figure 4: Number of drugs adhering to FEFO guidelines



Majority of health facilities (n = 12/15) surveyed had 5 – 8 medicines stored in adherence to FEFO guidelines whereas at 3 facilities; 0 – 4 medicines stored in adherence to FEFO guidelines. Correctness of stock control cards entries was also assessed and found that 20% of the facilities had only 0 - 4 stock control cards filled in accurately, 73.3% had 5-9 stock control cards filled in correctly. None of the 15 facilities had all stock control cards correctly filled in.

4. DISCUSSION

A recent needs assessment in Zambia identified that the lack of adequate drugs for Diabetes and Hypertension was at 89.6% and 13.4%, respectively [3]. Despite the commitment by the Zambian government to ensure the supply of the essential medicines at primary health level, supply of antihypertensive and antidiabetic medicines continues to be a challenge and evidence of the scale of the problem in Lusaka district was undetermined. Therefore, this study embarked to determine availability of essential antihypertensive and anti-diabetic medicines in public health facilities in Lusaka district during the period January to June 2016.Availability of 9selected generic medicines for hypertension (Atenolol, Nifedipine, Amiloride-Hydrochlorothizide, Frusemide and Hydralazine) and diabetes mellitus (Insulin, Glibenclamide and Metformin) was surveyed in 15 health facilities (i.e. 5 were first level hospitals, 5 were medium level hospitals and 5 were small health facilities based on the Zambia Ministry of Health categorization of health facilities) in Lusaka district. Majority of the facilities (80%, *n = 12*) were servicing catchment populations in the range 50,000 to 200,000 people in the community.

This study found that overall availability of the selected essential anti-hypertensive and anti-diabetic medicines was found to be 58.2% and 44.7% respectively during the period January to June 2016. This finding is similar to situations in several other developing countries. For instance, Prinja *et al* in a study to assess the availability of 9 antihypertensive and anti-diabetic medicines in public sector health facilities in the 2 states of India found that availability of anti-hypertensives was around 60% in both the states whereas for anti-diabetics it was 44% and 47% in Punjab and Haryana respectively [9]. With the high and increasing NCD burden in Zambia, all health facilities should ideally have 100% availability of essential medicines for hypertension and diabetes. Clearly, most patients accessing public health facilities in Lusaka district did not access all their anti-hypertensive and anti-diabetes medicines from the public facilities.

Globally, access to essential medicines still remains a challenge in many middle and low income Countries. In Uganda, a survey revealed that only 16% of the surveyed households had access to essential medicines [10].The United Nations in 2015, under the Sustainable Development Goal number 3.8, highlighted the need for all member states to prioritize increased access to quality assured essential medicines as one of the global developmental agenda 2030. Continuous access to essential medicines, with an emphasis on rational selection, affordable prices and sustainable financing, should be a key component of the policy framework [11].

During the period January to June 2016, the least available antihypertensive medicines were parenteral Frusemide (36.7%) and Hydralazine (14.4%) whereas the least available anti-diabetic medicine was Insulin (>38%) *(Figure 2)*. Correspondingly, these medicines also had the highest stock-out rates (more than 30 days) in over 80% of the facilities surveyed *(Figure 3)*. The pattern of non-availability was also not very different for each drug per facility. Moreover, the study revealed that the central Medical Stores which supplies medicines to all the public health facilities in the country was stocked-out of Hydralazine injection during the entire 6 months whereas Hrusemide was reported to have been in stock for only one month during that period. Insulin (both short and long acting preparations) and Glibenclamide tablets were available at central Medical Stores during the entire period. Notwithstanding the various health system factors that affect medicines availability, this situation has negative implications on the management of emergency cases hypertension and diabetes at primary care level. Mortality rates due to hypertensive and/or diabetes emergencies risk being high due to constant non-availability of essential medicines required for treatment. Clearly, patients that required these medicines had to do without them or alternatively purchase out-of-pocket from private retail pharmacies at a high cost.

Findings of this study collaborate evidence from Tanzania where a review of three different studies that measured the availability of medicines for hypertension and diabetes in 2012-2013 found that Glibenclamide availability ranged from 19% to 52%. One study reported low levels of insulin availability (9-16% depending on insulin type) compared to 34% in another similar study in Tanzania. All three studies showed suboptimal availability of NCD medicines [12]. Similarly, Shabangu & Suleman in Swaziland reported that most of the patients confirmed not receiving all of their prescribed medicines at each visit to the hospital in the past six months. On average patients spent 10–50 times more on their medicines at private pharmacies compared to user fees in the health facility. Stock-outs at the central Medical Stores in Swaziland ranged from 30 days to over 180 days during the course of their assessment period (12 months). These were found to contribute to inconsistent availability of medicines in the health facilities [13].Clearly, there is a cause of concern for health systems in developing countries in Africa to put measures in place that will ensure constant availability of quality, safe and affordable

essential medicines for NCDs if mortality rates are to be reduced. Arguably, the situation concerning availability of selected essential medicines for hypertension and diabetes in Lusaka district as described by findings of this study may not significantly differ from other districts in the country as the public health systems faces similar challenges with regards medicine availability and health workforce. In the health facilities surveyed in Lusaka district, the number of qualified health workers available at each health facility to cater for the growing primary care populations was quite low in relation to the catchment population they serve.

4.1. Implications for policy and practice

Ideally, essential medicine availability should be 100% in all health facilities. However, our study found 58.2% and 44.7% availability of essential antihypertensive and antidiabetic medicines, respectively during period January to June 2016.Clearly, most patients accessing the public health facilities in Lusaka district either did not access all their antihypertensive and antidiabetic medicines as expected from the public health facilities or had to resort to out-of-pocket purchase from private pharmacy outlets. This may have implications on not only the quality of health care management of hypertension and diabetes but also an added economic burden on the patient to afford the cost of medicines as a consequence of non-availability at the point of care. Arguably, situational findings in Lusaka district may not significantly differ from other districts in the country.

With the levels of availability and non-availability of essential antihypertensive and antidiabetic medicines in public health facilities in Lusaka district revealed by this study, the Ministry of Health through the Lusaka District Health Office should consider addressing the stock-outs and low availability of essential medicines for NCDs to improve the management of patients and reduce the morbidity and mortality associated with hypertension and diabetes. Private-public partnerships between government and private pharmacy service-providers through equitable and sustainable health insurance systems offers an opportunity to leverage an effective strategy to enhance financing mechanisms that reduce out-of-pocket expenses on medicines for the diverse patient populations. Moreover, implementation of effective national and institutional policy directions towards attaining SDG #3 is a must for Zambia.

4.2. Limitations of the study

The study setting was limited to health facilities in Lusaka district and many not be representative of other districts or the entire public health facilities in Zambia. Therefore, the results may not be generalizable to other public health facilities other districts in Zambia. However, we remain confident that the situation may not vary significantly. It would be interesting to conduct a larger country-wide study with a larger target of public health facilities. Moreover, the descriptive cross-sectional nature of the study relied on retrospective data for a recent but limited time period (January to June 2016). It would be interesting to determine if the situation was different had an earlier time been considered or track changes in the future if a prospective or longitudinal study is to be conducted. The study only quantified the availability of medicines and did not qualitatively investigate factors influencing or affecting the medicine availability.

5. CONCLUSION

Availability of essential medicines in public health facilities in Lusaka district continues to be a challenge with less than 60% of facilities surveyed experiencing low availability and stock-outs of essential antihypertensive and antidiabetic medicines over six months. Thiscould significantly be affecting effective clinical management of patients with hypertension and diabetes mellitus in the district and must be addressed. If Zambia is to make gains towards meeting the SDG's on universal access to quality, safe and affordable essential medicines for all and reducing the NCD burden by 2030, sustainable efforts and health policy directions may need to be addressed going forward.

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Declaration of interest:

The authors declare no conflict of interest associated with this work and have no financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed. This includes consultancies, honoraria, stock ownership, expert testimony, patents received or pending, or royalties.

Author contributions:

All authors collaboratively contributed to this work and generation of this manuscript. MM, ILS & GK (Ministry of Health) conceptualized and designed the study. BM (PSZ) facilitated technical and collaborative support for the study. PY(LAMU) designed data collection tools and validation.ACK (UNZA) facilitated collection and analysis of data, including coordinating manuscript writing. All authors participated in the internal reviewing of the manuscript.

REFERENCES

1. Bloom DE, Cafiero ET, Jané-Llopis E, et al. The global economic burden of noncommunicable diseases. Geneva: World Economic Forum; 2011.
2. World health organization, 'Global action plan for the prevention and control of noncommunicable diseases 2013-2020', world health organization Geneva; 2013. Available at:http://apps.who.int/iris/bitstream/10665/94384/1/9789241506236_eng.pdf
3. Ministry of Health. National Health Strategic Plan 2011-2015.2011; 3-61.
4. Central Statistics Office (CSO), Zambia City Population;2010. Available at: http://www.citypopulation.de/Zambia.html
5. Ministry of Health. Lusaka District Health Office, Health Management Information System; 2016.
6. Goma, F.M., Nzala S. H., Babaniyi O, Songolo P, Zyaambo C, Rudatsikira E, Siziya S and Muula A. Prevalence of hypertension and its correlates in Lusaka urban district of Zambia: a population based survey. International Archives of Medicine; 2011; 4:34.
7. World Health Organization. The World Medicines Situation. Geneva: World Health Organization; 2004.
8. Zarocostas J. Better access to medicines could save 10 million lives a year, says UN expert. BMJ; 2007; 335:635.
9. Prinja S, Bahuguna P, Tripathy J.P., Kumar R, Availability of Medicines in Public Sector Health Facilities 1 of Two North Indian 2 States; 2012.
10. Vialle-Valentin C. E, Serumaga B, Wagner A. K., Ross-Degnan D. Evidence on access to medicines for chronic diseases from household surveys in five low- and middle-income countries. *Health Policy and Planning*;2015; 30(8):1044-1052. doi:10.1093/heapol/czu107.
11. World health organization, '*Preventing chronic diseases: a vital investment', world health organization Geneva; 2005. Available at: http://www.who.int/chp/chronic_disease_report/contents.*
12. Robertson, J, Macé, C, Forte, G, de Joncheere K and Beran, D, Medicines availability for non-communicable diseases: the case for standardized monitoring, Globalization and Health; 2015;11:18.
13. Shabangu K, Suleman F. Medicines availability at a Swaziland hospital and impact on patients. Afr J Prm Health Care Fam Med; 2015;7(1), Art. #829, 6 pages. http://dx.doi.org/10.4102/phcfm.v7i1.829