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Availability Of Medicines for Non-Communicable Diseases Among Internally Displaced Persons In An Era Of Insurgency: A Cross Sectional Facility Survey

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A B S T R A C T
The availability of medicines for chronic and infectious diseases is reported to be low in many developing countries including Nigeria. The sustainable availability of medicines to both internally displaced persons and host communities bedevilled by a violent insurgency in North east Nigeria remain a critical challenge. Medicine donations and health intervention support from international humanitarian agencies have helped to improve availability in public health facilities in the region. There is however little appraisal of medicine availability in health facilities that provide services to internally displaced persons. This study therefore aims to assess availability of essential medicines in public and private health facilities.
A total of 37 tracer drugs covering four therapeutic classes were selected for the survey. Primary health care facilities and community pharmacies were selected according to modified WHO/HAI methodology. A total of fifty five health facilities were surveyed and results expressed using descriptive statistics.
Availability of essential medicines in both public and private outlets ranged from low to moderate, only 7 – 33% of selected drugs achieved the 80% availability as recommended by the World Health Organization. The low availability of medicines may contribute to significant reduction in the quality of healthcare services.
The challenge of low medicine availability among the displaced population need comprehensive intervention, if the overall quality of healthcare services is to significantly improve.

Keywords*: Essential medicines, Availability, Medicine outlets, internally displaced persons, non-communicable diseases, Health facilities.*

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INTRODUCTION

The prevalence of non-communicable diseases (NCDs) continue to rise globally and faster in low and middle income countries (LMIC) [1, 2]. The burden of chronic diseases is projected to increase over the next few decades, particularly in sub Saharan Africa where a combination of rapid unplanned urbanization and changing dietary habits is exposing the population to increased risks [3]. Mortality due to NCDs is reported to be about 73.6% of global deaths in 2016, 80% of which is estimated to have occurred in LIMC. The leading NCDs responsible for the rising cases of deaths include cardiovascular diseases, respiratory tract diseases, Diabetes and cancers [4]. The rapidly growing prevalence of these diseases is largely driven by epidemiological and demographic changes some of which include sedentary lifestyle, high fat diets, multi-morbidities, alcohol abuse, smoking and ageing [5,6,7,8,9]. There is also rising cases of NCDs among younger age groups in the population, though estimates of prevalence vary widely[10,11]. The current projections indicated that by 2030, there will be eight times more NCD related deaths in LMIC using current data as baseline[12].

Literature evidence indicated that cardiovascular diseases remains the largest contributor to premature mortality of about9.4 million deaths, which is more than half of all NCD related deaths [13]. Hypertension isreported to cause 45% of cardiovascular related deaths, while stroke is responsible for another51% of mortality [14,15,16]. Recent data suggest that the prevalence of stroke has risen sharply over the last few decades globally, however mortality is reported to be higher in LMIC compared to high income countries [[17,18]. Data for Ischaemic heart disease related deaths in high income countries showed it to be a common cause of disability and deaths, however evidence from sub Saharan Africa is limited [19].

Respiratory disease burden which is also rising in developing countries significantly increase the risk of premature mortality and reduced quality of life [20]. For instance, Asthma is reported to responsible for about 105 million premature deaths; some studies suggested that this figure might be a conservative estimate[21,22]. Recent projections indicated that asthma will affect another 100 million persons by 2020 [23] which will potentially contribute additional 4.15 disability adjusted life years (DALYs) [24,25, 26].

The prevalence of diabetes vary widely, while some estimates showed that 24-64% of cases remain undiagnosed in the population [27] and 10-25% of cases directly is related to gestational diabetes [28]. There is emerging epidemiological evidence that there is rising cases of diabetes in Nigeria, though prevalence studies in health facilities vary widely [31,32]. While prevalence of hypertension in Nigeria is estimated to be between 17.5 – 51.6% of adult population, hypertension related deaths is estimated to be about 61% of all NCD related deaths in the country[33,34,35,36]. Among adolescents, hypertension is also reported to be a growing public health concern [37,38,39].

The WHO global action plan for prevention and control of NCDs recommended 80% availability of NCD medicines by the year 2020 (WHO NCD Action Plan 2013). Several studies in LMIC have reported low availability of NCD medicines in both public and private health sectors [40,41,42,43]. Evidence from national and sub national surveys have supported these reports of low availability in public health facilities [44,45], although a few studies have reported the contrasting figures[46,47,48].

The impact of the decade old insurgency in north east of Nigeria on availability of essential medicines has not received literature reviews. This study therefore aims to assess availability of NCD medicines in both public and private health facilities that provide services to internally displaced persons.

METHOD

Setting: This study was carried out in medicine outlets located in four local area councils [Jere, Maiduguri municipal area council, Konduga and Mafa] of Borno State, Nigeria. At total of 20 community pharmacies, 20 primary health care centres [PHC] and fifteen internally displaced camps [IDPs] clinics were used in the study.

Sample size: The sample size was calculated using Taro Yamane'sformula for finite populations. A sample size of 33 health facilities obtained was multiplied by design factor of 1.5 producing 49 health facilities. A total of fifty five outlets were however used for the medicine survey.

Selection of drug outlets: The health facilities were selected using modified WHO/HAI survey methodology. Five public health facilities were randomly selected as well as five community pharmacies within a five kilometer radius of a public health facility, while IDP camp clinics were also included in the survey.

Selection of tracer medicines: A total of 37tracer NCD medicines were selected from the essential drugs list [EDL], pre-study survey and review of previous studies[43,46].

Data collection: A pair of trained data collectors visited pre-selected health facilitiesand extracted data on tracer medicines found on the date of survey. The data included name of drug, strength, quantity in stock, formulation and brand etc. Medicines were considered available if they were found in stock on the day of survey irrespective of formulation, strength and pack size.

Data analysis: Data was analyzed using WHO/HAI methodology. Availability was calculated as the percentage of medicine outlets that have preselected drugs in stock on the day of survey irrespective of strength.

ETHICAL APPROVAL: This was obtained from Borno State Ministry of Health [MOH/GEN/6679/1] and administrative approval from Borno State Primary Healthcare Development Agency [SPHCDA/GEN/181]

RESULT

Availability of essential medicines was generally higher in community pharmacies than in public health facilities, though results was comparable to availability was found with antimalarials, antiulcers, anthelminthics and antihistamines. A comparison between PHCs and IDP camp clinics showed that availability was however higher in the latter [**Figure 1**]

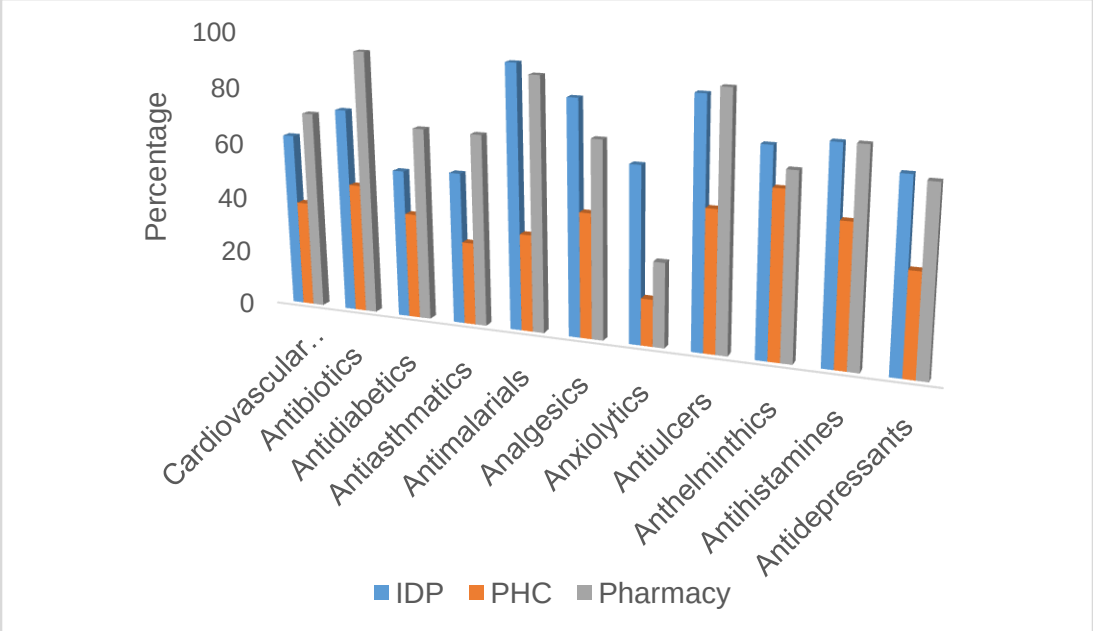

Figure 1: Availability of medicines by therapeutic class

There was high availability of cardiovascular drugs in both IDP camp clinics and community pharmacies compared to low and moderate availability in primary health care centres. Calcium channel blockers and Methyldopa had the highest availability, while ACEIs and diuretics had low to moderate availability in IDP and PHCs [**Figure 2**]

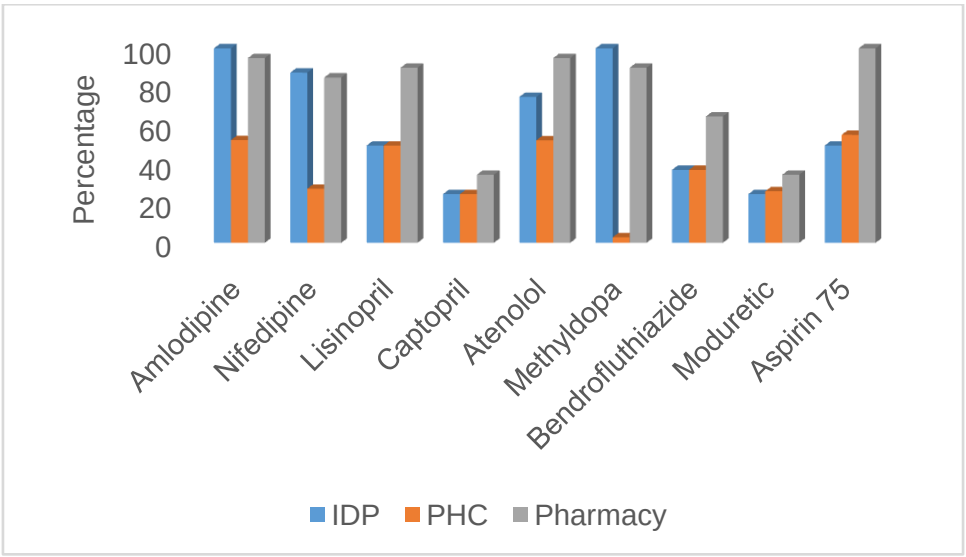

Figure 2: Availability of cardiovascular drugs

Antibiotic availability in pharmacies was high (≤ 90%) compared to moderate levels observed in IDP and low in PHCs [**Figure 3**]

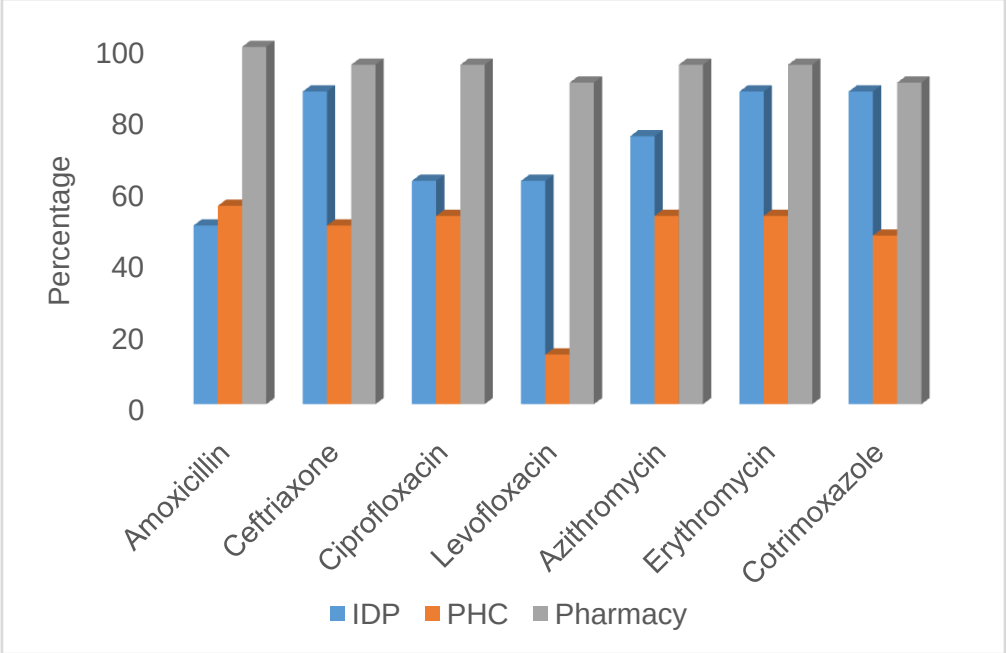

Figure 3: Availability of Antibiotics

Antidiabetic drugs availability was generally high in pharmacies except for Insulin. While Metformin and Insulin availability was high in IDP camp clinics, other drugs had low to moderate availability [**Figure 4]**

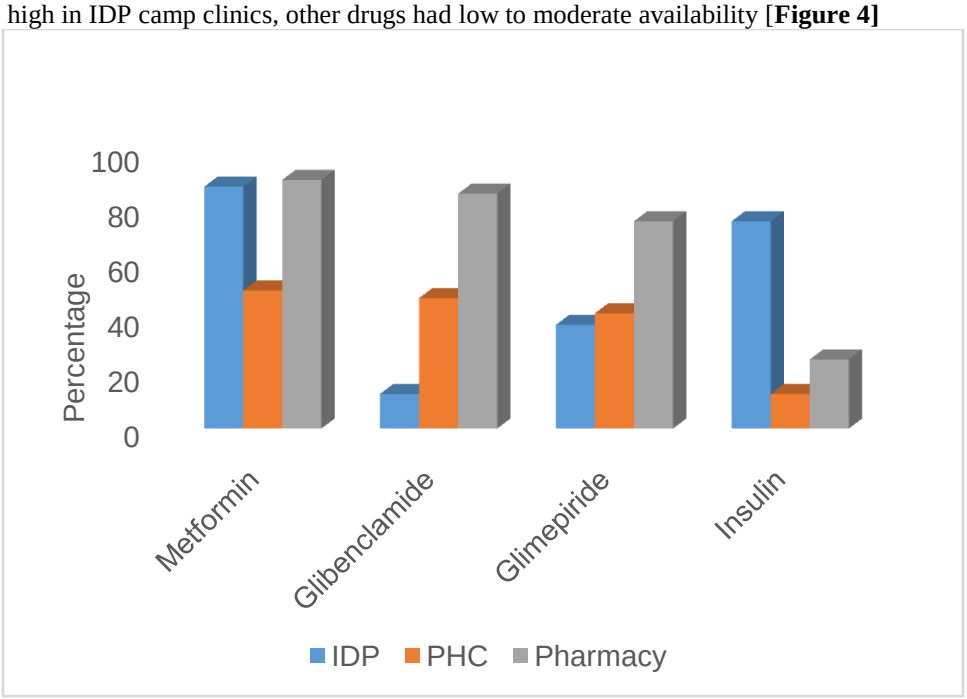

Figure 4: Availability of Antidiabetic drugs

The availability of analgesics was comparably high in both IDP camp clinics and community pharmacies, while in PHCs the result was low to moderate availability [**Figure 5**]

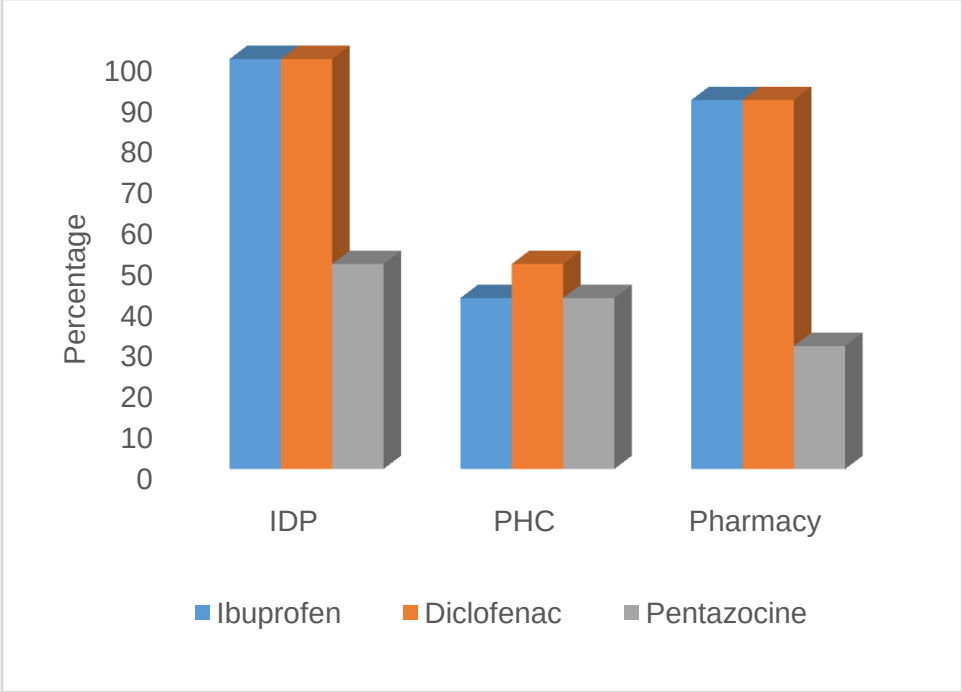

Figure 5: Availability of Analgesics

The availability of steroids was high in both pharmacies and IDP camps, while low availability was recorded in PHCs [**Figure 6**]

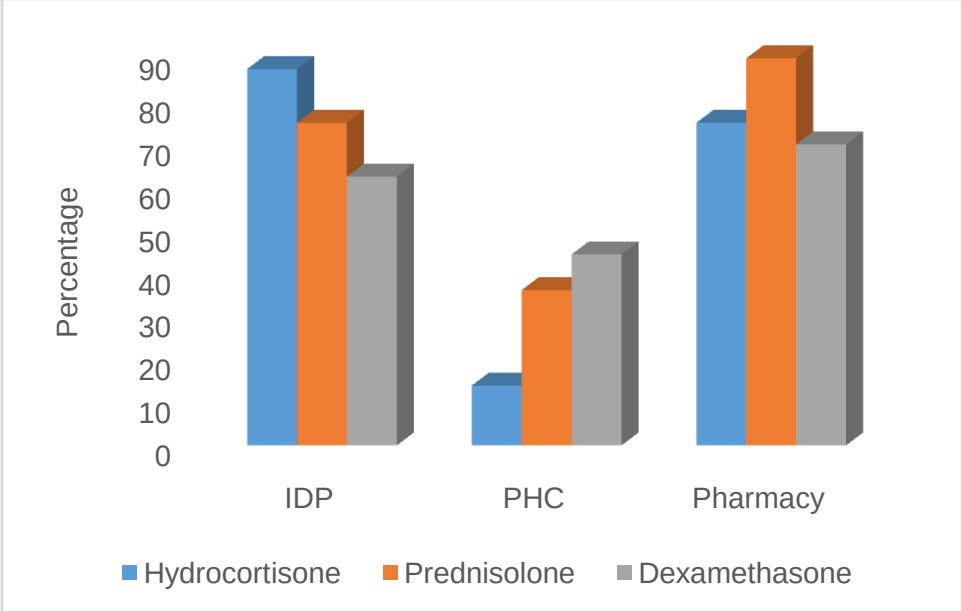

Figure 6: Availability of corticosteroids

The availability of Salbutamol tablet and inhaler was moderate to high in IDP camps and pharmacies but low in PHCs [**Figure 7**].

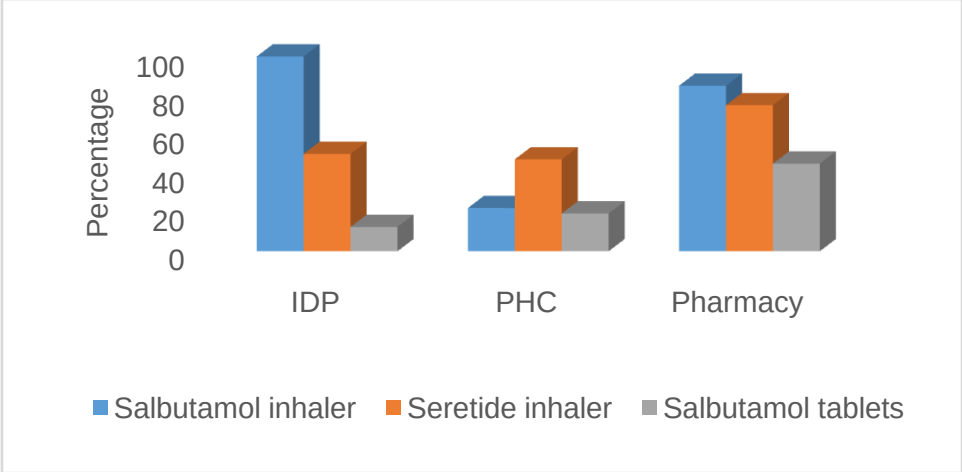

Figure 7: Availability of Antiasthmatics

The comparison of drug availability on the basis of WHO definition showed that higher percentage of medicines had low to moderate availability in both public and private facilities. Drugs with high availability [≥ 80%] were largely found in pharmacies with variable results for PHCs and IDPs clinics [**Table 1**].

Table 1: Comparison of availability of NCD medicines

Class of drug	Health facility	Low [0 – 50%]	Moderate [51 – 79%]	High [≥ 80%]
Antihypertensives				
	Pharmacy	42.9	14.3	42.8
	PHC	78.6	21.4	na
	IDP	64.3	14.3	21.4
Analgesics				
	Pharmacy	na	na	100
	PHC	na	25	75
	IDP	18.9	56.4	24.7
Antidiabetics				
	Pharmacy	25	25	50
	PHC	50	50	na
	IDP	75	na	25
Antiasthmatics				
	Pharmacy	60	20	20
	PHC	na	80	20
	IDP	60	40	na
Corticosteroids				
	Pharmacy	na	46	54
	PHC	41	44	15
	IDP	62	38	na

***Key**: PHARM = Pharmacy, IDP = internally displaced persons, PHC = Primary healthcare, na = not available*

DISCUSSION

The availability of NCD medicines is a major public health challenge in many countries of sub Saharan Africa. The burden is largely borne by the poor, women and children as well as other vulnerable groups resulting in higher risk of mortality[49]. Over the last few decades multiple initiatives has failed to significantly improve medicine access in many low and middle income countries including Nigeria [43]. The current security challenges coupled with large population displacement has worsened the already bad medicine situation in the study area [50,51, 52, 53].

The results of this study showed low to moderate availability of NCD medicines as previously reported in many studies [54,55,56], though similar study had reported higher level of availability [57]. There overall availability in both public and private sectors largely followed a similar pattern comparable to a previous study [58], though variable study results have been reported in literature [59].

The availability of cardiovascular drugs in public and private health facilities is comparable to a recent study [60]. While literature reviews has reported wide variability of cardiovascular drugs availability, the public sector is estimated to account for only 30% of actual patient needs [44,60]. The low availability of cardiovascular drugs was also reported in several studies in some developing countries[61,62,63,64,65].A similar pattern of low to moderate availability was observed for antidiabetic and antiasthmatic drugs [13,42,66,68,69], though higher availability has also been reported [67,70,71,72].

One of the major reasons for the low to moderate availability of NCD medicines is the poor public sector supply to health facilities. This may be the outcome to disruptions to medicine supply system due to the ongoing violent insurgency, inadequate budgetary allocation and damage to health care infrastructure in the region. So while donations/supplies from international humanitarian agencies has helped bridge the deficit [48,73,74], long term sustainable availability of medicines must be anchored on public sector driven improvement in health system management.There is need for increased funding for essential medicines not only at IDP camps, but for community health care infrastructure if challenges of medicine available will be contained on the long term. This is particularly critical as IDPs return to their ancestral homes with ongoing phased closure of IDP camps.

CONCLUSION

There is need to improve sustainable public sector supply of medicines to the internally displaced persons so as to improve their overall quality of healthcare.

CONFLICT OF INTEREST: The authors declare no conflict of interest

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REFERENCES

1. Benziger, C.P., Roth, G.A.,Moran, A.E [2016]. The Global Burden of Disease Study and the Preventable Burden of NCD. *Global Heart*. 11(4):393–7.
2. WHO. Global Action Plan for the Prevention and Control of Non - communicable Diseases 2013–2020. Geneva: World Health Organization, 2013.
3. Kibirige, D., Atuhe, D., Kampiire, L., et al [2017]. Access to medicines and diagnostic tests integral in the management of diabetes mellitus and cardiovascular diseases in Uganda: insights from the ACCODAD study. *Int J Equity Health*. 16(1):154.
4. World Health Organization (WHO). Non-communicable diseases country profiles [Internet], 2014. Available: http:// apps. who.int/iris/bitstream/10665/128038/1/9789241507509_eng.pdf? ua=1[Accessed 8th December 2021].
5. World Health Organization. NCD mortality and morbidity. Geneva: WHO; 2018.https://www.who.int/news-room/fact-sheets/detail/noncommunicablediseases. Accessed 10th Dec 2022
6. Lee, J.T., Hamid, F.,Pati, S., [2015] Impact of non - communicable disease multi-morbidity on healthcare utilization and out-of-pocket expenditures in middle-income countries: cross sectional analysis. *PloS One*. 10: e0127199
7. Atun, R., Davies, J.I., Gale, A.E.M., et al [2017]. Diabetes in Sub Saharan Africa: from clinical care to health policy. *Lancet Diabetes Endocrinol*. 5(8): 622 – 667
8. Bawah, A., Houle, B., Alam, M., et al [2016]. The evolving demographic and health transition in four low and middle income countries: evidence from four sites in the INDEPTH Network of longitudinal Health and demographic surveillance system. *PloS One*. 11(6): e0157281
9. Maher, D., Smeeth, L.,Sekajugo, J.,[2010]. Health transition in Africa: practical policy proposals from primary care 2010. *Bull World Health Organ*88(12): 943 – 948
10. Baker, R., Taylor, E., Essafi, S., et al [2016]. Engaging young people in the prevention of non-communicable diseases. *Bull World Health Organ* 94(1): 484
11. Patton, G.C., Sawyer, S.M., Santelli, J.S., [2016]. Our future, a Lancet commission on adolescent health and wellbeing. *Lancet*. 387: 2423 – 2478
12. Dalal, S., Beunza, J.J., Volmink, J., et al [2011]. Non communicable diseases in sub Saharan Africa: What we know now. *Int J Epidemiol*. 40(4): 885 – 901
13. Li, Z., Feng, Q., Kabba, J.A., et al [2019]. Prices, availability and affordability of insulin products: a cross-sectional survey in shaanxi province, western china. Trop Med Int Health. 24(1): 43–52.
14. Danaei, G., Lu, Y., Singh, G.M., et al [2014]. Cardiovascular disease, chronic kidney disease and diabetes mortality burden of cardiometabolic risk factors from 1980 – 2010. *Lancet Diabetes Endocrinol*. 2(8): 634 – 647
15. McAloon, C.J., Boylan, L.M., Hamborg, T., et al [2016]. The changing face of cardiovascular diseases 2000 – 2012: an analysis of the World Health Organizations global health estimates data. *Int J Cardiol*. 224: 256 – 264
16. Fahinfar,N., Khalid, D., Mohebi, R., [2012]. Risk factors for ischaemic stroke: results from 9 years of follow up in a population based cohort of Iran. *BMC Neurol*. 12: 117

17. Feigin, V.L., Forouzanfar, M.H., Krishmamurthi, R., et al [2014]. Global and regional burden of stroke during 1990 – 2010: findings from the global burden of diseases study 2010.*Lancet*. 383(9913): 245 – 254
18. Truelsen, T., [2010]. Stroke incidence studies in Africa. Lancet Neurology 2010. 9(8): 755 – 757
19. Hertz, J.T., Readon,J.M., Rodrigues, C.G., et al [2014]. Acute myocardial infarction in sub-Saharan Africa: the need for data. *Plos One*. 9(5): e96688
20. Vos, T., Abajobir, A.A., Abate, K.H., [2017]. Global, regional and national incidence, prevalence and years lived with disability for 328 diseases and injuries for 195 countries, 1990 – 2016: a systematic analysis for the global burden of disease study 2016. *Lancet.* 390(10100): 1211 – 1259
21. Ebmeiers, S., Thayabaran, D., Braithwaite, I., et al [2017]. Clément B, Mark W, Richard B. Trends in international asthma mortality analysis of data from the World Health Organization mortality database from 46 countries [1993 – 2012]. *Lancet*. 390(10098): 935 – 945
22. El Sony, A.I., Chiang,C.Y., Malik, E., [2013]. Standard care management of asthma in Sudan: a pilot project. *Public Health Action*. 3(3): 247 – 252
23. Behera, D.,Setigal, I.S., [2015]. Bronchial asthma – issues for the developing world. *Indian J MedRes*. 141(4): 380 – 382
24. Agarwal, G.,Keshri, K., [2014]. Morbidity patterns and healthcare seeking behavior among older widows in India. *Plos One*. 9(4): e94295
25. Reddel, H.K., Hurd, S.S., FitzGerald, J.M., [2014]. World Asthma Day, GINA 2014: a global asthma strategy for a global problem. *Int J Tubercul Lung Dis.* 18(5): 505 – 506
26. Akhiwu, H.O., Asani, M.O., Johnson, A.B., [2017]. Ibrahim M. Epidemiology of pediatric asthma in a Nigerian population. *J Health Res Rev*. 4(3): 130 – 136
27. Guariguata, L., Linnenkamp, U., Beagley, J., et al [2014]. Whitney DR, Cho NH. Global estimates of the prevalence of hyperglyceamia in pregnancy. *Diabetes Res ClinPract*. 103(2): 176 – 185
28. Jiwani, A., Marseille, E., Lohse, N., et al [2012].Damm P, Hod M, Kahn JG. Gestational diabetes mellitus: results from a survey of country prevalence and practices. *Maternal – Fetal Neonatal Med.* 25(6): 600 – 610
29. Enang, O.E., Out, A.A., Essien, O.E., et al [2014].Opara H, Fasanmade OA, Ohwovriole AE et al. Prevalence of dysglyceamia in Calabar: a cross sectional observational study among residents of Calabar, Nigeria. *BMJ Open Diabetes Res Care*. 2(1): e000032
30. Ogbera, A.O.,Ekpebegh, C., [2014]. Diabetes mellitus in Nigeria; The past, present and future. *World J Diabetes*. 5(6): 905 – 911
31. Oga, O.S., Madukwe, O.O., Onyeonoro, U.U., et al [2013].Chukwuonye II, Ukegbu AU,Akhimen MO. Cardiovascular risk factors and non-communicable diseases in Abia State, Nigeria: Report of a community based survey. *Int J Med Biomed Res*. 2(1): 57 – 68
32. Ige, O.K., Owoaje, E.T.,Adebiyi, A.O., [2013]. Non communicable disease and risky behaviour in an urban University community in Nigeria. *Afr Health Sci*. 13(1):62 – 67
33. Ekanem, U.S., Opara, D.C.,Akpaowo, C.D., [2013]. High blood pressure in a semi-urban community in south – south Nigeria: a community based study. *Afr Health Sci*. 13(1): 56 – 61
34. Oladapo, O.O., Salako, L., Sodiq, O., et al [2010]. Shoyinka K,Adedapo K. A prevalence of cardiometabolic risk factors among a rural, Yoruba South western Nigerian population: a population based survey. *Cardiovas J Afr*. 21(1): 26 – 31
35. Murthy, G.V., Fox, S., Sirasubramaniam, S., et al [2013]. Gilbert CE, Mahdi AM, Iman AU. Prevalence and risk factors for hypertension and association with ethnicity in Nigeria: results from a national survey. *Cardiovas J Afr*. 24(9): 344 - 350
36. Akinlua, J.T., Meakin, R., Umar, A.M., et al [2015]. Freemantle N. Current prevalence pattern of hypertension in Nigeria; a systematic review. *Plos One*. 10(10): e0140021
37. Adeloye, D.,Basqzull, C., [2014]. Estimating the prevalence and awareness rates of hypertension in Africa: a systematic analysis. *PloS One.* 9(8): e104300
38. Ejike. C.E.C.C.,[2017]. Prevalence of hypertension in Nigerian Children and adolescents: a systematic review and trend analysis of data from the past four decades. *J Trop Pediatr*. 63(3): 229 – 241
39. Vincent – Onabanjo, G., Mohammad, H.S.,Umeonwuka, C.,[2016]. Prevalence of undiagnosed hypertension among a cohort of University workers in Nigeria. *Int J Community Med Public Health*. 3(7): 1963 – 1967
40. Ashigbie, P.G., Rockers, P.C., Laing, R.O., et al [2020]. Availability and prices of medicines for non-communicable diseases at health facilities and retail drug outlets in Kenya: a cross-sectional survey in eight counties. *BMJ Open*. 10:e035132.
41. Chow, C.K., Ramasundarahettige, C., Hu, W., et al [2018].Khalid FAH, Alvaro AJ, Xiaoru C et al. Availability and affordability of essential medicines for diabetes across high-income, middle-income, and low-income countries: a prospective epidemiological study. *Lancet Diabetes Endocrinol*. 6(10): 798–808.
42. Ewen, M., Zweekhorst, M., Regeer, B., et al [2017]. Laing R. Baseline assessment of WHO target for both availability and affordability of essential medicines to treat non-communicable diseases. *PLoSOne*. 12: e0171284.

43. Cameron, A., Roubos, I., Ewen, M., et al [2011]. Differences in the availability of medicines for chronic and acute conditions in the public and private sectors of developing countries. *Bull WorldHealth Organ*. 89(6):412–421
44. vanMourik, M.S.M., Cameron, A., Ewen, M., et al [2010]. Laing RO. Availability, price and affordability of cardiovascular medicines: A comparison across 36 countries using WHO/HAI data. *BMC CardiovasDisord*.10:25
45. Cameron, A., Bansal, A., Dua, T., et al [2012]. Mapping the availability, price and affordability of antiepileptic drugs in 46 countries. *Epilepsia*. 53(6):962 - 969.
46. Dabare, P.R.L., Wanigatunge, C.A.,Hemantha, B.V.S., [2014]. A national survey on availability, price and affordability of selected essential medicines for non-communicable diseases in Sri Lanka. *BMC Public Health*. 14:817
47. Ozoh, O.B., Eze, J.N., Garba, B.I., et al [2021]. Nationwide survey of the availability and affordability of asthma and COPD medicines in Nigeria. *Trop Med Int Health*. 26(1):54-65.
48. Orubu, E.S.F., Robert, F.O., Samuel, M., et al [2019]. Megbule D. Access to essential cardiovascular medicines for children: a pilot study of availability, price and affordability in Nigeria. *Health PolicyPlanning.*34(Suppl 3): iii20–iii26,
49. Black, R.E., Morris, S.S., Bryce, J., [2003]. Where and why are 10 million children dying every year? *Lancet.* 361: 2226-2234.
50. Masters, S.H., Burstein, R.,Decenso, B., et al [2014]. Pharmaceutical availability across levels of care: evidence from facility surveys in Ghana, Kenya, and Uganda. *PLoS One*. 9(12): e114762.
51. Chen, C-C., Blank, R.H., Cheng, S-H., Medication supply, healthcare outcomes and healthcare expenses: longitudinal analyses of patients with type 2 diabetes and hypertension. *Health Policy*. 117(3): 374–381.
52. Ushie, B.A., Ugal, D.B.,Ingwu, J.A., [2016]. Overdependence on For-Profit Pharmacies: A Descriptive Survey of User Evaluation of Medicines Availability in Public Hospitals in Selected Nigerian States. *PLoS One*. 11(11): e0165707.
53. Bigdeli, M., Jacobs, B., Tomson, G., et al [2013]. Access to medicines from a health system perspective. *Health Policy Planning*. 28 (7): 692 - 704
54. Dong, Z., Tao, Q., Yan, B.,et al [2020'. Availability, prices and affordability of essential medicines in Zhejiang Province, China. *PLos One*. 15(11): e0241761
55. Jiang, M., Yang, S., Yan, K., et al [2013]. Measuring Access to Medicines: A Survey of Prices, Availability and Affordability in Shaanxi Province of China. *PLoS One*. 8(8): e70836
56. Droti,B., O'Neill, K.P., Mathai, M., et al [2019]. Poor availability of essential medicines for women and children threatens progress towards Sustainable Development Goal 3 in Africa. *BMJ GlobalHealth*. 4:e001306.
57. Kuwawenaruwa, A., Wyss, K., Wiedenmayer, K., et al [2020]. The effects of medicines availability and stock-outs on household's utilization of healthcare services in Dodoma region,Tanzania.*Health Policy and Planning*. 35(3): 323–333
58. Schafermann, S., Neci, R., Ndze, E.N., et al [2020]. Availability, prices and affordability of selected antibiotics and medicines against non-communicable diseases in western Cameroon and northeast DR Congo. *PLosOne*. 15 (1): e0227515.
59. Saleem, Z., Saeed, H., Akbar, Z., et al [2021]. WHO key access antibiotics prices, availability and affordability in private sector pharmacies in Pakistan. *Cost Effectiveness Resource Allocation*. 19:10
60. Husain, M.J., Datta, B.K., Kostova, D., et al [2020]. Access to Cardiovascular Disease and Hypertension Medicines in Developing Countries: An Analysis of Essential Medicine Lists, Price, Availability, and Affordability. *J Am Heart Assoc*. 9:e015302
61. Chow, C.K., Nguyen, T.N., Marschner, S., et al [2020]. Availability and affordability of medicines and cardiovascular outcomes in 21 high-income, middle-income and low-income countries. *BMJGlobal Health*. 5 : e002640
62. Attaei, M.W., Khatib, R., McKee, M., et al [2017].Availability and affordability of blood pressure-lowering medicines and the effect on blood pressure control in high-income, middle-income, and low-income countries: an analysis of the pure study data. *Lancet Public Health*. 2(9):e411–419.
63. Dzudie, A., Njume, E., Abanda, M., et al [2020].Availability, cost and affordability of essential cardiovascular disease medicines in the south west region of Cameroon: Preliminary findings from the Cameroon science for disease study. *PLos One*. 15 (3): e0229307.
64. Yusuf, S., Islam, S., Chow, C.K., et al [2011]. Use of secondary prevention drugs for cardiovascular disease in the community in high-income, middle-income, and low-income countries (the PURE Study): a prospective epidemiological survey. *Lancet*. 378(9798):1231–43
65. Mende, M.S., [2019]. Availability and affordability of essential medicines and patient satisfaction on pharmacy services: Case of Two Public Hospitals in Gamo Zone, Southern Ethiopia. *CPQ Medicine*. 7: 4.
66. Gong, S., Cai, H., Ding, Y., et al [2018]. The availability, price and affordability of antidiabetic drugs in Hubei province, China. *Health Policy Planning*. 33(8): 937–947
67. Zhu Wenwen, Y.C.C., Wenfang, S., Qian, W., [2017]. Study on availability evaluation of oral antidiabetic agents in public hospitals from Shaanxi Province. *China Pharm*. 28: 596–9.

68. Yang, C., Hu, S., Zhu, Y., et al [2019]. Evaluating access to oral anti-diabetic medicines: A cross-sectional survey of prices, availability and affordability in Shaanxi Province, Western China. *PLosOne*. 14(10): e0223769.
69. Jiang, M., Zhou, Z., Wu, L., et al [2015]. Medicine prices, availability, and affordability in the Shaanxi Province in China: implications for the future. *Int J Clin Pharm*. 37(1): 12–17
70. Barakat, D., Rockers, P.C., Vian, T., et al [2018]. Access to asthma medicines at the household level in eight counties of Kenya. *Int JTuberculLung Dis*. 22(5): 585–590
71. Bazargani, Y.T., de Boer, A., Leufkens, H.G.M., et al [2014]. Essential medicines for COPD and asthma in low and middle-income countries. *Thorax*. 69(12):1149–1151.
72. Global health estimates 2016. Deaths by cause, age, sex, by country and by region 2000 – 2016. Geneva. *World health Organization* 2018
73. Sambo, M.N., Lewis, I.,Kabir,S., [2008]. Essential drugs in primary health centres of north central Nigeria; where is Bamako initiative? *Nigerian J ClinPract*. 11(1):9-13
74. Irene, C., Komomo, E.A., Augustina, O.O., et al [2016]. Improving on the accessibility and availability of essential drugs in Calabar Metropolis, Cross River State.*J Health, Med Nurs*. 27: 45-55