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Assessment Of The Capacity Of Ugandan Health Facilities, Personnel, And Resources To Prevent And Control Noncommunicable Diseases

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ASSESSMENT OF THE CAPACITY OF UGANDAN HEALTH FACILITIES, PERSONNEL, AND RESOURCES TO PREVENT AND CONTROL NONCOMMUNICABLE DISEASES

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ABSTRACT

Due to the rapid rise of noncommunicable diseases (NCDs), the Uganda Ministry of Health (MoH) has prioritized NCD prevention, early diagnosis, and management. In partnership with the World Diabetic Foundation, MoH has embarked on a countrywide program to build capacity of the health facilities to address NCDs. A needs assessment was developed and conducted in 13 regional referral hospitals, 27 general hospitals, and 14 health center IVs in Uganda to: (1) assess the capacity of health units to detect and manage noncommunicable diseases; (2) describe provider knowledge, attitudes, resources, and practices, and (3) identify areas of improvement and areas in need of funding and training. Quantitative data on the human resources and skills, NCDs prevalence, services, equipment, medicines and stockouts, laboratory tests, referral system, health care providers' skills and attitudes, community engagement, and NCD association membership were collected through the needs assessment, and qualitative interviews were conducted for supplemental information. Data were analyzed and summary statistics (N, % and Mean ±SD, where applicable) for each facility type were generated, and frequencies and percents were used to summarize each of the major aspects of the health facilities. Results of this assessment demonstrate that there remain significant gaps in the resources and personnel at all facilities. Although there is variability among them, none of the facilities meet the WHO standards for essential tools and medicines to implement effective NCDs interventions. The regional referral hospitals fare the best compared to general hospitals and health center IVs, but all facilities report a concerning lack of NCD screening and care services. The assessment results demonstrate the need for Uganda to scale-up low cost, high impact NCD interventions and strengthen the knowledge and capacity of health personnel to reduce NCD disability and death in the country.

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I. Objectives

This needs assessment analysis has three (3) objectives:

1. To assess the capacity of health units to detect and manage noncommunicable diseases
2. To describe provider knowledge, attitudes, resources, and practices
3. To identify areas of improvement and areas in need of funding and training

This report is for the partial fulfillment of the requirements for the degree of Masters of Public Health at the Yale School of Public Health. It is also being sent to the Uganda Ministry of Health Program for the Prevention and Control of Noncommunicable Diseases for future use in building the capacity of the country's health system to address noncommunicable diseases.

II. Background

A. Geography and demographics

Uganda is a landlocked country in East Africa, north of Lake Victoria. Its total area is 241,038 km^2, with 19,100 km^2 of land and 43,938 km^2 of water. Uganda's estimated population is 36,346,000, and the population growth rate is 3.32%.[1] This is the second highest growth rate in the world, and Uganda's population is projected to be over 130 million in 2050.[2] The urban population is 15.6% of the total population. The population proportion under 15 years old is 48.54%, while 3.72% of the population is over 60 years old.[3,4] The capital city of Uganda is Kampala, which has a population of 1,723,300 million people. The sex ratio of the total population is 95 males per 100 females. The gross national income per capita is $1,120, and Uganda spends 9.5% of its GDP on health.[5]

B. Government

The Ugandan government is decentralized, and functions of the local government are specified for district level and sub-county level. According to the Local Government Act of 1997, the reason for decentralization was to address the necessity to administer effectively, bring the services closer to the people, and "account for the means of communication, geographical features, population density, and economic viability." There are currently 132 districts, 162 counties, and 1,116 sub-counties.[6]

C. Health system

The National Health System of Uganda consists of both public and private sectors. The public sector includes all health facilities under the Ministry of Health (MoH), health services of the Ministries of Defense, Internal Affairs, and Ministry of Local Government. The private sector includes private health providers, private not for profit providers, and traditional medicine practitioners. The Ministry of Health (MoH) supervises the local governments' delivery of health services and builds capacity within the local governments to enable them to meet the service delivery standards.[7]

D. Health facility types

Within the public sector, Uganda's health facilities are separated into four categories: 1) National Referral Hospitals (NRHs), 2) Regional Referral Hospitals (RRHs), 3) General Hospitals, and 4) the Health Subdistrict System. The subdistrict system is split into Health Center Is, IIs, IIIs, and IVs. NRHs and RRHs provide comprehensive specialist services and have

research, education, and supervisory programs, in addition to offering services offered by the more general hospitals. Mulago NRH in Kampala, the capital city, is the only NRH in the country. RRHs also offer specialist services such as psychiatry, ear, nose, and throat, ophthalmology, more advanced surgical and medical services, and support services such as laboratory, medical imaging, and pathology. There are 13 RRHs, each serving a population of about 2,307,692. General hospitals provide preventive, curative, maternity, in-patient services, surgery, blood transfusion, laboratory, and medical imaging services. They also offer training and research for the community-based health care programs. They provide care for 500,000 people. There are 164 health center IVs (HCIVs), which provide preventive, curative, and emergency surgery services. The HCIV population ratio is 1:187,500.[7]

E. Health service delivery

The Ugandan government owns most of the health facilities in the country. It owns 2242 health centers and 59 hospitals. In comparison, private not for profit providers own 613 health facilities and 46 hospitals, and private health providers own 268 health centers and 8 hospitals.

In 2001, Uganda abolished user fees. All public health facilities have free curative, preventive, rehabilitative, and promotive health services. Utilization of the health system is poor, even though 72% of households in Uganda are within 5 km from a health facility. MoH outlines the reasons for utilization as: poor infrastructure, lack of medicines and other supplies, shortage of human resources in the public sector, low salaries, lack of accommodation at health facilities, as well as other limiting factors.

The minimum package of services is the Uganda National Minimum Health Care Package (UNMHCP). This package has four main parts, namely: (1) health promotion, disease

prevention and community health initiatives; (2) maternal and child health; (3) prevention and control of communicable diseases; and (4) prevention and control of noncommunicable diseases.[7]

F. Health profile

The total life expectancy at birth is 50.2 years. Gender specific life expectancies are 48.8 years for men and 52 years for women. The total fertility rate is 6.2 children per women, and the maternal mortality rate is 310 per 1000 live births.[8,9] The infant mortality rate is 54 deaths per 1000 live births, and the under five mortality rate is 90 deaths per 1000 live births. A quarter of Uganda's people live below the national poverty line, and 73% of the population is literate.[1] Almost 90% of the population has access to improved sanitation.[3]

The contraceptive prevalence in Uganda is 30%, and 48% of women have adequate antenatal care (4+ visits). Fifty eight percent (58%) of births are attended by skilled health personnel.[10] Among girls aged 15-19%, 31.3% have an unmet need for family planning.[3] The measles immunization rate for 1-year olds is 75%. There are 1.2 physicians for every 100,000 people in Uganda, and there are 13.1 nurses and midwives per 100,000 population.[10]

In 2010, HIV/AIDS (17.3%), malaria (14.2%), and lower respiratory infections (6.4%) were the highest ranking causes of years of life lost (YLLs) due to premature death.[11] The current prevalence of HIV among adults 15-49 years old is 7.2%, and in 2011, there were 181 deaths due to HIV/AIDS per 100,000 population.[3] The top five leading causes of years lived with disability (YLDs) for all ages are iron-deficiency anemia, major depressive disorder, low back pain, HIV/AIDS, and malaria.[11]

The three factors that account for the most disease burden are alcohol use, household air pollution from solid fuels, and childhood underweight. In 2010, the top risk factor for adults aged 15-49 years was alcohol use, while that for children under 5 was childhood underweight.[12]

G. Noncommunicable diseases: Burden

The World Health Organization (WHO) classifies noncommunicable diseases (NCDs) as chronic non-infectious diseases.[12] Noncommunicable diseases are the leading causes in the world of death and disability.[13] Cardiovascular disease, cancer, respiratory disease, and diabetes are the most common noncommunicable diseases in the world.[12] NCDs lead to huge economic burdens on individuals, families, and the healthcare system. The World Economic Forum considers NCDs to be one of the top threats to global economic development.[14] Low- and middle-income countries account for 80% of noncommunicable disease-related deaths worldwide.[12] The WHO has predicted that Africa in particular will have the greatest regional increase in NCD-related death over the next decade.[15]

NCDs currently account for 25% of deaths in Uganda.[16] The WHO estimates that cardiovascular disease accounts for 11% of deaths, cancers 4%, respiratory diseases 3%, diabetes 1%, and other NCDs 6%. In 2008, the age-standardized death rate for all NCDs was 1094.7 deaths per 100,000 in males and 684.9 deaths per 100,000 in females.[16] In addition to the common NCDs such as hypertension, diabetes, cancer, and chronic respiratory diseases, the Ugandan MoH also considers mental illnesses, injuries, and oral diseases to be NCDs.[7] Mental health contributes to 13% of the total disease burden,[7] and injuries currently account for 10% of all deaths in Uganda.[16] In Kampala, 25% of all deaths are due to injury, in particular road traffic crashes (46%) and assaults (16%).[17] Other common injuries include falls, drowning, and burns.[18]

Two of the most common NCDs in Uganda are diabetes and hypertension. The overall prevalence of diabetes is relatively low, estimated at 2.9%,[19] though there are regions with considerably higher prevalence. For example, the prevalence of type 2 diabetes in the districts of Kampala and Mukono is 8.1%. Of this population, nearly 80% of women are overweight and an association among overweight, hypertension, and diabetes in women is observed.[20] In addition, rates of detection are low. There are now 560,000 registered patients in Uganda with diabetes, but it is predicted that an additional 560,000 people are unaware they have the chronic disease.[21] The prevalence of hypertension in the southwest regions of the country ranges from 20-30%.[22, 23]

The WHO STEPwise approach to Surveillance (STEPS) of risk factors is a standardized method for WHO member countries to collect, analyze, and share data for chronic disease risk factors.[24] A WHO-STEPS survey recently conducted in Kasese, a rural district in western Uganda, showed the prevalence of hypertension to be 22%, diabetes 9%, as well as high levels of risk factors, such as physical inactivity, overweight, and heavy tobacco smoking (51%, 15.6%, and 9.6%, respectively).[25]

H. Noncommunicable diseases: Current efforts

There has been a recent movement in Uganda to prioritize NCDs in government, academic research, and healthcare system. In 2006, the Ministry of Health (MoH) established a Program for the Prevention and Control of Noncommunicable Diseases. The program's mandate is to reduce the morbidity and mortality attributable to NCDs through appropriate health interventions targeting the entire population.[26] A planned baseline survey on risk factors and the magnitude of NCDs has not been conducted yet because of lack of funding. Uganda does not

currently have comprehensive data on NCDs, and there is no NCD policy, strategic plan, or standards and guidelines for managing NCDs.[7]

In 2008, MoH partnered with the World Diabetes Foundation (WDF) to develop and implement a national diabetes and NCD program (WDF05-222). The project was set to run from 2008-2012, but did not due to technical challengers. However, it became operational in 2013 and is expected to run until 2017. The program includes the "development of a policy, standards, guidelines, and an integrated, comprehensive work plan for the prevention, detection, and control of diabetes and related noncommunicable diseases." This phase of the partnership includes 4 main components: 1) policy, guidelines, and standards; 2) capacity building for improved diagnosis and care; 3) awareness in all population groups, including the nomadic and internally displaced persons; and 4) establishing and strengthening inter-sectoral collaborations with local and international stakeholders.[27]

I. Rationale for needs assessment

The second component of the MoH-WDF partnership, capacity building for improved diagnosis and care, is critical to improve the currently inadequate resources and skills of health workers in regards to NCDs. In 2013, WDF provided funding for a needs assessment to be conducted in various health units that cover primary, secondary, and tertiary care.[27]

Prior to the development of this needs assessment, there was no regional or national tool for assessing NCD prevalence or the capacity of health facilities and health personnel to address NCDs.

III. Methods

A. Development of the needs assessment tool

Background research was conducted to find the format and questions of needs assessments that were conducted in similar settings. The resources used include a past qualitative nationwide survey on the regional referral hospitals,[28] a NCDs needs assessment used in Tanzania and Zanzibar, an International Diabetes Federation needs assessment used in the Africa region, and a NCDs needs assessment conducted by USAID in Albania, Armenia, Georgia, and Russia.[29]

Priority NCDs were chosen by their mortality and morbidity in Uganda. These NCDs include diabetes, cancer, cardiovascular disease, renal disease, sickle cell disease, and chronic obstructive pulmonary disease.

The World Health Organization's Package for Essential Noncommunicable (PEN) Disease Interventions for Primary Health Care in Low-Resource Settings was used to determine the medicines, technologies, and tools on which to assess the health facilities (Appendix C).[30] PEN's list of essential technologies and tools and list of core medicines for implementing essential NCD interventions in primary care were reviewed, and those that were available, or supposed to be available, in Uganda were included in the needs assessment. Additional medicines, technologies, tools, and guidelines deemed essential by MoH were also included.

Hilary Rogers wrote the draft needs assessment tool with supervision from the Ministry of Health NCDs Programme. The final version of the tool was developed after a 1-day review with various Ugandan NCD experts and RRH managers. Thereafter, data collection with the needs assessment tool began in health facilities.

B. Sample of health facilities

Three types of health facilities were included in this study: Regional Referral Hospitals, General Hospitals, and Health Center IVs. All 13 of the regional referral hospitals were assessed. Three to four facilities, general hospitals and/or health center IVs, were assessed in each of the RRH's catchment area, resulting in 40 facilities in addition to the RRHs. Overall, 53 health units were assessed (Appendix A).

C. Sample of health personnel

Health personnel individually assessed during the MoH visit to determine their level of confidence in and attitudes towards managing NCDs. Different cadres and levels of health personnel were surveyed. These included nursing assistants, lab technicians, nurses and midwives, nursing officers, clinical officers, medical officers, physicians, and a hospital director. The selection process was based on convenience and availability of staff. (**Table 15**)

D. Implementation of needs assessment

Survey:

The health units were assessed throughout July-November 2013 by MoH staff. Two to three staff members visited the facilities and conducted the needs assessment in the specific offices, clinics, pharmacy, laboratory, and wards. Aided by the heads of the health facilities and other personnel, the MoH staff members filled out the survey tool.

Interviews:

In addition to the quantitative data collection, interviews were conducted with health facility personnel when time allowed during several of the MoH visits to health facilities. These interviews were not formalized due to time and staff constraints, and no randomized selection of personnel was used. Eight health personnel were personally interviewed by Hilary Rogers after they filled out the individual confidence and attitudes section of the needs assessment. Interviewees were asked supplemental questions about confidence, attitudes, and gaps in training and knowledge. Interviews were recorded and then transcribed in the U.S.

E. Data analysis

After completing the needs assessment exercise, MoH compiled the data in a Microsoft Access database. These data were then cleaned and imported into Microsoft Excel and SAS for further analysis. Data were analyzed and organized according to the organization of the original questionnaire (Appendix B). Summary statistics (N, % and Mean ±SD, where applicable) for each facility type (regional referral hospital, general hospital, health center IV) were generated. Similarly, frequencies and percents were used to summarize each of the major categories of personnel, services, equipment, pharmaceutical drugs, laboratory services, health care providers' skills and attitudes, referral system, community engagement and NCD association activities. For the providers' skills and attitudes, the associations between type of health care cadre and each of the confidence levels and attitudes were examined using the χ^2 test for trend with a significance level of 0.05.

The personal interviews were not analyzed. The interviews were evaluated for common themes, and relevant segments of the interviews are included in the results section of this paper to supplement the quantitative data from the needs assessment.

IV. Assessment findings

A. Description of sample

Thirteen (13) regional referral hospitals, 27 district (general) hospitals, and 14 health center IVs were assessed. Most of the regional referral hospitals were in urban areas (61.5%), while the majority of general hospitals and health center IVs were in rural areas (59.3% and 64.3%, respectively). Given these are government-owned health facilities, it is assumed that the majority of facilities surveyed receive public support rather than private support (only 45% of each facility type answered this question). While none of the other two types of facility had a private facility, one (3.7%) of the general hospitals was described as private. (**Table 1**)

B. Human resources

In terms of general personnel, all regional referral hospitals had at least one clinical officer (100.0%), with an average of 10.6 (± 3.9) clinical officers at each hospital. Most had at least one medical officer (76.9%), with an average 5.3 (± 4.3) per hospital. The regional referral hospitals had very few specialist physicians. The majority of hospitals had at least one specialist physician (53.8%), general surgeon (69.2%), obstetrician/gynecologist (61.5%), pediatrician (53.8%), and physiotherapist (61.5%), but the average number of these staff members ranged from 1-3 per hospital. Out of all of the regional referral hospitals, there was one cardiologist, one

endocrinologist/diabetologist, one pathologist, one psychiatrist, and one vascular surgeon. None of the regional referral hospitals had a neurologist, oncologist, or pulmonologist.

Most of the regional referral hospitals reported having nurses (76.9%), with an average of 47.8 (± 22.2) nurses at each hospital. Only 4 (30.8%) regional referral hospitals had at least one diabetic nurse, but 9 (69.2%) had a psychiatric nurse.

The majority of the regional referral hospitals had laboratory technicians (84.6%), laboratory technologists (84.6%), and radiology technicians (69.2%), with an average of about 2 staff members of each type per hospital.

The regional referral hospitals lacked other types of health personnel that specialize in NCDs. Specifically, none of the hospitals had a NCDs counselor, and 7.7% had a foot care specialist and a NCD educator.

As for general hospitals, the majority had medical (81.5%) and clinical officers (88.9%). Although a few had at least one general surgeon (11.1%) and OB/GYN (14.8%), the general hospitals did not have many specialist physicians.

The 25.9% of general hospitals that had at least one diabetic nurse had an average of 1.4 (±0.8) per facility. A larger number of hospitals (74.1%) had psychiatric nurses, with an average of 1.5 (±0.7) per facility. While seven of the general hospitals (25.9%) had a nutritionist, very few of them had a NCD counselor (3.7%) or NCD educator (3.7%), and none of them had a foot care specialist.

As expected, the majority of the personnel in the health center IVs were medical and clinical officers and nurses. Only two health center IVs (14.3%) had at least one nurse trained in diabetes care. None of the health center IVs had a staff member trained in NCD counseling, NCD education, foot care, or nutrition. (**Table 2**)

C. Facility-based NCDs prevalence

A patient was considered a "NCD patient" if their primary reason for visiting the health facility was a NCD. Due to the low rates of NCD screening in the facilities, it is unlikely that a patient would come in for another health issue and then be treated for a NCD. Although the breakdown of inpatient/outpatient is unknown, NCD patients are more likely to be in an outpatient setting. Only six regional referral hospitals were able to report the number of NCD patients in the facilities (Jinja, Kabale, Lira, Masaka, Mbale, and Mbarara). Many of the general hospitals and health center IVs also lacked data on the number of NCD patients. Of the average number of overall patients in regional referral hospitals (118,513), 17.28% were NCD patients. On average, 6.18% of the patients in general hospitals and 1.79% of the patients in health center IVs had at least one NCD. Overall, NCD recording and reporting in the health facilities was noted to be very poor or inadequate. Therefore, these data on NCD prevalence, while informative, are not reliable.

In the regional referral hospitals, injuries due to trauma not related to gender-based violence (2.18%), mental health disorders (1.53%), and diabetes for all ages (1.51%) had the highest average number of cases per year per overall patients in the facilities. Injuries due to trauma not related to gender-based violence (12.59%), mental health disorders (8.84%), diabetes for all ages (8.73%), adult diabetes (8.18%), hypertension (6.81%), and asthma (4.20%) had the highest average number of cases per patients with NCDs in the facilities. (**Table 3**)

Table 4 describes the recorded cases of regional referral hospitals in detail. In Arua, the NCDs with the highest percentage of cases per number of overall patients were injuries due to trauma not related to gender-based violence (1.01%) and hypertension (1.00%). Gulu did not have records of specific NCDs cases, with the exception of 700 diabetes cases. In Hoima, mental

health disorders (3.89%) and total diabetes (0.83%) had the highest proportions within the number of overall patients. In Jinja, 68.30% of patients have an NCD. The most prevalent NCDs were mental health disorder (8.83%), injury due to trauma not related to gender-based violence (8.48%), and heart disease (4.43%). In Kabale, 11.66% of patients have an NCD, and mental health disorder (1.64%) and injury due to trauma not related to gender-based violence (1.48%) are the most prevalent. In Lira, 11.32% of patients have an NCD, and injury due to trauma not related to gender-based violence (33.01%), total diabetes (11.32%), and asthma (4.72%) are the most prevalent. The prevalence of NCDs in Masaka Regional Referral Hospital is 14.50%, with total diabetes (3.88%), adult diabetes (3.88%), and injury due to trauma not related to gender-based violence (2.08) in the highest proportions. Mbale has a 27.74% NCDs prevalence among its patients, with asthma (4.12%), total diabetes (2.08%), adult diabetes (1.91%), and cancer (1.31%) in the highest proportions. Mbarara has a 14.51% NCDs prevalence among its patients, and total diabetes (3.91%), adult diabetes (3.90%), injury due to trauma not related to gender-based violence (2.08%), and mental health disorder (2.00%) have the highest proportions of the overall number of patients. In Mityana, adult diabetes (1.42%) and injury from a road traffic accident (1.18%) have the highest prevalence. In Moroto, the NCDs with the most number of cases are injury from trauma due to other causes (1.73%) and hypertension (0.28%). In Mubende, total diabetes (2.44%) and hypertension (2.06%) have the highest prevalence. In Soroti, injury from trauma due to other causes (4.43%), asthma (0.58%), and injury from a road traffic accident (0.51%) have the highest prevalence. (**Table 4**)

In the general hospitals, adult diabetes (2.94%), and injuries due to trauma not related to gender-based violence (1.94%) had the highest average number of cases per overall patients in the facilities. Adult diabetes (47.52%), injuries due to trauma not related to gender-based

violence (31.39%), childhood diabetes (10.75%), and hypertension (10.01%) had the highest average number of cases per patients with NCDs in the facilities. Chronic obstructive pulmonary disease was surprisingly high (68.31%), but this statistic is believed to be due to a reporting error, and is not accurate.

In the health center IVs, chronic obstructive pulmonary disease (7.10%), injuries due to trauma not related to gender-based violence (0.45%), and hypertension (0.32%) had the highest average number of cases per overall patients in the facilities. The mean number of cases of chronic obstructive pulmonary disease was 5156 per health center IV, which is more than the mean number of NCDs patients (N=1300), which suggests another reporting error. Injuries due to trauma not related to gender-based violence (24.92%), hypertension (17.77%), asthma (14.46%), total diabetes (11.00%), and adult diabetes (10.69%) had the highest average number of cases per patients with NCDs in the facilities. (**Table 3**)

D. Facility-based HIV prevalence

NCDs and HIV infection often coincide. They both are most frequent in low- and middle-income countries, with age-adjusted death rates nearly twice as high compared to high-income countries. HIV is also associated with high rates of NCDs. For example, a study in Kenya showed that HIV positive people had significantly higher rates of hypertension than those who were HIV negative. Due to the rapid expansion of HIV programs, people with HIV are living longer and aging, and thus developing other chronic conditions. There are also some opportunistic illnesses that are directly linked to HIV infection, such as HIV-associated lymphoma and cervical cancer.[31]

The care of HIV and NCDs also share many similarities. Both require the strengthening of primary health care, ongoing appointments, adherence to medications, healthy living, and self-management.[31] Furthermore, many scholars suggest leveraging effective HIV program approaches and service delivery models to address NCDs in resource-limited settings.[32] The topic of integrating HIV and NCDs care and learning from the lessons of HIV services also came up in the interviews with health personnel. One staff member said, "It used to be you treat diabetes, you don't think of…other conditions. But now, when you are treating for diabetes, you have to check for HIV." Another staff member discussed how the strategy of "having focal people" who are trained to screen, treat, and refer HIV patients would also work for NCDs.

Due to the overlap of HIV and NCDs, the needs assessment also examined the prevalence of HIV and comorbidities of HIV and NCDs in the health facilities. Only 3 regional referral hospitals, 4 general hospitals, and 4 health center IVs were able to sufficiently fill out the HIV prevalence section of the assessment. In each of the health facility types, there were more women with HIV in the last year than men. Specifically, 71.4% of the 5600 HIV patients were female in Jinja Regional Referral Hospital, 67.7% of the 753 HIV patients in Bududa General Hospital and 60.6% of the 2431 in Serere Health Center IV were female. (**Table 5**)

E. Clinics and services

The majority of regional referral hospitals had a clinic specifically for diabetes (84.6%). Additionally, many had a clinic for hypertension (53.9%), OB/GYN (53.9%), HIV (53.9%), and medical outpatient (53.9%). Less than half of the regional referral hospitals had a clinic for surgery (38.5%), pediatrics (30.8%), sickle cell (30.8%), cancer (15.4%), cardiology (15.4%), renal disease (15.4%), and COPD (7.7%).

The majority of general hospitals had a clinic for medical outpatient (92.6%), HIV (63.0%), and diabetes (55.6%). Less than half had a clinic for OB/GYN (44.4%) or pediatrics (29.6%). Few of the general hospitals had a clinic for hypertension (18.5%), surgery (11.1%), sickle cell (7.4%), cancer (3.7%), or cardiology (3.7%). None of the general hospitals had a clinic for COPD or renal disease.

In general, specialty clinics are not expected in health center IVs. None of the health center IVs had a clinic for cancer, cardiology, COPD, renal disease, sickle cell, pediatrics, or sickle cell. Most of them had a medical outpatient clinic (64.3%), and some had a clinic for HIV (28.6%), diabetes (21.4%), and OB/GYN (21.4%). One of the health center IVs had a hypertension clinic (7.1%). (**Table 6)**

The majority of the regional referral hospitals that have NCDs clinics had separate clinic rooms and conduct regular patient review. However, very few of these hospitals perform clinic performance audits. WHO recommends audit tools for implementing essential NCD interventions **(**Appendix C**)**. Half or less than half of the diabetes, hypertension, OB/GYN, pediatrics, HIV, surgery, and MOPD wards conduct clinic performance audits. These audits were not conducted in any of the cancer, cardiology, COPD, renal, or sickle cell clinics. (**Table 7**)

The availability of NCD services such as body measurements, screening, laboratory tests, and advice and support, were assessed in the health facilities. Most of the health facilities conduct weight and height measurements. However, only 35.7% of health center IVs measure height. Very few of the regional referral hospitals and general hospitals measure BMI and waist:hip ratio, and health center IVs do not measure either.

Most of the health facilities measure blood pressure. All of the regional referral hospitals offer screen for high blood pressure, while 88.9% of general hospitals and 85.7% of health center

IVs do. The health facilities had low rates of screening for particular NCDs. Less than half of regional referral hospitals (30.8%) and health center IVs (42.9%) screen for sickle cell. While more than half of all facilities offer pap smears for cervical cancer screening, only 40.7% of general hospitals and health center IVs screen for breast cancer. Less than a quarter of regional referral hospitals (15.4%) offer prostrate cancer screening, and only 1 general hospital (3.7%) offers the screening. Less than half of all health facilities perform eye examinations. Similarly, only 61.5% of regional referral hospitals, 44.4% of general hospitals, and 21.4% of health center IVs record a patient's family history of NCDs.

Most of the health facilities offer tests for oral glucose tolerance, blood lipids, urinalysis, urine proteins, and urine ketones. While none of the general hospitals or health center IVs offer cytology/pathology services, 30.8% of regional referral hospitals do.

About half of the regional referral hospitals and general hospitals offer physiotherapy and palliative care. Very few of the facilities offer chemotherapy or radiotherapy. Of regional referral hospitals, 2 (15.4%) offer chemotherapy and 1 (7.7%) offers radiotherapy.

The majority of regional referral hospitals and general hospitals offer individual (69.2% and 63.0%) and group (92.3% and 66.7%) NCD education, foot care for diabetic patients (61.5% and 55.6%), and nutrition advice for all patients (92.3% and 85.2%). However, very few of the facilities offer NCD patient cards or provide NCD Information, Education and Communication (IEC) materials. Ten (77.0%) of regional referral hospitals offer patient treatment plans, self-management support, and links to peer/social support. Less of the general hospitals and health center IVs offer these services. Specifically, only 11.1% of general hospitals and 28.3% of health center IVs offer patient treatment plans. Even fewer of the health center IVs offer self-management support (14.3%) and links to peer/social support (21.4%). (**Table 8**)

WHO lists evidence-based clinical protocols as essential for implementing NCD interventions. Very few Ugandan health facilities have guidelines for the management of common NCDs. Some of the personnel who were interviewed noted that few members of the staff have access to NCDs guidelines, so many "patients will not be diagnosed" and health professionals dealing with NCDs patients "are not very confident because they have forgotten the key message they should follow in managing that patient."

Specifically, only 30.8% of regional referral hospitals, 14.8% of general hospitals, and 7.1% of health center IVs have access to diabetes management guidelines. Even fewer have access to guidelines on hypertension management, and none of the regional referral hospitals or health center IVs have access to guidelines on hyperlipidemia management and tobacco screening and treatment. Less than a quarter of each type of health facility has access to guidelines on the screening and treatment of cancer, mental health, or sickle cell disease. Similar numbers were found for guidelines on asthma management and palliative care. (**Table 9**)

F. Equipment

Lack of equipment was a common issue in all of the health facilities. Many of the health workers commented on the lack of simple tools that help to prevent and manage NCDs during the interviews and administration of the needs assessment survey. For example, in one of the interviews, a health worker said, "You are limited somehow for particular investigations. You saw for diabetes we have glucometers around, but sometimes it's not everywhere: in the whole hospital you might get one. Those basic machines for investigations, sometimes even for observations…it can limit the way you want to do very efficient clinical work."

This section summarizes the availability of NCD-related equipment in the health facilities. While the regional referral hospitals and general hospitals had these items of equipment spread out among the different wards of the facilities, these items were usually only located in the medical out patient department (MOPD) of the health center IVs.

The WHO essential tools for implementing essential NCD interventions in primary care include: patient clinical record, medical information register, and audit tools. While over half of the regional referral hospitals reported having patient files (61.5%), the minority of general hospitals (44.4%) and health center IVs (35.7%) did. Some of the health facilities did not have adequate space (such as a file cabinet, cupboard, or stage space) to keep their patients files. Only 69.2% of regional referral hospitals, 66.7% of general hospitals, and 42.9% of health center IVs reported having space for files. The majority of the health facilities did not have NCD registers. For regional referrals, 46.2% had a register for new cases only, 46.2% for follow-up cases only, and 15.4% for admission only. For general hospitals, 51.9% had a register for new cases, 48.1% for follow-up cases, and 48.1% for admission cases. For health center IVs, 42.9% had a register for new cases, 42.9% for follow-up cases, and 50.0% for admission cases.

The essential technologies that WHO recommends are: thermometer, stethoscope, blood pressure measurement device, measurement tape, weighing machine, peak flow meter, spacers for inhalers, glucometer, blood glucose test strips, urine protein test strips, and urine ketone test strips. Some of the facilities within each health facility type lacked these essential technologies. For example, 53.8% of regional referral hospitals had at least one thermometer in the facility. Similarly, 51.9% of general hospitals and 57.1% of health center IVs did. The numbers are similar for stethoscopes: 1.5% of regional referral hospitals, 59.3% of general hospitals, and 50.0% of health center IVs had at least one stethoscope. Less than half of all regional referral

hospitals and general hospitals had at least one of each type of blood pressure machine (mercury sphygmomanometer, aneroid, and automated). WHO recommends, for facilities with nonphysician health workers, a blood pressure measurement device with digital reading. Five out of the 14 health center IVs (35.7%) had at least one automated blood pressure machine. Six (42.9%) had at least one aneroid machine, and six (42.9%) had at least one mercury sphygmomanometer. Which health center IVs had these machines is unknown at this time. The facilities also lacked blood pressure cuffs – 30.8% of regional referral hospitals, 33.3% of general hospitals, and 57.1% of health center IVs reported having at least one standard blood pressure cuff in the facility. The numbers were worse for pediatric cuffs –7.7% of regional referral hospitals, 11.1% of general hospitals, and 21.4% of health center IVs reported having at least one pediatric cuff in the facility. Just over a half of all types of health facilities had at least one measuring tape. Specifically, 53.8% of regional referral hospitals, 51.9% of general hospitals, and 50.0% of health center IVs had at least one.

WHO does not specify which type of scale is preferred. In this case, "bathroom type" meant the small, simple, automated scale. "Hospital type" meant the scales that have a die-cast balance beam scale at eye level. More facilities had at least one "bathroom type" weighing machine than "hospital type." Only 30.8% of regional referral hospitals, 40.7% of general hospitals, and 28.6% of health center IVs had at least one hospital type weighing scale, compared to 53.8% regional referral hospitals, 55.6% of general hospitals, and 57.1% of health center IVs that had at least one bathroom type scale.

Peak flow meters were not included in the needs assessment because MoH knew it was unlikely for the facilities to have them. Very few of the facilities had spacers for inhalers. Only 3 regional referral hospitals (23.1%), 1 general hospital (3.7%), and 1 health center IV (7.1%) had

them. The number of facilities with blood glucose meters (glucometer) was higher, but not sufficient. Of the facilities surveyed, 61.5% of regional referral hospitals, 74.1% of general hospitals, and 42.9% of health center IVs had at least one glucometer. Facilities were asked if they had multiple urine testing strips, which test both urine protein and urine ketone. Three regional referral hospitals (23.1%), 2 general hospitals (7.4%), and 2 health center IVs (14.3%) had multiple tests for their use.

WHO provides additional technologies that are essential when resources permit. Two technologies on this list are: nebulizer and tuning fork. Very few of the health facilities had these technologies. Specifically, 1 regional referral hospital (7.7%), 4 general hospitals (14.8%), and 2 health center IVs (14.3%) had at least one set of tuning forks. The proportion of facilities that had at least one nebulizer was slightly better: 30.8% of regional referral hospitals, 11.1% of general hospitals, and 14.3% of health center IVs. (**Table 10**)

More than half of each type of health facility had an ultrasound scan, but not all of them are functional. For example, 84.6% of regional referral hospitals had an ultrasound scan, but only 54.6% were functional. A few of the regional referral hospitals had an echocardiography machine (23.1%) and electrocardiogram (ECG) machine (23.1%), and even fewer of the general hospitals (3.7% and 14.8%, respectively) had these. Similarly, only 33.3% of the echocardiography and ECG machines in regional referral hospitals were functional.

Most of the regional referral hospitals (76.9%) and general hospitals (81.5%) had X-ray machines, but only a little over half of them were functional (60.0% and 54.6%, respectively). In comparison, 2 health center IVs had X-ray machines, but none of them were functional.

Even fewer health facilities had more advanced equipment. For example, 38.5% of regional referral hospitals had Doppler and 15.4% had CT-scan. None of the general hospitals or health center IVs had a CT-scan, and 1 general hospital had a non-functional Doppler.

Few health facilities have a reliable power supply (usually hydro-electricity). Specifically, 53.9% of regional referral hospitals, 63.0% of general hospitals, and 28.6% of health center IVs had a reliable power supply. More than half of them did have an alternative power supply (usually solar or a generator). Although it was not always functional, 69.2% of regional referral hospitals, 74.1% of general hospitals, and 64.3% of health center IVs had an alternative supply of power. (**Table 11**)

G. Drugs

A major challenge that health personnel said they face in their facilities every day was not knowing if the pharmacy would have the drug they prescribed to a patient. When asked if they receive the types of drugs and quantity of drugs they request, more than half of the pharmacists at each type of health facility said no (**Table 12**). The needs assessment included a section on the availability and stockout experiences of specific classes of drugs. The list of drugs was based off of the WHO core list of NCD medicines. Pharmacists were asked whether they had particular classes of drugs available on the day the needs assessment was conducted, and whether or not they had experienced a stockout in the last quarter or last year of the drugs. A stockout was defined as a period of time when the pharmacy's inventory of a drug was exhausted.

Regional referral hospitals' pharmaceutical drugs are restocked every two months. Overall, regional referral hospitals are well-stocked with anti-hypertensives with the exception of

beta-blockers. Only 53.8% of the facilities carry beta-blockers, and 23.1% experienced a stockout in the last quarter. The regional referral hospitals are also generally well-stocked with diabetic drugs, except for thiazolidinediones (7.7%). Twelve had biguanides (i.e. Metformin) available at the time of the needs assessment (92.3%), and none of the hospitals had had a stockout in the last year. The type of insulin carried varies by regional referral hospital. Specifically, 61.5% carry ultra short-acting, 69.2% carry short-acting, 76.9% carry intermediate, and 84.6% carry long-acting. Due to a recent national changeover of the concentration of insulin to U100, facilities were also asked about its availability. Ten of the regional referral hospitals had U100 (76.9%). As for other drugs, regional referral drugs are generally well-stocked with folic acid (92.3%) and cardiac aspirin (84.6%). However, only 15.4% carry statins, and 30.8% had experienced a stockout in the last quarter. The same amount (30.8%) of regional referral hospitals experienced a stockout of cardiac aspirin in the last year.

More than half of general hospitals carry the anti-hypertensive drugs. However, 37.0% experienced a stockout of beta-blockers in the last quarter. For diabetic drugs, 88.9% have biguanides available, and 81.5% have sulfonylureas. More than half of the hospitals (63.0%) have U100 concentration of insulin. Only 2 general hospitals have statins available (7.4%). While 59.3% have cardiac aspirin, 22.2% had experienced a stockout in the last year.

While all of the health center IVs had calcium channel blockers and biguanides available, 35.7% experienced a stockout of both drugs in the last year. Less than half carry ACE inhibitors (42.9%), thiazolidinediones (7.1%), dipeptidyl peptidase-4 inhibitors (7.1%), U100 (14.3%), statins (21.4%), and cardiac aspirin (35.7%). Five (35.7%) of the health center IVs experienced a stockout of cardiac aspirin in the last year. Additionally, only a few of the health center IVs carry insulin. Only 14.3% have U100, and by type, 21.4% carry ultra short-acting, 35.7% carry short-

acting, 21.4% carry intermediate, and 21.4% carry long-acting. Of those who do carry insulin, most of them did not experience a stockout in the past year.

The availability of a refrigerator in the pharmacy was also assessed. While the proportions of regional referral hospitals and general hospitals that had a refrigerator were high (92.3% and 70.4%, respectively), only 21.4% of health center IVs had a refrigerator to store drugs in their pharmacy. (**Table 13**)

H. Laboratory services

All of the regional referral hospitals and general hospitals and 12 of the health center IVs (86%) had an on-site laboratory. The facilities had high proportions of access to a centrifuge, microscope, and refrigerator in the laboratories.

In general, regional referral hospitals had the highest proportion of facilities that had general tests, such as hemoglobin, complete blood count and differential, electrolytes, renal function tests, liver function tests, lipid profile, and urinalysis, available. Most of the regional referral hospitals and health center IVs were able to do hemoglobin tests (88.9% and 78.6%) and urinalysis (96.3% and 92.9%). Less than half of the regional referral hospitals had available tests for electrolytes (40.7%) and lipid profile (33.3%).

Most of the health facilities were able to do random blood glucose testing. Only 30.8% of regional referral hospitals and 11.1% of general hospitals had urine microalbumin tests. Very few of the regional referral hospitals and general hospitals were able to do cancer tests.

Of note are the tests that more general hospitals have available than regional referral hospitals. Specifically, 18.5% of general hospitals and no regional referral hospitals have available hemoglobin A1c tests for diabetes, and 14.8% of general hospitals and no regional

referral hospitals have hemoglobin electrophoresis for sickle cell disease. Similarly, a higher proportion of general hospitals were recorded to have thick and thin film for malaria than regional referral hospitals. These statistics are unexpected, due to the larger capacity of regional referral hospitals, and may or may not be representative of the true proportions. (**Table 14**)

I. Health care providers' confidence and attitudes

Description of Sample:

The majority of health personnel individually surveyed on their confidence and attitudes of NCD management were nurses and midwives (27.6%). Nursing officers (15.5%), clinical officers (13.8%), medical officers (16.4%) and physicians (8.6%) also completed the individual survey. Personnel who did not fit into these five categories were classified as "Other", as well as those who filled out the survey but did not specify their cadre. (**Table 15**)

Confidence in NCD Management:

The personnel's confidence in managing hypertension, diabetes, and high cholesterol ($p<0.001$ for all three) was significantly associated with the type of cadre of personnel. The majority of nurses and midwives felt only somewhat confident in their skills to manage hypertension (56.3%) and diabetes (46.9%). Almost 72% were not at all confident in managing high cholesterol. Nursing officers and clinical officers followed a similar pattern. They were confident in managing hypertension (38.9% and 62.5%), somewhat confident in managing diabetes (38.9% and 56.3%), and not at all confident in managing high cholesterol (61.1% and 75.0%). Medical officers and physicians were more confident in their abilities to manage NCDs. A little over half of medical officers were confident in managing hypertension and diabetes (52.6% and 57.9%), while the majority of physicians were very confident (80.0% and 80.0%).

The majority of medical officers were either somewhat confident (31.6%) or not at all confident (31.6%) in managing cholesterol, while 60.0% of physicians were very confident.

The personnel's confidence in screening for cervical cancer (p=0.021) and breast cancer (p=0.037) was also significantly associated with the type of cadre. The majority of nurses and midwives, nursing officers, and clinical officers were not at all confident in screening for cervical cancer (68.8%, 66.7%, and 62.5%, respectively), while medical officers were mostly somewhat confident (31.6%). Sixty percent (60.0%) of physicians were either very confident or confident in their ability to screen for cervical cancer. These confidence levels are similar for screening for breast cancer. The majority of nurses and midwives and clinical officers are not at all confident in screening for breast cancer (46.9% and 43.8%), while nursing officers are somewhat confident (50.0%). The majority of both medical officers and physicians are very confident in screening for breast cancer (31.6% and 40.0%).

The personnel's confidence in diagnosing and managing asthma, depression and other mental health disorders, and sickle cell disease was significantly associated with the type of cadre. Nurses/midwives and nursing officers were confident in diagnosing and managing asthma (50.0% and 72.2%), but somewhat confident in diagnosing and managing depression and other mental health disorders (34.4% and 44.4%) and sickle cell disease (48.4% and 44.4%). The majority of clinical officers were confident in diagnosing and managing asthma (50.0%), but somewhat confident for depression and other mental health disorders (50.0%) and sickle cell disease (37.5%). Medical officers and physicians were very confident in diagnosing and managing asthma (63.2% and 70.0%). Medical officers were somewhat confident in diagnosing and managing depression and other mental health disorders (42.1%) and confident for sickle cell

disease (57.9%). Physicians were confident in diagnosing and managing depression and other mental health disorders (77.8%) and very confident for sickle cell disease (55.6%).

The personnel's confidence for the treatment of tobacco and alcohol abuse was not significantly associated with the type of cadre. Each cadre was less confident than in many of the other areas of NCD management, and the trend of confidence levels among the cadre groups was reversed compared to the areas discussed above. For example, while physicians usually were confident or very confident in their skills to manage NCDs, the majority of physicians were not at all confident in treating tobacco abuse or alcohol abuse (55.6% and 38.9%). In comparison, 46.9% of nurses/midwives and 38.9% of nursing officers felt confident in treating alcohol abuse. (**Table 16**)

Attitudes on NCD Management:

The attitudes on NCD management were not significantly associated with the type of cadre. The majority of the personnel agreed that patients receive better care for chronic medical conditions if they have a designated primary care provider. However, all health personnel disagreed that there are effective depression treatments that can be provided by a primary care physician in their facility. The majority of nurses and wives (65.5%), nursing officers (80.0%), medical officers (62.5%), and physicians (100.0%) agreed that their clinical training prepared them adequately to manage chronic diseases, but most clinical officers disagreed (75.0%). Nurses and midwives (78.6%), clinical officers (75.0%), and physicians (71.4%) agreed that a doctor can influence whether a patient successfully quit smoking, but nursing officers and medical officers had equal numbers of agreement and disagreement. Most personnel agreed that they are able to spend the time they need to provide good medical care for their patients with chronic disease. Specifically, nurses and midwives (80.0%), nursing officers (66.7%), medical

officers (56.3%), and physicians (71.4%) agreed, while half of clinical officers did not. While the majority of the different personnel cadres agreed that their facility has the capacity to manage chronic disease, medical officers had equal numbers of agreement and disagreement. (**Table 17**)

Comments:

Many of the personnel commented on the need for further training in NCDs. A clinical officer from Kaabong Hospital in the commented, "Management of communicable diseases has been challenging because of the knowledge gap at the primary level where most of the service providers use the basic knowledge they get from their training." A nursing officer from the same hospital said, "There are no staff trained on management of chronic conditions. We task the ministry to train nurses on the following conditions: cancer of the cervix, sickle cell disease, etc. MOH should strengthen capacity building for health workers in hard to reach areas and provide scholarships for specific courses."

Some of the personnel also commented that understaffing and lack of equipment and medicines inhibited their capacity to manage NCDs. A nurse in Lyantonde Hospital commented that the hospital has insufficient staff, thus they are "handling NCD patients in general OPD." Another nurse in Tororo Hospital commented that staff members are not interested in learning more about NCD management because most are volunteers and are not paid. A medical officer from Bududa Hospital said, "There is understaffing and lack of critical cadres. Basic investigations are not done due to a lack of skilled officers and lab reagents." Other personnel also noted the lack of laboratory reagents and medicines. For example, a nurse in Masindi Hospital commented that there is a lack of good follow-up of NCDs because it is "difficult to manage cases – no glucometers and drugs for diabetes and others." A physician in Hoima Regional Referral Hospital said that the capacity to manage NCDs is limited by: "no Hb

electrophoresis machine, stock out of strips to monitor diabetes, shortage of staff, stock out of medicines (e.g. insulin and oral morphine), limited space in OPD to run specialized out patient clinics." Several other personnel also mentioned the lack of space. A staff member in Pallisa Hospital said that the reason the hospital only ran a diabetes clinic once a month was because of "lack of staff, inadequate space to run a diabetes clinic."

J. Referral system

A small proportion of the health facilities had access to protocols for the management and referral of NCD patients. Specifically, 15.4% of regional referral hospitals, 29.6% of general hospitals, and 7.1% of health center IVs have access t the resource. Most of the facilities had access to an outgoing referral form, but only 46.2% of regional referral hospitals and 26.0% of general hospitals had access to a receiving referral form. The facilities also lack ambulances. Half of the health center IVs and regional referral hospitals have available transport to the next facility (50.0% and 53.8%, respectively). More general hospitals have a register to monitor follow-up and gather statistics on referrals (both outgoing and receiving) than health center IVs and regional referral hospitals. For example, 70.4% of regional referral hospitals have access to this outgoing register, compared to 42.9% of health center IVs and 46.2% of general hospitals. Additionally, only a few of the facilities had a program that integrates NCDs support supervision and capacity building in lower health facilities. Specifically 23.1% of regional referral hospitals, 14.8% of general hospitals, and 21.4% of health center IVs had such a program. (**Table 18**)

K. Community engagement

The majority of each type of health facility does not engage in community activities, especially NCDs activities. For example, only 46.2% of regional referral hospitals communicate about disease states through media, gatherings, IEC, and/or village health teams, 7.7% have formal linkages to the community and regular community meetings on NCDs, 7.7% have partnerships with community organizations that focus on NCDs, and 15.4% engage with the community in patient follow-up. These proportions are similar for general hospitals and health center IVs. (**Table 19**)

L. Associations

The majority of regional referral hospital diabetes clinics are linked with the Uganda Diabetic Association (UDA). While 61.5% of them have a branch of the UDA in the facility, 75.0% of these branches are functional, meaning regular meetings are held, minutes, work plans, and reports are available.

Of the 7 general hospitals (26.0%) that have a UDA branch, 71.4% of them are functional. Of the 2 health center IVs (14.3%) that have a UDA branch, only 1 of them is functional (50.0%). (**Table 20**)

V. Conclusion

A. Summary of findings

Results of this assessment of the capacity of Ugandan health facilities, personnel and resources to address NCDs demonstrate some strengths, but there remain significant gaps in the availability of human resources and NCD training, equipment, medicines, laboratory tests, accurate data, and NCD community activities. Although there is variability among the different types of health facilities, none of them meet the WHO standards for essential tools and medicines to implement effective NCDs interventions.

As expected, the regional referral hospitals fare the best compared to general hospitals and health center IVs, but they still report concerning numbers of facilities that lack basic and effective NCD prevention and control equipment, medicines, and standard guidelines. They also lack basic health personnel trained in NCDs, such as diabetic and psychiatric nurses, and staff that provide NCD counseling and education.

In general, Ugandan health facilities lack basic NCD screening and prevention services. Screening is important to catch patients with modifiable risk factors early on before they develop a severe NCD. Despite this, less than half of all health facilities have the essential equipment and tests to screen for such risk factors.

The health facilities also had poor to moderate quality of care of NCDs. Very few had standard guidelines to follow for managing specific NCDs and registers to keep track of NCD patients. All facilities experienced concerning numbers of stockouts of essential NCD medicines within the last year. Most of the providers demonstrated a lack of confidence in screening and managing NCDs. Limited training, heavy workloads, and a lack of equipment and medicines were often named as hindrances to performing effective NCD prevention and control.

The assessment also highlights the need to strengthen essential health system functions to improve NCD care. They lack a strong referral system to send NCD patients to higher-level facilities. Additionally, there is no NCD health information system. Health facilities cannot reliably measure NCD incidence, prevalence, mortality, or care coverage, so the true state of NCDs in Uganda is still unknown.

B. Limitations

This needs assessment had several limitations. To begin with, the sample of the needs assessment did not include all of the general hospitals or health center IVs. While it did survey many of these facilities, the sample was not randomized. Consequently, the results from this needs assessment may not be a general representative of general hospitals and health center IVs throughout the country. Additionally, the needs assessment survey itself involved many steps and questions, and therefore was burdensome for the MoH staff to conduct and for the health facilities to complete. For example, the equipment section asked about the availability and number of a certain type of equipment for each clinic. Given the resource-limited settings, it was often sufficient to ask how many items were available in the hospital overall. The health facility staff members were under time constraints, and may not have been able to fully and accurately complete each section.

The "gold standard" of conducting a needs assessment is time-intensive direct observation.[29] However, due to time and funding constraints, the survey was completed in a few hours by asking staff members about the availability and number of equipment, laboratory tests, guidelines, etc. There was no standardized method of conducting the needs assessment, and the quality and accuracy of the data collected depended on the staff available on the particular day of the MoH visit. The type of personnel who helped to complete the survey varied at each facility,

meaning their levels of knowledge and experience also varied. This may have had an effect on the accuracy of reporting. Sometimes the assessment was completed by manually counting the number of these items, but this was not the common method. Therefore, future improvements for similar needs assessment surveys would include randomized samples, standardized data collection methods, and time-intensive direct observation or manual spot checks.

The accuracy and availability of data were also limitations to the analysis section of this report. For example, in some cases, regional referral hospitals unexpectedly had lower proportions of available pharmaceutical drugs and laboratory tests than general hospitals. Perhaps this statistic is true, but it seems counterintuitive and may be due to inaccurate reporting from the reasons listed above as well as many others.

The data requested was often unavailable. Only six regional referral hospitals were able to report how many NCD patients they had. This lack of data made reporting representative statistics difficult. Improvements in NCD data collection are needed to provide an accurate representation of the magnitude of NCDs in Uganda.

Even with these limitations, the amount of data collected from this needs assessment is vast in magnitude and much more information can be pulled from it. This report is the beginning of the assessment, and there is great potential for finding significant differences between the capacities of the health facilities, examining differences between urban and rural facilities, assessing the exact number of equipment availability per clinic, and much more. The data collected from this needs assessment can and should be used for further analysis to develop the best strategies to improve NCD prevention and care in Uganda.

C. Conclusion

The results of this assessment highlight critical gaps in availability and use of essential NCD health services in Ugandan regional referral hospitals, general hospitals, and health center IVs. They demonstrate the need for Uganda to scale-up low cost, high impact NCD interventions and strengthen the capacity of health personnel to reduce NCD disability and death in the country. This report can aid the Ugandan Ministry of Health and partners to develop action steps to target key areas of improvement and fill in the gaps. The improvement of the capacity of health facilities and personnel to effectively detect and manage NCDs can yield significant economic gain for Uganda from reduced medical costs, improved quality of life, and increased productivity.[30]

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VII. Tables

Table 1. Health facilities surveyed by area and support

Type of Facility	Total	Area		Support	
		Urban N (%)	Rural N (%)	Public N (%)	Private N (%)
Regional Referral Hospital	13	8 (61.5)	1 (7.7)	6 (46.2)	0 (0.0)
General Hospital	27	6 (22.2)	16 (59.3)	12 (44.4)	1 (3.7)
Health Center IV	14	3 (21.4)	9 (64.3)	6 (42.9)	0 (0.0)

Table 2. Health care personnel availability and mean by health facility type

	Regional Referral Hospitals (N=13)		General Hospitals (N=27)		Health Center IVs (N=14)	
Personnel Type	**No. reporting at least 1 staff member of this type N (%)**	**Mean (±SD)**	**No. reporting at least 1 staff member of this type N (%)**	**Mean (±SD)**	**No. reporting at least 1 staff member of this type N (%)**	**Mean (±SD)**
General Physician						
Family physician	3 (23.1)	1.7 (± 1.2)	2 (7.4)	1.0 (± 0.0)	0 (0.0)	--
Medical officer	10 (76.9)	5.3 (± 4.3)	22 (81.5)	3.2 (±1.7)	11 (78.6)	1.2 (±0.7)
Clinical officer	13 (100.0)	10.6 (± 3.9)	24 (88.9)	5.6 (±2.4)	11 (78.6)	1.2 (±1.3)
Specialist Physician						
Specialist physician	7 (53.8)	1.3 (± 0.5)	0 (0.0)	--	0 (0.0)	--
Cardiologist	1 (7.7)	1.0 (± 0.0)	2 (7.4)	5.0 (± 0.0)	3 (21.4)	1.7 (±0.6)
Endocrinologist/ diabetologist	1 (7.7)	1.0 (± 0.0)	1 (3.7)	2.0 (± 0.0)	0 (0.0)	--
General surgeon	9 (69.2)	1.8 (± 0.9)	3 (11.1)	1.7 (±1.2)	1 (7.1)	1.0 (± 0.0)
Neurologist	0 (0.0)	--	1 (3.7)	1.0 (± 0.0)	0 (0.0)	--
OB/GYN	8 (61.5)	3.0 (± 1.7)	4 (14.8)	1.25 (±0.5)	0 (0.0)	--
Oncologist	0 (0.0)	--	0 (0.0)	--	0 (0.0)	--
Ophthalmologist	3 (23.1)	1.3 (± 0.6)	1 (3.7)	1.0 (± 0.0)	0 (0.0)	--
Pediatrician	7 (53.8)	2.1 (± 0.7)	1 (3.7)	1.0 (± 0.0)	0 (0.0)	--
Pathologist	1 (7.7)	1.0 (± 0.0)	0 (0.0)	--	0 (0.0)	--
Physiotherapist	8 (61.5)	2.6 (± 1.4)	6 (22.2)	1.0 (± 0.0)	0 (0.0)	--
Psychiatrist	1 (7.7)	1.0 (± 0.0)	1 (3.7)	1.0 (± 0.0)	3 (21.4)	1.0 (± 0.0)
Pulmonologist	0 (0.0)	--	0 (0.0)	--	0 (0.0)	--
Radiologist	6 (46.2)	1.8 (± 1.3)	0 (0.0)	--	0 (0.0)	--
Vascular surgeon	1 (7.7)	1.0 (± 0.0)	0 (0.0)	--	0 (0.0)	--
Nurse						
Nurse - general	10 (76.9)	47.8 (± 22.2)	22 (81.5)	31.5 (±13.7)	13 (92.9)	5.4 (±1.7)
Nurse - diabetic	4 (30.8)	3.0 (± 1.0)	7 (25.9)	1.4 (±0.8)	2 (14.3)	2.5 (±2.1)
Nurse - psychiatric	9 (69.2)	3.9 (± 3.3)	20 (74.1)	1.5 (±0.7)	8 (57.1)	1.8 (±0.5)
Midwife	13 (100.0)	32.9 (± 21.8)	24 (88.9)	15.1 (±8.7)	13 (92.9)	4.2 (±1.3)
Health technician						
Laboratory technician	11 (84.6)	2.8 (± 1.5)	21 (77.8)	1.9 (±0.9)	11 (78.6)	1.18 (±0.4)

Laboratory technologist	11 (84.6)	2.6 (± 1.3)	13 (48.1)	1.4 (±1.7)	2 (14.3)	1.0 (± 0.0)
Radiology technician	9 (69.2)	2.9 (± 1.5)	12 (44.4)	1.3 (±0.7)	1 (7.1)	--
Other						
Community health worker	7 (53.8)	2.6 (± 0.9)	7 (25.9)	5.7 (±0.5)	2 (14.3)	1.9 (± 2.1)
NCDs Counselor	0 (0.0)	--	1 (3.7)	2.0 (± 0.0)	0 (0.0)	--
Foot care specialist	1 (7.7)	1.0 (± 0.0)	0 (0.0)	--	0 (0.0)	--
Medical social worker	6 (46.2)	1.6 (± 0.9)	11 (40.7)	1.1 (±0.3)	0 (0.0)	--
NCD (DM) educator	1 (7.7)	1.0 (± 0.0)	1 (3.7)	6.0 (± 0.0)	0 (0.0)	--
Nutritionist	8 (61.5)	1.3 (± 0.5)	7 (25.9)	1.0 (± 0.0)	0 (0.0)	--

Table 3. Facility-based NCDs prevalence by health facility type

	Mean Cases in Last Financial Year								
	Regional Referral Hospitals			General Hospital			Health Center IV		
	Mean cases	% of overall	% of NCDs	Mean cases	% of overall	% of NCDs	Mean cases	% of overall	% of NCDs
Number of overall patients	118513			87891			72633		
Number of NCDs patients	20474	17.28%		5434	6.18%		1300	1.79%	
Diabetes (total)	1788	1.51%	8.73%	530	0.60%	9.75%	143	0.20%	11.00%
Diabetes (adult)	1674	1.41%	8.18%	2582	2.94%	47.52%	139	0.19%	10.69%
Diabetes (children)	40	0.03%	0.20%	584	0.66%	10.75%	2	<0.01%	0.15%
Diabetes (pregnant women)	0	0.00%	0.00%	380	0.43%	6.99%	0.5	<0.01%	0.04%
Hypertension (total)	1394	1.18%	6.81%	544	0.62%	10.01%	231	0.32%	17.77%
Hypertension (pregnant women)	30	0.03%	0.15%	272	0.31%	5.01%	1	<0.01%	0.08%
Cancer (total)	280	0.24%	1.37%	22	0.03%	0.40%	7	0.01%	0.54%
Breast cancer	16	0.01%	0.08%	3	0.00%	0.06%	0	0.00%	0.00%
Cervix cancer	51	0.04%	0.25%	10	0.01%	0.18%	6	0.01%	0.46%
Prostate cancer	15	0.01%	0.07%	8	0.01%	0.15%	0.5	<0.01%	0.04%
Lung cancer	3	<0.01%	0.01%	1	<0.01%	0.02%	0	0.00%	0.00%
Liver cancer	60	0.05%	0.29%	1	<0.01%	0.02%	1	<0.01%	0.08%
Kaposi's sarcoma	22	0.02%	0.11%	2	0.00%	0.04%	1	<0.01%	0.08%
Heart disease (total)	603	0.51%	2.95%	152	0.17%	2.80%	30	0.04%	2.31%
Heart disease (adults)	435	0.37%	2.12%	166	0.19%	3.05%	105	0.14%	8.08%
Heart disease (children)	33	0.03%	0.16%	1	<0.01%	0.02%	0	0.00%	0.00%
Asthma	860	0.73%	4.20%	319	0.36%	5.87%	188	0.26%	14.46%
COPD	118	0.10%	0.58%	3712*	4.22%	68.31%	5156*	7.10%	396.62%
Stroke	22	0.02%	0.11%	7	0.01%	0.13%	1	<0.01%	0.08%
Renal disease	53	0.04%	0.26%	8	0.01%	0.15%	0	0.00%	0.00%
Mental health disorder	1810	1.53%	8.84%	362	0.41%	6.66%	86	0.12%	6.62%
Sickle cell disease	467	0.39%	2.28%	23	0.03%	0.42%	14	0.02%	1.08%
Injury (road traffic accident)	545	0.46%	2.66%	344	0.39%	6.33%	44	0.06%	3.38%
Injury (gender-based violence)	56	0.05%	0.27%	71	0.08%	1.31%	7	0.01%	0.54%
Injury (trauma due to other causes)	2578	2.18%	12.59%	1706	1.94%	31.39%	324	0.45%	24.92%
Alcohol-related	83	0.07%	0.41%	34	0.04%	0.63%	8	0.01%	0.62%
Tobacco-related	69	0.06%	0.34%	10	0.01%	0.18%	5	0.01%	0.38%

*Given the estimated prevalence of COPD in Uganda, these statistics are unlikely and are probably due to reporting error.

Table 4. Facility-based NCDs prevalence for regional referral hospitals

	Recorded Cases in Last Financial Year N (%)*												
	Arua	**Gulu**	**Hoima**	**Jinja**	**Kabale**	**Lira**	**Masaka**	**Mbale**	**Mbarara**	**Mityana**	**Moroto**	**Mubende**	**Soroti**
Number of overall patients	172945		155654	54200	112541	21509	139660	107250	139690	60683	55743	89653	121629
Number of NCDs patients				37020 (68.30)	13121 (11.66)	2434 (11.32)	20250 (14.50)	29750 (27.74)	20271 (14.51)				
Diabetes cases (total)	728 (0.42)	700	1284 (0.83)	777 (1.43)	555 (0.49)	2433 (11.32)	5425 (3.88)	2235 (2.08)	5455 (3.91)	859 (1.42)	103 (0.19)	2190 (2.44)	503 (0.41)
Diabetes (adult)	727 (0.42)		1082 (0.70)		555 (0.49)	1 (<0.01)	5420 (3.88)	2052 (1.91)	5450 (3.90)	859 (1.42)	99 (0.18)		502 (0.41)
Diabetes (children)	1 (<0.01)		202 (0.13)		0 (0.0)	0 (0.0)	5 (<0.01)	183 (0.17)	5 (<0.01)	0 (0.0)	4 (<0.01)		1 (<0.01)
Diabetes (pregnant women)			0 (0.0)			0 (0.0)	0 (0.0)			0 (0.0)	0 (0.0)		0 (0.0)
Hypertension (total)	1736 (1.00)		1233 (0.79)	2245 (4.14)	1255 (1.12)	1778 (8.27)	2850 (2.04)	452 (0.42)	2875 (2.06)	84 (0.14)	155 (0.28)	1850 (2.06)	225 (0.19)
Hypertension (pregnant women)	20 (0.01)		10 (<0.01)		0 (0.0)	0 (0.0)	80 (0.06)		114 (0.08)	0 (0.0)	3 (<0.01)		43 (0.04)
Cancer (total)	298 (0.17)		111 (0.07)	108 (0.20)	65 (0.06)	126 (0.59)	560 (0.40)	1401 (1.31)	568 (0.41)	4 (<0.01)	3 (<0.01)	21 (0.02)	103 (0.09)
Breast cancer	17 (0.01)		4 (<0.01)	16 (0.03)	24 (0.02)	9 (0.04)	41 (0.03)	28 (0.03)	41 (0.03)	0 (0.0)	1 (<0.01)	5 (<0.01)	14 (0.01)
Cervix cancer	19 (0.01)			54 (0.10)	27 (0.02)	70 (0.33)	110 (0.08)	96 (0.09)	112 (0.08)	2 (<0.01)	1 (<0.01)	11 (0.01)	67 (0.06)
Prostate cancer	6 (<0.01)			30 (0.06)	12 (0.01)	15 (0.07)	36 (0.03)	17 (0.02)	38 (0.03)	0 (0.0)	0 (0.0)	5 (<0.01)	12 (0.01)
Lung cancer						0 (0.0)	10 (<0.01)		11 (<0.01)	0 (0.0)		0 (0.0)	0 (0.0)
Liver cancer	255 (0.15)						22 (0.02)		25 (0.02)	0 (0.0)		0 (0.0)	
Kaposi's sarcoma	1 (<0.01)		1 (<0.01)	8 (0.02)	2 (<0.01)	32 (0.15)	90 (0.06)	38 (0.04)	92 (0.07)	2 (<0.01)	1 (<0.01)	0 (0.0)	0 (0.0)
Heart disease (total)	12 (<0.01)		10 (<0.01)	2402 (4.43)	371 (0.33)	388 (1.80)	1540 (1.10)	392 (0.37)	1566 (1.12)	3 (<0.01)	9 (0.02)	142 (0.16)	403 (0.33)

Heart disease (adults)	12 (<0.01)		10 (<0.01)		368 (0.33)	353 (1.64)	1430 (1.02)	364 (0.34)	1445 (1.03)	3 (<0.01)	9 (0.02)		363 (0.30)
Heart disease (children)	0		0		3 (<0.01)	35 (0.16)	110 (0.08)	28 (0.03)	121 (0.09)	0 (0.0)	0 (0.0)		40 (0.03)
Asthma	919 (0.53)		50 (0.03)	673 (1.24)	403 (0.36)	1016 (4.72)	745 (0.53)	4419 (4.12)	745 (0.53)	157 (0.26)	98 (0.18)	386 (0.43)	710 (0.58)
COPD				95 (0.18)			0 (0.0)					0 (0.0)	377 (0.31)
Stroke			10 (<0.01)	5 (<0.01)	25 (0.02)		10 (<0.01)	107 (0.10)	15 (0.01)	0 (0.0)	0 (0.0)	10 (0.01)	42 (0.04)
Renal disease							110 (0.08)	65 (0.06)	121 (0.09)	0 (0.0)		0 (0.0)	23 (0.02)
Mental health disorder	293 (0.17)		6000 (3.89)	4783 (8.83)	1850 (1.64)	1182 (5.50)	2787 (2.00)	550 (0.51)	2787 (2.00)	205 (0.34)	140 (0.25)	577 (0.64)	572 (0.47)
Sickle cell disease			100 (0.06)	2704 (4.99)		0 (0.0)	0 (0.0)			0 (0.0)		0 (0.0)	
Injury (road traffic accident)	641 (0.37)		217 (0.14)		618 (0.55)	897 (4.17)	631 (0.45)	577 (0.54)	631 (0.45)	718 (1.18)	88 (0.16)	333 (0.37)	654 (0.54)
Injury (gender-based violence)	3 (<0.01)		60 (0.04)		29 (0.03)	72 (0.34)	210 (0.15)			19 (0.03)	18 (0.03)	97 (0.11)	2 (<0.01)
Injury (trauma due to other causes)	1741 (1.01)		386 (0.25)	4597 (8.48)	1665 (1.48)	7099 (33.01)	2901 (2.08)	949 (0.89)	2907 (2.08)	539 (0.89)	964 (1.73)	1810 (2.02)	5386 (4.43)
Alcohol-related	180 (0.10)		50 (0.03)	136 (0.25)	165 (0.15)	39 (0.18)	146 (0.11)	33 (0.03)	148 (0.11)	10 (0.02)	7 (0.01)	59 (0.07)	29 (0.02)
Tobacco-related	241 (0.14)		50 (0.03)	118 (0.22)	107 (0.10)	18 (0.08)	92 (0.07)			4 (<0.01)	1 (<0.01)	38 (0.04)	26 (0.02)

* Due to the number of regional referral hospitals that could not report total number of NCDs patients, the percentages for specific cases are number of cases per overall total cases.

Table 5. HIV prevalence by health facility type

		Total active* patients with HIV in last year N	Active male patients with HIV in last year N (%)	Active female patients with HIV in last year N (%)	Number of new cases 2012-13 N (%)	Number of new cases 2011-12 N (%)	Number of new cases 2010-11 N (%)
Regional Referral Hospitals	Jinja	5600	1600 (28.6)	4000 (71.4)			
	Mbale	4506	1460 (32.4)	3046 (67.6)	912 (20.2)	1113 (24.7)	780 (17.3)
	Mbarara	9641	3385 (35.1)	6256 (64.9)	1745 (18.1)	1593 (16.5)	1848 (19.2)
General Hospitals	Bududa	753	243 (32.3)	510 (67.7)	302 (40.1)	282 (37.5)	225 (29.9)
	Iganga	4619	1644 (35.6)	2975 (64.4)	1555 (33.7)	1082 (23.4)	949 (14.1)
	Kitgum				689	819	804
	Kyenjojo	3935	1607 (40.8)	2328 (59.2)	970 (24.7)	729 (18.5)	944 (24.0)
Health Center IVs	Budaka		700				
	Dokolo						
	Koboko		1506				
	Serere	2431	958 (39.4)	1473 (60.6)			

* "Active" means that the patient regularly attends check-ups at the facility and is receiving treatment.

Table 6. Health facilities that have NCDs clinics

Clinics/Wards	Regional Referral Hospitals that have clinic (N=13)	General Hospitals that have clinic (N=27)	Health Center IVs that have clinic (N=14)
	N (%)	N (%)	N (%)
Diabetes	11 (84.6)	15 (55.6)	3 (21.4)
Hypertension	7 (53.9)	5 (18.5)	1 (7.1)
Cancer	2 (15.4)	1 (3.7)	0 (0.0)
Cardiology	2 (15.4)	1 (3.7)	0 (0.0)
COPD	1 (7.7)	0 (0.0)	0 (0.0)
Renal	2 (15.4)	0 (0.0)	0 (0.0)
Sickle Cell	4 (30.8)	2 (7.4)	0 (0.0)
OB/GYN	7 (53.9)	12 (44.4)	3 (21.4)
Pediatrics	4 (30.8)	8 (29.6)	0 (0.0)
HIV	7 (53.9)	17 (63.0)	4 (28.6)
Surgery	5 (38.5)	3 (11.1)	0 (0.0)
Medical Out Patient	7 (53.9)	25 (92.6)	9 (64.3)

Table 7. Review of clinics in regional referral hospitals

Clinics/Wards	Regional Referral Hospitals (N=13)			
	Number that have clinic N (%)	Number that have separate clinic room N (%)	Number that do regular patient review N (%)	Number that do clinic performance audits N (%)
Diabetes	11 (84.6)	9 (81.8)	9 (81.8)	5 (45.5)
Hypertension	7 (53.9)	5 (71.4)	4 (57.1)	2 (28.6)
Cancer	2 (15.4)	2 (100.0)	2 (100.0)	0 (0.0)
Cardiology	2 (15.4)	1 (50.0)	2 (100.0)	0 (0.0)
COPD	1 (7.7)	0 (0.0)	1 (100.0)	0 (0.0)
Renal	2 (15.4)	1 (50.0)	2 (100.0)	0 (0.0)
Sickle Cell	4 (30.8)	1 (25.0)	2 (50.0)	0 (0.0)
OB/GYN	7 (53.9)	7 (100.0)	7 (100.0)	3 (42.9)
Pediatrics	4 (30.8)	3 (75.0)	3 (75.0)	2 (50.0)
HIV	7 (53.9)	5 (71.4)	4 (57.1)	3 (42.9)
Surgery	5 (38.5)	4 (80.0)	4 (80.0)	1 (20.0)
Medical Out Patient	7 (53.4)	6 (85.7)	5 (71.4)	3 (42.9)

Table 8. Availability of NCD services by health facility type

Services	Regional Referral Hospitals that offer service N (%)	General Hospitals that offer service N (%)	Health Center IVs that offer service N (%)
Measurement			
Weight	13 (100.0)	26 (92.3)	13 (92.9)
Height	8 (61.5)	15 (55.6)	5 (35.7)
BMI	6 (46.1)	5 (18.5)	0 (0.0)
Waist:Hip	4 (30.8)	2 (7.4)	0 (0.0)
Screening			
Blood pressure	13 (100.0)	24 (88.9)	12 (85.7)
Sickle cell screening*	4 (30.8)	16 (59.3)	6 (42.9)
Cervical cancer screening (pap smear)	9 (69.2)	14 (51.9)	8 (57.1)
Breast cancer screening	7 (53.8)	11 (40.7)	4 (28.6)
Prostate cancer screening	2 (15.4)	1 (3.7)	0 (0.0)
Eye examination	5 (38.5)	12 (44.4)	5 (35.7)
Record of family history of NCDs	8 (61.5)	12 (44.4)	3 (21.4)
Laboratory tests			
Blood glucose	11 (84.6)	23 (85.2)	11 (78.6)
Oral Glucose Tolerance Test (OGTT)	3 (23.1)	2 (7.4)	0 (0.0)
Blood lipids	3 (23.1)	3 (11.1)	1 (7.1)
Urinalysis	9 (69.2)	22 (81.5)	11 (78.6)
Urine proteins	9 (69.2)	20 (74.1)	12 (85.7)
Urine ketones	8 (61.5)	18 (66.7)	10 (71.4)
Cytology/pathology services	4 (30.8)	0 (0.0)	0 (0.0)
Treatment			
Physiotherapy	8 (61.5)	11 (40.7)	1 (7.1)
Palliative care	7 (53.8)	18 (66.7)	4 (28.6)
Chemotherapy	2 (15.4)	1 (3.7)	1 (7.1)
Radiotherapy	1 (7.7)	2 (7.4)	0 (0.0)
NCD advice and support			
Individual patient NCD education	9 (69.2)	17 (63.0)	5 (35.7)
Group NCD education	12 (92.3)	18 (66.7)	4 (28.6)
Foot care for diabetic patients	8 (61.5)	15 (55.6)	2 (14.3)
Nutrition advice for all patients	12 (92.3)	23 (85.2)	11 (78.6)
NCD patient card	3 (23.1)	1 (3.7)	2 (14.3)
Provision of NCDs IEC materials	4 (30.8)	2 (7.4)	2 (14.3)
Patient treatment plans	10 (77.0)	3 (11.1)	4 (28.6)
Self-management support	10 (77.0)	13 (48.1)	2 (14.3)
Peer/social support linkage	10 (77.0)	10 (37.0)	3 (21.4)

*Including sickle cell screening for newborns

Table 9. Availability of NCD guidelines by health facility type

Guidelines	Regional Referral Hospitals that have guidelines N (%)	General Hospitals that have guidelines N (%)	Health Center IVs that have guidelines N (%)
Diabetes management	4 (30.8)	4 (14.8)	1 (7.1)
Hypertension management	3 (23.1)	3 (11.1)	1 (7.1)
Hyperlipidemia management	0 (0.0)	2 (7.4)	0 (0.0)
Tobacco screening & treatment	0 (0.0)	2 (7.4)	0 (0.0)
Alcohol screening & treatment	0 (0.0)	1 (3.7)	1 (7.1)
Cancer (cervical, breast, prostate) screening & treatment	3 (23.1)	2 (7.4)	2 (14.3)
Mental health screening & treatment	2 (15.4)	3 (11.1)	2 (14.3)
Asthma management	2 (15.4)	2 (7.4)	1 (7.1)
Sickle cell screening & management	2 (15.4)	3 (11.1)	0 (0.0)
Palliative care	2 (15.4)	6 (22.2)	1 (7.1)

Table 10. Equipment availability by health facility type

Equipment	No. of Regional Referral Hospitals that have at least one of equipment (N=13) N (%)	No. of General Hospitals that have at least one of equipment (N=27) N (%)	No. of HCIVs that have at least one of equipment (N=14) N (%)
Basic Equipment and Tools			
Clinician table	11 (84.6)	24 (88.9)	13 (92.9)
Nurses station/table	10 (76.9)	20 (74.1)	9 (64.3)
Hand washing basin/sink with soap	10 (76.9)	22 (81.5)	12 (85.7)
Patient files	8 (61.5)	12 (44.4)	5 (35.7)
File cabinet/cupboard/storage space	9 (69.2)	18 (66.7)	6 (42.9)
NCD Register			
New cases only	6 (46.2)	14 (51.9)	6 (42.9)
Follow-up cases only	6 (46.2)	13 (48.1)	6 (42.9)
Admission only	2 (15.4)	13 (48.1)	7 (50.0)
Screening Equipment			
Thermometer	7 (53.8)	14 (51.9)	8 (57.1)
Stethoscope	8 (61.5)	16 (59.3)	7 (50.0)
Blood pressure machine: Mercury sphygmomanometer	6 (46.2)	9 (33.3)	6 (42.9)
Blood pressure machine: Aneroid	6 (46.2)	7 (26.0)	6 (42.9)
Blood pressure machine: Automated	5 (38.5)	13 (48.1)	5 (35.7)
BP cuffs: Standard (25 cm x 12 cm)	4 (30.8)	9 (33.3)	8 (57.1)
BP cuffs: Alternate (36 cm x 12 cm)	0 (0.0)	1 (3.7)	1 (7.1)
BP cuffs: Pediatric	1 (7.7)	3 (11.1)	3 (21.4)
Measuring tapes	7 (53.8)	14 (51.9)	7 (50.0)
Blood glucose meter	8 (61.5)	20 (74.1)	6 (42.9)
Weighing scales: Bathroom type	7 (53.8)	15 (55.6)	8 (57.1)
Weighing scales: Hospital type	4 (30.8)	11 (40.7)	4 (28.6)
Urine testing strips: Multiple test	3 (23.1)	2 (7.4)	2 (14.3)
Height meters	4 (30.8)	9 (33.3)	5 (35.7)
Ophthalmoscope	3 (23.1)	12 (44.4)	6 (42.9)
Snellen charts: Handheld	1 (7.7)	4 (14.8)	0 (0.0)
Snellen charts: Distance	3 (23.1)	11 (40.7)	1 (7.1)
BMI chart	4 (30.8)	5 (18.5)	1 (7.1)
Other Equipment			
Tuning forks	1 (7.7)	4 (14.8)	2 (14.3)
Monofilament	1 (7.7)	1 (3.7)	0 (0.0)
Spirometer	1 (7.7)	0 (0.0)	0 (0.0)
Spacers for inhalers	3 (23.1)	1 (3.7)	1 (7.1)
Nebulizer	4 (30.8)	3 (11.1)	2 (14.3)

Speculum	7 (53.8)	17 (63.0)	9 (64.3)
Bronchoscope	1 (7.7)	0 (0.0)	1 (7.1)
Proctoscope	4 (30.8)	1 (3.7)	1 (7.1)
Colonoscope	1 (7.7)	0 (0.0)	0 (0.0)
Autoscope	6 (46.2)	6 (22.2)	6 (42.9)
Emergency trolley/tray	4 (30.8)	14 (51.9)	3 (21.4)
Physiotherapy equipment	4 (30.8)	8 (29.6)	0 (0.0)
Maintenance Plan			
Written equipment maintenance plan	3 (23.1)	5 (18.5)	2 (14.3)
Implemented equipment maintenance plan	2 (15.4)	3 (11.1)	0 (0.0)

Table 11. Availability and function of advanced equipment and power supply by health facility type

Equipment	Regional Referral Hospitals (N=13)		General Hospitals (N=27)		Health Center IVs (N=14)	
	Available N (%)	Functional N (%)	Available N (%)	Functional N (%)	Available N (%)	Functional N (%)
Ultrasound Scan	11 (84.6)	6 (54.6)	23 (85.2)	18 (78.3)	7 (50.0)	3 (42.9)
Echography	3 (23.1)	1 (33.3)	1 (3.7)	1 (100.0)	0 (0.0)	0 (0.0)
ECG Monitor	3 (23.1)	1 (33.3)	4 (14.8)	2 (50.0)	1 (7.2)	0 (0.0)
X-Rays	10 (76.9)	6 (60.0)	22 (81.5)	12 (54.6)	2 (14.3)	0 (0.0)
Doppler	5 (38.5)	3 (60.0)	1 (3.7)	0 (0.0)	0 (0.0)	0 (0.0)
CT-Scan	2 (15.4)	1 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Reliable power supply	7 (53.9)	4 (57.1)	17 (63.0)	14 (82.4)	4 (28.6)	2 (50.0)
Alternative source of power	9 (69.2)	7 (77.8)	20 (74.1)	18 (90.0)	9 (64.3)	4 (44.4)

Table 12. Unfulfilled drug requests by health facility type

	No. of Regional Referral Hospitals (N=13) **N (%)**	**No. of General Hospitals (N=27)** **N (%)**	**No. of HCIVs (N=14)** **N (%)**
Do not receive type of drugs requested	11 (69.2)	15 (55.6)	9 (64.3)
Do not receive the quantity of drugs requested	10 (76.9)	18 (66.7)	10 (71.4)

Table 13. Availability of medicines and supplies by health facility type

Pharmaceutical Drugs		Regional Referral Hospitals (N=13)			General Hospitals (N=27)			Health Center IVs (N=14)		
		No. that have drug available N (%)	Stockout in last quarter N (%)	Stockout in last year N (%)	No. that have drug available N (%)	Stockout in last quarter N (%)	Stockout in last year N (%)	No. that have drug available N (%)	Stockout in last quarter N (%)	Stockou in last year N (%)
Anti-hypertensives										
Thiazide diuretic		12 (92.3)	1 (7.7)	2 (15.4)	24 (88.9)	3 (11.1)	2 (7.4)	9 (64.3)	3 (21.4)	2 (14.3)
Calcium channel blocker		12 (92.3)	1 (7.7)	1 (7.7)	23 (85.2)	3 (11.1)	4 (14.8)	14 (100.0)	4 (28.6)	5 (35.7)
Beta-blocker		7 (53.8)	3 (23.1)	3 (23.1)	15 (55.6)	10 (37.0)	8 (29.6)	13 (92.9)	3 (21.4)	3 (21.4)
ACE inhibitor		10 (76.9)	2 (15.4)	2 (15.4)	21 (77.8)	5 (18.5)	6 (22.2)	6 (42.9)	2 (14.3)	2 (14.3)
Others (e.g. Methyldopa, hydralazine, magnesium sulphate)		10 (76.9)	2 (15.4)	2 (15.4)	20 (83.3)	2 (8.3)	5 (20.8)	9 (64.3)	3 (21.4)	2 (14.3)
Diabetic Drugs and Supplies										
Biguanides		12 (92.3)	0 (0.0)	0 (0.0)	24 (88.9)	4 (14.8)	2 (7.4)	14 (100.0)	4 (28.6)	5 (35.7)
Sulfonylureas		11 (84.6)	2 (15.4)	2 (15.4)	22 (81.5)	6 (22.2)	2 (7.4)	11 (78.6)	3 (21.4)	4 (28.6)
Thiazolidinediones		1 (7.7)	2 (15.4)	2 (15.4)	2 (7.4)	5 (18.5)	4 (14.8)	1 (7.1)	1 (7.1)	1 (7.1)
Dipeptidyl peptidase-4 inhibitors			1 (7.7)	1 (7.7)	1 (3.7)	5 (18.5)	4 (14.8)	1 (7.1)	1 (7.1)	0 (0.0)
Alpha-glucosidase inhibitors			1 (7.7)	1 (7.7)	2 (7.4)	5 (18.5)	5 (18.5)	0 (0.0)	0 (0.0)	1 (7.1)
Insulin type	Ultra short-acting	8 (61.5)	1 (7.7)	0 (0.0)	10 (41.6)	3 (11.1)	6 (22.2)	3 (21.4)	0 (0.0)	0 (0.0)
	Short-acting	9 (69.2)	3 (23.1)	3 (23.1)	15 (55.6)	2 (7.4)	6 (22.2)	5 (35.7)	1 (7.1)	1 (7.1)
	Intermediate	10 (76.9)	3 (23.1)	5 (38.5)	13 (48.1)	4 (14.8)	6 (22.2)	3 (21.4)	0 (0.0)	0 (0.0)
	Long-acting	11 (84.6)	3 (23.1)	4 (30.8)	15 (55.6)	4 (14.8)	5 (18.5)	3 (21.4)	1 (7.1)	1 (7.1)
Insulin syringes*		11 (84.6)	3 (23.1)	4 (30.8)	17 (63.0)	4 (14.8)	4 (14.8)	6 (42.9)	2 (14.3)	2 (14.3)
Other drugs and supplies										
Folic acid		12 (92.3)	2 (15.4)	2 (15.4)	25 (92.6)	2 (7.4)	4 (14.8)	14 (100.0)	3 (21.4)	4 (28.6)
Statins		2 (15.4)	4 (30.8)	3 (23.1)	2 (7.4)	4 (14.8)	5 (18.5)	3 (21.4)	1 (7.1)	1 (7.1)
Cardiac aspirin		11 (84.6)	4 (30.8)	4 (30.8)	16 (59.3)	5 (18.5)	6 (22.2)	5 (35.7)	5 (35.7)	5 (35.7)
Refrigerator*		12 (92.3)			19 (70.4)			3 (21.4)		

* These data are for the availability of the supplies in the pharmacy only, they do not account for the same type of supplies in other areas of the facilities.

Table 14. Laboratory equipment and test availability by health facility type

	No. of facilities that have laboratory equipment or test		
	RRH (N=13) N (%)	**GH (N=27) N (%)**	**HCIV (N=14) N (%)**
On-site laboratory	**13 (100%)**	**27 (100%)**	**12 (86%)**
Laboratory equipment			
Centrifuge	11 (84.6)	24 (88.9)	10 (71.4)
Microscope	11 (84.6)	27 (100.0)	14 (100.0)
Refrigerator	12 (92.3)	27 (100.0)	10 (71.4)
General tests			
Hemoglobin	12 (92.3)	24 (88.9)	11 (78.6)
Complete blood count and differential	11 (84.6)	20 (74.1)	5 (35.7)
Electrolytes	9 (69.2)	11 (40.7)	0 (0.0)
Renal function	9 (69.2)	14 (51.9)	1 (7.1)
Liver function	9 (69.2)	12 (44.4)	0 (0.0)
Lipid profile	6 (46.2)	9 (33.3)	1 (7.1)
Urinalysis	11 (84.6)	26 (96.3)	13 (92.9)
Endocrine tests			
Random blood glucose	12 (92.3)	24 (88.9)	14 (100.0)
Hemoglobin A1c	0 (0.0)	5 (18.5)	0 (0.0)
Urine microalbumin	4 (30.8)	3 (11.1)	0 (0.0)
Thyroid function	0 (0.0)	1 (3.7)	0 (0.0)
Cancer tests			
Cytology	2 (15.4)	3 (11.1)	0 (0.0)
Hemoccult	3 (23.1)	4 (14.8)	0 (0.0)
Prostate-Specific Antigens	1 (7.7)	2 (7.4)	1 (7.1)
Sickle cell disease tests			
Hemoglobin electrophoresis	0 (0.0)	4 (14.8)	0 (0.0)
Sickling test	11 (84.6)	21 (77.8)	7 (50.0)
Infectious disease tests			
Bacteriology including culture and sensitivity	5 (38.5)	6 (22.2)	0 (0.0)
Thick Film	11 (84.6)	27 (100.0)	12 (85.7)
Thin Film	11 (84.6)	24 (88.9)	11 (78.6)
Other tests			
Blood grouping and cross-match	11 (84.6)	27 (100.0)	10 (71.4)
Pregnancy test	9 (69.2)	24 (88.9)	14 (100.0)

Table 15. Description of individual health provider survey sample

Cadre	**Number surveyed N (%)**
Nurse/Midwife	32 (27.6)
Nursing Officer	18 (15.5)
Clinical Officer	16 (13.8)
Medical Officer	19 (16.4)
Physician	10 (8.6)
Other*	21 (18.1)

* "Other" includes lab technicians, nursing assistants, hospital director, and missing.

Table 16. Confidence in NCD management by cadre

Confidence in NCD Management	Nurse/ Midwife (N=32)	Nursing Officer (N=18)	Clinical Officer (N=16)	Medical officer (N=19)	Physician (N=10)	Other (N=21)	p†
Hypertension							<0.001
Very confident	0 (0.0)	5 (27.8)	2 (12.5)	9 (47.4)	8 (80.0)	4 (22.2)	
Confident	14 (43.8)	7 (38.9)	10 (62.5)	10 (52.6)	2 (20.0)	7 (38.9)	
Somewhat	18 (56.3)	5 (27.8)	4 (25.0)	0 (0.0)	0 (0.0)	6 (33.3)	
Not at all	0 (0.0)	1 (5.6)	0 (0.0)	0 (0.0)	0 (0.0)	1 (5.6)	
Diabetes							<0.001
Very confident	2 (6.3)	3 (16.7)	1 (6.3)	6 (31.6)	8 (80.0)	2 (11.1)	
Confident	12 (37.5)	4 (22.2)	6 (37.5)	11 (57.9)	2 (20.0)	9 (50.0)	
Somewhat	15 (46.9)	7 (38.9)	9 (56.3)	2 (10.5)	0 (0.0)	6 (33.3)	
Not at all	3 (9.4)	4 (22.2)	0 (0.0)	0 (0.0)	0 (0.0)	1 (5.6)	
High cholesterol							<0.001
Very confident	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.8)	6 (60.0)	0 (0.0)	
Confident	4 (12.5)	3 (16.7)	1 (6.3)	5 (26.3)	4 (40.0)	4 (22.2)	
Somewhat	5 (15.6)	4 (22.2)	3 (18.8)	6 (31.6)	0 (0.0)	6 (33.3)	
Not at all	23 (71.9)	11 (61.1)	12 (75.0)	6 (31.6)	0 (0.0)	8 (44.4)	
Screening for cervical cancer							0.021
Very confident	3 (9.4)	0 (0.0)	0 (0.0)	4 (21.1)	3 (30.0)	3 (16.7)	
Confident	4 (12.5)	1 (5.6)	0 (0.0)	4 (21.1)	3 (30.0)	2 (11.1)	
Somewhat	3 (9.4)	5 (27.8)	6 (37.5)	6 (31.6)	1 (10.0)	2 (11.1)	
Not at all	22 (68.8)	12 (66.7)	10 (62.5)	5 (26.3)	3 (30.0)	11 (61.1)	
Screening for breast cancer							0.037
Very confident	3 (9.4)	2 (11.1)	0 (0.0)	6 (31.6)	4 (40.0)	1 (5.6)	
Confident	6 (18.8)	2 (11.1)	3 (18.8)	5 (26.3)	3 (30.0)	6 (33.3)	
Somewhat	8 (25.0)	9 (50.0)	6 (37.5)	5 (26.3)	2 (20.0)	3 (16.7)	
Not at all	15 (46.9)	5 (27.8)	7 (43.8)	3 (15.8)	1 (10.0)	8 (44.4)	
Diagnosis/management of asthma							<0.001
Very confident	5 (15.6)	0 (0.0)	6 (37.5)	12 (63.2)	7 (70.0)	9 (52.9)	
Confident	16 (50.0)	13 (72.2)	8 (50.0)	6 (31.6)	3 (30.0)	2 (11.8)	
Somewhat	7 (21.9)	4 (22.2)	2 (12.5)	1 (5.3)	0 (0.0)	4 (23.5)	
Not at all	4 (12.5)	1 (5.6)	0 (0.0)	0 (0.0)	0 (0.0)	2 (11.8)	
Screening/management of depression & other mental health disorders							0.049
Very confident	3 (9.4)	2 (11.1)	2 (11.1)	3 (15.8)	0 (0.0)	2 (11.1)	
Confident	7 (21.9)	4 (22.2)	4 (22.2)	7 (36.8)	7 (77.8)	6 (33.3)	
Somewhat	11 (34.4)	8 (44.4)	8 (50.0)	8 (42.1)	2 (22.2)	3 (16.7)	
Not at all	11 (34.4)	4 (22.2)	1 (6.3)	1 (5.3)	0 (0.0)	7 (38.9)	
Screening/diagnosis/ management of sickle cell disease							<0.001
Very confident	1 (3.2)	0 (0.0)	0 (0.0)	6 (31.6)	5 (55.6)	3 (16.7)	
Confident	2 (6.5)	5 (27.8)	6 (37.5)	11 (57.9)	4 (44.4)	5 (27.8)	
Somewhat	15 (48.4)	8 (44.4)	6 (37.5)	2 (10.5)	0 (0.0)	6 (33.3)	
Not at all	13 (41.9)	5 (27.8)	4 (25.0)	0 (0.0)	0 (0.0)	4 (22.2)	
Treatment of tobacco abuse							0.233
Very confident	2 (6.3)	2 (11.1)	1 (6.3)	2 (10.5)	0 (0.0)	1 (5.6)	
Confident	9 (28.1)	3 (16.7)	2 (12.5)	2 (10.5)	5 (55.6)	4 (22.2)	
Somewhat	6 (18.8)	7 (38.9)	5 (31.3)	8 (48.1)	4 (44.4)	3 (16.7)	
Not at all	15 (46.9)	6 (33.3)	8 (50.0)	7 (36.8)	0 (0.0)	10 (55.6)	
Treatment of alcohol abuse							0.594
Very confident	2 (6.3)	2 (11.1)	1 (6.3)	2 (10.5)	1 (11.1)	0 (0.0)	
Confident	15 (46.9)	7 (38.9)	3 (18.8)	4 (21.1)	4 (44.4)	6 (33.3)	
Somewhat	6 (18.8)	5 (27.8)	7 (43.8)	7 (36.8)	4 (44.4)	5 (27.8)	
Not at all	9 (28.1)	4 (22.2)	5 (31.3)	6 (31.6)	0 (0.0)	7 (38.9)	

† P-value is for χ^2 test.

Table 17. Attitudes on NCD management by cadre

Attitudes	Nurse/Midwife (n=32)	Nursing Officer (n=18)	Clinical Officer (n=16)	Medical officer (n=19)	Physician (n=10)	Other (n=21)	p†
There are effective depression treatments that can be provided by a primary care physician in my facility.							0.363
Agree	6 (20.7)	2 (13.3)	4 (33.3)	4 (25.0)	0 (0.0)	1 (5.9)	
Disagree	21 (72.4)	13 (86.7)	7 (58.3)	12 (75.0)	7 (100.0)	16 (94.1)	
No opinion	2 (6.9)	0 (0.0)	1 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	
My clinical training prepared me adequately to manage chronic diseases.							0.075
Agree	19 (65.5)	12 (80.0)	3 (25.0)	10 (62.5)	7 (100.0)	11 (64.7)	
Disagree	9 (31.0)	3 (20.0)	9 (75.0)	5 (31.3)	0 (0.0)	6 (35.3)	
No opinion	1 (3.5)	0 (0.0)	0 (0.0)	1 (6.3)	0 (0.0)	0 (0.0)	
A doctor can influence whether a patient successfully quits smoking.							0.335
Agree	22 (78.6)	7 (46.7)	9 (75.0)	7 (43.8)	5 (71.4)	13 (76.5)	
Disagree	4 (14.3)	7 (46.7)	2 (16.7)	7 (43.8)	1 (14.3)	3 (17.7)	
No opinion	2 (7.1)	1 (6.7)	1 (8.3)	2 (12.5)	1 (14.3)	1 (5.9)	
I am able to spend the time I need to provide good medical care for my patients with chronic diseases.							0.315
Agree	24 (80.0)	10 (66.7)	5 (41.7)	9 (56.3)	5 (71.4)	13 (76.5)	
Disagree	6 (20.0)	4 (26.7)	6 (50.0)	7 (43.8)	2 (28.6)	4 (23.5)	
No opinion	0 (0.0)	1 (6.7)	1 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	
Patients receive better care for chronic medical conditions if they have a designated primary care provider.							0.821
Agree	26 (86.7)	12 (80.0)	9 (75.0)	14 (87.5)	6 (85.7)	15 (88.2)	
Disagree	2 (6.7)	3 (20.0)	2 (16.7)	2 (12.5)	1 (14.3)	2 (11.8)	
No opinion	2 (6.7)	0 (0.0)	1 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	
My facility has the capacity to manage chronic diseases.							0.508
Agree	19 (63.3)	11 (73.3)	7 (63.6)	7 (43.8)	3 (42.9)	9 (56.3)	
Disagree	10 (33.3)	4 (26.7)	3 (27.3)	7 (43.8)	2 (28.6)	6 (37.5)	
No opinion	1 (3.3)	0 (0.0)	1 (9.1)	2 (12.5)	2 (28.6)	1 (6.3)	

† P-value is for χ^2 test.

Table 18. Referral system by health facility type

Resource		No. of Regional Referral Hospitals that have resource (N=13) N (%)	No. of General Hospitals that have resource (N=27) N (%)	No. of HCIVs that have resource (N=14) N (%)
Protocols for management and referral of NCD patients		2 (15.4)	8 (29.6)	1 (7.1)
Referral form	Outgoing	11 (84.6)	23 (85.2)	8 (57.1)
	Receiving	6 (46.2)	7 (26.0)	4 (28.6)
Transport to the next facility		7 (53.8)	10 (37.0)	7 (50.0)
Register to monitor follow-up and gather statistics on referrals	Outgoing	6 (46.2)	19 (70.4)	6 (42.9)
	Receiving	4 (30.8)	15 (55.6)	5 (35.7)
Program that integrates NCDs support supervision and capacity building in lower health facilities		3 (23.1)	4 (14.8)	3 (21.4)

Table 19. Community activities by health facility type

Community Activity	No. of Regional Referral Hospitals that do activity (N=13) N (%)	No. of General Hospitals that do activity (N=27) N (%)	No. of HCIVs that do activity (N=14) N (%)
Formal linkages to the community and regular meetings with community on NCDs	1 (7.7)	6 (22.2)	1 (7.1)
Communication about disease states through media, gatherings, IEC, and/or village health teams	6 (46.2)	11 (40.7)	3 (21.4)
Partnerships with community organizations that focus on NCDs	1 (7.7)	4 (14.8)	1 (7.1)
Engagement with community in patient follow-up	2 (15.4)	5 (18.5)	1 (7.1)

Table 20. Uganda Diabetic Association membership by health facility type

	No. of Regional Referral Hospitals (N=13)		No. of General Hospitals (N=27)		No. of HCIVs (N=14)	
	Available N (%)	**Functional* N (%)**	**Available N (%)**	**Functional* N (%)**	**Available N (%)**	**Functional * N (%)**
Branch of Uganda Diabetic Association	8 (61.5)	6 (75.0)	7 (26.0)	5 (71.4)	2 (14.3)	1 (50.0)

* e.g. Regular meetings held, minutes available, work plans available, reports available and/or submitted to UDA head office, etc.

VIII. Appendices

Appendix A. List of health facilities surveyed

Regional Referral Hospitals	General Hospitals	Health Center IVs
Arua RRH	Apac Hospital	Serere HCIV
Fort Portal RRH	Mityana Hospital	Kabwohe HCIV
Gulu RRH	Kaabong Hospital	Nabilatuk HCIV
Hoima RRH	Tororo Hospital	Rwekubo HCIV
Jinja RRH	Anaka Hospital	Amuria HCIV
Kabale RRH	Kamuli Hospital	Kamukira HCIV
Lira RRH	Kisoro Hospital	Sembabule HCIV
Masaka RRH	Lyantonde Hospital	Koboko HCIV
Mbale RRH	Bundibugyo Hospital	Padibe HCIV
Mbarara RRH	Itojo Hospital	Dokolo HCIV
Moroto RRH	Rakai Hospital	Budaka HCIV
Mubende RRH	Kyenjojo Hospital	Alebtong HCIV
Soroti RRH	Abim Hospital	Kebisoni HCIV
	Kagadi Hospital	
	Bwera Hospital	
	Moyo Hospital	
	Iganga Hospital	
	Rushere Hospital	
	Pallisa Hospital	
	Nebbi Hospital	
	Atutur Hospital	
	Masindi Hospital	
	Kiboga Hospital	
	Kiryandongo Hospital	
	Kitgum Hospital	
	Bugiri Hospital	
	Bududa Hospital	

Appendix B. Uganda Ministry of Health Noncommunicable Diseases needs assessment survey

Official survey tool begins on next page.

Non-Communicable Diseases Needs Assessment Tool

Ministry of Health
Uganda

July 2013

Background: Non-communicable diseases (NCDs) are currently the leading killer diseases globally, and are on the rise. About 80% of NCDs deaths occur in low and middle-income countries, including Uganda. The major NCDs in Uganda are diabetes mellitus, hypertension, cardiovascular disease, and some cancers, while others include renal disease, sickle cell disease, and chronic obstructive pulmonary disease (COPD). Among the challenges of NCD control in Uganda are the lack of baseline data on prevalence and risk factors, and the inadequate capacity of the existing health system to provide quality NCDs services.
The Uganda Ministry of Health (MoH) prioritizes NCDs especially in regard to prevention, early diagnosis, and proper management. In partnership with the World Diabetic Foundation (WDF), the MoH has embarked on a countrywide program to build capacity in the control and clinical management of NCDs (with emphasis on diabetes) at the different levels of health care. A Needs Assessment is therefore essential to identify the existing gaps and plan appropriate interventions.

Purpose: To assess the capacity of Health Facilities to detect and manage NCDs, as well as identify areas for improvement.

Overview: There are **13** main sections of the tool.
They include: **(A)** *Visit Information,* **(B)** *Health Facility Profile*, **(C)** *Human Resource and Skills Profile*, **(D)** *Facility-Based NCD Prevalence*, **(E)** *Clinics and Services*, **(F)** *Equipment*, **(G)** *Medicines & Sundries,* **(H)** *Laboratory*, **(I)** *Costs Related to NCDs,* **(J)** *Referral System,* **(K)** *Health Care Providers' Skills and Attitudes,* **(L)** *Community Involvement (Engagement)*, and **(M)** *Associations/Patient Groups*.

Instructions:

- For a **Yes/No** question (e.g. "Is there a pharmacy in your facility?"), please mark "**YES**" as "**Y**" and **"NO"** as "**N**" in the box provided.
- If the question asks for the "Number" (e.g. "How many weighing scales are there?"), please simply write the number of items in the appropriate box.
- Other questions will show the numbers that correspond to specific answers.
- If the question does not apply, please write "**not applicable**" or "**N/A**".

Abbreviations:

- **NCD:** Non-Communicable Disease
- **DM:** Diabetes Mellitus
- **HT:** Hypertension
- **COPD:** Chronic Obstructive Pulmonary Disease
- **Cardio:** Cardiology
- **SC:** Sickle Cell
- **OB/GY:** Obstetrics/Gynecology
- **MOPD:** Medical Outpatient Department
- **IEC:** Information Education Communication
- **CME:** Continuing Medical Education

A. VISIT INFORMATION

A1	Date of visit (dd/mm/yy)		
A2	Officers visiting the Hospital		1)
			2)
			3)
A3	Personnel interviewed[1]		
	1	**Hospital Director:**	
		Title/Qualification	
		NCD involvement	
		Contact	
	2	Name	
		Title/Qualification	
		NCD involvement	
		Contact	
	3	Name	
		Title/Qualification	
		NCD involvement	
		Contact	
	4	Name	
		Title/Qualification	
		NCD involvement	
		Contact	

B. HEALTH FACILITY PROFILE

B1	Name of health facility					
B2	City/town					
B3	Full address of health facility					
B4	Is the health facility urban or rural, public or private?	Urban Rural	☐ ☐	Public Private	☐ ☐
B5	Health facility category: National Referral Hospital – **1**; Regional Referral Hospital – **2**; General Hospital – **3**; Health Centre IV – **4**					☐

[1] Personnel interviewed should be from any of the following areas: Administration, Pharmacy, Clinicians in NCD clinics (including nurses), Records, and/or Laboratory.

C. HUMAN RESOURCE AND SKILLS PROFILE

Are the following personnel in the facility, and if so, how many of each specialty/position?				
	Specialty/Position	**Yes/No**	**Number**	**Additional Skills[2]**
C1	Cardiologist			
C2	Clinical Officer(s)			
C3	Community Health Worker(s)			
C4	(NCDs) Counsellors			
C5	Endocrinologist/Diabetologist			
C6	Family physician			
C7	Foot care specialist			
C8	General surgeon			
C9	Laboratory technician(s)			
C10	Laboratory technologist(s)			
C11	Medical Officer(s)			
C12	Medical social workers			
C13	Midwives			
C14	NCD (DM) Educator			
C15	Neurologist			
C16	Nurse(s) – general			
C17	Nurse(s) – diabetic			
C18	Nurse(s) – psychiatric			
C19	Nutritionist(s)			
C20	Obstetrician/Gynecologist			
C21	Oncologist			
C22	Ophthalmologist			
C23	Paediatrician			
C24	Pathologist			
C25	Physiotherapist			
C26	Psychiatrist			
C27	Pulmonologist (or Chest physician)			
C28	Radiologist(s)			
C29	Radiology technician(s)			
C30	Specialist Physician			
C31	Vascular Surgeon			
C32	Other, specify:			

COMMENTS:

[2] e.g. Foot care, palliative care, nutrition, cancer screening, sickle cell screening, mental health skills, and any other skill. Please list skill and then number of personnel with the specified skill. For example: Foot care (2).

D. FACILITY-BASED NCDs PREVALENCE

	NUMBER OF CASES IN LAST FINANCIAL YEAR[3]		NUMBER
D1	Estimated number of overall patients in your facility[4]		
D2	Estimated number of patients with NCDs		
D3	Total number of diabetes cases		
D4	Adults		
D5	Children		
D6	Pregnant women		
D7	Total number of hypertension cases		
D8	Pregnant women		
D9	Total number of cancer cases		
D10	Breast cancer		
D11	Cervix cancer		
D12	Prostate cancer		
D13	Lung cancer		
D14	Liver cancer		
	Kaposi's sarcoma		
D15	Other cancer (specify)		
D16	Total number of heart disease cases		
D17	Adults		
D18	Children		
D19	Total number of asthma cases		
D20	Total number of other COPD cases[5]		
D21	Total number of stroke cases		
D22	Total number of renal disease cases		
D23	Total number of mental health disorder cases		
D24	Total number of sickle cell disease cases		
D25	Total number of injury cases – road traffic accidents		
D26	Total number of injury cases – gender-based violence		
D27	Total number of injury cases – trauma due to other causes		
D28	Total number of alcohol-related cases		
D29	Total number of tobacco-related cases		

COMMENTS:

[3] Please obtain actual number of patients from register.
[4] Both inpatient (admission) and outpatient.
[5] COPD – defined as progressive symptoms of cough, and/or sputum production, and/or dyspnea for more than 3 months where asthma and infectious causes have been excluded.

E. CLINICS AND SERVICES

Clinics												
		DM	HT	Cancer	Cardio	COPD	Renal	SC	OB/GY	Paed	HIV	Surgery	MOPD
E1	Do you have a clinic (NCD)? (**Y/N**)												
E2	Do you have a separate (NCD) clinic room? (**Y/N**)												
E3	How often is the clinic held?												
E4	When is the clinic held?												
E5	Is there regular patient review? (**Y/N**)												
E6	If yes, how often is each patient reviewed?												
E7	Does the clinic conduct performance audits? (**Y/N**)												
E8	If yes, specify.[6]												

Services												
		DM	HT	Cancer	Cardio	COPD	Renal	SC	OB/GY	Paed	HIV	Surgery	MOP
	Are the following services offered?	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
E9	Blood Pressure measurement												
E10	Weight												
E11	Height												
E12	BMI calculation												
E13	Waist:Hip ratio												
E14	Blood glucose												
E15	Oral Glucose Tolerance Test (OGTT)												
E16	Blood lipids												
E17	Urinalysis												
E18	Urine protein												
E19	Urine ketones												
E20	Eye examination												
E21	Individual patient NCD education												
E22	Group NCD education												
E23	Foot care for Diabetic patients												
E24	Nutrition advice for all patients												
E25	Sickle cell screening (incl. newborns)												

[6] e.g. loss to follow-up, deaths, availability of drugs, etc.

E26	Cervical cancer screening (pap smear)												
E27	Breast cancer screening												
E28	Prostate cancer screening												
E29	Cytology/pathology services												
E30	Palliative care												
E31	Chemotherapy												
E32	Radiotherapy												
E33	Physiotherapy												
E34	Record of family history of NCDs												
E35	NCD patient card												
E36	Provision of NCDs IEC materials												
E37	If you answered yes to #E36, please list examples[7]	_____											
E38	Patient treatment plans												
E39	Self-management support[8]												
E40	Peer/social support linkage[9]												

Guidelines

		DM	HT	Cancer	Cardio	COPD	Renal	SC	OB/GY	Paed	HIV	Surg	MOP
	Are the following guidelines used?	**Y/N**	**Y/N**	**Y/N**	**Y/N**	**Y/N**	**Y/N**	**Y/N**	**Y/N**	**Y/N**	**Y/N**	**Y/N**	**Y/N**
E41	Diabetes management												
E42	Hypertension management												
E43	Hyperlipidemia management												
E44	Tobacco screening & treatment												
E45	Alcohol screening & treatment												
E46	Cancer (cervical, breast, prostate) screening & treatment												
E47	Mental health screening & treatment												
E48	Asthma management												
E49	Sickle cell screening & management												
E50	Palliative care												

COMMENTS: (include type of guidelines used, e.g. WHO, UCG – Uganda Clinical Guidelines or IDF – International Diabetic Federation). Also mention about any Rehabilitation services.

[7] Brochures, booklets, magazines, CDs, dummies, posters, audiotapes, etc.
[8] e.g. Lifestyle modification
[9] Including expert patients

HIV CLINIC		
Number of known HIV patients		
E39	Total number of active patients with HIV in the last financial year[10]	Male: Female:
E40	Number of new cases in last 3 financial years	2012-13:
		2011-12:
		2010-11:
E41	Number of active HIV patients with cancer	
E42	Number of active HIV patients with diabetes	
E43	Number of active HIV patients with hypertension	
E44	Number of active HIV patients with CVD	
E45	Number of active HIV patients with liver disease	
E46	Number of active HIV patients with kidney disease	
COMMENTS:		

F. EQUIPMENT

[10] An "active patient" has attended the HIV clinic within the last 6 months.

			DM		HT		Cancer		Cardio		COPD		Renal		SC		OB/GY		Paed		HIV		Surgery		MOPD	
Is the following equipment available in the NCD clinic? (Y/N and number)			**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**
F1	Clinicians table																									
F2	Nurses station/table																									
F3	Hand washing basin/sink with soap																									
F4	Patient files																									
F5	File cabinet/cupboard/storage space																									
F6	NCD register: for new cases only																									
F7	NCD register: for follow-up cases only																									
F8	NCD register: for admission only																									
F9	BP machine: Mercury sphygmoman-ometer	Number present																								
F10		Number functional																								
F11		# Calibrated																								
F12	BP machine: Aneroid	Number present																								
F13		Number functional																								
F14		# Calibrated																								
F15	BP machine: Automated	Number present																								
F16		Number functional																								
F17		# Calibrated																								
F18	BP cuffs: Standard (25 cm x 12 cm)																									
F19	BP cuffs: Alternate (36 cm x 12 cm)																									
F20	BP cuffs: Paediatric																									
F21	Stethoscope	Number present																								
F22		Number functional																								
F23	Blood Glucose meter	Number present																								
F24		Number functional																								
F25		# Calibrated correctly																								
F26		Cost of strips per unit																								
F27	Urine testing	Multiple test																								

F29	strips	Availability? Always – **1**; Sometimes – **2**; Never – **0**																								
F30	Weighing scales	# Bathroom type																								
F31		# Hospital type																								
F32	Height meters	Number present																								
F33		# Calibrated correctly																								
F34	Ophthalmo-scope	Number present																								
F35		Number functional																								
F36	Snellen charts (visual acuity exam)	# Handheld type																								
F37		# Distance type																								

		DM		**HT**		**Cancer**		**Cardio**		**COPD**		**Renal**		**SC**		**OB/GY**		**Paed**		**HIV**		**Surgery**		**MOPD**	
	Other equipment	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**	**Y/N**	**#**
F38	BMI chart																								
F39	Measuring tapes																								
F40	Tuning forks																								
F41	Monofilament																								
F42	Spirometer																								
F43	Spacers for inhalers																								
F44	Nebuliser																								
F45	Thermometers																								
F46	Speculum (cervix)																								
F47	Bronchoscope																								
F48	Proctoscope																								
F49	Colonoscope																								
F50	Autoscope																								
F51	Emergency Trolley/Tray[11]																								
F52	Physiotherapy equipment																								
F53	Other																								

[11] Please specify under comments what your emergency trolley/tray contains.

	(Specify)																							
	Maintenance	**Y/N**		**Y/N**		**Y/N**		**Y/N**		**Y/N**		**Y/N**		**Y/N**		**Y/N**		**Y/N**		**Y/N**		**Y/N**		**Y/N**
F54	Is there a written equipment maintenance plan?																							
F55	If yes, is the plan implemented?																							

	Imaging	**Available?**	**Functional?**
F56	Ultrasound scan		
F57	Echography		
F58	ECG monitor		
F59	X-Rays		
F60	Doppler		
F61	CT-Scan		
F62	Other, specify		
	Power Supply	**Available?**	**Functional?**
F63	Reliable power supply		
F64	Alternative source of power[12]		

COMMENTS:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

[12] e.g. standby generator, solar, etc.

G. MEDICINES AND SUNDRIES

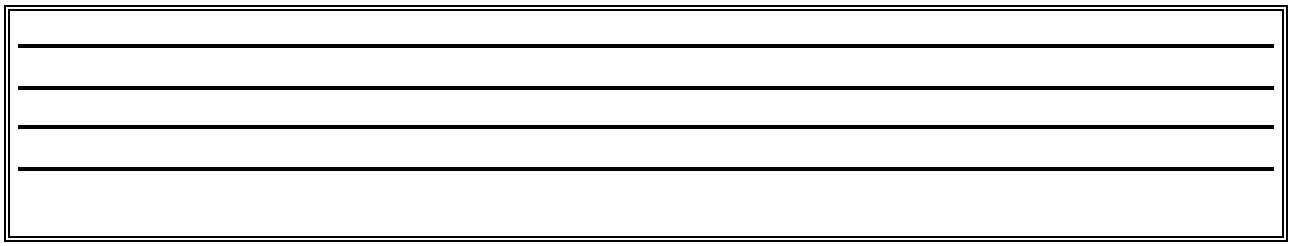
G1	Is there a drug store (pharmacy) in your facility? (**Y/N**)					
Medicines						
	Classes of drugs		**Available**	**How often are they stocked?** Every 2 mos. 1 Quarterly 2 Other 3	**Was there a stock-out in the last quarter?**	**Was there a stock-out in the last financial year?**
	Anti-hypertensives					
G2	Thiazide diuretic (e.g. Aprinox)					
G3	Calcium channel blocker (e.g. Nifedipine)					
G4	Beta-blocker (e.g. Propranolol)					
G5	ACE inhibitor (e.g. Captopril)					
G6	Others (e.g. Aldomet, Hydrallazine, Magnesium Sulphate)					
	Diabetic drugs					
G7	Biguanides (e.g. Metformin)					
G8	Sulfonylureas (e.g. Glibenclamide)					
G9	Thiazolidinediones (e.g. Pioglitazone)					
G10	Dipeptidyl peptidase-4 inhibitors					
G11	Alpha-glucosidase inhibitors					
G12	Others					
G13	Insulin type available	Ultra short-acting				
G14		Short-acting				
G15		Intermediate				
G16		Long-acting				
G17	Strength of insulin available	U 100				
		Other				
G18	Insulin syringes (e.g. U100)					
	For other diseases					
G19	Folic acid					
G20	Statins					
G21	Cardiac Aspirin					
G22	Sulfadoxine/pyrimethamine (e.g. Fansidar)					
G23	Antibiotics, specify:					
G24	Anticoagulants					
G25	Anticancer, specify:					
G26	Other[13]					
Other Questions						
	What is the source of procurement?					
G27	Government					

[13] Include renal, and other drugs.

G28	Other, and specify[14]	
G29	Do you get the types of drugs you ask for?	
G30	Do you get the quantity of drugs you ask for?	
G31	Do you have a refrigerator in the drug store (pharmacy)?	

COMMENTS:

[14] e.g. Special fund for health, independent wholesaler, gift from a philanthropic body



H. LABORATORY

	QUESTION	YES/NO
H1	Is there a laboratory in the facility?	
	Are the following lab tests done?	
H2	Bacteriology including culture and sensitivity	
H3	Blood Grouping and Cross-match	
H4	Cytology	
H5	Electrolytes (e.g., potassium)	
H6	Full blood count and differential	
H7	Full Urinalysis	
H8	Hb electrophoresis	
H9	HbA1c	
H10	Hemoccult	
H11	Hemoglobin	
H12	Hormonal Assays (other)	
H13	Lipid Profile	
H14	Liver Function Tests	
H15	Microalbuminuria	
H16	Pregnancy test	
H17	PSA	
H18	Random Blood Sugar	
H19	Renal Function Tests	
H20	Sickling test	
H21	Thick Film	
H22	Thin Film	
H23	Thyroid function tests	
H24	Other, specify[15]	
H25	Is there a functional centrifuge available?	
H26	Is there a functional microscope available?	
H27	Is there a functional refrigerator available?	

[15] e.g. Carcinoembryonic Antigen

COMMENTS:

K. COSTS RELATED TO NCDS[16]

	GENERAL ITEM	SPECIFY ITEM	COST ESTIMATE[17]
I1	Drugs		
I2	Labs		
I3	Imaging		
I4	Other Services		

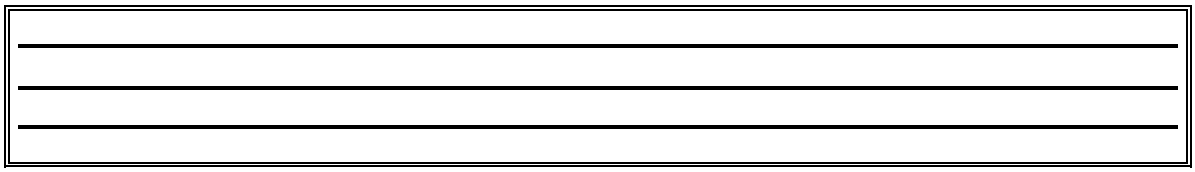
COMMENTS:

J. REFERRAL SYSTEM

	QUESTION		YES/NO
J1	**Health System:** Availability of protocols for management and referral of NCD patients in this facility.		
J2	**If yes specify:**		
J3	**Health System:** Availability of a referral form (or any other form of communication) to the next facility	Outgoing	
		Receiving	
J4	**Health System:** Availability of transport to the next facility		
J5	**Referral Practicalities:** A register exists to monitor follow-up and gather statistics on referrals	Outgoing	
		Receiving	
J6	**Supervision and Capacity Building:** The facility has a program that integrates NCDs support supervision and capacity building in lower health facilities		

COMMENTS:

[16] Costs for patients related to NCDs.
[17] Estimate cost for 1 month's supply of drugs and 1 visit for labs, imaging, and other services.



K. HEALTH CARE PROVIDERS' SKILLS AND ATTITUDES

ACCESS						
	Do you have access to the following resources?				Yes/No	
K1	Facility-specific NCD guidelines					
K2	National/WHO NCD guidelines					
K3	NCD journal articles					
K4	Do you receive "medical alerts"[18] on NCD patients?					
K5	Do you receive NCD support supervision?					
SKILLS (target NCDs team)						
		Phys.	**MOs**	**Cos**	**Nurse**	**Other**
K6	How many have received any special training or CME on NCDs?					
	How many have received training or CME in the following areas?					
K7	Prevention/management of hypertension					
K8	Prevention/management of diabetes					
K9	Prevention/management of heart disease					
K10	Screening breast cancer					
K11	Screening cervical cancer					
K12	Diagnosis/management of asthma					
K13	Diagnosis/management of COPD					
K14	Screening/diagnosis/management of sickle cell disease					
K15	Screening/diagnosis/management of depression & mental health d/o					
K16	Screening/management tobacco abuse					
K17	Screening/management alcohol abuse					
K18	Palliative care					
COMMENTS:						

[18] "Medical alerts" refers to any form of identification for NCDs patients e.g. Health cards, sticker on patient's file, etc.

Individual Provider Survey

K18	**Cadre:**	
K19	**Clinic:**	

	CONFIDENCE IN NCD MANAGEMENT	
	Not at all – **1**; Somewhat – **2**; Confident – **3**; Very confident - **4**	Response
K20	Hypertension	
K21	Diabetes	
K22	High cholesterol	
K23	Screening for cervical cancer	
K24	Screening for breast cancer	
K25	Diagnosis/management of asthma	
K26	Screening/management of depression & other mental health disorders	
K27	Screening/diagnosis/management of sickle cell disease	
K28	Treatment of tobacco abuse	
K29	Treatment of alcohol abuse	
	ATTITUDES	
	Agree – **1**; Disagree – **2**; No opinion – **3**	Response
K30	There are no effective depression treatments that can be provided by a primary care physician in my facility.	
K31	My clinical training prepared me adequately to manage chronic diseases.	
K32	A doctor can influence whether a patient successfully quits smoking.	
K33	I am able to spend the time I need to provide good medical care for my patients with chronic diseases.	
K34	Patients receive better care for chronic medical conditions if they have a designated primary care provider.	
K35	My facility has the capacity to manage chronic diseases.	

L. COMMUNITY INVOLVEMENT (ENGAGEMENT)

		Y/N
L1	Health facility has formal linkages to community – regular meetings with community on NCDS	
L2	Health facility communicates with community about disease states through media, gatherings, IEC, and/or village health teams	
L3	Health facility participates in partnerships with community organizations that focus on NCDs	
L4	Health facility engages community in patient follow-up	

COMMENTS:

M. ASSOCIATIONS/PATIENT GROUPS

UGANDA DIABETIC ASSOCIATION		
M1	Do you have a branch of UDA in your facility? (**Y/N**)	
M2	Is the branch functional?[19]	
M3	Contact information for your UDA branch	Contact person: Address: Telephone: Email:
M4	What do you need from UDA head office?	
M5	If no, are you willing to open a UDA branch at your facility? (**Y/N**)	
M6	Contact information for person interested in heading branch	Contact person: Title: Telephone: Email:
OTHER ASSOCIATIONS/GROUPS		
	Association/Group	**Contact information**
M7		
M8		
M9		

[19] e.g. Regular meetings held, minutes available, work plans available, reports available and/or submitted to UDA head office, etc.

COMMENTS:

Appendix C. World Health Organization Essential Tools and Medicines for Noncommunicable Diseases

The following tables are adapted from the World Health Organization's Package of Essential Noncommunicable (PEN) Disease Interventions for Primary Health Care in Low-Resource Settings.

Table 1. WHO essential technologies and tools for implementing essential NCD interventions in primary care[30]

Technologies:	**Tools:**
Thermometer Stethoscope Blood pressure measurement device Measurement tape Weighing machine Peak flow meter Spacers for inhalers Glucometer Blood glucose test strips Urine protein test strips Urine ketones test strips	WHO/ISH risk prediction charts Evidence based clinical protocols Flow charts with referral criteria Patient clinical record Medical information register Audit tools
Add when resources permit: Nebulizer Pulse oximeter Blood cholesterol assay Lipid profile Serum creatinine assay Troponin test strips Urine microalbuminuria test strips Tuning fork Electrocardiograph (if training to read and interpret electrocardiograms is available) Defibrillator	

Table 2. WHO core list of medicines required for implementing essential NCD interventions in primary care[30]

Medicines	
Thiazide diuretic	Ibuprofen
Calcium channel blocker (amlodipine)	Codeine
Beta-blocker (atenolol)	Morphine
Angiotensin inhibitor (enalapril)	Penicillin
Statin (simvastatin)	Erythromycin
Insulin	Amoxcillin
Metformin	Hydrocortisone
Glibenclamide	Epinephrine
Isosorbide dinitrate	Heparin
Glyceryl trinitrate	Diazepam
Furosemide	Magnesium sulphate
Spironolactone	Promethazine
Salbutamol	Senna
Prednisolone	Dextrose infusion
Beclometasone	Glucose injectable solution
Aspirin	Sodium chloride infusion
Paracetamol	Oxygen