Determining Healthcare Workforce Requirements for Kuluva Hospital in West Nile-Uganda, using the Workload Indicators of Staffing Need (WISN)

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Research

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Abstract

Introduction:

Health workforce shortage is a major threat to global public health with a greater implication for low-resourced countries. The right placement of the available staff in many health facilities remains a challenge due to inadequate information on exact workload and work pressure that staff undergo in course of work. This study aimed to determine the need for key health workforce cadre in Kuluva hospital using Workload Indicators of Staffing Need (WISN) methodology.

Method:

The study followed a predominantly quantitative approach of Workload Indicator Staffing Needs (WISN) methodology. We held a meeting with hospital management to understand policy issues and procedures. The key staff were interviewed in departments, available records reviewed, practices observed to establish the available working time, activity standards and time taken to perform other supportive activities. Service statistics was generated from HMIS data of 2016/17. Data was analyzed manually using calculator and Microsoft Excel spreadsheet.

Results

All cadre categories had the same available working time of 1,504 hours in a year with 105 staff of the studied cadres required to perform all activities in Kuluva hospital based on WISN calculation. Although overall work pressure was 30%, 5 out of 7 staff cadre categories experienced work pressure of varying degrees – medical officers (70%), laboratory staff (70%) and clinical officers (60%) were most affected compared to nurses (30%) and midwives (10%). There was perfect number of anesthetists but surplus nursing assistants than needed by the hospital. Amidst shortage, the critical cadres still spent significant time on non-professional activities; medical officers (24%) and midwives (25%).

Conclusion

These findings can provide insight into the management of Kuluva hospital to address the current disparities in the health workforce in terms of numbers and skill mix for continuous improvement of health service delivery to the population it serves.

Background

Health systems are highly labour demanding and health workforce play a critical role towards performance and execution of the key health system functions. Ensuring both the right numbers and skill mix of work force. Provision of the required resources and incentive is required for healthcare workers to

accomplish their assigned functions well [1]. The need for balance between the human and physical resources as being essential to maintain an appropriate skill mix between the different types of service provision ensures the health system's effectiveness [2]. Despite the global efforts, healthcare managers continue to be faced with serious human resource challenges towards delivery of quality health services to the population. Even then, the few available health workers in the health facilities are not equitably distributed according to workload, resulting into high work pressure among some staff cadre categories hence poor quality services offered to the population [3]. One major obstacle to the achievement of the global strategy on human resources by health managers for many health systems in developing countries is inadequate number of health workforce to meet the demand of the ever-growing population [4, 5]. The WHO report [6] estimates global health workforce shortage of 7.2 million and projects it to reach 12.9 million by 2035. Liese and Dussault [7] agree with the WHO findings and substantiated that in Africa, average ratio of physicians per 100,000 population is 15.5 compared to 311 for nine selected developing countries. Nurse's average at 73.4 per 100,000 population compared to 737.5/100,000 in developing countries. African countries have 20 times fewer physicians and 10 times fewer nurses compared to developed countries. Korea, India, Vietnam, Singapore have average of 106.3 physicians per 100,000 population and 220.3 nurses for the same population. Even in Sub-Saharan Africa (SSA), some countries are doing better than others. For instance, Botswana and Egypt have the following ratios of 28.7 and 218 physicians per 100,000 population and 240 and 284 nurses per 100,000 population respectively [7].

In a related study, shortages of 1,000,000 nurses and 200,000 physicians were projected for the year 2020 [8]. Human resource for health shortage will make access to healthcare services more difficult should appropriate human resource planning not be in place to address this shortage. Gasim, [9] in his study on the current crisis of human resources for health in Africa reports total workforce of 590,198 health workers with shortage of 817,992. This will require increase of 139% to reach the required level of health workers. In a nutshell, African countries have 20 times fewer physicians and 10 times fewer nurses compared to developed countries. Africa's ratio is still even poorer compared to developing countries such as India, Korea, and Vietnam that average106.3 physicians and 220.4 nurses per 100,000 people.

Disparities in staffing and skills mix have been reported in many African countries for various reasons [10]. Out of 48 African countries, 13 had fewer than 5 physicians per 100,000 people except Burkina Faso, Mozambique and Tanzania. African countries present different human resource for health challenges; e.g. 50% of physicians in Namibia are expatriates, Cameroon had ban on health workers' recruitment for 15 years; Ghana, Zambia and Zimbabwe lose annually 15%-45% of public health sector employees. Among Sub Sahara African (SSA) countries, Malawi has consistently had one of the worst health worker to population ratios, with 2.22 physicians per 100,000 people compared to 4.55 in Kenya and 9.09 in Zambia, with only 50% of the available posts filled. Sub-Sahara Africa accounts for 11% of World's population, 25% of global disease burden but only 3% of global health workforce thus putting the total workforce of doctors, nurses and midwives in Africa at approximately 590,198 with an estimated shortfall of 817,992 hence making African countries not meeting the WHO's "Health for All" standard of 1doctor per 5000 population [11, 12].

In Uganda's health care system, the private not for profit (PNFP) facilities play pivotal role; contributing 30%–35% of health service delivery and accounting for 40% of the country's hospitals. One -third of the workforce serving the country's strategic plan, i.e. 11,000 of the 36,000 health workers and 60% of the country's nurses are trained in 20 PNFP schools among others [13]. Over the years, Uganda adopted generic staffing norm for distribution of health workers at various levels of the health care system, especially in the public sector. This staffing norm has neither addressed human resource for health challenges of the country nor improved equity in human resource allocation and distribution. The Annual Health Sector Performance Report of Uganda, [3] identified some key challenges facing the health sector that include: 9.8% public expenditure on health as opposed to the Abuja target of 15%, combined health worker to patient ratio of only 0.74 (doctors: 0.03, midwives: 0.25, nurses: 0.46) compared to the WHO recommendation of 2.3 per 1000 population, severe staff shortage of 68% in general hospitals including the PNFP. In PNFP facilities, although the average staffing was 73%, this varies from 28–88% [3].

To address the critical challenge of inadequate human resource for health, demand has grown for appropriate tools to expedite planning, including tools that can help with applying objective and scientific methodologies to estimate health workforce requirements [3]. Establishing the right staffing level and skill mix is thus a dire component of efficacious and efficient health care delivery [14]. The strategic objective of the Second National Health Policy (NHP II) of Uganda's Ministry of Health (MoH) is to ensure adequate and appropriate human resource for quality health service delivery [15]. Uganda government recognizes the contribution of the private sector in health service delivery and supports PNFP facilities with human resource, medicines and health supplies, funds, support supervision and other logistics to improve health care [16]. Despite this support to PNFP facilities, PNFP hospitals have high staff attrition of between 60% and 70% of the departures destined to government [17]. Kuluva hospital's management uses resources generated from internal and external sources to recruit staff every year to fill the gaps created by staff attrition in order to improve service delivery in the hospital while staff needs are determined by the management from time to time. However these allocations and deployments have not been based on the World Health Organization's Workload Indicator Staffing Needs (WISN) methodology [18], a human resource management tool that bases the health work force requirement on the health facility workload [19].

"WISN Method as an analytical tool is used to determine the required number of health workforce that can cope with actual workload in a given facility and to estimate staffing required to deliver expected services of a health facility based on workload [19]. Importantly, the difference between the actual and calculated number of health workers show the level of staff shortage or surplus for the particular staff cadre and the facility type for which WISN has been applied. On the other hand, the ratio of the actual and the required number of staff is a measure of the workload pressure with which the staff is coping. More sophisticated analyses may use calculations of workforce size and mix through use of case-load profiling, acuity measures, queuing theory, production functions, treatment care standards or a combination of factors in regression analysis [4]. In 2010 when computerized application-based WISN tool was released, four countries in the WHO African Region, (Ghana, Kenya, Liberia and Sierra Leone) participated in the first sub regional levels WISN capacity building workshops [20]. In India, it was applied

to estimate the number of required nurses in an emergency hospital [21] and also for calculating the health worker requirements for maternal and child health services guarantees [5]. Namibia applied WISN to establish the number of doctors, nurses, pharmacists and pharmacy assistants for the different levels of health facilities [22]. Ghana adopted WISN in 2011 to address the issue of numbers [20, 23]. In the revised HRH norms and standard guidelines, the Kenya health sector adopted WISN approach which also specified the implementation master plan [24]. In Uganda, WISN tool has been successfully applied in Lacor hospital, a PNFP facility in Northern Uganda [25] and in other health facilities to determine staff requirements by MoH [14], for instance Mityana hospital [4]. Application of WISN in Uganda has clearly shown that Uganda has one health worker for every 818 people, far below the WHO recommendation of a minimum of one health worker for every 439 people, with majority concentrated in urban centers [14]. The application of WISN in Uganda is in line with the main aim of the MoH, i.e. to have an adequate, appropriately skilled and equitably distributed health care workforce that is responsive to the needs of the people [16, 26].

Study Objective

This study applied the World Health Organization (WHO) Workload Indicators of Staffing Need (WISN), 2011 tool to determine the ideal staffing requirements in Kuluva hospital.

Methodology

Study Design, Site And Settings

In this descriptive study with predominantly quantitative approach, a set of operations was used, using Workload Indicators of Staffing Need (WISN) methodology initially developed by Shipp [18] to estimate optimal health professionals required at Kuluva Hospital of West Nile, Uganda. We targeted eight cadres namely; medical officers, clinical officers, nurses, midwives, laboratory personnel, radiographers, anesthetists and nursing assistants. These are cadres usually known to be performing activities of the hospital and hence any variation in their numbers greatly affects the operations of the hospital. They also directly experience work pressures in their daily operations. Kuluva hospital, located in North Western Uganda (West Nile) being one of the 40 PNFP hospitals operates at the level of general hospital in Uganda. The hospital receives patients from Uganda and neighboring countries like the Democratic Republic of Congo (DRC) and South Sudan. Of the 76 staff in the cadre categories, 25 were selected and 20 were interviewed; these included 2 medical officers, 2 clinical officers, 5 midwives, 6 nurses, 1 anesthetist, 1 laboratory personnel and 3 nursing assistants. We interviewed staff who were available at work, familiar with the activities in the hospital and had worked for at least six months.

Data collection and study instruments

The WISN study team held several meetings with the relevant groups including the top hospital management (Kuluva hospital) to understand the practice and policy issues relating to human resource

for health; senior staff in departments and individuals who had worked in Kuluva hospital for at least six months.

Using the pre-designed forms and checklists, the team sought key variables including; - available working time (AWT), activity standards, allowance standards and service statistics guided by the existing national WISN standards [27], developed by the Uganda MoH, United States Agency for International Development, IntraHealth and Uganda Capacity. These were available for medical officers, clinical officers, nurses, midwives and nursing assistants. For laboratory staff, radiographers and anesthetists we relied on information from the key informants and available standard operating procedures. The team was able to establish the available workload, conditions of health services and their components as well as other support activities performed by the health workers. Standard operating procedures in place were also used to obtain and verify additional information given by the health workers. We also reviewed the Health Management Information System (HMIS) reports of 2016/17 and activities that were not captured in HMIS, e.g. work plan, human resource manual, circulars or memos, duty rosters and leave rosters among others.

Staff available on duty and who were willing to participate were interviewed at their work units to establish the different activities they were participating in and how long they would take to accomplish the activities to the expected standards. They were specifically interviewed on health service and supportive activities done either in groups of the cadre category or some individuals within the cadre category. Kuluva hospital human resource policy manual and the staff list were requested for from the hospital management to refer to the key human resource policies applicable to the WISN method. Potential working hours, days, official annual leave, other authorized offs and record of absences due to trainings and conferences for 2017/2018 financial year were reviewed to determine the annual AWT. Annual service statistics for 2016/17 was accessed from Arua district health office since this was the most recent financial year and the variation in service load would not be significant.

WISN methodology and operational definitions

Unless or otherwise specified, the terms used in this study were adopted from the WISN guidelines [19]. This study was conducted in 6 steps which are in accordance with the updated version.

i.

Available Working Time (AWT): This is the time that a health worker has available in one calendar year to do his or her work, taking into account authorised and unauthorised absence [19]. It is denoted by the formula (Eq. 1); AWT = A-(B + C + D + E)……*Equation 1*.

Where: -A = the number of potential working days in a year; B = the number of public holidays; C = the number of off-duty days due to annual leave; D = the number of off-duty days due to sickness; E = the number of off-duty days due to other leaves. Following a discussion and available records in the facility, we estimated the annual working days, estimated days for vacation, public holidays, other annual leave and absence days per year and then deducted days off from annual working days.

ii.

Activity standard (AS): This is the amount of time necessary for a well-trained, skilled and motivated worker to perform an activity to professional standards in the local circumstances; and other support activities conducted individually and in groups [19]. The set AS is then used to calculate the standard workload, category allowance factor (CAF) and individual allowance factor (IAF).

iii.

The standard workload /service standard: This refers to activity standard for health service activities for which annual statistics are regularly collected and reported in the HMIS [19]. Activity standard was obtained by interviewing the key informants in the different cadre categories. The standard workload was then calculated using the formula *(Eq. 2)*:

$$\textbf{Standard workload} = \frac{\textbf{Available Working Time (AWT)}}{\textbf{Activity Standard}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \textit{Equation 2.}$$

iv.

Category allowance factor (CAF): The CAF is **a** multiplier used to estimate the number of health workers required for both health service delivery (i.e. with outputs reported in the HMIS) and support activities done by cadre categories in groups. At first, we summed up the percentages of time it takes all members of the staff category to perform activities for which annual statistics were not available in order to derive the Category Allowance Standard (CAS). The CAS was then used in the subsequent stage to compute the CAF. using the formula (Eq. 3)

$$\mathbf{CAF} = \frac{\mathbf{1}}{\mathbf{1} - \sum \boldsymbol{CAS}\%} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \textit{Equation 3.}$$

v.

Individual allowance factor (IAF): Staff requirement to cover additional activities of certain cadre members (not all members) participate in the activity. The IAF shows how many full-time equivalent staff members are needed to cover the time commitment of certain cadre members to additional activities. IAF is added to staff requirement of health service and support activities. This was obtained by the following methods; we wrote down the number of staff who performed each activity and the time it took them, then multiplied the number of staff by the time the activity required in a year to derive the Individual Allowance Standard (IAS) for each activity. Finally we calculated the total IAS in a year by adding the activity-specific IAS. The IAS was then used to derive the allowance factor with the formula in Eq. 4

$$\mathbf{IAF} = \frac{\boldsymbol{IAS}}{\boldsymbol{AWT}} \ldots\ldots\ldots\ldots\ldots\ldots \textit{Equation 4}$$

The finding was also used to compute the staff requirement to cover additional activities of some cadres and then establishing the additional workload of the staff in Kuluva hospital.

vi.

Annual Workload: Also referred to as the service statistics for each staff category were obtained from DISH 2 platform by the district HMIS focal person as data from the hospital was incomplete. The statistics were for OPD, maternal and child health, laboratory, HIV/AIDS, imaging, theatre and in-patient services performed by each staff category.

Workload based staffing requirement

This WISN staff requirement was calculated using the formula in Eq. 5

$$= [\frac{\textbf{Annual workload xCAF}}{\textbf{Standard workload}}] + \textbf{IAF} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots Equation\ 5$$

Staffing Gaps

This was defined as staff not available to cover required activities. Established by subtracting WISN staff requirement from the current existing staff.

Workload pressure: Additional work staff have to cope with because of staff shortage. This was calculated using the formula: 100-(existing staff/computed staff x 100).

Staffing requirement

Staff needed to cover health service, supportive and other additional activities.

Data Analysis

Data was analyzed manually and using Microsoft excel spreadsheet program. To analyze the AWT, potential working days per week, working hours per day and approved absences were entered for each cadre and the result automatically generated. The activity standard for each cadre category was entered in the excel spreadsheets for each activity generated guided by the activity and allowance standards for Uganda and interviews and average time generated in minutes. The rounded-off average time for each cadre category in minutes was used to develop a graph in excel template. The activity standards were further converted to hours and the AWT divided with the result using a calculator to obtain the standard workload for each cadre category for the activity. The annual service statistics of 2016/17 financial year for each health service activity was divided by the standard workload to get the basic staff required to perform the specific health service activities and their total gives number of staff per cadre required for those activities. The allowance standards (CAS and IAS), were generated for supportive activities in excel spread sheets and converted to factors for each supportive activity using a calculator. The information on CAF and IAF were then further used to manually calculate the total staff requirements for Kuluva hospital. To determine the work pressure, WISN ratio for each staff cadre category (Existing staff/computed staff) was converted into percentages and subtracted from 100% to establish the work pressure. In summary overall work pressure for the hospital is summarized in *Eq. 6*:

$$= 100 - \left(\frac{\text{Existing Staff}}{\text{Computed Staff}}\right) \text{X } 100 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots Equation\ 6$$

In-depth interviews for each individual representing the different cadres was analyzed manually by a team of researchers and the results obtained were used to substantiate the study's findings.

Quality control

The team adhered to WISN's standard quality control protocols. All the study staff were trained on the methodology and data collection tools were pre-tested at Oli health center IV, Arua municipality before the main data collection exercise. The study team created rapport with the management and staff and further explained the rationale of the study so that they could clearly understand the relevance of this study and be able to provide correct and therefore reliable information. Interviews for particular cadres were led by interviewer who was a peer of such profession or was very familiar with the operations of that cadre. This enabled proper guidance of the respondents. The data collected using the standard WISN tool for the staff categories were double-checked before end of the study by at least two members in the group familiar with the operations of the staff cadre category. The data collected was immediately entered into the excel sheet so as to enable quick identification of the errors. Additionally, data analysis was carried by two persons independently to ensure reliability.

Results

Available Working Time (AWT) of staff cadre categories

The AWT was estimated at 1,504 hours per year and was the same for all staff categories of Kuluva hospital (Table 1).

Table 1
Available Working Time

Available time component in a year	Cadres						
	Medical officers	Clinical Officers	Mid-wives	Nurses	Anesthetists	Lab staff	Nursing Assistants
Working Days Per Week	5	5	5	5	5	5	5
Working Hours Per Day	8	8	8	8	8	8	8
Annual Leave	21	21	21	21	21	21	21
Public Holidays	17	17	17	17	17	17	17
Sick Leave	31	31	31	31	31	31	31
Special No Notice Leave	3	3	3	3	3	3	3
Training Days Per Year	0	0	0	0	0	0	0
Non - Working Days	72	72	72	72	72	72	72
Non-working weeks	10.3	10.3	10.3	10.3	10.3	10.3	10.3
Working days	260	260	260	260	260	260	260
Working Weeks	52	52	52	52	52	52	52
Working hours	1,504	1,504	1,504	1,504	1,504	1,504	1,504

Unit Time required to perform different tasks by the staff cadre categories

The unit time for the health workers to perform different tasks to professional standards was established and the average standard time for each cadre category is shown in Fig. 1. Nurses had the highest average unit time to perform their professional activities followed by anaesthetists. Nursing assistants had the shortest time.

Looking at the complexity of activities, nurses and medical officers spent their longest time in operations. Besides, nurses participate in pre-operative and post-operative nursing care that consumes a lot time. However, the longest time of nursing assistants is spent on assisting midwives during delivery of about 30 minutes compared with nurses (455minutes) supporting major surgery and medical officers (130 minutes) according to allowance standards for Uganda.

Allowance Standards

Additional activities performed by the heath workers were also elicited through key informant interviews. Time allocated for support activities were computed using the allowance standards for Uganda. Although most time was devoted for the professional work by the health workers, significant amount of time was spent by critical cadres such as medical officers, midwives, anaesthetists and lab staff on supportive activities as shown in Fig. 2.

We also captured additional workload that is generated when the staff were involved in other activities not reported in the routine health management information system (HMIS). Table 2 summarises total time spent on such activities.

Table 2
Time consumed by additional activities

Cadre	Total Category Allowance (%)	Total Annual Individual Allowance (hours)
Medical officer	8.125	980
Clinical officer	4.825	96
Midwives	10.2	1,944
Nurses	44.775	4,523
Anaesthetists	13.325	85
Laboratory staff	11.825	257
Nursing assistants	26.875	2,626

Certain activities were performed by all members of cadre category, for examples, doctors participated in departmental meetings, planning, teaching students among others while nurses, midwives, nursing assistants participated in general cleanliness, dumb-dusting and registration of clients, among others. Some individuals within the cadre category were reported to perform other activities not reported in the HMIS individually. For examples, some medical officers spent substantial time on support supervision, management meetings; some midwives spent part of their time on outreach; some nurses spent time on medicine rounds; and some laboratory staff spent most time on inventory taking and transportation of blood from blood bank of Arua hospital.

Nurses spent collectively the highest (about 45%) of their time on additional activities and also 4523hours of some nurses' time on other supportive activities not reported in the HMIS. Clinical officers spent the shortest time on other activities and only 98 hours in a year on other supportive activities.

Workload-based staffing requirements (BSR) of cadre categories at Kuluva hospital

Table 3 shows the staffing requirement for Kuluva hospital based on workload. The basic staffing requirement (BSR) column shows the number of staff that would be needed to offer basic healthcare

services whose outputs are reported in the HMIS. The column of category allowance factor (CAF) was used as a multiplier for BSR in order to determine the intermediate staff requirement (ISR), i.e. the number of staff required to offer basic healthcare (reported in HMIS) and additional activities performed by all members of the cadre category not reported in HMIS. The individual allowance standard (IAF) shows the equivalent number of staff required to perform other supportive activities not reported in HMIS by some members of the cadre. This factor was added to ISR to get the total staffing requirement for the hospital. More nurses were required by Kuluva hospital followed by medical officers, nursing assistants, lab staff and midwives. The lowest number required was for the anesthetists and clinical officers. If this number required is not met, there is likelihood of disrupted service delivery hence poor quality service.

Table 3
Staffing requirement for Kuluva hospital

Cadre	BSR	CAF	ISR	IAF	Total staffing requirement
Medical officer	11.18	1.1	12.30	0.6	13
Clinical officer	5.07	1.1	5.58	0.1	6
Midwives	8.99	1.0	8.99	1.3	10
Nurses	22.86	2.0	45.72	3.0	48
Anaesthetists	1.43	1.2	1.72	0.1	2
Laboratory staff	10.98	1.0	10.98	0.2	12
Nursing assistants	8.42	1.4	11.79	2.0	14

Work Pressure Among Staff Cadre Categories Of Kuluva Hospital

Majority of the cadres experienced some work pressure with exception of anesthetists and nursing assistants (Table 4).

Table 4
Work pressure among different staff cadre categories in Kuluva hospital

Cadre	Existing staff (2017/18)	Calculated requirement (WISN)	WISN difference (current staff-WISN requirement)	WISN ratio (existing staff/WISN requirement)	Work pressure
Medical officer	4	13	-9	0.3	70%
Clinical officer	3	6	-3	0.5	50%
Midwives	9	10	-1	0.9	10%
Nurses	34	48	-14	0.7	30%
Anaesthetists	2	2	0	0	0%
Laboratory staff	4	12	-8	0.3	70%
Nursing assistants	19	14	5	1.4	-40%
Total	**75**	**105**	**-30**	**0.7**	**30%**

Medical officers and lab staff experienced the highest work pressure of up to 70% while clinical officers who followed these have a pressure of up to 50% compared to the other cadres (nurses and midwives). Anesthetists had the ideal number while nursing assistants were in excess hence working without pressure at all (-40%).

Discussion

AWT has been varying over the years in health facilities where WISN method is applied [4]. Mityana hospital had AWT of 1696 hours for nursing assistants and 1664 hours for other cadres [4], whereas Lacor hospital had AWT of 1884 hours for nursing assistants and 1815.4 hours for other cadres [14]. This study found AWT of 1504 hours for all staff categories because the human resource manual of Kuluva hospital [28] stipulates 21 days of leave for every cadre. Contrarily, the public service standing order [29] of Uganda recommends annual leave days of 18 working days for officers in salary scale U8, and 22 annual leave days for staff from scales U7 to U3. There are also 17 public holidays recognized at Kuluva hospital compared to 15 national public holidays that sometimes increases with special events such as voting. Besides other traditionally known public holidays recognised in Uganda, Kuluva hospital also recognizes mid-wives' day every 4th May and nurses day every 12th May as public holidays. Public holidays can significantly affect available working time in a year hence less time to attend to the patients and other activities potentially compromising quality of care. The difference in the findings of Kuluva hospital and Lacor hospital is because PNFP hospitals operate differently hence setting their own

operational procedures. Trainings are very important for the development of staff capacity. The Uganda public service standing order stipulates that 'a public officer must undertake staff development activities for a minimum of forty (40) hours in a financial year to improve his or her competencies [29] but this was not the case at Kuluva hospital. Although some staff went for trainings and conferences, these were not documented anywhere at Kuluva hospital and this could have led to over-estimation of AWT. Lack of clear capacity building policies affects staff morale hence attrition.

Much as health workers should participate in health service and other supportive activities, service delivery should not suffer at the expense of some supportive and other additional activities. A lot of staff spent time on non-professional activities at Kuluva hospital. For example, significant proportion of nurses' time (45%) was spent on other activities such as general cleanliness, departmental meetings that they perform jointly but are never reported in HMIS. Likewise some nurses, nursing assistants, midwives, medical officers respectively spent 4523, 2626, 1944, 980 hours of work annually on supportive activities such as outreach, support supervision, mentorship, management meetings and yet some cadres are constrained. The implication of this finding is that less time is used to perform professional work by the skilled staff, resulting in poor quality of services, long service queues, and dissatisfaction from clients. Quite often, the Ugandan general public has been complaining about health workers spending more time on seminars and workshops [30]. Most of the support activities could actually be shifted. For example management could shift responsibility of transporting blood to midwives or nursing assistants who experienced proportionately less work pressure than did their laboratory counterparts. Similarly, nursing assistants can be spread across all departments to help with sterilization, general cleanliness, temperature logging and sample registration among other non-professional roles. If the staff used their time maximally for their professional work, actual staff requirement of the key cadres under study could have reduced. In a WISN study of family physicians, the authors [31] established that physicians were spending more time attending in service trainings, performing referral coordination, management and administrative assignments that could be performed by other cadres and yet these activities take a lot of time. The findings in Kuluva hospital were not in conformity with study findings at Mityana hospital for cadres like medical officers [4]. Whereas medical officers in Mityana hospital spent more than half of their time on performing non-professional activities, those in Kuluva hospital spent only 24% of their time on such activities. Both studies report more of midwives and clinical officers time being spent on professional activities than non-professional ones. These findings are not surprising given that clinical officers take fewer management and coordination roles at hospitals – the findings would have been different at lower level health facilities like level III health centers mostly managed by clinical officers. Skilled staff should use much of their time for professional activities in order to improve quality of care. It was not surprising that nursing assistants spent 336%, the highest time spent by staff of Kuluva hospital on non-professional activities because they have less skills for technical work and therefore easily assigned other duties by other cadres. The clinical officer cadre could similarly step in for medical officers in undertaking some non-professional responsibilities. In the event that trained staff are away for activities like meetings, workshops, the excess numbers of nursing assistants can easily be used to

undertake some crucial health service activities such as working with medical officers during ward round, post-operative care and yet this would be best for the nurses and midwives.

Although overall work pressure of 30% appears relatively low for staff of Kuluva hospital, lab staff (70%), medical officers (70%) and clinical officers (50%) were most overloaded. However, midwives (10%) and nurses (30%) had the least pressure. Anesthetists had a perfect number matching with the workload, whereas nursing assistants were in surplus. Although the staff on ground spent most of their time on professional activities, if the staffing gap is not closed by making critical human resource decisions such as recruitment, some staff would leave hence making the situation worse. Accordingly, the number of these critical cadres should be increased or some of their non-professional responsibilities shifted in order to improve quality healthcare. Without shifting responsibilities among cadre categories, Kuluva hospital will need additional 14 nurses, 9 medical officers, 8 laboratory staff, 3 clinical officers and 1 midwife in order to ensure no added work pressure on staff of these cadres. Our findings are consistent with those of earlier WISN studies conducted in Uganda's health facilities [25], [4], [26]; Kenya's public health sector [24] and Ghana [23] that report over staffing of certain cadre categories with others grossly understaffed. The annual health sector performance report of Uganda [3] also reveals overall shortage of key health workers such as medical officers. The 71% staffing level of Kuluva hospital was close to the national average of 73% for the private not for profit (PNFP) health facilities and the 71% for public health facilities [32]. The Ministry of health human resources for health audit report of 2017 further revealed serious gaps for medical officers (42.5%), midwives (20%) and nurses (13%) which Kuluva hospital experienced as well. With recent improvements in salary for public health workers, more attrition from the PNFP health facilities is eminent. Abundance of nursing assistants could be due to government policy of phasing out the cadre hence those already in place might not be willing to leave. The attrition of nurses and nursing assistants was the lowest in a previous study [33]. There is urgent need for the hospital to review its human resource policies and plan to address the staffing gaps in order to offer good quality healthcare [4].

Study Limitations

The WISN methodology has been considered as an ideal tool in the current context of human resource for health planning, it however has its limitations [11, 20]. The methodology is based on the annual workload derived from the annual service statistics and varies yearly. This WISN study relied on data of the most recent financial year (2016/17) in order to calculate the staffing needs for financial year 2017/18. Its accuracy is thus determined by the precision of the statistics themselves. This study did not determine the staffing needs in each department hence future WISN studies could consider this as well for appropriate staff deployment across departments.

In this study, service statistics for radiographers for instance was not reflected in the HMIS hence dropped from the final analysis. In a way of limiting any bias in the process, triangulation of the data was done with the corresponding information obtained from the interviews.

Conclusion

Our assessment revealed the same AWT for all cadres of staff in Kuluva hospital. There is overall shortage of key staff for service delivery, these include; laboratory staff, midwives, clinical officers, medical officers and nurses hence high work pressure on the staff of these cadre categories amidst surplus nursing assistants. The key staff spent significant amount of time on non-professional activities. The hospital management needs to review AWT with a particular focus on the approved 'offs' including public holidays that do not appear on the national schedule, leave days to optimally use the available human resource for health. The hospital should consider reviewing roles and responsibilities of different staff cadres. Where possible, non-professional roles undertaken by some cadres with high work pressure should be shifted to other cadre with lower or no work pressure in the event the hospital cannot fill in the additional staff positions.

Strategies towards capacity building through tailored training programs can be enhanced for nursing assistants who are able to join nursing and midwifery training institutions geared towards filling the existing gaps in nursing and midwifery positions.

List Of Abbreviations

AS–Activity Standard; AWT–Available Working Time; BSR–Basic Staffing Requirement; CAF–Category Allowance Factor; CAS–Category Allowance Standard; EPI–Expanded Program on Immunization; ESR–Erythrocyte Sedimentation Rate; GDP–Gross Domestic Product; HMIS–Health Management Information System; HR–Human Resource; HSD– Health Sub-District; IAF–Individual Allowance Factor; IAS–Individual Allowance Standard; MDG–Millennium Development Goal; NRH–National Referral Hospital; PNFP–Private Not For Profit; RRH–Regional Referral Hospital; SSA–Sub-Saharan Africa; UCMB–Uganda Catholic Medical Bureau; UNMHCP–Uganda National Minimum Health Care Package; UPMB–Uganda Protestant Medical Bureau; VHT–Village Health Team; WHO–World Health Organization.

Declarations

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Availability of data and materials: The datasets supporting our conclusions can be made publicly available to any interested parties though not directly accessible online. These will be made available upon written request through the corresponding author, provided the request complies with the Research Ethics Committee (REC) guidelines of the university.

Ethics approval and consent to participate:

This study observed all necessary ethical obligations including approval issued by the faculty of health sciences board of Nile University campus of Uganda Martyrs University and Research Ethics Committee (REC) of the university. Permission sought and approval obtained from Kuluva Hospital management during the study. Qualitative interviews used to make these conclusions were only conducted after relevant informed consent was obtained from the respondents. All personal identifiers have been removed from this publication and confidentiality and privacy issues have been adhered to fully by this study. Additionally, the authors are entirely responsible for all information expressed in this manuscript.

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Authors' contributions:

This manuscript is based on original WISN field analysis design, collation and outputs conducted in Kuluva Hospital by MSc. HSM students of Nile University campus of Uganda Martyrs University. The team included: TA, AH, WW, RD, RA, JLA, IM, ACLB closely guided by the WISN Technical team who reviewed the methodology, guided the statistical analysis and directly supervised the collation through RADO.

For publication purposes, PG and RADO conceived the idea, designed the manuscript, re-analyzed the data and drafted the first version of the paper for publicity. MN and IK provided contribution to the analysis output and manuscript. Finally, PG drafted this manuscript in the format recommended by Human Resources for Health (HRH), while RADO, MN and IK reviewed it. All authors read, made relevant comments or corrections and approved the final manuscript.

Consent for publication: All authors have approved the manuscript for submission.

Competing interests: The authors declare that they have no competing interests.

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Figures

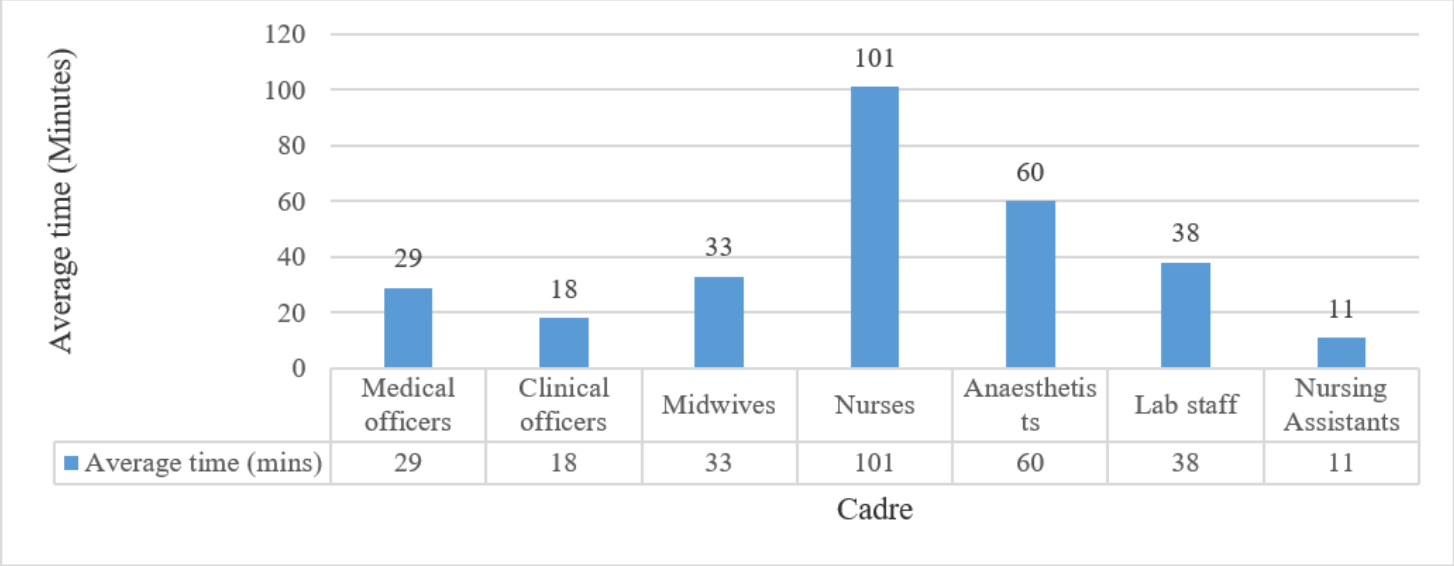

Figure 1

Average activity standards

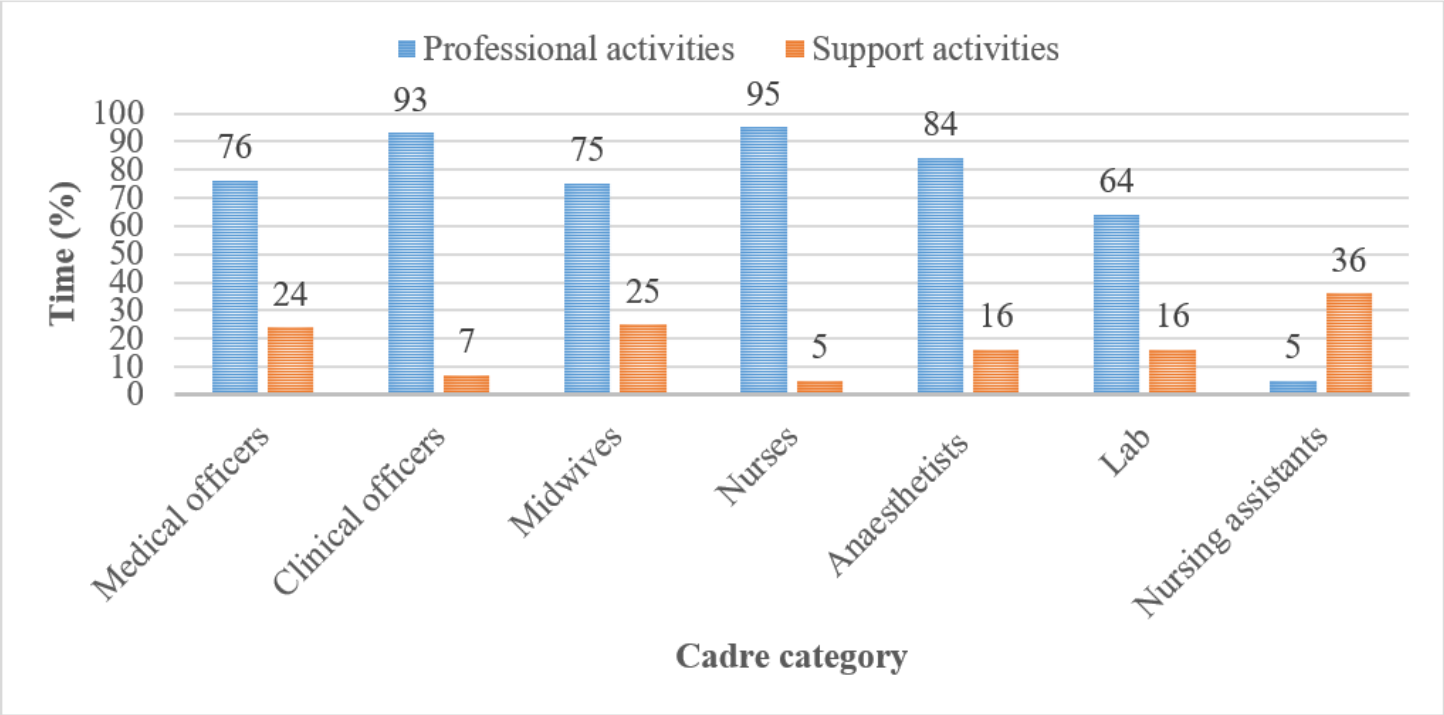

Figure 2

Proportion of time (%) used by health workers for health service and other activities in Kuluva