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SPECIAL CONTRIBUTION

Shining a Light on Task-Shifting Policy

Exploring opportunities for adaptability in non-communicable disease management programmes in Uganda

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إلقاء الضوء على سياسة تحول المهام

أستكشاف فرص ا لتكيف في برامج إدارة الأمراض غير المعدية بأوغندا

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ABSTRACT: In terms of disease burden, many low- and middle-income countries are currently experiencing a transition from infectious to chronic diseases. In Uganda, non-communicable diseases (NCDs) have increased significantly in recent years; this challenge is compounded by the healthcare worker shortage and the underfunded health system administration. Addressing the growing prevalence of NCDs requires evidence-based policies and strategies to reduce morbidity and mortality rates; however, the integration and evaluation of new policies and processes pose many challenges. Task-shifting is the process whereby specific tasks are transferred to health workers with less training and fewer qualifications. Successful implementation of a task-shifting policy requires appropriate skill training, clearly defined roles, adequate evaluation, an enhanced training capacity and sufficient health worker incentives. This article focuses on task-shifting policy as a potentially effective strategy to address the growing burden of NCDs on the Ugandan healthcare system.

Keywords: Health Workforce; Physician Shortage Area; Community Health Planning; Delivery of Health Care; Uganda.

الملخص: من حيث عبء المرض، تواجه حاليا الكثير من الدول ذات الدخل المنخفض والمتوسط تحولا من الأمراض المعدية إلى الأمراض المزمنة. في أوغندا زادت الأمراض غير المعدية بشكل ملحوظ في السنوات الأخيرة ، ويتفاقم هذا التحدي بسبب نقص العاملين في الرعاية الصحية ونقص التمويل لإدارة النظام الصحي. معالجة الانتشار المتزايد للأمراض غير المعدية يحتاج إلى سياسات قائمة علىأدلة واستراتيجيات لحفظ معدلات الإصابة والوفيات، ومع ذلك، فإن التكامل وتقييم السياسات والعمليات الجديدة تطرح العديد من التحديات. تحويل المهام هو عملية يتم بموجبها نقل مهام محددة للعاملين الصحيين بأقل تدريب وعدد أقل من المؤهلات. يتطلب التنفيذ الناجح لسياسة تحويل المهام إلى التدريب المناسب، وأدوار محددة وواضحة، تقييم مناسب، القدرة على التدريب المعزز ووجود حوافز كافية للعاملين. يركز هذا المقال على سياسة تحول المهام كاستراتيجية فعالة لمعالجة زيادة الأعباء المترتبة على الأمراض غير المعدية على نظام الرعاية الصحية في أوغندا.

كلمات مفتاحية: القوى العاملة الصحية؛ منطقة نقص الأطباء؛ تخطيط صحة المجتمع؛ تقديم الرعاية الصحية؛ أوغندا.

Nearly 80% of the nine million deaths worldwide among individuals under 60 years old occur in low- and middle-income countries (LMICs).[1] In these developing countries, non-communicable diseases (NCDs) have emerged relatively unnoticed while the international community focused on combating human immunodeficiency virus (HIV), acquired immune deficiency syndrome (AIDS), malaria and tuberculosis.[2] Furthermore, NCDs have long been under-recorded and were omitted from the Millennium Development Goals.[2] Consequently, there are numerous knowledge, policy, and implementation gaps regarding the treatment of NCDs.[2,3] As a result, strategies for the treatment and management of NCDs have traditionally struggled to gain significant financing. In general, NCDs share common risk factors (e.g. tobacco use, excessive alcohol consumption, unhealthy diets and physical inactivity) and socioeconomic determinants of health (e.g. poverty, lack of education and urbanisation) with cardiovascular diseases (CVDs).[2,4,5]

In Uganda, a low-income country in east sub-Saharan Africa, the double burden of both communicable diseases and NCDs is a challenge to the underfunded health system administration.[2,3,6] Over the last decade, the prevalence of NCDs in Uganda has increased significantly, with NCDs estimated to account for 27% of total deaths.[2] The World Health Organization (WHO) estimates that CVDs account for 9% of total deaths in Uganda.[1] Recent statistics have also shown an increase in mortality from cancers (5%), chronic respiratory diseases (2%), type 2 diabetes

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mellitus (1%), injuries (13%) and other NCDs (10%); chronic, communicable, maternal, perinatal and nutritional conditions are responsible for 60% of all deaths.[3] The rise in NCDs in Uganda is compounded by numerous factors such as an increasing elderly population as well as unplanned urbanisation, which can lead to increased blood pressure and increased consumption of unhealthy foods.[2–5]

While sub-Saharan Africa accounts for 11% of the world's population and 24% of the global burden of disease, only 3% of the world's health workers are based in this region.[7] In 2008, the WHO noted a regional critical shortage of more than four million trained health workers.[5,8,9] In 2015, 31 countries in sub-Saharan Africa reported an increased need for trained health personnel.[10] As there is a direct relationship between the health worker-to-population ratio and NCD health outcomes, this is a serious concern.[7,11–13] In Uganda, the increasing demand for healthcare services, a steadily growing population and the continued burden of morbidity and mortality from infectious diseases have led to significant health workforce shortages.[8] Numerous knowledge, social, economic, legislative, policy and implementation gaps have also affected the workforce shortage and this problem has been exacerbated by the emigration of trained professionals to Europe and the USA.[14–16] These issues have significantly affected the delivery of healthcare services in Uganda and highlight the need for the implementation and development of policies that consider both an efficient and effective use of existing human resources through planned resource allocation.[8,10,17,18] The WHO recommends task-shifting as a national strategy to combat the health human resource crisis and to aid in the implementation of national NCD management programmes.[8,10,11,13,17–19] This article examines task-shifting policy in Uganda within the current political and economic context.

Healthcare Structure and Delivery

Currently, Uganda has a population of more than 36 million people, although only 22.5% of the population is between 30–70 years old.[2] The majority of Ugandans live in rural provinces and only 15.6% live in urban areas.[2] Healthcare services in Uganda are provided through both governmental and non-governmental resources. In Uganda, the decentralised healthcare system is categorised by the level of healthcare delivery; public healthcare is provided at the local, district, regional and national levels. The district health service is responsible for all healthcare structures within that district, except for the national and regional referral hospitals. Health centre I is the name given to the most basic level of healthcare provision in Uganda, operating within villages. A health centre II is the first physical centre at which a patient can be seen; from here, patients are referred to a health centre III, which can then refer patients to a health centre IV. Communities and facilities served at the health centre IV level make up a health sub-district. The fifth level of care is provided at a district or general hospital, which then refers patients to regional hospitals, and from there to national referral hospitals.

As yet, Uganda has no evidence-based national guidelines, protocols or standards for the management of major NCDs.[2,5] Healthcare professionals manage NCD patients with minimal local epidemiological data, as few studies include sub-Saharan African populations in determining optimal medications for specific NCDs.[3] Considering the lack of NCD surveillance systems and inadequate financial resources, addressing and reporting NCDs to meet the nine global NCD targets of the WHO will continue to pose a challenge.[2,5] Given its limited resources, the government of Uganda has set in place an operational unit within the Ministry of Health to address the health burden caused by NCDs.[3] This will require moving away from siloed programmes towards diagonally oriented and integrated health service delivery platforms.[11]

Uganda continues to face problems in the recruitment and retention of trained health workers to serve its growing population and the healthcare worker shortage is characterised by an inadequate number of personnel with the required skills, low motivation, poor performance and high attrition rates.[8,10,13,17] During the 2010–2011 fiscal year, only 56% of approved positions in the public sector at the national level were filled by trained health professionals, which is well below established norms.[20] Currently, over 51% of all staff positions at all levels of the healthcare delivery system in Uganda are unfilled.[21,22] Uganda's National Development Plan for 2010/2011–2014/2015 estimated the health worker-to-population ratio to be 1:1,298; this is much higher than the ratio in most countries in the East African region.[23] In 2010, data showed that the doctor-to-patient ratio in Uganda was 1:24,725 while the nurse-to-patient ratio was 1:1,000.[23] In 2011, data collected by the Ugandan Ministry of Health indicated significant gaps in health staffing at all levels [Table 1].[24] Staff shortages were reportedly more acute in rural health facilities. As such, a large proportion of the available health workforce is urban-based while the majority of Uganda's low-income population lives in rural areas.[14]

Table 1: Number of units and percentage of staffing positions filled at various health facilities in Uganda

Facility	Units	Positions filled, %
Mulago Hospital	1	87
Butabika Hospital	1	93
Regional referral hospitals	13	72
General hospitals	39	63
District health offices	112	57
Health centres IV	164	60
Health centres III	803	60
Health centres II	1,321	45
Urban authorities	155	50
Total	**2,609**	**58**

Adapted from Uganda Ministry of Health. Human resources for health bi-annual report: Improving HRH evidence for decision making - April–September 2011.[24]

According to the Uganda Nurses and Midwives Council (UNMC), the national licensing body for nurses and midwives, there are 11,673 nurses and midwives in Uganda, 6,405 of whom have attained a certificate level of nursing education.[25] Fewer nurses obtain a specialised nursing education as there are only three graduate nursing programmes available in Uganda.[25] Other factors affecting staff recruitment and retention include a lack of promotion opportunities, unequal remuneration of healthcare workers compared to other professionals, inadequate training/facilities, poor leadership, inadequate staff accommodation and staff fatalities due to HIV/AIDS, accidents and malaria.[14,16,26,27]

Task-Shifting Policy

Fulton *et al*. define task-shifting as the delegation of tasks to an existing or new cadre of health workers with either less training or disease-/skill-specific training.[10] The WHO describes task-shifting as the process whereby specific tasks are transferred, in a structured manner, to health workers with less training and fewer qualifications than normally required to provide a certain service or perform a specific task.[8] Task-shifting strategies have the potential to meet the demands of NCD programmes since management principles for these diseases are based on screening, health promotion, initiation of treatment and referral of high-risk patients to physicians.[28] Proponents of task-shifting point to significant positive outcomes for patients with HIV, obstetric care requirements, mental health issues and malaria.[8,10,13,20] Trained non-physician healthcare workers (NPHWs) have also successfully screened and treated individuals for various NCDs, such as asthma, cancer, hypertension, diabetes, depression and epilepsy.[9,15,28–30] Additionally, NPHWs can also encourage medication adherence among patients requiring chronic care.[7] Task-shifting interventions by nurses and nursing assistants in LMICs have reportedly helped to reduce the burden of CVDs and there is considerable evidence supporting the effectiveness of task-shifting implementation for chronic disease management.[9,19]

The WHO recommends task-shifting as a strategy for LMICs to address the global human resource crisis.[8] Without a policy on task-shifting, Uganda may not attain the benefits and viability of NCD programme implementation reported by other countries.[20] Task-shifting has been present in Uganda for decades as nurses have been known to undertake a range of tasks that were formerly the responsibility of doctors.[14,20] However, at the national level, there are no policies on task-shifting to address the growing burden of NCDs.[2,5] Although task-shifting is not a new concept, it has faced criticism due to its unstructured approach and lack of systematic follow-up and monitoring.[17,20] A qualitative study on task-shifting in Uganda found NPHWs were perceived by health managers and policy-makers as incompetent, overworked and lacking support or supervision.[14] Barriers to task-shifting in Uganda include, but are not limited to: reluctance to change; protection of professional 'turf'; institutional regulations; heavy workloads; lack of time to provide necessary supervision and training; and the high disease burden.[20] Other challenges include poor planning, inadequate guidelines and high unemployment rates, as well as the lack of task-shifting advocates in Uganda.[20]

Successful task-shifting interventions are potentially effective and affordable; some of the benefits include mitigation of the health workforce shortage by increasing the number of NPHWs and thus providing increased access to life-saving treatment, improving health workforce skills and increasing the efficiency and sustainability of healthcare delivery.[28] These elements form the core principles of primary NCD management.[14] At the same time, challenges to task-shifting implementation need to be identified and addressed. These challenges include the identification of the right health workers with the necessary competencies, effective supervision of NPHWs and sufficient support from policy-makers, professional bodies and managers.

Political and Legal Environment

Analysis of the Ugandan National Development Plan 2010/2011–2014/2015 revealed many existing gaps in achieving its intended results.[23,31] However, the Ugandan Government, private partners and donor agencies are all committed to solving the on-going human resource crisis.[31] To ensure that the United Nations Millennium Development Goals are met, the Government of Uganda has prioritised their response by addressing the uneven distribution of health workers.[21–23,32,33] The majority of trained healthcare providers are educated in state-sponsored universities; thus, a loss of trained personnel is an investment loss on the part of the government.[21] It is therefore imperative for the Government of Uganda, healthcare leaders and policy-makers to extend their political commitment to support and allocate adequate budgets for training, incentivising, hiring and retaining healthcare workers in the public sector.

Currently, several policies are being implemented in various sectors, including agriculture, health and education. Within the health sector, the National Development Plan and national health policies have been put in place to guide the achievement of health indicators.[23,24] Professional councils and licensure bodies in Uganda are responsible for controlling health worker professional practices, with published codes of conduct;[23,25] however, no specific guidelines exist regarding task-shifting in the management of NCDs in Uganda. In addition, no policies have been developed to stop the emigration of healthcare providers.[34] As such, it is recommended that healthcare professional councils work in collaboration with universities or institutions and other government agencies in Uganda to institute a formal legal framework that will support contractual employment for retention purposes.[14] It is important that policies and standards for managing NCDs, considering the barriers to task-shifting implementation, are established.[17] The WHO recommends that countries facing a growing NCD burden, as well as a human resource crisis, undertake a fast-track strategy to produce essential revisions to their regulatory policies, enabling existing healthcare staff to work with an extended scope of practice without compromising quality or patient safety.[8]

Social and Economic Influences

Disparities in salaries are strongly linked to health workforce shortages, leading to a significant mal-distribution of healthcare providers and inequitable healthcare service provision.[21,31] In the public sector, attrition among health workers and low productivity have reportedly led to low salaries and delayed payments.[31] Research indicates that Uganda's budget allocation for the health sector is inadequate to provide liveable salaries for health workers serving in the public sector.[14,30] Consequently, the remaining healthcare providers are overworked, resulting in some choosing to leave the profession altogether.[34] Other healthcare providers often look for additional employment to supplement their wages, causing uncontrolled absenteeism.[31] These factors have significantly affected the provision of high-quality healthcare services.[22,31,33,35] The World Bank reported absenteeism as the single largest waste factor in the public sector, leading to an estimated loss of 26 billion Ugandan Shillings.[23,31] Similarly, social pressure and increased responsibilities have forced more healthcare providers in rural areas to leave their families and work in urban areas.[21,31] National reports in Uganda indicate that healthcare providers in the public sector and in rural settings are more likely to work without incentives or motivation compared to their private sector counterparts, leading to a significant maldistribution of healthcare workers.[14,21] Rural areas do not have the capacity to attract and retain health workers; as such, recruitment efforts should be focused on these regions.[14]

The term 'brain drain' is used to describe the phenomenon whereby highly trained personnel migrate to another country, usually for social and/or economic reasons. Due to the high cost of living, many healthcare workers from Uganda emigrate in an effort to attain a better quality of life.[31] Tsolekile *et al*. found that 22% of medical school graduates from sub-Saharan Africa had migrated outside of Africa five years post-graduation.[7] To address this challenge, health trainees sponsored by the government should be contractually obligated to serve the Ugandan health sector for a five-year period before receiving their academic transcripts and certificates.[14]

In order for NCD management programmes to be both successfully implemented and sustainable, social and economic factors affecting healthcare provider retention and efficiency need to be addressed through improved salary packages, including allowances for housing, transportation to work facilities and other social amenities.[30] Such benefits could result in major improvement to the lives of healthcare workers in rural settings and thus contribute to their retention.[14] An opportunity that may present with a NCD task-shifting policy is the potential to create demand for better pay for NPHWs who accept these new roles.[15] Furthermore, the Government of Uganda should

increase budget allocations to purchase the drugs required for the management of NCDs.

Adapting Task-Shifting Strategies to Non-Communicable Disease Programmes

In order for Uganda to pursue its goal of improving the health of its population, both the existing health workforce crisis as well as the growing burden of NCDs need to be addressed.[31] Task-shifting from physicians to NPHWs, if accompanied by the restructuring of the health system, is a potentially effective and affordable strategy.[28] Specifically, successful task-shifting should include workforce skill-mix changes, worker incentives and an increase in training capacity and supportive oversight.

WORKFORCE SKILL-MIX CHANGES

Notably, task-shifting in NCD programmes requires the skill mix of various healthcare providers working collaboratively with regards to management, screening, prevention, lifestyle modification health education, treatment and referrals for specialised care.[30] Ugandan nurses are among those envisioned to take up the task-shifting role in the detection and management of NCDs; as a result, these nurses will require additional training in NCD management as well as supportive supervision, mirroring the use of NPHWs in the detection and management of HIV.[9,14,15,18,26,29] Unfortunately, the scope of practice for nurses and midwives often limits their roles. At present, only midwives in Uganda are allowed to administer drugs during obstetric care. The UNMC is currently developing a scope of practice for all cadres of nurses and midwives in Uganda which will extend their prescriptive role.[25] Policies governing prescriptive roles need to be put in place and disseminated nationally to protect and facilitate the NPHW's extended role in treatment. Encouraging consensus among the relevant stakeholders within the Ugandan healthcare sector would be beneficial in successfully implementing NCD programmes.[3]

TRAINING CAPACITY AND SUPPORTIVE OVERSIGHT

Focused training and intensive support of NPHWs by experienced health workers is essential to maintain quality standards.[14,17,28] Healthcare workers taking up new roles in identifying and managing NCDs need to be adequately prepared through formal training, enabling them to successfully carry out their new duties.[8] Adequate training, evaluation, clinical mentoring and supportive supervision will also counteract the number of health workers leaving the country.[8] However, training health workers to meet the current demands of both communicable diseases and NCDs poses a significant challenge to many countries.[8,36] Training NPHWs to take up expanded roles will require introducing them to evidence-based guidelines, protocols and strategies in the management of NCDs;[37] approved treatment algorithms may be useful in this respect. Re-training, supportive supervision and mentoring of NPHWs need to be considered as quality-monitoring approaches to the implementation of an effective task-shifting policy.

HEALTH WORKER INCENTIVES

Considerable evidence suggests that incentives play a significant role in increasing the retention, productivity and motivation of health workers.[8,14] The WHO advises healthcare policy-makers to consider both financial and non-financial incentives predicated on performance-based measures, particularly with respect to encouraging NPHWs in their new or increased responsibilities.[8,37] However, these incentives should be matched with available resources to ensure sustainability.[8,17] Similarly, it has been suggested that incentivising health workers enhances their responsiveness to patient needs and is associated with improved healthcare outcomes.[8]

Further Recommendations

In addition to the above recommendations, further operational research is needed to understand barriers to the successful implementation of task-shifting policies in Uganda. The role of incentives and remuneration in retaining an optimal health workforce should not be underestimated. Further investigation is necessary to understand how role expansion for NPHWs might affect patient safety. Moreover, additional studies are needed to assess the acceptance of existing task-shifting strategies among communities and professionals.

Conclusion

In Uganda, the growing NCD burden is complicated by a severe shortage of healthcare personnel. Task-shifting may potentially be an effective model for the management of NCDs. Successful implementation of the task-shifting model of care requires policy changes to include standardised protocols, enhanced training capacity and the incentivisation and integration of NPHWs as part of a multidisciplinary team of health workers. Further studies are needed to assess the

effectiveness of and barriers towards task-shifting in NCD programmes in Uganda.

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References

1. World Health Organization Western Pacific Region. Noncommunicable diseases. From: www.wpro.who.int/media centre/factsheets/fs_20120926e/en/ Accessed: Dec 2015.
2. World Health Organization. Noncommunicable diseases country profiles 2014: Uganda. From: www.who.int/nmh/countries/uga_en.pdf?ua=1 Accessed: Dec 2015.
3. Siddharthan T, Ramaiya K, Yonga G, Mutungi GN, Rabin TL, List JM, et al. Noncommunicable diseases in East Africa: Assessing the gaps in care and identifying opportunities for improvement. Health Aff (Millwood) 2015; 34:1506–13. doi: 10.1377/hlthaff.2015.0382.
4. Addo J, Smeeth L, Leon DA. Hypertension in sub-Saharan Africa: A systematic review. Hypertension 2007; 50:1012–18. doi: 10.1161/HYPERTENSIONAHA.107.093336.
5. World Health Organization. Noncommunicable diseases country profiles 2011. From: www.who.int/nmh/publications/ncd_profiles2011/en/ Accessed: Dec 2015.
6. Labhardt ND, Balo JR, Ndam M, Grimm JJ, Manga E. Task shifting to non-physician clinicians for integrated management of hypertension and diabetes in rural Cameroon: A programme assessment at two years. BMC Health Serv Res 2010; 10:339. doi: 10.1186/1472-6963-10-339.
7. Tsolekile LP, Abrahams-Gessel S, Puoane T. Healthcare professional shortage and task-shifting to prevent cardiovascular disease: Implications for low-and middle-income countries. Curr Cardiol Rep 2015; 17:115. doi: 10.1007/s11886-015-0672-y.
8. World Health Organization. Task shifting: Global recommendations and guidelines. From: www.who.int/workforcealliance/knowledge/resources/taskshifting_guidelines/en/ Accessed: Dec 2015.
9. Ogedegbe G, Gyamfi J, Plange-Rhule J, Surkis A, Rosenthal DM, Airhihenbuwa C, et al. Task shifting interventions for cardiovascular risk reduction in low-income and middle-income countries: A systematic review of randomised controlled trials. BMJ Open 2014; 4:e005983. doi: 10.1136/bmjopen-2014-005983.
10. Fulton BD, Scheffler RM, Sparkes SP, Auh EY, Vujicic M, Soucat A. Health workforce skill mix and task shifting in low income countries: A review of recent evidence. Hum Resour Health 2011; 9:1. doi: 10.1186/1478-4491-9-1.
11. Schwartz JI, Dunkle A, Akiteng AR, Birabwa-Male D, Kagimu R, Mondo CK, et al. Towards reframing health service delivery in Uganda: The Uganda Initiative for Integrated Management of Non-Communicable Diseases. Glob Health Action 2015; 8:26537. doi: 10.3402/gha.v8.26537.
12. Maher D, Waswa L, Baisley K, Karabarinde A, Unwin N. Epidemiology of hypertension in low-income countries: A cross-sectional population-based survey in rural Uganda. J Hypertens 2011; 29:1061–8. doi: 10.1097/HJH.0b013e3283466e90.
13. Katende G, Groves S, Becker K. Hypertension education intervention with Ugandan nurses working in hospital outpatient clinic: A pilot study. Nurs Res Pract 2014; 2014:710702. doi: 10.1155/2014/710702.
14. Baine SO, Kasangaki A. A scoping study on task-shifting: The case of Uganda. BMC Health Serv Res 2014; 14:184. doi: 10.1186/1472-6963-14-184.
15. Foster N, McIntyre D. Economic evaluation of task-shifting approaches to the dispensing of anti-retroviral therapy. Hum Resour Health 2012; 10:32. doi: 10.1186/1478-4491-10-32.
16. Islam SM, Purnat TD, Phuong NT, Mwingira U, Schact K, Fröshl G. Non-communicable diseases (NCDs) in developing countries: A symposium report. Global Health 2014; 10:81. doi: 10.1186/s12992-014-0081-9.
17. Callaghan M, Ford N, Schneider H. A systematic review of task-shifting for HIV treatment and care in Africa. Hum Resour Health 2010; 8:8. doi: 10.1186/1478-4491-8-8.
18. World Health Organization. Global status report on noncommunicable diseases 2010. From: www.who.int/nmh/publications/ncd_report_full_en.pdf Accessed: Dec 2015.
19. Wouters E, Van Damme W, van Rensburg D, Masquillier C, Meulemans H. Impact of community-based support services on antiretroviral treatment programme delivery and outcomes in resource-limited countries: A synthetic review. BMC Health Serv Res 2012; 12:194. doi: 10.1186/1472-6963-12-194.
20. Dambisya YM, Matinhure S. Policy and programmatic implications of task shifting in Uganda: A case study. BMC Health Serv Res 2012; 12:61. doi: 10.1186/1472-6963-12-61.
21. Kirby KE, Siplon P. Push, pull, and reverse: Self-interest, responsibility, and the global health care worker shortage. Health Care Anal 2012; 20:152–76. doi: 10.1007/s10728-011-0178-8.
22. Gross JM, Riley PL, Kiriinya R, Rakuom C, Willy R, Kamenju A, et al. The impact of an emergency hiring plan on the shortage and distribution of nurses in Kenya: The importance of information systems. Bull World Health Organ 2010; 88:824–30. doi: 10.2471/BLT.09.072678.
23. Uganda Ministry of Health. National Development Plan (2010/11 - 2014/15). From: www.undp-alm.org/sites/default/files/downloads/uganda-national_development_plan.pdf Accessed: Dec 2015.
24. Uganda Ministry of Health. Human resources for health bi-annual report: Improving HRH evidence for decision making - April–September 2011. From: library.health.go.ug/publications/health-workforce/human-resource-management/human-resources-health-bi-annual-report-2011 Accessed: Dec 2015.
25. Uganda Nurse and Midwives Council. Performance report:FY 2014 2015 (July 2014 to June 2015). From: unmc.ug/download/UNMC%20Perfomance%20Report%20FY-14-15.pdf Accessed: Dec 2015.
26. Africa Health Workforce Observatory. Human resources for health: Country profile - Uganda. From: www.hrh-observatory.afro.who.int/images/Document_Centre/uganda_country_profile.pdf?ua=1 Accessed: Dec 2015.
27. Zachariah R, Ford N, Philips M, Lynch S, Massaquoi M, Janssens V, et al. Task shifting in HIV/AIDS: Opportunities, challenges and proposed actions for sub-Saharan Africa. Trans R Soc Trop Med Hyg 2009; 103:549–58. doi: 10.1016/j.trstmh.2008.09.019.
28. Joshi R, Alim M, Kengne AP, Jan S, Maulik PK, Peiris D, et al. Task shifting for non-communicable disease management in low and middle income countries: A systematic review. PLoS One 2014; 9:e103754. doi: 10.1371/journal.pone.0103754.

29. Beaglehole R, Epping-Jordan J, Patel V, Chopra M, Ebrahim S, Kidd M, et al. Improving the prevention and management of chronic disease in low-income and middle-income countries: A priority for primary health care. Lancet 2008; 372:940–9. doi: 10.1016/S0140-6736(08)61404-X.

30. Lekoubou A, Awah P, Fezeu L, Sobngwi E, Kengne AP. Hypertension, diabetes mellitus and task shifting in their management in sub-Saharan Africa. Int J Environ Res Public Health 2010; 7:353–63. doi: 10.3390/ijerph7020353.

31. Uganda Ministry of Health. National Health Policy: Reducing poverty through promoting people's health. From: library.health.go.ug/publications/leadership-and-governance-governance/policy-documents/national-health-policy-reducing Accessed: Dec 2015.

32. United Nations. Millennium development goals and beyond 2015: Background. From: www.un.org/millenniumgoals/bkgd.shtml Accessed: Dec 2015.

33. Zuin P, Dolea C, Stilwell B; World Health Organization. Issue paper 4: Nurse retention and recruitment - Developing a motivated workforce. From: www.icn.ch/images/stories/documents/publications/GNRI/Issue4_Retention.pdf Accessed: Dec 2015.

34. Record R, Mohiddin A. An economic perspective on Malawi's medical "brain drain". Global Health 2006; 2:12. doi: 10.1186/1744-8603-2-12.

35. Mullan F. The metrics of the physician brain drain. N Engl J Med 2005; 353:1810–18. doi: 10.1056/NEJMsa050004.

36. Scheffler RM, Mahoney CB, Fulton BD, Dal Poz MR, Preker AS. Estimates of health care professional shortages in sub-Saharan Africa by 2015. Health Aff (Millwood) 2009; 28:w849–62. doi: 10.1377/hlthaff.28.5.w849.

37. Long L, Brennan A, Fox MP, Ndibongo B, Jaffray I, Sanne I, et al. Treatment outcomes and cost-effectiveness of shifting management of stable ART patients to nurses in South Africa: An observational cohort. PLoS Med 2011; 8:e1001055. doi: 10.1371/journal.pmed.1001055.