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Using Trends in Nurse Workforce Supply to Inform the Scale-Up of Nurse Training in Kenya

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2009

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An abstract of
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Abstract

Using Trends in Nurse Workforce Supply to Inform the Scale-Up of Nurse Training in Kenya

By Ashley Appiagyei

Background & Problem Statement: Recent initiatives aim to scale-up nurse training and education as a means to address the health workforce shortage in sub-Saharan Africa. In order for the government of Kenya and donor agencies to support the scale-up, data on nurse supply must be analyzed to develop evidence-based strategies to ensure the retention and licensure of all potential nurses who enroll in pre-service training.

Significance: Information generated from this project will enable Kenya's policymakers and donors to more effectively develop interventions for the scale-up of nurse training and education.

Aims: This study uses data from a Human Resources Information System in conjunction with qualitative methods to describe trends in the progression of Kenyan nursing students through the nurse supply pipeline and to identify barriers to the scale-up.

Methods: Data from the Kenya Health Workforce Informatics System (KHWIS) were analyzed to describe students trained in Kenyan nursing schools from 1999 to 2004 and to determine how many of these potential nurses were lost from the nurse supply pipeline at the point of registration with the Nursing Council of Kenya (NCK). Key informant interviews were also conducted with nurse training institution administrators and/or tutors, to investigate barriers to the scale-up and perceptions related to nurse training capacity in their institutions.

Results: 8,645 students began training in Kenyan nursing schools from 1999 to 2004. Students were more likely to originate from Central and Nairobi provinces, and least likely from Coast and Northeastern provinces. Of these students, 8,110 (94%) are currently registered with the NCK. Failure to register was more common among BScN nurses (12%) compared with registered nurses (5%) and enrolled nurses (7%). Student attrition was not found to be a significant problem among institution key informants interviewed. Tutor recruitment and retention, as well as mentorship of students by qualified nurses were identified as key intervention areas for the scale-up.

Conclusion: Nearly all students who enrolled in nurse training institutions in Kenya from 1999 to 2004 successfully completed training and registered with the NCK. However, a greater proportion of students trained as BScN nurses have failed to register. Further research is needed to investigate reasons for failure of BScN nurses to register. Challenges regarding the clinical environment, should be addressed for scale-up initiatives to succeed. Simultaneous initiatives to improve tutor recruitment and retention must also be considered.

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Table of Contents

Definition of Terms

Cadres refer to the different nurse qualifications in Kenya (i.e. enrolled nurses, registered nurses, and baccalaureate). Enrolled nurses are entry-level nurses that work under the supervision of registered nurses. Registered nurses receive post-secondary education, clinical training, and leadership courses. Baccalaureate nurses receive their Bachelors of Science in Nursing (BScN), representing one of the highest levels of nursing education in Kenya.

Permanent Attrition refers to student attrition in which training is permanently disrupted resulting in no return to complete training by the time of data analysis,

Temporary Attrition refers to student attrition in which students return to complete their nursing program after training has been disrupted (ex. returning to complete training after training disruptions due to pregnancy).

Harambee refers to the Kenyan tradition of community self-help events such as fundraising or development activities.

Self-sponsored students refers to students who receive no financial assistance for their education.

Human Resources Information System refers to an integrated system for managing information used in decision making for human resources for health (HRH). These systems link all HRH data from the time professionals enter pre-service training until they leave the workforce.

Chapter 1: Introduction

Introduction and Rationale

In recent years, we have witnessed an increased influx of financial support for global health. This comes at a much needed time. Despite significant health gains in the last twenty years, we have also witnessed an unprecedented reversal of health improvements due to the HIV/AIDS epidemic in many low-income countries in sub-Saharan Africa. This, and the sustained burden of other infectious and chronic diseases has caused the demand for health services, and hence, human resources for health (HRH), to grow exponentially.

HRH are a fundamental component of health system strengthening. The global public health community has documented the shortage of skilled health care workers in sub-Saharan Africa [1], which has 25% of the world's disease burden, but possesses only 1.3% of the world's trained health workforce [2]. Research from the World Health Report [1] and the Joint Learning Initiative [3] have described the positive correlation between health workforce density and improved health service delivery. In countries all over the world, both maternal and child survival have been shown to be positively influenced by the density of skilled health workers, and WHO has identified Kenya as one of the countries in which the workforce density is below the threshold needed to meet the health related Millennium Development Goals [1].

In Kenya, nurses provide the bulk of health care services. In Northeastern province, where health outcomes related to HIV/AIDS and maternal health are a concern [4], the nurse to population ratio is 28 to 100,000. In contrast, in regions with relatively better health outcomes, such as Central province, the ratio is 206 to 100,000 [5]. In recognition of the shortage of HRH as a major concern, the global public health community [6], and the government of Kenya (GOK)

have declared health worker shortages as a major challenge to health development, and improving HRH has become a top priority [7].

Working in partnership with host nations, PEPFAR plans to support treatment for at least 3 million people; prevention of 12 million new infections; and care for 12 million people, including 5 million orphans and vulnerable children over ten years [8]. To meet these goals, PEPFAR has committed to support the training of at least 140,000 new health care workers – with an emphasis on doctors and nurses – in recipient countries by 2015 to contribute to HIV/AIDS prevention, treatment and care [8]. In order for the GOK and donor agencies to support capacity development and plan for expansion of training, it is essential that accurate data on HRH training capacity are collected and analyzed to develop evidence-based strategies to ensure the retention of all newly enrolled health profession students. Such information could have implications on how donor and government funds are allocated through HIV/AIDS programs, particularly for HRH capacity development.

The nurse shortage in Kenya has been studied looking at attrition of nurses in the public sector [7]. However, no published research from Kenya has investigated the loss of potential nurses from training institutions, that is, prior to joining the workforce. Pre-service training attrition is characterized by individuals who enroll in nurse training institutions, but discontinue training, fail to pass licensure exams, or do not register with nursing regulatory boards. Thus, retention is not only important once nurses enter the workforce, but also while students are in the nurse supply pipeline. In countries other than Kenya, many studies have investigated the loss of potential nurses from the supply pipeline focusing on only one or two stages of the supply pipeline (Figure 1) [9-11], but not together as a chain of interrelated events.

An approach to scale-up the nursing workforce in Kenya that focuses on increasing the number of trained nurses, but does not take into account the capacity of the country to provide quality training for these individuals, will have limited success. Also, strategies to improve training capacity that fail to emphasize continued professional development (CPD) and improved tutor capacity, may affect not only attrition of teaching personnel, but also the performance of these individuals [12].

Problem Statement

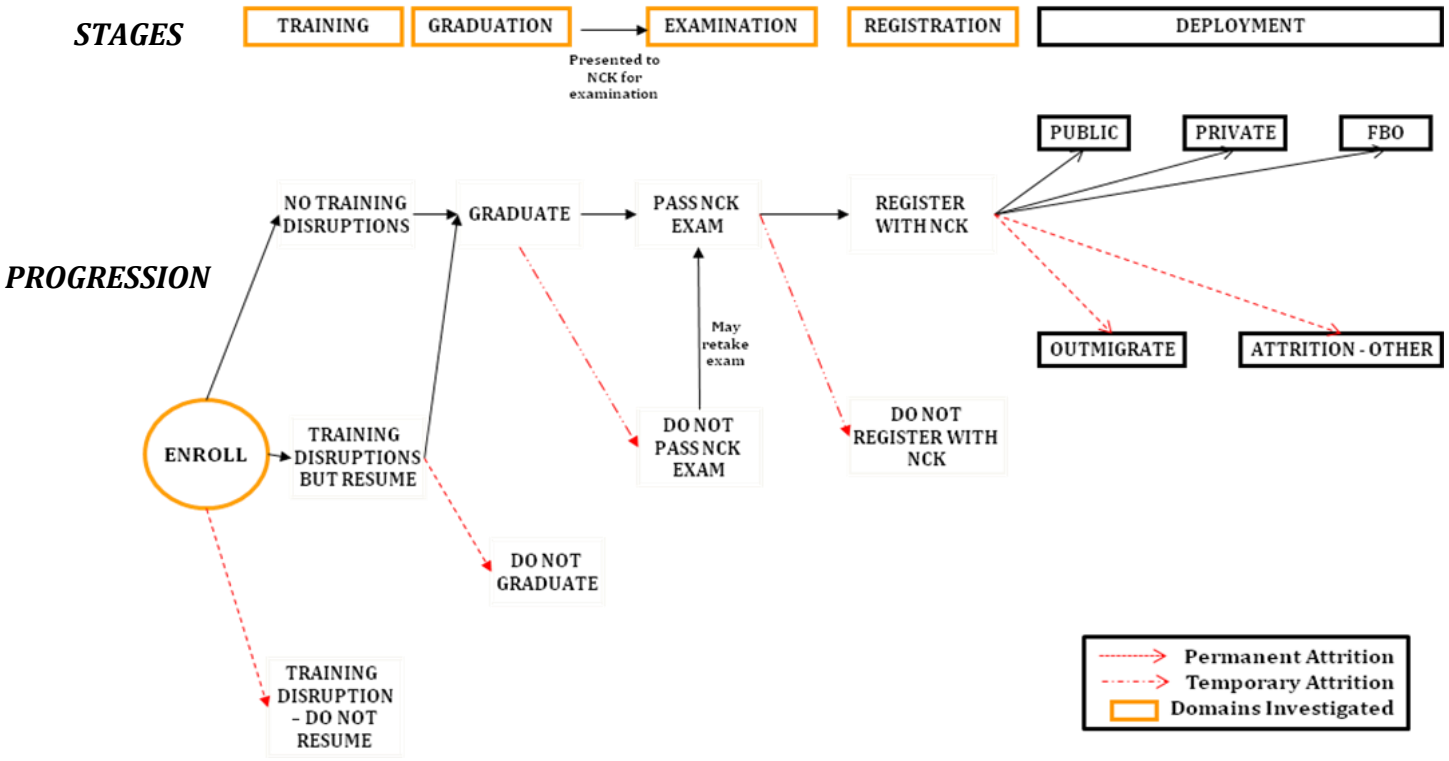
The potential impact of public health programs funded by donors and the GOK is threatened by a lack of sufficient HRH [7]. In recognition of this problem, PEPFAR intends to support training of at least 140,000 new healthcare workers in its recipient countries by 2015 [13]. To plan for nurse workforce expansion in response to this PEPFAR initiative, the GOK needs timely and accurate data on the country's capacity to train and retain newly enrolled students to increase the likelihood that they are capable and available to subsequently contribute in the health workforce. A failure to do so could result in the channeling of funds into stages of the supply pipeline (Figure 1) which warrant less concern than others. The Kenya Health Workforce Informatics System (KHWIS) collects data on HRH in Kenya, including demographic information, as well as information on nurse student enrollment, and registration with the nursing council [14]. This information system has been used in the past to analyze out-migration by Kenyan nurses [5], and can also be used to quantify the supply of nurses in Kenya to inform scale-up initiatives.

Purpose Statement

It is essential that governments track individuals who enroll in health training programs and strive to mitigate attrition of these individuals in order to maximize the returns on investments in education and training. Institutions lose investments in students who have enrolled, but fail to

reach graduation, pass licensure examination or register. Consequences of student attrition include the lack of available qualified nurses to meet the health care needs of society, and eventually, fewer nurses in the pipeline to fill leadership and teaching positions. Figure 1 details the stages of nurse supply and deployment in Kenya, in addition to scenarios for how students who enroll in nursing schools progress through these stages.

Figure 1. Supply and Deployment Framework for Nursing in Kenya



Each step in this framework can be viewed as a possible *scale-up intervention area*. If donors decide to channel funds into the scale-up of nurse education and training, but many of the new pool of graduates do not register with the Nursing Council of Kenya (NCK), the desired outcomes may potentially be negated. By using existing data from the KHWIS, and information collected from key informant interviews, this study will allow stakeholders to assess trends in the supply component of the pathway illustrated in the framework to identify problem areas, in order to strategically plan training scale-up initiatives.

Research Questions

The following research questions will enable stakeholders to understand trends in each area of the nurse supply pipeline, in order to strategically plan the allocation of resources in training scale-up initiatives.

Of individuals who enrolled in pre-service nurse training institutions in Kenya from 1999-2004:

1. What are the descriptive characteristics that define this cohort?
2. What percentage experienced temporary training disruptions?
3. What percentage experienced permanent attrition?
4. What were the perceived reasons for training disruptions and attrition?
5. What were the perceived challenges regarding students' clinical experience?
6. What were the perceived challenges regarding tutor capacity?
7. What proportion completed training and subsequently graduated?
8. What proportion passed the NCK licensure examination and subsequently registered with the NCK?

Study Significance

Information generated from this project will enable Kenya's policymakers and donors to more effectively address problems in the nurse supply pipeline which can subsequently provide guidance on plans to scale-up the nurse workforce in Kenya, as well as other countries in sub-Saharan Africa. Furthermore, this information may be applicable to the scale-up of other cadres of health workers.

Chapter 2: Review of the Literature

Human resources for health (HRH) are a fundamental component of health system strengthening. The global public health community has documented the shortage of skilled health care workers, especially in sub-Saharan Africa [6]. This critical health workforce shortage weakens the functionality of health systems throughout sub-Saharan Africa and prompt action should be taken to support health systems and health workforce strengthening.

The Kampala Declaration [6] resulted from the first global forum on HRH. The forum was attended by government representatives, multilateral and unilateral academic institutions, civil society organizations, representatives from the private sector, as well as HRH professional associations and unions from sub-Saharan Africa and global health donor countries. Recognizing the HRH crisis, and the devastating impact of HIV/AIDS and other public health issues on health systems and the health workforce, the participants of the forum called for participant countries to develop health workforce information systems, to "improve research and to develop capacity for data management in order to institutionalize evidence-based decision-making and enhanced shared learning" [6]. It was also recommended that governments determine the "appropriate skill mix and institute coordinated policies… for an immediate, massive scale up of community and mid-level health workers, while also addressing the need for more highly trained and specialized staff" [6].

The *Agenda for Global Action* [6] developed at this forum, is built around six fundamental, and interconnected strategies, including scaling-up health worker education and training, as well as strategies for "retaining an effective, responsive and equitably distributed health workforce." Within the goal to scale-up education and training, the forum participants agreed that such an

undertaking should be linked to health workforce information systems, and that quality of the scale-up and training should be monitored and improved using systematic methods.

Scale-up efforts have often targeted isolated areas of the nurse supply and deployment pipeline (Figure 1), depending on stakeholder activities and donor interests. But efforts to address several areas of the pipeline as a chain of interrelated issues are insufficient [9, 10]. Issues pertaining to training and human resource management do not compete well for policy attention with elite sciences or macroeconomics [15] and thus often fail to capture the attention of researchers and decision makers. Health sector reforms in many developing countries have failed to address the problems with human resource infrastructure, and governments continue to introduce new programs, assuming that workers will be available, motivated, and able to undertake newly assigned functions [15].

Training institutions in low-income countries are struggling financially and many donors and development agencies lack coherent and integrated investment strategies to strengthen the workforce, resulting in an overemphasis on workshops and training sessions that have an unclear effect [15]. Anecdotal reports suggest that training capacity in many low-income countries is low, but the precise nature of the problem has been difficult to ascertain because data on health professionals tends to come from administrative statistics and limited information is available on key training personnel such as tutors [15].

In 2009, the United States President's Emergency Plan for AIDS Relief (PEPFAR) committed to support the education and training of 140,000 new health care workers in recipient countries by 2015, with an emphasis on doctors and nurses – the segment on nurses being led by the Nursing Education Partnership Initiative (NEPI) [16]. Other organizations including the Global Alliance

for Vaccines and Immunisation (GAVI), the Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM) and the Japan International Cooperation Agency (JICA) have also made efforts to encourage the scale-up of health worker education and training [1].

In order to develop the nursing workforce, it is important that nursing education is viewed in the framework of the health system, such that education, training, research and service delivery work synergistically, and not in isolation. Furthermore, there is a need to strengthen the overall capacity of educational institutions, working in collaboration with country-led health workforce development plans to ensure that the pipeline from the enrollment of students into training institutions, through to their recruitment into the health workforce, is maximized to support the scale-up.

In the scale-up of nurse education and training, intervention areas may include, but are not limited to 1) physical infrastructure of training institutions; 2) tutor availability and capacity; 3) quality and availability of students' clinical experience; 4) training disruptions and student attrition, and; 5) nursing licensure examinations and subsequent registration with the appropriate regulatory board

In Ghana, for instance, where the HRH crisis is heavily influenced by out-migration and a geographical imbalance of HRH in urban areas, training institutions are being encouraged to increase their intake of health workers of all cadres [17]. However, these proposals, which are intended to aid in the scale-up of the health workforce, have not been accompanied by simultaneous increases in available resources [17]. This has resulted in large class sizes and suboptimal tutor to student ratios. A review of the Community-based Health Planning and Services program, which was introduced in Ghana in 1999 to address health workforce

challenges, found that the capacity of health training institutions to train sufficient numbers of HRH to meet the national requirements was inadequate in terms of infrastructure, logistics, teaching staff, as well as funding. It is essential that a scale-up in quantity does not compromise the quality of health worker training [6].

The majority of published literature on scale-up intervention areas has used health facility and/or survey data, and has overwhelmingly emerged from countries in Europe, and from Australia [7, 10, 11, 18]. In the absence of data from sub-Saharan Africa on these issues, findings from other countries can be extremely valuable in the planning of scale-up initiatives in Kenya.

The Importance of Physical Infrastructure in the Scale-Up of Nurse Education

While many countries in sub-Saharan Africa have an appreciable number of nurse training institutions, these institutions often lack the required amounts of training materials or tutors, and have limited physical infrastructure, all of which affect the ability of the institutions to increase the supply of newly trained nurses. Strengthening of physical infrastructure in nurse training institutions requires addressing issues related to educational resources (textbooks, materials for skills labs, etc.), buildings, water and sanitation, transportation to clinic sites, and accommodation.

Some studies have linked investments in infrastructure with enhanced student outcomes. A meta-analysis of 96 education studies conducted in low-income countries found several estimates suggesting that increased infrastructure and educational materials positively influenced student performance [19]. More recent evidence from randomized evaluations suggests that improvements in school resources have some effect on educational outcomes (such as years of schooling completed without permanent attrition, and economic returns on investments in

education – such as subsequent earnings of graduates). These results, however, have been inconsistent across studies [20]. A series of randomized evaluations in Kenya showed that positive effects of textbook provision were only witnessed among students who were already performing better than their peers [21, 22].

The inconsistency in the relationship between school resources and educational outcomes has been associated with deficiencies in the incentive structure of school systems. Service delivery systems in developing countries often face challenges that negate the impact of pure resource-based policies. Service delivery systems rely on the interactions between various actors. At the highest level, governments set overall policies, and are responsible for the allocation of resources; the activities of service providers (e.g. school administrators and tutors), are then conditioned by the constraints set by these governments; and then ultimately, the behaviors of the students are influenced by the resources offered to them. Therefore, if governments do not provide school administrators and tutors with adequate incentives, the resultant lack of motivation and effort on the part of these providers, has the potential to derail potential improvements in educational outcomes, whether educational resources and physical infrastructure are improved or not. Coupling increases in educational resources/infrastructure with policy changes with regard to provider incentives can have an increasingly positive impact on outcomes [20].

Scaling-up enrollment of nurse training facilities, without simultaneous investments in physical infrastructure, may increase the quantity of nurses trained but may compromise the quality of the education they receive.

Tutor Recruitment and Retention

The fact that educational budgets have not increased simultaneously with increases in educational programs offered and student enrollment, has lead to large student-tutor ratios and overstretched physical infrastructure. Without taking incentives for tutors and clinical instructors into account, increasing resources may not make up for deficiencies in the quality of education. Improvements in tutor and clinical instructor capacity and motivation combined with increases in educational resources could be essential to scaling-up nurse education and training [23]. Faculty should be provided not only with opportunities, but also financial assistance for continued professional development (CPD) to ensure that research, theoretical and clinical skills are up to date.

A scheme to retain nurse tutors in Malawi is a valuable case study for tutor recruitment and retention initiatives. In the late 1990s, a shortage of nurse tutors and a subsequent threat of the closure of several training institutions under the Christian Health Association of Malawi, resulted in a scheme instituted through the Ministry of Health funded by the Organisation for Development Co-operation and the German Technical Cooperation, with the goal of attracting and retaining nurse tutors [24]. The scheme included salary supplements, subsidized staff housing, and transportation for staff commuters. Success of the program has been attributed to the public-private partnerships between the government, private and faith-based sectors, as well as to its ability to attract faith-based donors to invest in the improvement and expansion of the training institutions infrastructure used by both students and tutors [24]. For tutors who were a part of the scheme, proximity to their families, opportunities for promotions and career advancement have been cited as additional reasons for program success.

The Clinical Experience as a Component of Training Capacity

The clinical experience allows students to apply knowledge and skills learned in theory in the classroom to real life settings in health centers and hospitals. Inadequate resources for student clinical experiences could negatively influence nurse education and eventually nursing practice in many ways.

Dunn and Hansford [25] used the Clinical Learning Environment Scale (CLES) to qualitatively investigate the perceptions of Australian nursing students about their clinical experience. The authors concluded that nursing staff, who supervised students, had the most influence on student perceptions of the clinical learning environment. Positive perceptions of the clinical experience were associated with nurse manager commitment to teaching and relationships formed with patients [25].

A lack of mentorship was also an issue among student respondents in a Delphi study conducted in the United Kingdom [10], with ninety-one percent of respondents agreeing that not all qualified nurses at their clinical sites were good mentors. In an environment where nursing shortages are already an issue, many nurses may feel overworked, and taking on the mentorship of students may feel like an additional burden. Students felt that they needed more tutor support during clinical placements, while some tutors expressed that they did not feel clinically credible anymore, due to the fast pace with which clinical practice changes over time. Some qualified nurses interviewed expressed that since some nurse training had transitioned from purely nurse training schools to university-level Bachelors' programs, they felt less ownership towards the students and hence felt no duty to invest their time and energy into training them [10].

Integration of nursing students into the team of existing nursing staff has been reported to play a role in student satisfaction with the clinical experience among nursing students in Finland [26]. Students who worked in health facilities where they felt they were appreciated and were provided with opportunities to work on tasks which met their learning objectives were more likely to believe they benefitted from their clinical experience [26]. Other studies from Sweden have cited responsibility, independence, and opportunities to practice tasks and receive feedback as facilitators in the clinical experience; deficiencies in the student-supervisor relationship and organizational shortcomings in supervision were viewed as obstructers in the clinical experience [27].

In some degree nursing programs in Kenya, nursing students have clinical experiences once a week, usually during their first and second year. Ninety-four percent of respondents from the U.K. Delphi study agreed that having clinical experience only once a week did not give them the continuity needed to enhance their clinical skills. Also, respondents agreed that the communication between their school and the clinical placement facility was insufficient, with each side not really knowing what was taking place at the other site. The logistics of transportation to and from clinical sites can also prove to be a challenge in cases where the clinical sites are not directly annexed to the training institution [10].

Scaling-up enrollment of nurse training institutions will demand a concurrent increase in the capacity of health facilities to accommodate a larger number of students. The lack of motivation in nursing staff at clinical sites to mentor new students and the potential for overcrowding in the clinical environment are other factors that may compromise the quality of training and ultimately the capacity of this new workforce.

The Burden of Training Disruptions and Attrition on Nurse Training

It is essential that governments track individuals who enroll in nurse training programs and strive to mitigate attrition of these individuals in order to maximize the returns on investments in education and training. Institutions lose investments in students who have enrolled but fail to reach graduation, or graduate but fail to register to practice in the country. Consequences of student attrition include the lack of available qualified nurses to meet the health care needs of society and eventually, fewer nurses in the pipeline to fill leadership and teaching positions [28].

A U.K. Delphi study [10], reported that as many as twenty-seven percent of nursing students may never become registered; some training institutions have a dropout rate of nearly forty percent. Although not exclusive to nursing students, the external pressures of financial hardship and balancing school work, studies, family life, and often second jobs, prove to be a constant strain for students often resulting in attrition. Some researchers have also suggested that an emphasis on academic learning as opposed to clinical practice is a negative factor for retention [10]. Stress from the clinical environment primarily resulting from a lack of time on the part of existing nursing staff to adequately supervise and mentor students has also been cited as another factor which negatively affects nursing student retention [10]. A qualitative study conducted by Watkins [29] in Delaware, in which graduating nursing school seniors were given exit interviews to identify contributing factors to student success in the program found that faculty-student interaction, more than any other factor, was related to academic success and retention in the nursing program.

In the results of the Delphi study conducted in the U.K., ninety-seven percent of nursing student respondents felt that there was too much emphasis on academics in their program at the expense of minimal training on clinical skills. First year students in particular found it difficult to relate

theory to practice– referred to as the theory-practice gap – and qualified doctors and nurses interviewed agreed that although newly qualified students possessed theoretical knowledge, they often lacked clinical skills. Ninety-four percent of student respondents in this study agreed that their nursing program needed more guidance and structure, particularly in the first year. Other respondents mentioned that large class sizes compromised their learning experience due to inhibited participation and limited placement opportunities [10].

The perceptions of students about nursing education and the nursing profession have also been shown to influence student attrition. A study conducted in Australia by Harvey and McMurray [30] found that students who had dropped out of nursing programs were more likely than students who remained to report a discrepancy between what they expected, and the realities of nursing education. Seventy-eight percent of respondents from the Delphi study agreed that their nursing program did not meet their expectations – with most expecting more practical nursing with a greater emphasis on anatomical or disease led approaches, as opposed to the emphasis on academic work which they experienced [10].

Enrollment trends in numerous developed and developing countries show an increasing number of mature (non-traditional) students enrolling in nursing programs. These students may attend school part-time, and may have more family responsibilities than younger students, which may result in increased temporary or permanent attrition rates. Non-traditional students might experience “stopouts” (breaks in continuous enrollment for one or more semesters) for non-academic reasons such as pregnancy, childcare, care of a sick family member, financial strain, and employment constraints, among many others [18].

The Nursing Undergraduate Retention and Success (NURS) model [31] proposes that nurse student retention is based on interactions between student demographics, affective factors, academic factors, environmental factors, professional integration factors, academic outcomes, and psychological outcomes. *Student affective factors* include students' attitudes, values and beliefs about learning, including cultural values and beliefs, self-efficacy, and motivation, as well as their ability to learn and perform the necessary tasks required for course and program success. *Academic factors* include personal study skills, study hours, class attendance and academic services provided by the school and used by the student such as libraries, counseling services, and computer laboratory services. *Environmental factors* are those external to the academic process, such as family financial status, emotional support, family responsibilities, and employment outside of school work, among others. *Professional integration factors* include faculty advisement and mentorship, memberships in professional organizations and others. *Outside surrounding factors* are those that exist beyond the students' academic setting and personal environment. These include national and local political and economic climates, the country's health care system, and issues such as job certainty. *Academic outcomes* reflect the student's academic performance throughout enrollment (i.e. grade-point average (GPA), or course letter grades). *Psychological outcomes* include student satisfaction with their nursing education, and also stress as a result of course activities.

Tinto's theory of student departure [28] has also been used to explain student attrition. It emphasizes the importance of the relationship between academic system variables such as academic performance and faculty/staff interactions, with social system variables such as extracurricular activities and peer-group interaction. According to this theory, the greater the interaction between these variables, the greater the probability of student retention. However,

some researchers believe that with the changing trends in nursing student populations (i.e. an increase in non-traditional, older students, who may live off-campus and have families), there has been a recognition that non-academic variables and relationships with faculty have more of an influence on student attrition than academic variables [28].

A study from the state of New York [18], which followed 112 students who entered their first clinical nursing course during the Fall or Spring of the 1997-1998 academic year, found a total retention rate of seventy-five percent, which was spread evenly across students who had ideal program retention (26%), continuous program retention (24%) and interim program retention (26%). Ideal program retention was described as when the student successfully completes the required courses sequentially, in the specified period of time, and without evidence of withdrawal or failure. Continuous program retention refers to completing the nursing program by taking the required courses sequentially, but possibly including courses repeated for previous withdrawal and/or failure. Interim retention was defined as intermittent enrollment in the program, having 5 or more semesters with one or more stopouts. Voluntary attrition was found in 14% of the students, 5.4% (N=6) of whom withdrew during the medical-surgical course. Only 2% (N=2) of the students were dismissed from the program (i.e. involuntary attrition). Eighty-four (75%) of the students successfully completed the program, regardless of the time taken to complete. The majority of students (67%) completed in four or five semesters (ideal time frame), while 23% completed in six or seven semesters. When graduates were compared to non-graduates, it was found that graduates were somewhat younger, and had a higher high school GPA. There were no significant differences between males and females. The highest percentage of voluntary attrition was observed among African-American students.

In one nursing school in Texas, which experienced increasing attrition rates and decreasing licensure exam pass rates over a decade, a study was conducted to seek strategies to lower the attrition rate and raise the licensure exam pass rate. The majority of faculty interviewed mentioned that mentorship by faculty was essential in lowering attrition rates. Faculty also expressed that they could have better met the needs of students if they were not assigned so many tasks that took their time away from their students [11].

Another study conducted in eighteen nursing schools in England found that of 845 students who had enrolled in a particular year, 131 (15%) had left by the second year of their program. Of the 131, seventeen percent dropped out because of academic failure, and eighty-two percent dropped out because of personal reasons – the leading reason that they disliked nursing (thirty-nine percent). This study found that there was no relationship between age at enrollment or gender and attrition. Seventy-seven percent of individuals who dropped out had ever seriously thought of entering another profession prior to enrollment, as compared to sixty-four percent of individuals who were retained in the program and this difference was statistically significant. Also, twenty-four percent of drop outs said that they were worried ‘a great deal’ about being happy in the nursing profession, as compared to fourteen percent of retained students [9].

Interim student retention has been reported to have effects on student performance and permanent attrition. Attrition from educational institutions is much easier to address than attrition from the workforce [18], and hence, should not be allowed to hinder potential outcomes of educational scale-up initiatives.

Nurse Licensure/Registration Subsequent to Training

Some researchers have suggested that the way in which HRH are trained, deployed and managed in Africa does not enhance productivity, leaving countries unable to realize the full potential expected from health workers – what some authors have described as wastage. In some countries, wastage of newly trained health workers may result from underuse or non-use of personnel, resulting in unemployment, or an inability to absorb certain skill types. A consequence of this could be the movement of individuals who have successfully completed nursing programs into professions sometimes unrelated to healthcare. This has occurred in Mozambique, where a study conducted in 2002 found that a large number of nurses changed professions and went into fields such as law, biology, psychology, international affairs, and geography [32].

In a study conducted in the state of New York [18], licensure data were available for 77 of the 84 graduates from a particular nursing school. Ninety-four percent of the students were licensed in the state of NY as RNs, while five students remained unlicensed in NY. Ninety-four percent of the students who had no course withdrawals during nurse training passed the licensure exam on the first try. In contrast, only fifty percent of the students with two course withdrawals and/or failures (W/F) during nurse training passed the licensure exam on the first try. Of the five students who remain unlicensed, two had three W/F, two students had one W/F, and one student had no W/F. The number of W/F was inversely correlated with the licensure exam pass rate on one or more attempts. In addition to the negative effect of withdrawals and/or failures on licensure exam performance, this study also found that withdrawals and/or failures were a significant predictor of retention and successful completion of the program [18].

One of the shorter term goals of scaling up nurse education and training is to increase the number of nurses available to take up positions in health service delivery and other parts of the health system. Ideally, all trained nurses in the workforce should be registered with the appropriate regulatory body. Failures to register could indicate a movement of trained nurses to other professions or possible deployments without appropriate licensure. Both issues could compromise scale-up initiatives, and must be thoroughly investigated and addressed.

Chapter 3: Manuscript

Using Trends in Nurse Workforce Supply to Inform the Scale-Up of the Nurse Training in Kenya

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Abstract

Background

As Kenya began receiving support for public health programs from international donors, the country's ability to translate such funding into improved and equitable health outcomes was threatened by the lack of sufficient human resources for health. Recent initiatives aim to scale-up nurse training and education as a means to address the workforce shortage. However, not all students who enter training facilities remain in school, pass licensure exams, and subsequently register to practice. In order for the government of Kenya and donor agencies to support the scale-up, it is essential that accurate data on nurse supply is analyzed in order to develop evidence-based strategies to ensure the retention and licensure of all potential nurses who enroll in nurse pre-service training.

Methods

Data from the Kenya Health Workforce Informatics System (KHWIS) were analyzed to describe students trained in Kenyan nursing schools from 1999 to 2004 and to determine how many of these potential nurses were lost from the nurse supply pipeline at the point of registration with the Nursing Council of Kenya (NCK). Key informant interviews were also conducted with nurse training institution administrators and/or tutors, to investigate barriers to the scale-up and perceptions related to nurse training capacity in their institutions.

Results

8,645 students began training in Kenyan nursing schools from 1999 to 2004. Students were more likely to originate from Central and Nairobi provinces, and least likely from Coast and Northeastern provinces. Of these students, 8,110 (94%) are currently registered with the NCK. Failure to register was more common among BScN nurses (12%) compared with registered nurses (5%) and enrolled nurses (7%). Student attrition was not found to be a significant problem among institution key informants interviewed. Tutor recruitment and retention, as well as mentorship of students by qualified nurses were identified as key intervention areas for the scale-up.

Conclusion

Nearly all students who enrolled in nurse training institutions in Kenya from 1999 to 2004 successfully completed training and registered with the NCK. However, a greater proportion of students trained as BScN nurses have failed to register. Further research is needed to investigate reasons for failure of BScN nurses to register. Challenges regarding the clinical environment, primarily congestion, clinical facility resources, logistics of transportation and accommodation as well as mentorship of students should be addressed for scale-up initiatives to succeed. Simultaneous initiatives to improve tutor recruitment and retention must also be considered.

Background

Human resources for health (HRH) are a fundamental component of health system strengthening. The global public health community has documented the shortage of skilled health care workers in sub-Saharan Africa (World Health Organization 2008), which has 25% of the world's disease burden, but possesses only 1.3% of the world's trained health workforce (Dovlo 2007). Research from the World Health Report (2006) and the Joint Learning Initiative (2004) have described the positive correlation between the health workforce supply and improved delivery of health services. In countries all over the world, both maternal and child survival have been shown to be positively impacted by the density of skilled health workers, and WHO has identified Kenya as one of the countries in which the workforce density is below the threshold needed to meet the health related Millennium Development Goals (World Health Organization 2006).

In Kenya, nurses provide the bulk of health care services. In Northeastern province, where health outcomes related to HIV/AIDS and maternal health are a concern (Pathfinder International 2007), the nurse to population ratio is 28 to 100,000. In contrast, in regions with relatively better health outcomes such as Central province the ratio is 206 to 100,000 (Gross et al. 2011). In recognition of the shortage of HRH as a major concern, the global public health community (World Health Organization 2008), and the government of Kenya (GOK) have declared health worker shortages as a major challenge to health development, and improving HRH has become a top priority (Chankova, Muchiri et al. 2009).

The Kampala Declaration (World Health Organization 2008) was drafted as a result of the first global forum on HRH. Recognizing the HRH crisis, and the devastating impact of HIV/AIDS and other diseases on health systems, the participants of the forum called for participant countries to develop health workforce information systems, to "improve research and to develop capacity for data management in order to institutionalize evidence-based decision-making and enhanced shared learning" (World Health Organization 2008). It was also recommended that governments determine the "appropriate skill mix and institute coordinated policies… for an immediate, massive scale up of community and mid-level health workers, while also addressing the need for more highly trained and specialized staff" (World Health Organization 2008).

The *Agenda for Global Action* (World Health Organization 2008) developed at this forum, is built around six fundamental, and interconnected strategies, including scaling-up health worker education and training, as well as strategies for "retaining an effective, responsive and equitably distributed health workforce." Within the goal to scale-up education and training, the forum participants agreed that such an undertaking should be linked to health workforce information systems, and that quality of the scale-up and training should be monitored and improved using systematic methods.

Scale-up efforts have often targeted isolated areas of the HRH supply and deployment pipeline, depending on stakeholder activities and donor interests. However, efforts to address all stages of the pipeline as a chain of interrelated issues are lacking (Singh and Smith 1975; Last 2003).

Health sector reforms in many low-income countries have failed to address the problems with human resource infrastructure, and governments continue to introduce new programs, assuming that workers will be available, motivated, and able to undertake newly assigned functions (Vasant et al. 2004). Given the limitations health sector reforms place on public sector spending, governments must also plan to ensure they have the fiscal space necessary to hire newly trained workers produced by scale-up initiatives.

Training institutions in low-income countries are struggling financially and many donors and development agencies lack coherent and integrated investment strategies to strengthen the workforce, resulting in an overemphasis on workshops and training sessions that have an unclear effect (Vasant et al. 2004). According to anecdotal reports, training capacity in many low-income countries is low, though the precise nature of the problem has been difficult to ascertain because data on health professionals tends to come from administrative statistics and limited information is available on key training personnel such as tutors (Vasant et al. 2004).

An approach to scale-up the nursing workforce in Kenya that focuses on increasing the number of trained nurses, but does not take into account the capacity of the country to provide quality training for these individuals, will have limited success. Also, strategies to improve training capacity that fail to emphasize continued professional development (CPD) and improved tutor capacity, may affect not only attrition of teaching personnel, but also the performance of these individuals (Hongoro and McPake 2004).

In 2009, the United States President's Emergency Plan for AIDS Relief (PEPFAR) committed to support the education and training of 140,000 new health care workers in recipient countries by 2015, with an emphasis on doctors and nurses – the segment on nurses being led by the Nursing Education Partnership Initiative (NEPI) (United States National Institutes of Health 2011). Other organizations including the Global Alliance for Vaccines and Immunisation (GAVI), the Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM) and the Japan International Cooperation Agency (JICA) have also made efforts to encourage the scale-up of health worker education and training (World Health Organization 2006).

In order to develop the nurse workforce, it is important that nursing education is viewed appropriately in the framework of the health system, such that education, training, research and service delivery work synergistically, and not in isolation. There is a need to strengthen the overall capacity of educational institutions, working in collaboration with country-led health workforce development plans to ensure that the pipeline from the enrollment of students into training institutions, through to their recruitment into the health workforce, is maximized to support the scale-up.

It is essential that governments track individuals who enroll in health training programs and strive to mitigate student nurse attrition, in order to maximize returns on investments in pre-service education and training. Institutions lose investments in students who have enrolled, but fail to reach graduation, pass licensure examination or register. Consequences of student attrition include the lack of available qualified nurses to meet the health care needs of society and eventually, fewer nurses in the pipeline to fill leadership and teaching positions.

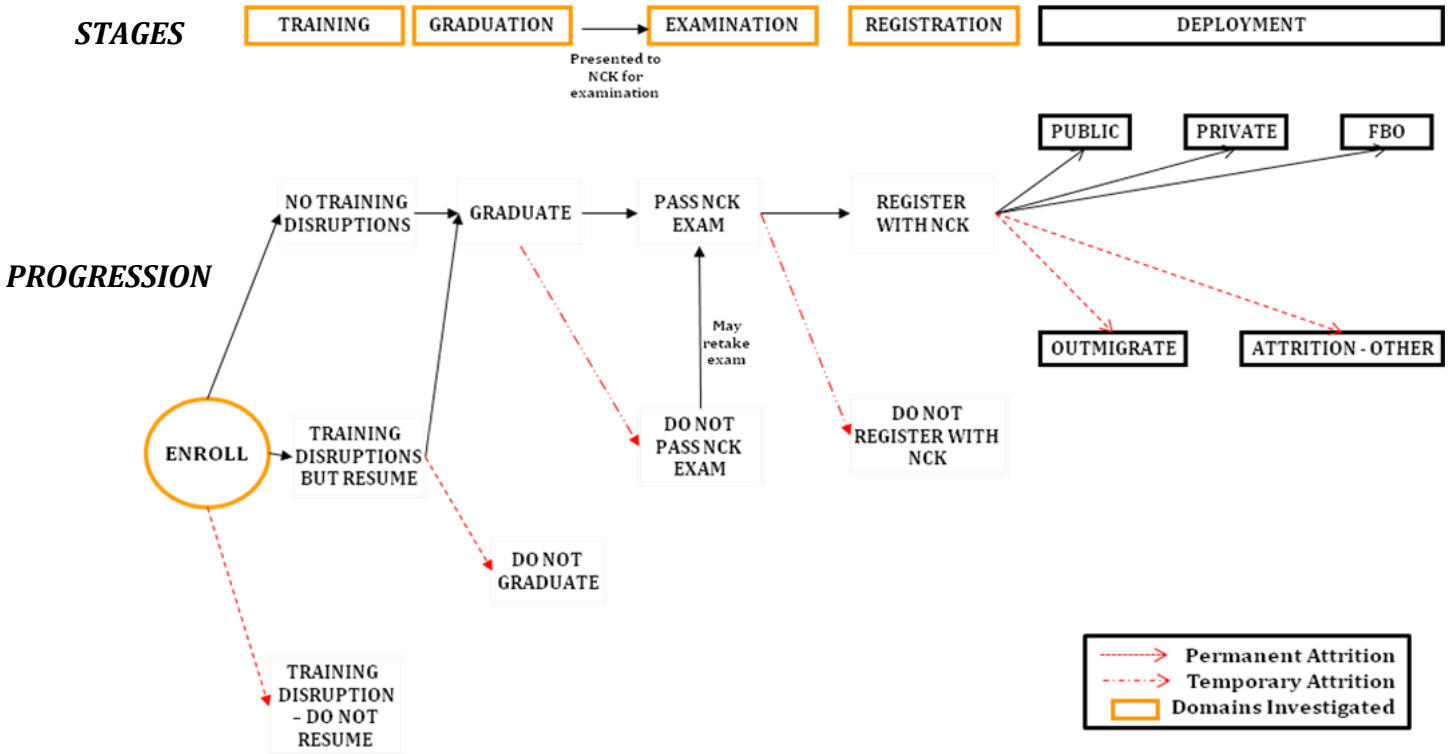
The nursing shortage in the Kenya has been studied looking at attrition of nurses in the public sector (Chankova, Muchiri et al. 2009). However, no published research has investigated loss of potential nurses from training institutions, that is, prior to joining the workforce. There is a possibility that not all individuals who enroll in nurse training institutions remain in school, pass licensure exams, register with the Nursing Council of Kenya (NCK) in order to practice, or even remain in the country to contribute to the nursing workforce in Kenya. Some of these issues have been studied as isolated events in countries other than Kenya (Singh and Smith 1975; Last 2003; Higgins 2005), but not together as a chain of interrelated issues.

In order for the Government of Kenya (GOK) and donor agencies to support capacity development and plan for expansion of nursing and medical education, it is essential that accurate data on HRH training capacity and deployment are collected and analyzed, to develop evidence-based strategies to expand the health workforce in Kenya. Such information could have implications on how donor and government funds are allocated through public health programs, particularly for HRH capacity development. This study, therefore, sought to quantify training capacity and student attrition and also examined possible barriers to the scale-up of nurse training in Kenya.

Methods

This study used a mixed methods approach to investigate trends in each area of the nurse supply pipeline to inform efforts to scale-up the nurse workforce in Kenya. Figure 1 details the stages of nurse supply and deployment in Kenya, in addition to scenarios for how students who enroll in nursing schools progress through these stages.

Figure 1. Supply and Deployment Framework for Nursing in Kenya



The quantitative component of this study analyzed de-identified data provided by the nursing component of the Kenya Health Workforce Informatics System (KHWIS), a family of databases for each health professional cadre in Kenya. The nursing component of the KHWIS consists of two linked databases – one, housing regulatory information (e.g. training and licensure) and another, capturing deployment information (e.g. current location and type of health facility of employment). The regulatory database is managed by the nursing regulatory agency – the Nursing Council of Kenya (NCK), while the deployment database is managed by the Department of Nursing (DON) in the Ministry of Medical Services (MoMS), which along with the Ministry of Public Health and Sanitation (MoPHS) comprises Kenya's two health ministries. Details of the development of the KHWIS were published in 2007 (Riley 2007).

A de-identified copy of the dataset from the KHWIS containing variables for this study was formatted in Microsoft Access, and then cleaned and analyzed using STATA at the Kenya Health Workforce Project office in Nairobi Kenya, with the assistance of project analysts familiar with KHWIS data collection and coding. Permission to analyze this data was obtained from the NCK and MoMS. Because the authors of this study used de-identified data from this existing database, and also because information obtained through key informant interviews did not consist of any personal, identifiable data, this study was deemed exempt from human subjects review by the Emory University Institutional Review Board.

The study population for the quantitative component of this study includes all individuals, 18 years of age and older, who received pre-service training in Kenyan nurse training institutions from 1999 to 2004 (N=8,645). Nurses trained outside Kenya were excluded from all analyses. This cohort was selected 1) because of the presence of enhanced accuracy and relevance in more recent data, and; 2) to provide a long enough timeframe for all subjects to move through the sequence of events in the nurse supply pipeline (Figure 1) by the time the study was conducted. The geographic sampling area included all eight provinces of Kenya.

The quantitative component of this study followed students who enrolled in pre-service training from 1999 to 2004 through the nurse supply pipeline until April of 2011. This portion of the study aimed to 1) describe individuals trained in Kenyan nurse training institutions; 2) describe

trends in annual nurse training enrollment, and; 3) quantify the loss of potential additions to the nurse workforce by non-registration with the NCK.

Quantitative data analyzed from the KHWIS were complemented by qualitative information obtained through key informant interviews (KIIs) with nurse training institution educators and/or administrators. This data, which would not have been possible to obtain from the KHWIS, included information on loss of individuals from the nurse supply pipeline due to training disruptions and student attrition. KIIs also captured potential barriers to the scale-up of nurse training in Kenya. The KIIs aimed to investigate: 1) the perceived reasons for, and burden of training disruptions and student attrition; 2) perceived tutor capacity, and; 3) perceived challenges regarding students' clinical experience.

The study population from KIIs included a convenience sample of nine administrators and/or tutors from nine different nurse training institutions in four provinces – Nairobi, Central, Eastern and Rift Valley. The sample included six public institutions, two faith-based, and one private.

Guides for the KIIs were developed by authors from Emory University and reviewed and edited by collaborators from the KHWP and NCK. Using the qualitative data analysis software MaxQDA, all qualitative data were coded and a thematic analysis was conducted to identify both recurrent and unique statements and themes.

Data Analysis

All data on students included in the study population were analyzed using the students' index number, a unique identifier assigned at the commencement of nursing education and retained in the KHWIS throughout his/her career.

Description of Nurses Trained in Kenya, 1999-2004

The students who received pre-service training in Kenyan nursing institutions from 1999-2004 were described by age at enrollment, gender, cadre, province of training, and sponsoring agent of the training institution attended (i.e. public, private, faith-based).

Date of birth and year of commencement of pre-service training for all individuals included in the study cohort were used to calculate age at enrollment. Individuals were then categorized into

four age groups: 18-20, 21-25, 26-30 and older than 30. The initial cadre of training which was recorded upon enrollment in pre-service training was used to categorize individuals into the three main cadres of nursing in Kenya: enrolled, registered, and baccalaureate. The description and roles of these cadres have been previously discussed (Gross et al. 2011). Training institution province codes were used to identify the province in Kenya where each individual in the study cohort received pre-service training. Institution sponsoring agent codes were used to identify nurse training schools as either public, private, or faith-based.

Annual Training Enrollment from 1999-2004

Annual nurse training enrollment was defined as the annual number of new enrollees in nurse training institutions in Kenya – who could potentially enter the nurse workforce upon completion of training – each year during the study period. Dates of commencement of pre-service training were used to describe trends in annual nurse training enrollment over time, and data on cadre distributions within the study cohort were used to stratify annual enrollment by cadre.

NCK Registration

Upon successful completion of nurse training programs, all potential nurses must pass a licensure exam administered by the NCK, and subsequently register with the NCK before they can practice. Students in the study cohort who had failed to register with the NCK at the time of data analysis were compared to those who did register to determine characteristics associated with failure to register. Pearson chi-square tests were used to evaluate the significance of age at enrollment, gender, cadre, province of training, and training institution sponsoring agent between the two groups.

Training Disruptions and Student Attrition

Data on training disruptions and student attrition were not available in the KHWIS. Key informant interviews were therefore used to investigate the perceived burden and reasons for training disruptions and student attrition, and to identify possible patterns in these outcomes in relation to age group of students at time of enrollment, gender, cadre, and province of origin. Questions on trends in training disruptions and student attrition over time were also asked of respondents.

Coding categories included interim training disruption, permanent student attrition, pregnancy, financial difficulties, academic failure, disinterest, transfers to non-health professions, association with age, association with gender, association with cadre, association with province of origin and trends over time.

Tutor Capacity

KIIs aimed to obtain information on tutor capacity including 1) perceived challenges faced by nurse tutors in their institutions; 2) capacity for tutor recruitment and retention; 3) opportunities for, and sponsorship of continued professional development (CPD), and; 4) to identify possible patterns in these outcomes with the same descriptive variables listed above. Respondents were also asked to discuss their thoughts on what simultaneous investments should be made in tutors in order for a scale-up of nurse training to be as successful as possible.

Coding categories included tutor to student ratios, CPD opportunities, CPD sponsorship, tutor recruitment, tutor retention, association with age of tutors, association with province of training institution, association with training institution sponsoring agent, and trends over time.

Clinical Experience

Information on administrators'/tutors' perceptions of challenges faced by students with regard to clinical training were elicited in KIIs. Respondents were asked questions about the perceived quality of mentorship by trained nurses at the students' clinical sites, as well on as the presence and degree of institutional challenges related to the clinical experience, such as site accommodations, transportation, relationships between institution and clinical site administrations. Availability and capacity of clinical instructors were also assessed.

Coding categories included overcrowding, theory versus practice, mentorship, logistics, association with province of training institution, and association with training institution sponsoring agent.

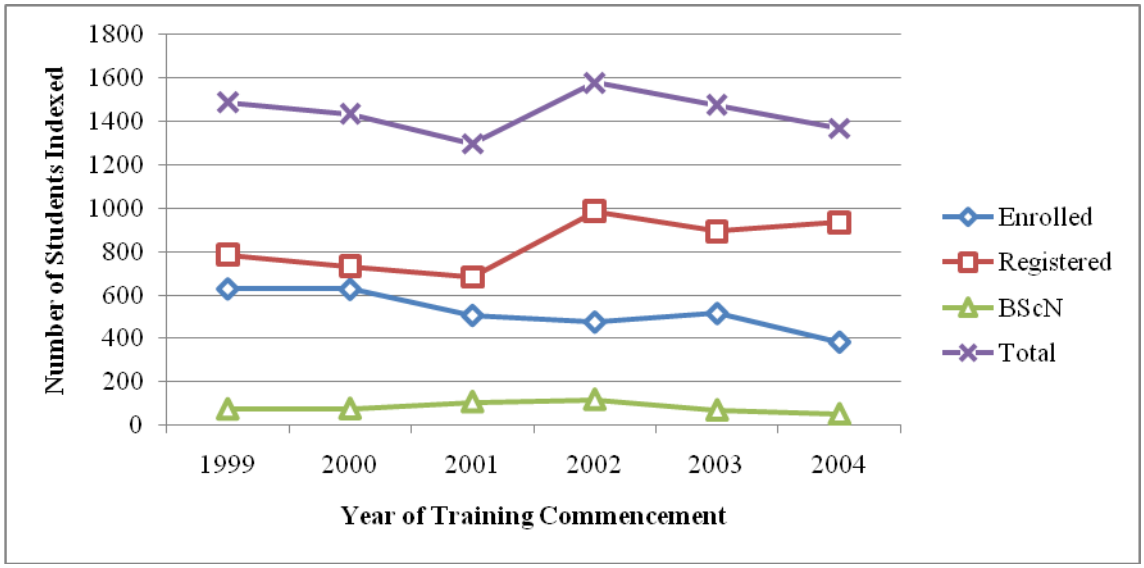
Results

Kenya's Nursing Workforce Trained from 1999-2004

There were 8,645 nurses who enrolled in pre-service training in Kenya between 1999 and 2004 (an average of 1,441 per year). Of these, 3,816 (47%) were in the age group 18-20 years, 3,892 (48%) in the age group 21-25 years, 343 (4%) in the age group 26-30 years, and 61 (0.75%) over the age of 30 (Table 1). The mean age at enrollment was 21 years. 6,502 (75%) were female and 2080 (24%) were male. Most nurses (58%) were trained in registered nursing programs, 36% enrolled, and 6% BScN (Table 1).

Annual nurse training enrollment remained consistent over the study period, but the proportions of registered nurses to enrolled nurses from 2002 changed due to the phasing out of the majority of enrolled nursing programs (Figure 2).

Figure 2. Annual Nurse Training Enrollment by Cadre and Year, 1999-2004



When compared to the population distribution that would be expected based on the distribution in Kenya by province, students in the study cohort were more likely to originate from Central (16%) and Nairobi (12%) provinces, compared to Coast (4%) and Northeastern (2%) provinces (Table 4). The majority of students were trained in Rift Valley (21%) and Eastern provinces (17%), with the least in Coast (5%) and Northeastern (3%) provinces (Table 1). 5,305 (64%) of

the students were trained in public institutions, while 2662 (32%) were trained by institutions affiliated with faith-based organizations and 383 (5%) by private institutions (Table 1).

Nursing Council of Kenya Licensure/Registration

Of the 8,645 students who enrolled in Kenyan training schools from 1999 to 2004, 8,110 (94%) completed their training, passed the NCK examination, and were registered to practice nursing in Kenya at the time of data analysis. 535 (6%) have failed to register with the NCK. The proportion of students who have failed to register, however, differed by cadre of study—12% of those trained as BScN failed to register, compared with 7% of enrolled nurses, and 5% of registered nurses.

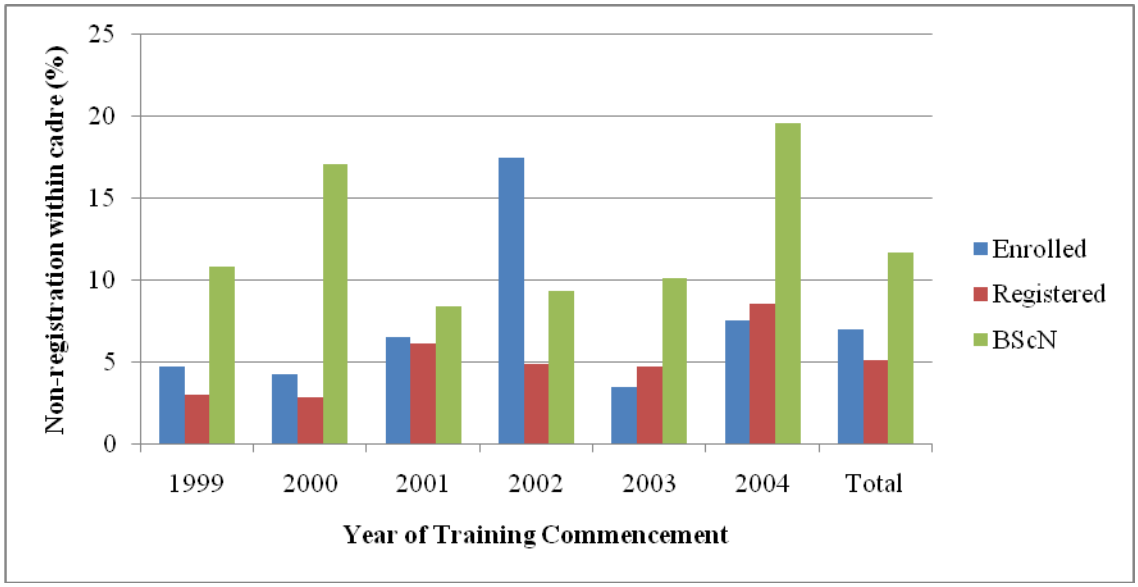
Trends over time in Failure to Register with the NCK

The study cohort was stratified by cadre to investigate trends over time in failure to register with the NCK. Among individuals who received training as enrolled nurses, failure to register was high among individuals for whom pre-service training began in 2002 (17%) (X^2= 101.6703 (df=5), p<0.001) (Figure 3).

Among all individuals in the study cohort who received training in BScN programs, 12% have failed to register with the NCK. Failure to register was high across all years of training commencement (Table 2) and was highest among those who trained in 2004 (20%) (X^2= 7.2113 (df=5), p=0.205) (Figure 3). Among those for whom pre-service training began in 2004, 51 (20%) had failed to register.

Failure to register among individuals who received training in registered nursing programs ranged from 3% among those for whom training commenced in 1999, to 9% in those for whom training commenced in 2004 (Figure 3).

Figure 3. Failure to Register with the NCK by Cadre and Year



Students who failed to register with the NCK differed in several ways from those who registered. Those who failed to register were more likely to be in the older age groups at the time they began pre-service training (6.2% of students who failed to register were older than 25 years compared to 4.9% of those who went on to register, X^2= 20.853 (df=3), p<0.001). The odds of non-registration for individuals older than 30 were 2.93 times higher than those aged 18-20 (p<0.001) (Table 3).

Students who were trained in Rift Valley province were more likely to have failed to register (9.7% of students trained in Rift Valley failed to register compared to 4.1% in Eastern and Nyanza provinces, X^2= 66.389 (df=7), p-value < 0.001). The odds of non-registration among students trained in Rift Valley were 1.70 times the odds in students trained in Nairobi (p<0.001); the odds in students trained in Western province were 1.40 times the odds in students trained in Nairobi (p=0.063). Among students trained in all other provinces, the odds of non-registration were lower than that of students trained in Nairobi (Table 3).

There was also a significant relationship between institution sponsoring agent and failure to register. Among students trained in faith-based institutions, 8.4% failed to register compared to 4.9% of students trained in public institutions (X^2= 39.316 (df=3), p<0.001). The odds of non-registration among faith-based trained students were 1.78 times the odds in publicly trained

students ($p<0.001$); the odds of non-registration among privately trained students were 1.24 times the odds in publicly trained students ($p=0.173$) (Table 3).

Training Disruptions and Attrition from Training Institutions

KII respondents cited pregnancy as a primary reason for training disruptions in their institution. Though the degree to which pregnancy in the students was perceived as a major reason for training disruptions varied, respondents stated that the students who did become pregnant did not drop out of the program completely. Many of these students only take a few months off and rejoin the program with the subsequent class.

Respondents also cited failure to pay fees as a reason for training disruptions and expressed that issues with school fees cause only minor training disruptions and not complete attrition. Self-sponsored students were identified as having the most difficulties in paying for school fees.

All respondents cited academic difficulty or failure as a reason for training disruptions. This usually resulted in students having to repeat a year or even more, but usually managing to eventually complete the program. Disinterest among the students was also cited as a reason for academic failure or absconding, and hence training disruptions.

According to all respondents, it was uncommon for students to transfer to other institutions. Students who do transfer generally do so because of illness or academic failure – these students have to wait a whole year to repeat courses in institutions that have intake only once a year and hence transfer to institutions that have intakes twice a year. Some students also transfer into academic programs they may have originally applied for, but into which they were not initially accepted. All respondents stated that it was uncommon for graduates from their institution to move into non-health professions after completing the nursing program.

The majority of respondents stated that the number of training disruptions and attrition had remained constant over time, with the exception of one institution in which a high number of students were discontinued for inciting a strike among students, and another in which an institution decided to skip one intake due to limited accommodation, resulting in a high number

of transfers among students who would have had to repeat their year with the next incoming class.

There appeared to be no relationships between student attrition and the provinces in which students completed their secondary education. Respondents stated that though students who schooled in remote areas, such as the Northeastern province, may have difficulty keeping up with the academic workload, they usually completed the program. Respondents also stated they did not believe there were any patterns in training disruptions/student attrition by gender. Patterns as a result of cadre of study could not be assessed since none of the institutions interviewed trained multiple cadres. Training disruptions/student attrition was also thought to be more common in the first year of training than others.

Respondents also stated that training disruptions were more common in the first year of nursing programs – because the students are being placed in a new environment, and are often unsure of their interest in nursing, while others may have academic difficulties in the first year and become discouraged, leading to academic failure or absconding. Respondents expressed that improved counseling for students could address this issue.

It was uncommon for the institutions sampled to enroll mature students in their pre-service training programs. One institution had a special program for admitting mature students (a maximum of two students per year), and the respondent stated that it had not experienced any training disruptions or attrition in these individuals.

Overall, all respondents stated that on average, student attrition rates of more than 1-2% per year did not occur, consistent with the finding that 94% of students eventually registered.

Clinical Experience

Though most institutions interviewed had a health facility annexed to their school, which was primarily used by their students, they also had to send students to other facilities for selected components of the clinical experience, such as the district health and rural health experience, and for specialties which could not be taught at their facility, such as pediatrics, or maternity. These facilities are often shared not only by nursing students from various institutions – public, private,

and faith-based – but also by other health profession students such as medical students and clinical officer students, resulting in congestion of the clinical site.

Respondents stated that resources available in some teaching health facilities are often inadequate, and therefore students may experience instances where they are taught an ideal skill in the classroom, practice it in their skills lab, but are unable to implement this when they are having their clinical experience. According to one respondent, "the students leave here with a lot of basic skills, which they have not developed to mastery. But when they go to clinical, those resources to help them develop them are not there." Some respondents stated that the separation of districts as a result of the political situation in the country, which has forced some lower level health facilities to begin serving as district hospitals without adequate resources, has the potential to worsen the situation. Though some respondents stated that their students are taught from the beginning to be able to use whatever resources are available to them, others stated that one of the advantages of the clinical practice is that the students are exposed to the realities on the ground before they enter the profession – so they have realistic expectations before entering the workforce.

Respondents also expressed that as a result of the existing nurse shortage, qualified nurses working in the health facilities are overworked, and often do not have the time to adequately supervise students. A KII respondent from one private institution stated that as a solution to this, his institution has a mentorship program which nursing staff responsible for mentoring students must complete. Another respondent expressed that there is a need to equip mentors with the necessary tools to be able to teach students, particularly in regards to health topics surrounding HIV and others, which may not have been taught during the time of the older qualified nurses. The shortage of tutors in many institutions makes it difficult for them to follow up with the students on clinical experience. Though some institutions, particularly the private and faith-based institutions, have clinical instructors who spend most of their time with the students on their clinical components, others expressed that they do not have the resources to have dedicated clinical instructors who can fill in the gaps in health facilities where qualified staff do not have the time to actually teach students.

When students have to travel to facilities outside of their institution for clinical experience, the logistics of transportation, and accommodation (if they will reside there for a period of time), must be organized. In some instances, the school provides both or one of these, and in others, students are responsible for organizing and paying for their transport and accommodation during placements. One respondent from an institution which trains many other health professions stated that though the school does provide transportation for students to go for clinical experience, it is shared by all the different health profession students. Because of this, when nursing students have to be taken for day trips to clinical facilities, they can only stay there a short period of time, since all the health profession students must be dropped off, and picked up within a specified time.

Tutor Capacity

None of the institutions interviewed had the optimum tutor-to-student ratio of 1:10 as recommended by the NCK. The ratios ranged from 1:14 in the private and faith-based institutions, to as high as 1:40 in one public institution. In all public institutions interviewed, this resulted in a large workload for tutors, giving them insufficient time to follow up on students during their clinical experience, or to spend time with students in the skills lab if extra time and assistance were needed.

All respondents stated that there were always many opportunities for staff development. Responses on sponsorship of CPD by the institutions were mixed however. Some institutions stated that while their administration sponsors staff for CPD quite well, they, in fact, don't have the time to attend all the workshops, conferences or seminars for which they are sponsored. Others felt that their institution did not have the financial resources to sponsor CPD. One respondent stated that his institution could usually only afford to send one or two out of twenty staff members. For long courses such as Masters' degrees or PhDs, the majority of respondents said that their staff could be sponsored with time off, but not financially.

Some respondents stated that recruitment of staff was a problem for their institution. For the Kenya Medical Training Colleges (MTCs), recruitment is carried out centrally, and tutors are often transferred between institutions depending on the need. One respondent expressed that many tutors at their institution, which had a tutor-student ratio of 1:40, had been transferred to

other institutions that were worse off, sometimes having as few as five tutors, with very many students.

One respondent expressed that there was a high turnover of tutors in his institution because of a great interest in moving into government positions, which were often better paying, short contractual jobs. Salary and benefits, as well as location of the training institutions were cited as factors contributing to the competitiveness in recruiting well qualified tutors. Difficulty in retaining qualified tutors was attributed to the age and level of training of tutors as well as the location of the training institution.

Many of the public institutions, particularly the MTCs, were primarily established to train only one or two health professions, and over time have expanded to train up to five or more in some cases. With these expansions, there has not been an equivalent increase in the resources for the institutions, and limited classroom and accommodation space are ongoing challenges.

Discussion

The overall goal of the PEPFAR initiative to scale-up nurse training/education is to increase Kenya's national nursing workforce. In order to ensure that the GOK and donors maximize on this investment, they must ensure that attrition of individuals who enroll in nurse training programs is kept at a minimum. Due to the possibility that a scale-up in enrollment could compromise quality of training, it is also essential that the capacity of tutors, the physical infrastructure within schools, and the capacity for clinical instruction are considered.

This study found that permanent attrition of nursing students by the point of registration with the NCK was low, only 6%. Training institution tutors and administrators indicated that the few events of temporary attrition/training disruptions were most likely due to pregnancy, financial difficulties, academic difficulty, and a disinterest in nursing. Improved counseling resources for students and varied options for tuition payment could address these issues.

Lack of employment opportunities in the nursing field was cited as another possible reason for nursing school graduates to move into non-health professions after completing training. It is possible that these individuals seek alternative employment before going through the process of registration, and may be contributing to the group of individuals who have failed to register.

Limitations in public sector hiring as a result of poverty reduction strategies regulated by international finance institutions have been cited as reasons for unemployment among nurses in Kenya (Gross et al 2011). Working in collaboration with country-led health workforce development plans, donors must ensure that channels for recruitment and deployment of the increased output of new graduates are functional and efficient.

Though permanent student attrition from training institutions was uncommon, there are significant differences that exist between those who registered and those who failed to register which warrant further investigation.

Age was found to be a significant factor in whether or not individuals registered or not. When compared to students who began training between 18 and 20 years, those over the age of 30 were almost 3 times as likely to have failed to register. This is a surprising finding, particularly because data from KIIs indicated that mature students were less likely to experience training disruptions or student attrition, because it was rare for them to have an opportunity to begin training at that age, and they were often sacrificing more than other students to remain in the programs (e.g. family responsibilities, financial obligations, etc.). However, studies from the U.K. (Last 2003), and the United States (Jeffreys 2007) have suggested that mature students are more likely than younger students to experience temporary and permanent student attrition. KII responses regarding low rates of attrition among mature students may be biased due to the small sample size. Also, further research is needed to accurately identify what stage of the nurse supply pipeline these individuals are lost, that is, prior to graduation or at the stage of NCK examination.

Contrary to what the authors of this study had hypothesized, students who were trained in Rift Valley, Western and Nairobi provinces were more likely to have failed to register than students trained in provinces such as Coast, Eastern and Nyanza. This finding may be confounded by the fact that many of the BScN nurses, of whom a significant number have failed to register, are trained in Nairobi and Rift Valley.

When the study cohort was stratified by cadre of training to investigate failure to register with the NCK, it was found that students trained in BScN programs were most likely to have failed to register, followed by those trained in enrolled programs and least in those from registered

programs. Due to the phasing out of enrolled nursing programs discussed previously, it is possible that individuals who received training in enrolled nursing programs decided to enroll in upgrade training programs to become registered or BScN nurses before registering with the NCK to work. Because BScN nurses receive the highest level of pre-service training, it is possible that this group of individuals have a stronger desire to out-migrate, since it is easier for them to obtain employment in other countries as compared to enrolled or registered nurses. Also, because BScN nurses have a Bachelors' degree, it is likely that they have more opportunities to work in professions outside of nursing (e.g. administrative positions in banks or in non-governmental organizations) as compared to graduates from enrolled or registered nursing programs.

Students trained by private (though not statistically significant) and faith-based institutions were also more likely to have failed to register with the NCK. This may be due to a stronger desire to out-migrate among these individuals, though there is no published data to support this.

Congestion in clinical sites and inadequacies in student mentorship were mentioned as key issues to be addressed in a scale-up of nurse training in Kenya. Some studies from high-income countries have suggested that mentorship by qualified nurses during the clinical experience strongly influence student perceptions of the clinical learning environment (Dunn and Hansford 1997; Last 2003; Lofmark and Wikblad 2001). Since the outcomes of scaling-up nurse training with regard to improving the nurse shortage are likely to take some time to become evident, investing in clinical instructors who can fill in the gaps left by inadequate mentorship at clinical sites should be considered as a possible solution.

If there is difficulty obtaining placements for students at a facility and an institution would like to obtain approval from the NCK to use as a different clinical site for students, the institution must consider transportation and accommodation (if applicable). This is a major barrier to addressing the challenges due to congestion in clinical sites. Another challenge in addressing congestion is that though institutions can seek approval for alternative health facilities, these facilities may not have the patient base to ensure that the students are able to witness a sufficient number of cases and practice all the skills necessary to fulfill the clinical experience objectives.

High tutor to student ratios have resulted in overworked tutors, and an inability for them to support students as much as most institutions would like. This has been addressed in one

institution by establishing two to three year contracts for all newly employed tutors to ensure sustainability and retention of tutors, and this may serve as a good model for other institutions. Also, schemes similar to the tutor retention program launched in Malawi (Caffrey 2006) aimed at attracting and retaining nurse tutors by providing adequate incentives and opportunities for career advancement should be considered. A desire for increased opportunities for sponsorship of CPD for tutors was expressed by several respondents, and should be considered in interventions to attract nurse tutors and to ensure their retention.

Study Limitations

Due to data limitations, the authors were unable to use quantitative data to investigate graduation from nurse training institutions as well as student performance on the NCK licensure examination. Also, due to limited funding, a convenience sample of institutions in close proximity to Nairobi was selected for KIIs. To minimize any bias as a result of this, the authors included at least one institution from public, private, and faith-based sectors. Also, institutions varied in regards to urban versus rural geography.

An ideal sample for KIIs would have consisted of students currently enrolled in nurse training institutions, or individuals who had been lost from the HRH supply and deployment pipeline. However, due to difficulties in identifying and tracing these individuals for interviews, a convenience sample of nursing school administrators and/or tutors was more feasible.

As with any form of retrospective survey, recall bias is a concern for responses elicited from KIIs. However, all respondents had worked in their institution for a significant period of time, and therefore had witnessed many incoming and graduating classes of students, giving them a wealth of insight on the domains investigated in the KIIs.

Conclusions

According to the results of this study, it appears that the majority of students who enroll in nurse training programs successfully complete training and register with the NCK. BScN nurses who represent some of the most highly trained nurses in Kenya were less likely to register than other cadres. Failure to register among BScN nurses should be further investigated to obtain an accurate understanding of the factors contributing to non-registration. Because of challenges in

regards to data availability, this study was unable to use quantitative data to investigate whether students are lost at the graduation and NCK examination stages of the supply pipeline. Further research is needed to accurately identify whether students who fail to register do so because of obstacles at these stages. Unemployment in the nursing field was cited as a possible reason for the loss of trained nurses, and it therefore is critical that the GOK and donors ensure that recruitment channels for graduates to enter the workforce are functional and efficient in order to accommodate the increased output of trained nurses that will result from scale-up initiatives.

Interventions to invest in the scale-up of nurse training should focus on improving challenges regarding the clinical experience of students, primarily congestion, resources in clinical facilities, capacity for mentorship of students, and logistics of transportation to clinical sites and accommodation. Improved recruitment, retention and CPD for both tutors and clinical instructors are needed.

Competing interests

The authors declare that they have no competing interests.

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Tables

Table 1 - Descriptive Characteristics, NCK Registration Status

	Total (n=8645)	Total (%)	Non-Registered (n=535)	Non-Registered (%)	Registered (n=8110)	Registered (%)
Age						
18-20	3816	47.04	220	5.8	3596	94.2
21-25	3892	47.98	248	6.4	3644	93.6
26-30	343	4.23	19	5.5	324	94.5
>30	61	0.75	12	19.7	49	80.3
Total	8112		499	6.2	7613	93.8
Gender						
Female	6502	75.76	390	6.0	6112	94.0
Male	2080	24.24	130	6.3	1950	93.8
Total	8582		520	6.1	8062	93.9
Cadre						
Enrolled	3134	36.25	220	7.0	2914	93.0
Registered	5016	58.02	257	5.1	4759	94.9
BScN	495	5.73	58	11.7	437	88.3
Total	8645		535		8110	93.8
Home Province						
Nairobi	1033	12.11	54	5.2	979	94.8
Central	1406	16.48	81	5.8	1325	94.2
Coast	313	3.67	10	3.2	303	96.8
Eastern	1499	17.57	75	5.0	1424	95.0
Northeastern	155	1.82	8	5.2	147	94.8
Nyanza	1157	13.56	69	6.0	1088	94.0
Rift Valley	2256	26.44	153	6.8	2103	93.2
Western	713	8.36	54	7.6	659	92.4
Total	8532		504		8028	94.1
Province of Training						
Nairobi	1356	15.69	80	5.9	1276	94.1
Central	1438	16.64	83	5.8	1355	94.2
Coast	435	5.03	20	4.6	415	95.4
Eastern	1530	17.70	62	4.1	1468	95.9
Northeastern	230	2.66	11	4.8	219	95.2
Nyanza	1154	13.35	47	4.1	1107	95.9
Rift Valley	1834	21.22	177	9.7	1657	90.3
Western	667	7.72	54	8.1	613	91.9
Total	8644		534		8110	93.8
Institution Sponsoring Agent						
Public	5305	63.53	261	4.9	5044	95.1
Private	383	4.59	23	6.0	360	94.0
Faith-Based	2662	31.88	224	8.4	2438	91.6
Total	8350		508		7842	

Table 2 - Non-Registration by Cadre and by Year

Cadre	Year of Commencement	Not Registered (n)	Total (n)	Not Registered (%)
Enrolled				
	1999	30	629	4.77
	2000	27	627	4.31
	2001	33	506	6.52
	2002	83	475	17.47
	2003	18	515	3.50
	2004	29	382	7.59
Total		220	3,134	**7.02**
Registered				
	1999	24	785	3.06
	2000	21	733	2.86
	2001	42	684	6.14
	2002	48	986	4.87
	2003	42	893	4.70
	2004	80	935	8.56
Total		257	5,016	**5.12**
BScN				
	1999	8	74	10.81
	2000	13	76	17.11
	2001	9	107	8.41
	2002	11	118	9.32
	2003	7	69	10.14
	2004	10	51	19.61
Total		58	495	**11.72**

Table 3 - Odds Ratio Analysis, Non-Registration among Kenyan Nursing Students

	Odds Ratio	Std Error	z	p-value	95% Conf Interval
Age Group					
18-20	ref				
21-25	1.112	0.086	-1.12	0.265	0.922 - 1.342
26-30	0.959	0.257	0.17	0.863	0.592 - 1.553
>30	4.003	0.082	-4.21	<0.001	2.099 - 7.635
Province of Training					
Nairobi	ref				
Central	0.977	0.165	0.14	0.885	0.712 - 1.341
Coast	0.769	0.333	1.03	0.305	0.465 - 1.27
Eastern	0.674	0.258	2.28	0.023	0.480 - 0.946
Northeastern	0.801	0.412	0.67	0.501	0.420 - 1.529
Nyanza	0.677	0.278	2.07	0.038	0.468 - 0.980
Rift Valley	1.704	0.082	-3.81	<0.001	1.300 - 2.241
Western	1.405	0.130	-1.86	0.063	0.982 - 2.011
Institution Sponsoring Agent					
Public	ref				
Private	1.235	0.053	-6.18	0.173	0.796 - 1.916
Faith-Based	1.776	0.182	-0.94	<0.001	1.476 - 2.136

Table 4 – Country versus Cohort Population Distribution by Province

Province	Country Population [33] (2009)	Population (2009) (%)	Study Cohort Population	Study Cohort Population (%)
Nairobi	3,138,369	8.13	1033	12.11
Central	4,383,743	11.35	1406	16.48
Coast	3,325,307	8.61	313	3.67
Eastern	5,668,123	14.68	1499	17.57
Northeastern	2,310,757	5.98	155	1.82
Nyanza	5,442,711	14.10	1157	13.56
Rift Valley	10,006,805	25.92	2256	26.44
Western	4,334,282	11.23	713	8.36
Total	38,610,097		8532	

Chapter 4: Discussion, Conclusion and Recommendations

Overview

As conveyed in the Kampala Declaration [6], this study has illustrated the potential uses of human resources information systems in health systems research. The availability of timely, accurate data on the supply and deployment of HRH in Kenya can aid the GOK and researchers in the development of evidence-based strategies for scale-up activities.

This study found that permanent attrition of nursing students by the point of registration with the NCK was low, only 6%, and the few events of temporary attrition/training disruptions were due to pregnancy, financial difficulties, academic difficulty, and a disinterest in nursing. Improved counseling resources for students and varied options for tuition payment could address these issues.

Unemployment in the nursing field was cited as a reason for nursing school graduates to move into non-health professions after completing training. It is possible that these individuals seek alternative employment before going through the process of registration, and may be contributing to the group of individuals who have failed to register. Limitations in public sector hiring as a result of poverty reduction strategies regulated by international finance institutions have been cited as reasons for unemployment among nurses in Kenya [5]. Working in collaboration with country-led health workforce development plans, donors must ensure that channels for recruitment and deployment of the increased output of new graduates are functional and efficient.

Though permanent student attrition from training institutions was uncommon, there are significant differences that exist between those who registered and those who failed to register which warrant further investigation.

Age was found to be a significant factor in whether individuals registered or not. When compared to students who began training between 18 and 20 years, those over the age of 30 were almost 3 times as likely to have failed to register. This is a surprising finding, particularly because data from KIIs indicated that mature students were less likely to experience training disruptions or student attrition, because it was rare for them to have an opportunity to begin training at that age, and they were often sacrificing more than other students to remain in the programs (e.g. family responsibilities, financial obligations, etc.). However, studies from the U.K. [10], and the United States [18] have suggested that mature students are more likely than younger students to experience temporary and permanent student attrition because of these very same things they are sacrificing. KII responses regarding low rates of attrition among mature students may be biased due to the small sample size. Also, further research is needed to accurately identify what stage of the nurse supply pipeline these individuals are lost, that is, prior to graduation or at the stage of the NCK examination.

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When the study cohort was stratified by cadre of training to investigate failure to register with the NCK, it was found that students trained in BScN programs were most likely to have failed to register, followed by those trained in enrolled programs and least in those from registered nursing programs. Due to the phasing out of enrolled nursing programs discussed previously, it is possible that individuals who received training in enrolled nursing programs decided to enroll in upgrade training programs to become registered or BScN nurses before registering with the NCK to work. Because BScN nurses receive the highest level of pre-service training, it is possible that this group of individuals have a stronger desire to out-migrate, since it is easier for them to obtain employment in other countries as compared to enrolled or registered nurses. Also, because BScN nurses have a Bachelors' degree, it is likely that they have more opportunities to work in professions outside of nursing (e.g. administrative positions in banks or in non-governmental organizations) as compared to graduates from enrolled or registered nursing programs.

Students trained by private (though not statistically significant) and faith-based institutions were also more likely to have failed to register with the NCK. This may be due to a stronger desire to out-migrate among these individuals, though there is no published data to support this.

Congestion in clinical sites and inadequacies in student mentorship were mentioned as key issues to be addressed in the scale-up of nurse training in Kenya. Some studies from high-income countries have suggested that mentorship by qualified nurses during the clinical experience strongly influence student perceptions of the clinical learning environment [10, 25, 27]. Since the outcomes of scaling-up nurse training with regard to improving the nurse shortage are likely to take some time to become evident, investing in clinical instructors who can fill in the gaps left by inadequate mentorship at clinical sites should be considered as a possible solution.

If there is difficulty obtaining placements for students at a facility and an institution would like to obtain approval from the NCK to use as a different clinical site for students, the institution must consider transportation and accommodation (if applicable). This is a major barrier to addressing the challenges due to congestion in clinical sites. Another challenge in addressing congestion is that though institutions can seek approval for alternative health facilities, these facilities may not have the patient base to ensure that the students are able to witness a sufficient number of cases and practice all the skills necessary to fulfill the clinical experience objectives.

High tutor to student ratios have resulted in overworked tutors, and an inability for them to support students as much as most institutions would like. This has been addressed in one institution by establishing two to three year contracts for all newly employed tutors to ensure sustainability and retention of tutors, and this may serve as a good model for other institutions. Also, schemes similar to the tutor retention program launched in Malawi [24] aimed at attracting and retaining nurse tutors by providing adequate incentives and opportunities for career advancement should be considered. A desire for increased opportunities for sponsorship of CPD for tutors was expressed by several respondents, and should be considered in interventions to attract nurse tutors and to ensure their retention.

Strengths and Limitations

This study has several strengths and limitations. Study strengths include use of data at the population level for nurses in Kenya spanning several years. This allowed a thorough analysis of trends in progression through the nurse supply pipeline over time. This study also provides an illustration of progression through the nurse supply pipeline as a series of interrelated events, as opposed to an isolated study of training disruptions or non-registration with the nursing council.

Some of the limitations of this study include the use of a convenience sample for key informant interviews, as well as the inability to use quantitative data to describe loss of potential nurses at the stages of graduation and NCK examination.

Conclusion & Recommendations

According to the results of this study, it appears that a majority of nurses who enroll in nurse training programs successfully complete their programs, and go on to register with the NCK. Failure to register among BScN nurses should be further investigated to obtain an accurate understanding of the factors contributing to non-registration.

Due to issues with data availability, the authors were unable to use quantitative data to investigate the relationship between training disruptions/interim training disruptions with subsequent registration with the NCK, as well as the loss of potential nurses at the graduation and NCK examination stages of the supply pipeline to accurately identify whether students who fail to register do so because of challenges at these stages. When possible, future research should be conducted to investigate this further. It may also be beneficial for future studies to use qualitative methods to investigate reasons for non-registration in a cohort of students who have graduated from training programs but failed to register.

Interventions to invest in the scale-up of nurse training should focus on improving challenges regarding the clinical experience of students, primarily congestion, resources in clinical facilities, capacity for mentorship of students, and logistics of transportation and accommodation. Simultaneous initiatives to improve tutor and clinical instructor recruitment, retention and CPD must be considered. Schemes similar to the tutor retention program launched in Malawi [24] aimed at attracting and retaining nurse tutors by providing adequate incentives and opportunities

for career advancement should be considered. Also, institutions should consider bonding contracts with tutors to improve retention.

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Appendices

Appendix A – Quantitative Data Analysis Plan

Question 1: Describe Individuals Trained in Kenyan Nurse Training Institutions from 1999-2004				
DOMAIN	**VARIABLE**	**DESCRIPTION**	**INCLUSION / EXCLUSION / OTHER COMMENTS**	
Age Group at Enrollment	nck_datebirth	Date of Birth	Use to calculate age groups at time of training commencement Age groups: 18-20; 21-25; 26-30; >30	Include all students for whom training began in Kenyan training institutions 1999-2004
Gender	nck_sex	Gender (male, female)	Include all	
Province of training	nck_provcode	Training institution province	Include all eight provinces of Kenya	
Province of origin	nck_homeprovcode	Home province	Include all eight provinces of Kenya	
Institution Sponsoring Agent	nck_ntscode	Training institution sponsoring agent (i.e. public, private, faith-based)	Include all public, private and faith-based training institutions in Kenya	
Trends in Intake Over Time	nck_yearintake	Year training was commenced	Year of training commencement 1999-2004	
Cadre	nck_initial_classcode nck_initial_cadrecode	Cadre of training received (i.e. enrolled, registered, BScN)	Include all enrolled, registered and BScN trained students	
Question 8: What proportion of students enrolled from 1999-2004 registered with the NCK after completion of training?				
DOMAIN	**VARIABLE**	**DESCRIPTION**	**INCLUSION / EXCLUSION / OTHER COMMENTS**	
NCK Registration (Y/N)	nck_yearreg	Year registered	Include all students for whom training began in Kenyan training institutions 1999-2004 If nck_yearreg missing, then not registered	
ASSOCIATIONS				
Age Group at Enrollment	nck_datebirth	Date of Birth	Use to calculate age groups at time of training commencement Age groups: 18-20; 21-25; 26-30; >30	
Cadre	nck_initial_classcode nck_initial_cadrecode	Cadre of training received (i.e. enrolled, registered, BScN)	Include all enrolled, registered and BScN trained students	
Gender	nck_sex	Gender (male, female)	Include all; exclude if gender missing	
Province of training	nck_provcode	Training institution province	Include all eight provinces of Kenya	
Province of origin	nck_homeprovcode	Home province	Include all eight provinces of Kenya	
Institution Sponsoring Agent	nck_ntscode	Training institution sponsoring agent (i.e. public, private, faith-based)	Include all public, private and faith-based training institutions in Kenya	

Year of Intake	nck_yearintake	Year training was commenced	Also stratified by cadre
Question 9: What proportion of nurses in our cohort applied to out-migrate?			
DOMAIN	**VARIABLE**	**DESCRIPTION**	**INCLUSION / EXCLUSION**
Out-migration			Include all students for whom training began in Kenyan training institutions 1999-2004
ASSOCIATIONS			
Trends over time	nck_yearintake	Year training was commenced	Year of training commencement 1999-2004
Province of origin	nck_homeprovcode	Home province	Include all eight provinces of Kenya
Gender	nck_sex	Gender	Include all
Age Group at Enrollment	nck_datebirth	Date of Birth	Use to calculate age groups at time of training commencement Age groups: 18-20; 21-25; 26-30; >30
Cadre	nck_initial_classcode nck_initial_cadrecode	Cadre of training received (i.e. enrolled, registered, BScN)	Include all enrolled, registered and BScN trained students
Question 10: What is the geographic distribution of trained nurses who enter the public sectors?			
DOMAIN	**VARIABLE**	**DESCRIPTION**	**INCLUSION / EXCLUSION**
Deployment by Province	ke_psprovcode	Current province of deployment	Include all eight provinces of Kenya
Deployment by Institution Sponsoring Agent	ke_facilityagentcode	Sponsoring agent of health facility of current employment	Include students trained in Kenya from 1999-2004, but only public sector deployed nurses – exclude nurses currently employed in private and faith-based health facilities
ASSOCIATIONS			
Trends over time	nck_yearintake	Year training was commenced	Year of training commencement 1999-2004
Province of origin	nck_homeprovcode	Home province	Include all eight provinces of Kenya
Gender	nck_sex	Gender	Include all
Age Group at Enrollment	nck_datebirth	Date of Birth	Use to calculate age groups at time of training commencement Age groups: 18-20; 21-25; 26-30; >30
Cadre	nck_initial_classcode nck_initial_cadrecode	Cadre of training received (i.e. enrolled, registered, BScN)	Include all enrolled, registered and BScN trained students

Appendix B – Key Informant Interview Guides

LECTURERS' & ADMINISTRATORS INTERVIEW GUIDE

WHAT IS THE DEMOGRAPHIC MAKE UP OF MOST OF THE STUDENTS IN YOUR INSTITUTION?
Domains: Age, gender, province of origin, previous education.

PROBES

- What is the average age of the students who enter? Youngest known age? Oldest known age?
- How does the age distribution differ by cadre?
- Do students at your school predominantly originate from certain provinces? Which ones?
- Could you describe how students from certain provinces/origins may have a different experience within the program versus others? Any patterns in what cadres they enroll in?
- What is the previous educational status (type of institution (govt, private, etc; geographical locations of secondary schools, etc.) of the students in this institution? Any patterns in what cadres they enroll in?

CAN YOU PLEASE DESCRIBE SOME OF THE MAIN CAUSES OF TRAINING DISRUPTION IN THE NURSING STUDENTS IN THIS INSTITUTION?
Domains: Relationships between occurrence/causes of training disruption, and age, gender, province of origin, previous education/level of preparedness/expectations, cadres, temporary versus permanent attrition

PROBES

- What are some common causes of training disruption that you witness at your institution?
- Is training disruption more common among older students versus younger students? Which causes of attrition?
- Is training disruption more common among male students versus female students? Which causes of attrition?
- Are certain types of disruption more associated with students from certain provinces?
- Do you feel that the students' previous education before entering the nursing program is associated at all with whether they experience training disruption? *(Their level of preparedness; expectations)*
- Do you witness training disruption in some cadres more than others?
- How common is it for students to successfully complete the program, but end up moving into non-health professions?
- Could you describe any patterns/differences you have witnessed in the causes of attrition based on the year of study of the students?
- Could you talk a bit about students who resume training after disruptions, if they are not expelled? Is this a common occurrence? Do female students who have training disrupted due to pregnancy often return after giving birth?
- How common is it for students to transfer to other institutions, either within the country, or abroad?

- Do you feel that the majority of students are able to handle the academic workload? Younger age groups versus older age groups *(who may have more responsibilities)*
- Could you describe any specific years or instances where attrition was very high?

CAN YOU PLEASE TELL ME ABOUT GRADUATION FROM THE NURSING PROGRAM, AND SUBSEQUENT APPLICATION FOR, AND PERFORMANCE IN THE NCK EXAM?
Domains: Time frame, how many students successfully graduate from the program, barriers to applying for the NCK exam, NCK exam performance.

PROBES

- Of the students that enroll, what percent would you estimate successfully complete the program?
- Do you perceive there to be any patterns in successful completion of the program with - age group, gender, cadre, province of origin, previous education, whether or not they had training disruption? Explain.
- What is the time frame between graduation from the nursing program, and application for/ administration of the NCK exam?
- Could you describe any instances where individuals may have successfully completed the program, but did not apply for the NCK exam? Reasons?
- Have there been any instances where you have known students who applied for the exam but did not sit for them? Reasons?
- How common is it for students to fail the exam on the first try? Any feedback from students who have failed? Do many of these students retake the exam?

CAN YOU PLEASE DESCRIBE THE CLINICAL REQUIREMENTS AND EXPERIENCES OF THE STUDENTS DURING THE NURSING PROGRAM HERE.
Domains: theory-practice gap, level of preparation/confidence for clinical work, mentorship

PROBES

- Where do most of the students at this institution do their clinical practice? Is it close by? Is transportation provided? How often do they go for clinical?
- How would you describe the relationship between the school's administration, and that of the facility where students do clinical? Are they well linked? Is there support from school tutors for clinical experiences?
- In the curriculum used at this institution, how would you describe the balance between theoretical academic instruction and instruction for clinical skills.
- What is some feedback that you consistently get from students regarding their clinical experience? Does staff at clinical sites take the time to mentor students?

COULD YOU DESCRIBE SOME OF THE CHALLENGES THAT TUTORS FROM NURSE TRAINING SCHOOLS IN GENERALLY FACE?
Domains: Number and workload of tutors, number of actual students versus recommended capacity, faculty continued education

PROBES

- Do most of the tutors feel equipped to provide the level of instruction that they would like?
- Enough tutors and support staff to give students enough attention, support, and motivation?
- Describe any continued education that is available to tutors? How often? Is it sponsored by the institution?
- Does the institution have the capacity to hold the number of students that it does?

Appendix C – Internal Review Board Exemption Form

EMORY UNIVERSITY | Institutional Review Board

TO: Martha Rogers, MD
Principal Investigator

DATE: March 24, 2010

RE: **Clarification of Exempt Status**

IRB 672-2006

Kenya Workforce and Database Analysis Project

Thank you for requesting clarification of whether the above-referenced study still qualifies as exempt in view of a change in plans. This study was re-determined to be exempt from further IRB review on **03/31/2008.** We have reviewed the information you submitted to the IRB on **03/24/2010** and find that the project, as changed, is still exempt from further IRB review.

As you know, a determination of exempt status is good indefinitely unless something changes substantively in the project that affects our analysis. The PI is responsible for contacting the IRB for clarification about any *substantive* changes in the project. Therefore, please *do* notify us if you plan to:

- Add a cohort of *children* to a survey or interview project, or to a study involving the observation of public behavior in which the investigators are participating.
- Change the study design so that the project no longer meets the exempt categories (e.g., adding a medical intervention or accessing identifiable and potentially damaging data)
- Make any other kind of change that does not appear in the list below.

Please *do not* notify us of the following kinds of changes:

- Change in personnel, except for the PI
- Change in location
- Change in number of subjects to be enrolled or age range for *adults*
- Changes in wording or formatting of data collection instruments that have no *substantive* impact on the study design

For more information about the exemption categories, please see our Policies & Procedures at www.irb.emory.edu. In future correspondence about this study, please refer to the IRB file number, the name of the Principal Investigator, and the study title. Thank you.

Sincerely,

Carol Corkran, MPH
Senior Research Protocol Analyst
This letter has been digitally signed

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