Full Length Research Papers

Task analysis: An evidence-based methodology for strengthening education and training of nurses and midwives in Liberia

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Liberia suffers from high maternal, infant and child mortality. In response, the Ministry of Health and Social Welfare prioritized a basic package of health services in 2007. Ensuring health workers are competent to deliver these services is crucial for safe and effective health care. A task analysis survey of health workers was conducted to determine how often recently graduated health workers perform tasks from the basic package of health services, and whether training was received for these tasks either in school or on the job. The findings informed updates to the curricula, core competencies and job descriptions of these cadres to help ensure a competency-based education linked to readiness for an entry-level position. Sample findings in key tasks, such as antenatal care and integrated management of childhood illnesses, highlight the need for examining where these competencies are included in the educational preparation of nurses and midwives. This paper will focus on nurse and midwife cadres and describe the: 1) Implementation of the study in Liberia, 2) Key findings and analysis of select clinical tasks, and 3) Recommendations for improving and integrating educational programs.

Key words: Competency-based education, core competencies, curricula, task analysis, nursing education, midwifery education.

INTRODUCTION

Liberia suffers from high maternal and child mortality, with a maternal mortality ratio of 994 per 100,000 live births, infant mortality rate of 71 per 100,000 live births, and under-five mortality rate of 235 per 100,000 live births, placing both new mothers and infants at high risk of mortality. In addition to this high disease burden, Liberia has a critical shortage of qualified health care workers (WHO, 2010; GHWA, 2010). High rates of infant and maternal mortality are further exacerbated by high prevalence of infectious diseases such as malaria, HIV and tuberculosis. Liberia's long civil war left its health care service delivery system fragmented, severely damaged and heavily dependent on donor funds. The conflict also crippled the capacity of the system to provide adequate health services for its people, leading to a serious decline in health indicators and access to care.

Rebuilding basic health services (RBHS) is a current five-year, USAID-funded project aimed at improving services at health facilities in Liberia. RBHS is working with the Liberian Ministry of Health and Social Welfare (MOHSW), educators and other stakeholders to strengthen its capacity to educate and deploy its health workforce in alignment with its basic package of health services (BPHS).

An optimal response to decreasing maternal and infant mortality rests on having a mix of qualified health care workers in sufficient quantities that are prepared to provide high-quality and relevant services (Frenk et al., 2010). There is ample evidence that sufficient numbers of clinically competent health care workers directly impact other health outcomes, including infant and maternal survival rates (WHO, 2006). However, increasing the number of midwives and nurses without ensuring their competency in the BPHS will not neces-sarily positively impact on maternal and infant mortality. Enhancements in the quality and relevance of tasks performed are essential and depend on a critical analysis

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of the tasks these cadres are expected to perform upon graduation. In order to contribute to the attainment of millennium development goal (MDG) 3 (empowering women), MDG 4 (infant and child mortality), MDG 5 (maternal mortality) and MDG 6 (HIV, malaria and other diseases), health workforce preparation needs to be evidence-based and relevant to national needs (Frenk et al., 2010).

Oshio et al. (2002) define task analysis as a "systematic assessment of knowledge, skills, and abilities (professional behaviors) that characterize [practice]". Task analysis is an evidence-based methodology used to understand the practices or tasks of health workers within health care systems. Classically, these studies survey a random sample of recent incumbents of the jobs for which individuals are being prepared. The survey is designed by subject matter experts using a range of pertinent documents that may include job descriptions, practice-related literature, educational curricula and professional core competencies. This latter category, core competencies, can be defined as the fundamental knowledge, ability or expertise in a specific subject area or skill set a provider needs; the core part of the term indicates the provider has a strong basis from which to gain the additional competence to do a specific job (SearchCIO-Midmarket.com). Once drafted, the survey is reviewed by a broad range of stakeholders and piloted to ensure its relevance and clarity. Results of a task analysis study may serve many purposes. Findings can be used to refine core competencies, amend job descriptions, develop policies on deployment and align curricula with national needs. Task analysis is a valuable tool that has thus far been underutilized for ensuring education is relevant to national needs. Researchers have, however, reported the results of job and task analyses conducted in Columbia (Hysong et al., 2007), in South Africa at the district level (Uys et al., 2003), and planned analyses in Tajikistan and China (Reamy and Gedik, 2001). The objectives of this paper are to: 1) describe key tasks expected of Liberian nurses and midwives in service delivery and 2) explore, through an analysis of these findings, the implications for educational and health policy reform.

MATERIALS AND METHODS

Design

The task analysis consisted of semi-structured interviews with recent nursing and midwifery graduates. Recent graduates were defined as anyone from the two cadres currently working in good standing in a health facility in a RBHS Project county that had graduated in the past six months to two years (2007 to 2009). Participation was voluntary and confidential. The survey tool was adapted from a task analysis tool of a study in Mozambique. Lessons learned from the Mozambique study prompted some adaptations. The Mozambique study team attempted to assess the respondent's ability to assess the impact if the respondent was not able to perform a task. In general, most respondents were unable to

comment or did not understand the question. The study team also indicated that they tried to assess knowledge, but the data from these questions did not reveal any useful information. The Mozambique study did not inquire about the location of training received. Since this study aimed to improve the preparation at the pre-service level, it was important for the Liberian task analysis study team to distinguish, if possible, whether the training was occurring as part of nursing and midwifery education or later as part of a program of job orientation or in-service training.

The task list (Appendix A) was based on the national performance standards, which were linked to national needs. The survey contained 264 tasks spanning infection prevention, health facility management and the 17 priority health areas specified in the six components of the BPHS: 1) maternal and newborn health, 2) child health, 3) reproductive and adolescent health, 4) communicable disease control, 5) mental health and 6) emergency care services. The task items were selected after consulting the BPHS and the clinical standards developed by the education and training national working group (ETNWG) and represents the tasks that registered nurses (RNs) and certified midwives (CMs) are expected to perform. The ETNWG reviewed the selected tasks used to develop the survey. The task analysis examined 19 areas critical to promoting public health in Liberia (priority areas are in Box 1).

This construction of a task analysis tool was unique in that generally, the survey tool is built only from reviewing job descriptions or professional scopes of practice. The survey targeted baseline tasks of RNs and CMs at the clinic or hospital level and was developed from the pool of tasks required of these health workers from the BPHS. These were compared and cross-referenced to job descriptions, core competencies and approved curricula for each cadre. Variations in the BPHS tasks versus tasks in the job descriptions and core competencies were immediately apparent. Many tasks that were required in the BPHS were not reflected in the job descriptions or were not addressed in core competencies or the curricula. Once the survey was in final draft, Liberian stakeholders and experts in the subject area reviewed the tool and gave their input to finalize the tool.

For each task, the respondent was asked how frequently s/he performs it ("Never", "Rarely", "Monthly, "Weekly", "Daily"), whether or not s/he was trained to do so ("Yes" or "No"), and if trained, where s/he was trained ("School", "Job", or "Both"). The survey also left space for other comments to be made for each task, as well as at the end of the survey, where the respondent was asked an open-ended question on whether the respondent performed tasks for which s/he had not been trained. The survey also collected a few demographic measures (county location, facility type, date of graduation and date of entering workforce). The respondents had different interpretations of being trained. For future inquiries, we recommend printing out definitions for the survey team, with each team giving the parameters for the meaning of being "trained" and each surveyor checking respondents for their understanding of the parameters. For future studies, collecting information on the school attended and area within the facility where the provider is working can enhance the utility of results. Finally, if the interviewee indicates that another worker performed the task, the cadre of that other worker should be identified, so that the survey team knows whether it is another worker of the same cadre or another type of cadre.

The standardization of data collection processes and instruments took place over a two-day workshop on research ethics and utilizing the survey instrument. Guidance was provided to the team on collecting informed consent and conducting structured interviews. Several team members included were also PSE instructors from both Tubman National Institute for the Medical Arts (TNIMA) and Esther Bacon School of Nursing and Midwifery (EBSNM) and had all collected data before, but had not administered informed consent procedures in the past. TNIMA is the largest health-related training institution in the country and is located in the capital, Monrovia, whereas EBSNM is a private school at the northern

1) Malaria; 2) Family planning; 3) Antenatal care; 4) Postnatal care; 5) Adolescent, 6) Sexual and reproductive health; 7) Normal labor care; 8) Obstetric complications; 9) Management;10) infection prevention; 11) Mental health; 12) Sick newborn care; 13) Expanded program on immunizations; 14) Integrated management of childhood illnesses;15) Infant and young child feeding;16) Emergencies; 17) Sexually transmitted infections; 18) Voluntary counseling and testing for HIV; Tuberculosis and 19) Other emerging diseases.

Box 1. Liberia's 19 priority areas to improving public health.

border in Zorzor, Lofa County. The survey team practiced in simulation first and then piloted the survey tool prior to the actual data collection. The workshop materials consisted of PowerPoint presentations, the workshop schedule, the Johns Hopkins School of Public Health Human Subjects Research Ethics Field Guide, syllabus, the two survey tools, and tools needed to carry out the data collection. These tools included a script for the data collector, talking points for persons encountered that are not participants (that is, county health team), roster and survey trip checklist, surveys, and lock box for completed surveys. The University of Liberia Institutional Review Board (IRB) and the IRB of Johns Hopkins University Bloomberg School of Public Health approved the final survey and study protocol, consent forms and other tools. The tools had been piloted (as mentioned earlier) with six recent graduate volunteers from a local hospital and clinics in Monrovia with the facilities department head's approval. The survey was revised for language clarifications as requested.

Sampling

An estimated 100 RNs and 40 CMs were graduated between 2007 to 2009 from Liberian training institutions. A convenient sample was selected from seven of fifteen counties (where RBHS-supported health facilities are located). A convenient sample was deemed feasible due to the lack of available systematic data on the number of recent graduates actually working in MOHSW sites. Prior to the site visits, the field investigator contacted the county health coordinators and clinical site supervisors to inform them about the study and that a study team would be visiting on specified dates.

The RBHS county coordinators collected information on the number of new graduates that might be available for the interviews. Within each county, the study team first visited project-supported facilities, followed by other health facilities as time permitted.

Data collection

Data collection was conducted from December 2009 to February 2010 by a team of 12 interviewers who had successfully completed the ETHICS AND SURVEYING WORKSHOP. The study team included interviewers representing each cadre, the RBHS county coordinators responsible for working with the county health team on RBHS activities implemented by nongovernmental organizations supported by RBHS funding, and RBHS pre-service education staff. Informed consent was obtained from all survey participants. The current study's response rate was 100%, since all health workers asked to participate agreed and no one dropped out or changed their mind. Additionally, the current study attempted to decrease self-reporting bias by conducting interviews in-person.

Data entry and analysis

The data were all categorical. Data entry was conducted from January to March 2010. Ten percent of the data entries were verified and any errors found were fixed in the database. Missing or inconsistent responses were assigned specific codes and not included in the results and analysis. Performance of a task was separated into two categories. A task was defined as 'frequent" if the task was performed "daily" or "weekly" and defined as "rarely" if the task was performed "monthly" or "rarely". Descriptive statistical analysis was performed on the overall survey data, with additional breakdowns by cadre and facility level. Stata v 11.0 was used to tabulate the data. No statistical tests were conducted for comparing the data between cadres as the results and analysis are purely descriptive.

RESULTS

Description of respondents

Among the 165 study respondents, 46 CMs and 119 RNs who graduated in the previous six months to two years were surveyed, representing half of the recent graduate population of these two cadres nationwide. The mean time in the workforce was 16.9 months for CMs and 13.6 months for RNs. The results presented focus on areas of practice that appeared to have overlaps in practice between the CM and RN. They are antenatal care (ANC), normal labor care (NLC), postnatal care, obstetric complications (OC), malaria, expanded program of immunezations (EPI) and integrated management of childhood illnesses (IMCI). The results are organized into three main characteristics of the responses. The three characteristics are:

1) Proportion of interviewed health workers reporting frequently performing at least one task in the area,
2) Select findings within an area for individual tasks, and
3) Proportion of health workers that did not receive educational preparation in school.

Antenatal care

Thirty-nine percent of nurses and 83% of midwives reported performing at least one ANC task frequently.

Although, on average, less than 40% of RNs perform at least one ANC task frequently, a minimum of 65% of clinic RNs do so frequently, with the exception of one task: counsel ANC clients with HIV, reported to be frequently performed by no more than about one-third of nurses. Similar trends can be seen for midwives, with about 60% of clinic midwives providing counseling for ANC clients with HIV. Eighteen percent of nurses and 13% of midwives did not receive training in school for some ANC tasks. CMs from both levels, especially at hospital level, perform ANC tasks more frequently than RNs.

Normal labor care

Seventy-three percent of midwives perform at least one NLC task frequently. More than 80% of midwives reported reviewing and filling out the clinical history of the woman in labor, but only about half reported preparing and implementing a plan for providing care to the woman according to the findings of the history and physical exam. Another key task is use of the partograph. Partograph use was reported to be performed frequently by 80% of midwives, but AMTSL was reported as being performed frequently by about 60% of midwives. Also of note, 18% of midwives did not receive training in school for at least one key NLC task and would have to be trained on the job to perform that particular basic package of health services task.

Postnatal care

Within postnatal care, there is a large difference between the overall proportions of each cadre that perform postnatal care tasks frequently. The differences between clinic and hospital CMs are small, but not for RNs. Thirty-eight percent of nurses and 83% of midwives reported performing at least one postnatal care task frequently. More clinic nurses reported performing postnatal care tasks frequently, with a range of 55 to 82% across all tasks as compared to a range of 10 to 32% of hospital nurses. The task reported frequently performed by the lowest proportion of nurses was "referring the postpartum women per protocol." A range of 70 to 100% of midwives reported performing postnatal care tasks frequently except for referring the postpartum woman per protocol, which was frequently performed by only 37 and 60% of clinic and hospital midwives, respectively. Twenty percent each of nurses and midwives did not receive training in school on at least one key postnatal care task.

Obstetric complications

Twenty-four percent of midwives reported performing at least one OC task frequently. About half of midwives at hospital level reported frequently managing incomplete abortion, managing severe pre-eclampsia or eclampsia and managing PPH (due to retained placenta, uterine atony and perinea or cervical tears), and performing uterine massage and extraction of clots for management of PPH. Across key OC tasks, an average of 3% were not trained at all; an average of 4% trained only on the job; an average of 45% were trained in school only; and an average of 48% received training both in school and on the job.

Malaria

Eighty-three percent of nurses perform at least one malaria-related task frequently. Across the tasks, an average of 2% were not trained, an average of 22% received on-the-job training (OJT) only, an average of 21% received training in school only, and an average of 55% received training both in school and OJT.

Expanded program on immunizations

The cadre that has the highest proportion of health workers performing EPI tasks frequently is CMs. Twenty-four percent of nurses perform at least one EPI task frequently. However, midwives report providing vaccination services more than nurses, with over 40% of midwives reported performing key vaccination tasks frequently and no less than 70% of clinic-level midwives reporting frequently using the vaccine schedule, educating clients on the immunization schedule and administering injectable and oral vaccines. Nine percent of nurses did not receive training in at least one EPI task, 16% received OJT only, 51% were trained in school only and 23% received training both in school and OJT. Among midwives, 5% reported no training at all in at least one EPI task, 11% received only OJT, 58% were trained only in school and 27% were trained both in school and OJT.

Integrated management of childhood illnesses

Fifty-seven percent of RNs perform at least one IMCI task frequently. In general, clinic nurses provide IMCI services more frequently than hospital nurses, as could be expected, although a maximum of about 40% of clinic nurses interviewed reported assessing infants for jaundice, about 20% reported classifying and treating it. Four percent of nurses were not trained at all in at least one IMCI task, 18% received only OJT, 35% school only and 42% received training both in school and OJT.

DISCUSSION

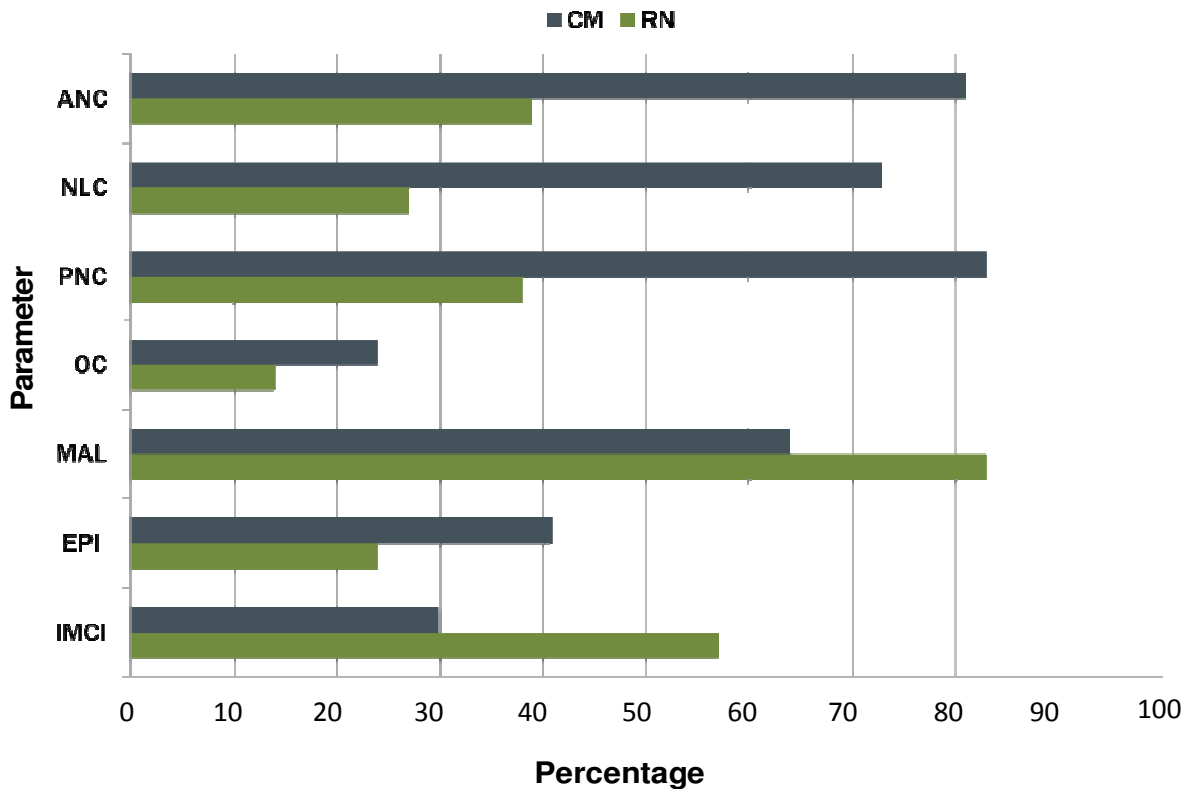The data may be viewed in many ways, depending on the

Figure 1. Overall percentage of RN and CMs frequently performing key tasks, by area.

objective of the inquiry. The study team chose recent graduates in hopes that the recall of their educational program would be more accurate and that the findings would elicit key tasks currently being performed and compare those tasks to national needs and priorities as outlined in the BPHS. Findings of actual performance on the basic package related tasks help determine changes needed in educational preparation for each cadre. The present analysis focused on identifying key tasks that should be included in each cadre's scope of practice. These tasks need to be included in updated job descriptions and reflected in educational preparation. Determining key tasks to include is based on frequency of performance, criticality of task, consistency with national needs, existing job descriptions, desired core competencies and available resources. In turn, updated job descriptions may act as a guide for ensuring that the core competencies, training content, teaching and learning methods, and assessment methods, job placement and job orientation are all linked to expected, observable job functions of an entry-level health professional graduating from a diploma program. Family planning requires a separate discussion and is not included in this paper. FP tasks were performed by a low proportion of providers because there are few providers that have been trained. Widely known to be critically important competencies, FP tasks were recommended to be included in all of the

health service cadre's job descriptions.

Frequency percentages (Figure 1) represent the proportion of daily or weekly responses on tasks within each area. These results, however, are not a complete measure of how often this care is provided by other health workers not included in the survey. For example, a more senior health care provider (that is, more than two years of experience) could be implementing tasks that are not reflected. Nonetheless, these overall averages help identify, at a minimum, which areas should be part of job descriptions. It is important to use caution when considering removing tasks from the job description, as the data from this task analysis may not reflect the performance of more experienced health workers. However, it may inform priority areas of in service training for recent graduates, who need to grow into necessary expanded roles not possible to develop within midwifery and nursing school.

ANC

Based on these results, all ANC tasks may be included in the job descriptions for RNs and CMs. Adding these, ANC tasks is only the first step, but the job description provides guidance to where changes may be needed in both curricula. This cross-training, or as Frenk et al. (2010)

describe, "transprofessional education," allows for a significant cost savings to the educating institutions and easier integration of topics not currently included (e.g., HIV counseling during ANC). Not only can institutions share instructors and classroom time on these topics, but they can also use the same simulation resources and space and conduct joint assessments. Opportunities should be carefully planned and managed to save time and resources for both programs. The added benefit is that nurses and midwives will start at the training level, learning to work side-by-side and from each other.

The list of ANC tasks includes malaria, HIV, and postpartum family planning (PPFP) tasks that are integral to ANC services. Midwives and nurses are best positioned to identify, assess, treat and educate on diseases like malaria and HIV in pregnant women, as well as prepare the woman to choose a PPFP method prior to delivery. They have the ability and the foundation to learn the required competencies and to educate their communities to protect themselves. In the 2010 United Nations report on the state of MDGs, Liberia's data on the use of insecticide treated nets was not recorded. This may be because Liberia was in a state of civil war during the baseline collection in 1990 and hence comparison data was not collected. However, Liberia also aims to achieve the MDGs by 2015 and has resources to combat malaria and other diseases. The use of this simple measure improves progress towards MDG3 through MDG6.

NLC

The results in this area suggests that: 1) respondents did not understand the question posed on preparing and implementing a plan for providing care and/or 2) these health workers are not prepared or do not feel confident in their level of competence to make the clinical decisions required once they have the information. Other possible reasons for this finding might include a lack of referral system or the unavailability of resources and materials required to conduct the tasks. Additionally, fewer than 50% of CMs report performing three key tasks frequently: provide HIV counseling and testing, give antiretroviral medicine during childbirth and use acceptable, feasible, affordable, sustainable and safe criteria to counsel women on infant feeding tasks. Again, these are clinical tasks that, if not completed, compromise the health of both the mother and the newborn. Because partograph use includes conducting AMTSL, the finding that partograph use is not performed at an equal frequency to AMSTL is concerning. The gap is clear, given that these are all International Confederation of Midwives essential competencies. All deployed midwives should be competent in all NLC tasks and educational preparation needs, to ensure competency development in these tasks. Based on the decision that the MOHSW has taken, all NLC tasks should be included in the job descriptions of RNs working at clinic level, at least until an adequate

number of midwives in the country is attained.

Again, the opportunity for integration of topics in education preparation and then integration of health services is clear. If the patient is in need of HIV-related care, that provider needs to be prepared to deliver the services at the point of care during the intra-partum period. Hence, the job description should include the HIV-related tasks, since the provider performing all other NLC tasks would probably also be responsible for the HIV tasks. Either HIV training needs to be included during pre-service education, made a certification post-graduation but prior to deployment, or more in-service training needs to be implemented. This should be discussed with the National AIDS Control Program. Testing is not yet routine and therefore the available prevalence is most likely not the actual disease burden. The current estimated prevalence is 1.7%. Liberia has deemed the HIV burden a national need and therefore at the minimum, health workers need to be prepared to be competent to implement prevention and control programs upon or shortly after graduation.

PNC

These findings suggest several hurdles that both health workers and women face: 1) the availability of protocols and guidance for women on where to follow up, 2) when to return or where to go for additional services, and 3) the sheer lack of referral centers. These tasks should be continued and strengthened and the job description aligned to reflect expectations of the RN on the job. Again, the resources may be shared at the pre-service level to offset needed training costs. The opportunities for transprofessional education are mounting and could set precedence for other countries trying to attain similar goals.

OC

These tasks are performed in response to events that are not frequent but are life-threatening. It is not surprising, therefore, that the overall proportions of each cadre that perform these tasks frequently are quite low for each of the cadres. However, these tasks have life-saving potential and as such should be included in updating the job descriptions of both cadres who are considered skilled birth attendants. A strategy for training and deploying midwives to provide basic emergency obstetrical care, is a key to reducing maternal and newborn mortality (Campbell and Graham, 2006).

Malaria

The high proportion of providers performing malaria tasks confirms the need to ensure educational preparation is relevant to national needs and adequately prepares health workers to deliver those services upon graduation. Key malaria competencies should be included in the

responsibilities of both RN and CM job descriptions, with CM focus on malaria in pregnancy tasks. Prior to RBHS, malaria prevention received focused funding to provide training to health workers who are already practicing. In Liberia, this funding is vertical funding (that is, the funds may only be used for a specific health topic) and may only be used for malaria training. Thus, malaria training is available with test kits and clear diagnostic and treatment algorithms. Does vertical funding mean that these funds could not be used to support the integration of vertically funded topics into PSE? Not necessarily. Since starting our PSE work under RBHS, vertical funding has been made available for PSE. This simply required making the vertical programs aware of the need and the training institutions aware of the support.

EPI

The EPI findings suggest that a minimum of two health worker cadres should be prepared to give EPI. If two health workers are capable of providing EPI, then if one cadre is not present, there is another available given the demand of needed immunizations. Overlap and task sharing is essential to providing the services consistently. A module on EPI should be included under primary health care (PHC) or perhaps some content could be reduced in RN curriculum (e.g. epidemiology in PHC II) to give RNs credit hours to EPI. Interestingly, CMs have immunization responsibilities in their job description, but it is only currently included in theory-based training (lecture only) in their curriculum. Since CMs are already providing immunizations, their educational preparation needs to adequately address competency development of these tasks, giving adequate time for practicing in a simulated environment with possible scenarios they may encounter. Simply knowing how to give an injection is not sufficient. The provider must have key information and practice with the logistics, quality of the vaccine products, and monitoring and tracking adverse reactions.

IMCI

Considering these findings, existing pediatrics syllabi should be cross-checked with IMCI content, and any missing content inserted, as well as added to each job description as it is currently not listed. IMCI provides guidance on a critical list of tasks in managing childhood illnesses but it is not comprehensive and would not replace issues around well child visits, maintaining health and developmentally appropriate care. Liberian leadership has rightly chosen that IMCI be a part of the BPHS. Now, ensuring that educators have IMCI integrated with practical exercises and role plays will increase their ability to teach students to effectively communicate to parents how to better care for their children, where

most of child care takes place (WHO EMRO, 2010).

Conclusion

Even though only a portion of all the RNs and CMs in Liberia was sampled, this study produced concrete evidence and a wealth of information to help ensure that changes to pre-service education are relevant and respond to national needs. This underscores the usefulness of the task analysis methodology in determining core competencies, scopes of practice, job descriptions and educational preparation. Building the evidence base for conducting task analyses could equip developing countries with a practical, established method of determining the current work practices of a cadre and rationalizing their pre-service education and in-service training systems accordingly.

In the most recent version of the BPHS, the MOHSW requested more research be conducted to ensure future versions of the BPHS include evidence-based interventions. The task analysis method was very useful in providing information on whether revisions to pre-service and in-service curricula are needed and showed evidence and trends across different health areas, facility types and cadres. In some cases, the results demonstrated that current educational preparation is adequate; in others, the results highlighted the need for more attention to competency development for tasks in the areas of EPI and OC. Interestingly, by allowing for comparison between cadres, the task analysis also demonstrated the potential for combining the training and assessment of multiple cadres in areas in which they should all receive training. From this task analysis, changes may be considered for:

1) Tasks included in an entry-level job description for RNs and CMs;
2) Related core competencies required to meet national needs; and
3) Curricular changes needed in pre-service education to prepare graduates to implement these tasks. In addition, the leaders of education and training in Liberia should continue a trend in that they have already had the foresight to start: transprofessional education.

Vertical programs need to be included in the decision-making process of which tasks should be moved into pre-service education. Changes in content have broad impact across the curriculum; thus, changes require broad involvement of faculty, professional councils, patients and other key stakeholders (WHO, 2006). This process may limit the speed and number of decisions, but is the only way to provide legitimacy (WHO, 2006). In successful pre-service interventions, the process is owned by the political leaders (ministers, council registrars and professional association leaders) (Crisp et al., 2008). This is

a transition to a more sustainable model, but all stake-holders need to participate. It is important to determine to what level and in what courses this material may be integrated, adjusting hours and length of study as needed.

When combined with epidemiological, demographic, political and socioeconomic contexts and evidence, task analysis provides critical data to support national efforts to ensure pre-service education meets national health goals. Stakeholders from the government, professional associations, training institutions and nongovernmental organizations can review the data to determine how health worker education and performance can help to meet national health goals and contribute to the global health agenda. In addition, stakeholders may utilize the standards on which the questions were based to improve the quality of the services. Although the task analysis does not address quality, the RBHS program in conjuncttion with instructors and health providers is addressing quality through implementation and monitoring of the performance standards. Administrators, instructors and clinicians have an opportunity to provide feedback on a monthly basis to assist in strengthening their respective sites.

National level policy changes

After the findings and analysis were shared with the Liberian Education and Training National Working Group, the working group decided to adopt the majority of the investigators' recommendations and made additional revisions to current training curricula and job documents. The majority of those recommendations as they pertain to these two cadres have been threaded throughout the results and discussion of this paper. The study has also informed the quality improvement process that is under-way for both the nations' pre-service institutions and the health facilities. As these changes are formalized and officially implemented, Liberia will become one of only a handful of developing countries to have utilized task analysis to rationalize pre-service education in the health training sector.

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APPENDIX

Appendix A: Task lists

Here, the 22 NLC tasks are presented as follows:

1) Assess pregnant women in labor to identify complications and prioritize admissions.
2) Treat pregnant woman in labor in a respectful manner.
3) Review and fill out the clinical history of the woman in labor.
4) Conduct the physical examination between contractions if time allows.
5) Conduct the obstetric examination between contractions if time allows;
6) Conduct a vaginal examination of a woman in labor;
7) Provide counseling and testing for women in labor with unknown HIV status.
8) Give antiretroviral medicine to HIV-positive women during labor and delivery.
9) Use acceptable, feasible, affordable, sustainable and safe criteria to counsel HIV-positive women on infant feeding.
10) Prepare and implement a plan according to the findings of the history and physical exam for providing care to the woman.
11) Use partograph to monitor labor and make adjustments to the birth plan;
12) Assist woman to labor and deliver in the position she wants.
13) Assist woman to have a safe and clean birth.
14) Conduct rapid initial assessment.
15) Perform active management of the third stage of labor (AMTSL).
16) Perform immediate postpartum care.
17) Dispose medical waste after assisting the birth according to protocol.
18) Place used equipment in decontamination solution according to protocol.
19) Monitor newborn in immediate postpartum period.
20) Monitor woman for at least two hours after the birth.
21) Perform resuscitation of the newborn and
22) Provide appropriate medication to the newborn.

The 18 ANC tasks included in the survey were:

1) Conduct rapid initial evaluations of pregnant women.
2) Treat woman and companion(s) with respect.
3) Interview pregnant woman for danger signs.
4) Obtain obstetrical history.
5) Obtain medical history from pregnant woman.
6) Perform physical exams on pregnant woman.
7) Perform obstetrical exams.
8) Counsel woman and companion(s) on personal care (nutrition and hygiene).
9) Counsel woman on breastfeeding.
10) Conduct individualized care for pregnant woman based on findings and protocols.

11) Initiate intermittent preventive treatment according to protocol.
12) Assist women and companion(s) with birth preparedness and complication readiness.
13) Plan return ANC visits.
14) Counsel ANC client regarding postpartum family planning.
15) Counsel ANC clients with HIV.
16) Evaluate care given to ANC client.
17) Treat pregnant woman with malaria according to national guidelines.
18) Advise on use of insecticide-treated net.

The survey included the following 12 postnatal care tasks:

1) Conduct a rapid initial assessment of the postpartum woman.
2) Treat woman and companion(s) with respect.
3) Verify existence of, or open a record for, the postpartum woman.
4) Conduct routine physical postpartum exam.
5) Manage postpartum woman according to assessment findings.
6) Advise on danger signs during postpartum.
7) Refer postpartum woman per protocol.
8) Assess the neonate.
9) Demonstrate proper positioning and attachment of neonate on the breast.
10) Manage the neonate.
11) Counsel parent(s) on baby's care.
12) Advise on danger signs in neonate period.

The OC task list includes the following 13 tasks:

1) Manage hypovolemic shock of woman.
2) Maintain airways.
3) Administer oxygen to the woman, 6 to 8 L/min by cannula or mask,
4) Start two IV lines using a 16- or 18-gauge needle.
5) Conduct Rh cross-match.
6) Assess woman's need for transfusion based upon signs of shock or impending shock due to amount of blood loss.
7) Recognize symptoms of acute postpartum coagulopathy.
8) Manage incomplete abortion,
9) Manage severe pre-eclampsia and/or eclampsia,
10) Manage postpartum hemorrhage (PPH) when bleeding is due to retained placenta,
11) Manage PPH when bleeding is due to uterine atony.
12) Manage PPH when bleeding is due to perineal or cervical tears.
13) Perform uterine massage and extraction of clots for management of PPH.

The malaria area included eight tasks (malaria care for the pregnant woman was included under ANC and was

presented with ANC results):

1) Conduct a rapid initial assessment of suspected malaria of client.
2) Collect key information during history-taking.
3) Conduct a physical exam to diagnose malaria.
4) Use malaria case management diagnostic algorithms.
5) Use malaria case management treatment algorithms.
6) Manage malaria in children under-five years of age.
7) Use rapid test to identify presence of malaria parasites.
8) Provide education on malaria prevention.

The eight EPI tasks included in the analysis were:

1) Use of cold chain system to preserve vaccine integrity.
2) Participate in vaccine consumption recording.
3) Use a multi-dose and open-vial policy.
4) Ask client about immunizations received.
5) Use the immunization schedule with clients.
6) Educate clients on immunization schedule.
7) Administer vaccines to clients according to protocol.
8) Administer oral vaccines.

The 43 IMCI tasks in the survey were as follows:

1) Conduct rapid initial assessment of infants.
2) Assess for possible bacterial infection in infants.
3) Classify bacterial infection in infants.
4) Treat infants for infection.
5) Assess for possible jaundice in infants.
6) Classify jaundice in infants.
7) Treat infants for jaundice.
8) Assess infant for diarrhea.
9) Classify dehydration in infants.
10) Treat infants for diarrhea with severe dehydration.
11) Treat infant for diarrhea with some and no dehydration.
12) Treat infant for severe persistent diarrhea and/or dysentery.

13) Assess infant for feeding problems or low weight.
14) Classify feeding problem or low weight in infants.
15) Manage infant for feeding problem or low weight.
16) Assess infant's immunization status.
17) Advise mother/father/caretaker about infant danger signs.
18) Conduct initial identification of child's problems,
19) Assess child for general danger signs.
20) Classify sick child for general danger signs.
21) Treat sick child with very severe disease.
22) Assess child for cough or breathing difficulty.
23) Classify sick child for cough and breathing difficulty.
24) Treat child with severe pneumonia or very severe disease.
25) Treat child with pneumonia and no pneumonia.
26) Assess child for diarrhea/dehydration.
27) Classify diarrhea/dehydration in the child.
28) Treat child for diarrhea with severe dehydration.
29) Treat child for diarrhea with some and no dehydration.
30) Treat child for severe persistent diarrhea and dysentery,
31) Assess child for fever and measles.
32) Classify child with fever in malaria high-risk areas.
33) Classify child with fever in malaria low-risk areas.
34) Classify child with fever and measles.
35) Treat child for fever in malaria high-risk areas.
36) Treat child for fever in malaria low-risk areas.
37) Treat child for fever and measles.
38) Assess child for ear problems.
39) Classify child with ear problems.
40) Treat child with ear problem.
41) Check child's immunization.
42) vitamin A supplementation.
43) de-worming status.