Costs of pre-service Midwifery education

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Introduction

This paper discusses the critical factors in costing of pre-service midwifery training program and identifies arguments associated with the cost effectiveness of midwife-led programs.

The Importance of Costing Midwifery Training and Services

Within the iterative cycle of planning, costing, budgeting and financing, the planning stage often involves a few important steps such as performing a needs assessment, identifying targets and goals, analyzing bottlenecks as well as selecting impactful and implementable interventions. The output of the planning stage needs to be costed in order to assess different options and possible strategies for improving health. In the specific example of pre-service midwifery training programs, the costing of these programs is necessary to effectively allocate resources among other possible investments in human resources and more broadly in the health system.

For example, when considering MDG 5A – “reduce by three quarters, between 1990 and 2015, the maternal mortality ratio” – it is well established that increasing skilled birth attendance is a highly impactful intervention. Thus, access to a fully competent skilled birth attendant, a midwife or equivalent, during pregnancy, childbirth and the post-partum period, is critical.

In order to estimate the costs of midwifery training, one of the most important initial steps at the planning stage is the projection of midwifery training needs. In Tanzania, with a forecasted requirement of a midwife density of 0.2 FTEs (full-time equivalent) per 1,000 population, it was estimated that 7,600 midwives would be needed to meet the health requirements in 2015. This projected need for midwives must be compared with the current supply, production capacity and attrition rates to determine what changes need to occur in
order to achieve this goal. If the required number of midwives exceeds the production capacity then the planning should include considerations such as building new schools and expanding the current schools. If attrition is a major factor limiting the number of practicing midwives then this issue needs to be addressed through retention programs. If the geographic distribution of midwives is an issue then programs which encourage a more geographically diverse recruitment of trainees and also encourage relocation of midwives should be developed. Quality concerns such as the training of master midwifery trainers and equipping of training sites have to be considered as well.

Midwifery pre-service training costs are one component of the broader health system costs, which include other aspects of human resource costs such as salaries, benefits, incentives, in-service training, as well as non human resource costs including facilities, equipment, supplies, medicines, logistics systems, monitoring, evaluation and other components. Given this broader context of scaling up an entire health system, it is important to cost midwifery pre-service training programs and answer the question “how much of the overall costs are associated with midwifery pre-service training?”

Recently there have been a large number of exercises which estimated the costs of scaling up service delivery to meet the health-related MDG goals including Adding It Upiii, ICPD @ 15iv, the High Level Task Force on Innovative Financingv and the Secretary General’s Global Strategy for Women’s and Children’s Health.

According to the High-Level Taskforce on Innovative Financing for Health Systems, about 9% of the incremental costs of scaling up health system were related to the pre-service training of all cadres of health workers (Figure 1)vi. In this exercise, the authors lacked national estimates of the capital costs for constructing new schools so they assumed that the projected training needs are within current training capacity. Consequently, necessary capital costs associated with increasing training capacity were omitted and the resulting cost estimates for pre-service training significantly underestimate the actual projected costs. It has been estimated by the International Finance Corporation that start-up costs for a school for nurses, midwives, and lab technicians range from US$0.3 to $2 million, for a large, multidiscipline medical university range from US$3 to $10 million, and distance learning programs for nurses range from US$0.2 to $0.5 millionvii.
According to Constraints to Scaling Up the Health Related Millennium Development Goals, the WHO estimated that 75,495 additional midwives were needed by 2015 in order to support increased scaling up of skilled birth attendance worldwide. In the African Region, it was estimated that an additional 1.5 million health workers were needed to meet the minimum standard of health service at a projected total pre-service training cost of $26.4 billion over a 10-year period.

The UNICEF-led working team for the High-Level Taskforce on Innovative Financing for Health Systems estimated a similar percentage of pre-service training for the total cost in spite of using a different costing methodology. In this cost estimate, the general reluctance of existing midwives to work in rural areas was identified as an issue in scaling up delivery coverage.

Cost Components within Midwifery Training Programs

Identifying the scope of costing and the cost components is a critical initial step in costing midwifery training programs, both for pre-service training and in-service training. Cost estimates are developed where these estimates need to pay particular attention to the capital and recurrent costs. Capital costs refer to one-time expenses on items expected to last for more than one year such as the initial construction, upgrading and major rehabilitation of facilities as well as equipment purchases and development of trainers. Recurrent costs include the costs of operations, maintenance of facilities and equipment as well as program-related costs such as personnel, materials and supplies. The capital costs
of a typical midwifery training program may include school construction and equipment purchases. Typically, if the projected need exceeds the current training capacity, the capital costs will increase significantly due to necessary investments. The recurrent costs of the program may include facility costs (operation, maintenance, and supplies), student accommodation and meals, student allowance, midwifery staff costs such as salary, incentives, benefits, development of trainers, as well as administration costs including personnel and supervisory visits. Transportation costs may have both capital and recurrent elements depending on how a school implements its transportation plan (Figure 2).

Whenever costing is performed, an explicit decision needs to be made concerning from whose perspective is the costing being performed. Possible options include from the point of view of the national government, from the point of view of the student and from the point of view of other actors involved in midwifery pre-service training.

From the government’s perspective, the tuition paid by students is revenue, rather than a cost. If it is assumed that the midwifery pre-service training program is run profit-neutral, then the revenue equals the cost by definition. Under this assumption, the annual tuition per student would equal the annual cost per student. While there are limitations to this argument, since in some countries, the tuition fees are funded or partially funded by the government or external partners, this assumption will be leveraged later in the chapter.

**Figure 2**

<table>
<thead>
<tr>
<th>Capital costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• School construction</td>
</tr>
<tr>
<td>• Equipment purchases</td>
</tr>
<tr>
<td>• Transportation costs (if vehicles purchased)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recurrent costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Facility costs (operation, maintenance, and supplies)</td>
</tr>
<tr>
<td>• Student accommodation and meals</td>
</tr>
<tr>
<td>• Student allowance</td>
</tr>
<tr>
<td>• Midwifery staff costs</td>
</tr>
<tr>
<td>• Administration costs</td>
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<tr>
<td>• Transportation costs</td>
</tr>
</tbody>
</table>

**Country-Specific Estimates of Pre-service Midwifery Training Costs**

According to the WHO, the health workforce is classified into nine groups (Figure 3). Of these health professions, the cadre of nursing and midwifery personnel includes professional midwives, auxiliary midwives and enrolled midwives. Pre-service training costs vary based on the cadres since care configurations and training time vary for different cadres.
See Table 1 for country specific inputs related to training costs and training cost elements.
Table 1. Country specific inputs related to training costs and training cost elements for selected countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Duration of Training</th>
<th>Scope of Costing</th>
<th>Cost per student per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>26 months (24 months training + 2 months selection, deployment)</td>
<td>All expenses including housing, food, training material etc.</td>
<td>US$8,000-9,000</td>
</tr>
<tr>
<td>Burundi</td>
<td>4 years</td>
<td>Tuition, transportation, accommodation and living fees, Registration Fees, Internet Fees, Library charges</td>
<td>US$3,250</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>4 years</td>
<td>School fees (classroom learning and clinical experience in the field)</td>
<td>US$1,630</td>
</tr>
<tr>
<td>Ghana</td>
<td>3 years</td>
<td>Tuition, transportation, living fees, books, educational visits</td>
<td>US$1,502</td>
</tr>
<tr>
<td>Kenya</td>
<td>---------</td>
<td>Recurrent expenditures</td>
<td>US$1,800</td>
</tr>
<tr>
<td>Malawi</td>
<td>3 years</td>
<td>Tuition, boarding facility fees</td>
<td>US$1,504</td>
</tr>
<tr>
<td>Southern Sudan</td>
<td>3 years</td>
<td>Scholarship, full board, books, and transportation fees</td>
<td>US$11,800</td>
</tr>
<tr>
<td>Tanzania</td>
<td>---------</td>
<td>Recurrent expenditures</td>
<td>US$3,236</td>
</tr>
<tr>
<td>Yemen</td>
<td>2 years</td>
<td>Tuition</td>
<td>US$1,250</td>
</tr>
</tbody>
</table>

Sources: References 23-31. Costs estimates are from different sources ranging from 2006 to 2010.

Since the data sources varied, the scopes are different for the costs listed in Table 1. For Afghanistan, Southern Sudan, Yemen, Malawi, Ghana, Burundi, Ethiopia, Kenya, and Tanzania, the estimated costs per student per year are recurrent costs ranging from US$1,250 to US$11,800. These cost estimates do not include capital costs, thus they are likely an underestimate of the overall costs.

Cost Effectiveness of Midwife-led Programs

Developing an accurate cost-effectiveness model to compare midwife-led programs to physician-led programs is challenging due to major data constraints. As an alternative, we will present a series of logical arguments for the cost-effectiveness of midwife-led versus physician-led programs which includes an analysis of the differences in training costs, salary, attrition rate, and effectiveness of the two health professionals. This analysis is made for a specific scope of skills – midwifery skills. It is acknowledged that the scope of medical skills required for emergency situations goes beyond standard midwifery skills.

Cost drivers and effectiveness measurements are the two components needed to analyze the cost-effectiveness of midwife-led versus physician-led programs (Figure 4). The cost drivers include pre-service training, in-service training, salary, incentives, benefits,
Cost Drivers

- Pre-service Training
- In-service Training
- Salary
- Incentives
- Benefits
- Administration Costs
- Monitoring and Evaluation

Effectiveness Measurements

- Number of patients served
- Skilled birth attendance rate
- Maternal mortality rate
- Adverse event rate
- Beneficial outcomes
- Administration costs
- Monitoring and Evaluation costs

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Administration costs and monitoring and evaluation costs. The effectiveness measurements may include service delivery statistics such as number of patients served or the corresponding skilled birth attendance rate or they may include outcome measures such as maternal mortality rate and adverse event rates. Attrition plays an important role in the cost effectiveness since high attrition rates require a more rapid replenishment of the human resources than lower attrition rates.

**Figure 4**

Relative cost of training. In the High Level Task Force in Innovative Financing (2009) and the World Health Report (2006), WHO assumed that the total pre-service education costs were a multiplicative factor of the GDP per capita. The estimated cost of a midwife’s pre-service training was about 1/3 the cost of a physician’s pre-service training where it was assumed that physician training was for 6 years and midwife training lasted 3 years. An important additional consideration is that the midwife’s shorter duration of training allows for faster scaling of delivery service than doctor-led models.

Relative salary. According to the WHO CHOICE salary database, salaries for health professionals are classified by different educational codes. For example, level 3 corresponds to nurse/midwife; level 4 corresponds to medical officer/nursing director; level 5 corresponds to medical specialist. A salary for a physician or medical specialist is generally at least twice that of a salary for a nurse/midwife (Figure 5). If incentive pay is provided to encourage relocation to remote areas, then the compensation difference becomes even larger since incentive pay is often proportional to the base salary.
**Relative attrition rate.** Attrition is a major issue impacting the ability of countries to scale up coverage. Causes of attrition include serious illness/mortality, dismissal, retirement from medical field, changing professions within the medical field, and emigration. While mortality-related attrition for midwives and nurses is lower than for doctors, it remains a relatively minor contributor to the overall causes of attrition. Based on the Zambia Ministry of Health payroll data from September 2008, the baseline estimate of total attrition for midwives was 4.5%, with involuntary attrition of 3.1% and voluntary attrition of 1.4%. By contrast, the baseline estimate of total attrition for doctors was more than double at 9.8%, with involuntary attrition of 6.7% and voluntary attrition of 3.1% (Figure 6). The components of involuntary attrition included dismissal (12%), retirement (10%), contract expiration or transfer (8%), and serious illness and death (38%). In 2006, the attrition rate for doctors in Nigeria was 2.3% or once again about double the 1.4% rate for nurses and midwives. The health profession’s attrition was primarily due to migration with voluntary retirement being less critical.

**Relative effectiveness.** We are not aware of experimentally-designed comparative studies of effectiveness between midwife-led and physician-led care in developing countries. As such, we have used comparative studies in developed countries to conclude that there are no obvious differences in effectiveness between midwife-led and physician-led care. A comparative study of midwife-led care and other models of care including obstetrician-led care, family doctor-led care, and shared models of care in the United Kingdom, Canada, New Zealand, and Australia showed that women randomized to midwife-led models of care were 21% less likely to experience fetal loss or neonatal death at less than 24 weeks’ gestation, 14% less likely to have instrumental birth, 18% less likely to have an episiotomy, and significantly more likely to have a spontaneous vaginal birth and to initiate breastfeeding. The study also suggested a cost-saving effect in intrapartum care for midwife-led models of care compared to other models of care. Another study estimated that...

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**Salaries for medical specialists were higher than nurse/midwives in sample countries.**

*Source: WHO CHOICE salary database*

**Figure 5**

<table>
<thead>
<tr>
<th>Country</th>
<th>Level 5 Medical Specialist</th>
<th>Level 3 Nurse/Midwife</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zambia</td>
<td>$12,000</td>
<td>$4,000</td>
</tr>
<tr>
<td>Pakistan</td>
<td>$10,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Nepal</td>
<td>$8,000</td>
<td>$8,000</td>
</tr>
<tr>
<td>Kenya</td>
<td>$6,000</td>
<td>$10,000</td>
</tr>
<tr>
<td>Ghana</td>
<td>$4,000</td>
<td>$12,000</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>$2,000</td>
<td>$8,000</td>
</tr>
<tr>
<td>Burundi</td>
<td>$0</td>
<td>$6,000</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>$0</td>
<td>$4,000</td>
</tr>
</tbody>
</table>

**Annual Salary**
midwifery-led care to be associated with less obstetrical intervention, decreased maternal morbidity including severe perineal injury, fewer babies with preterm birth, and low birthweight. In addition, there were no differences observed in adverse outcome rates for mothers by using midwife-led health care service versus other care service such as obstetrician-led care, family doctor-led care, and shared models of care.

Figure 6

Attrition rates were higher for doctors than midwives in Zambia.

Source: Reference 35

Figure 7

Midwife-Led Care Has Higher Cost Effectiveness Than Physician-Led Care

Physician-Led Care
- Higher Training Costs
- Longer Training Duration
- Higher Salary
- Higher Attrition
- Same or Lower Effectiveness

Midwife-Led Care
- Lower Training Costs
- Shorter Training Duration
- Lower Salary
- Lower Attrition
- Same or Higher Effectiveness
When we look broadly at midwifery-led care versus physician-led care, the midwife-led care appears to be more cost effective due to its significantly lower costs (salary, training, attrition) and similar or potentially even higher effectiveness (Figure 7).

Acknowledgement: We thank our colleagues for their support in this work with a special gratitude to the World Health Organization for their data provision.
References:

22. World Health Organization. CHOICE salary database


Hatem M, Sandall J, Devane D, Soltani H, Gates S. Midwife-led versus other models of care for childbearing women, Cochrane Database of Systematic Reviews. 2008; Issue 4, Page 50