Human resource development: new assessments and new directions*

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SUMMARY

The National Health Plan (NHP) 2001-2010 required a health workforce situation analysis and strategy to match the NHP’s priorities and strategies. This paper is based on the work that was done in 2001 to support the preparation of a Health Human Resource Development Strategy for Papua New Guinea (PNG). The analysis showed that changes in health sector financing, population growth and changing health needs had created many human resource problems and challenges. This paper focuses on the main categories of health worker in PNG: doctors, health extension officers, nurses and community health workers. It presents analyses of workforce numbers and costs, and discusses future health system and human resource strategies based on the 2001 study and subsequent developments.

Introduction

Human resource strategies must be grounded in the reality of a country’s health problems and service delivery systems and structures if they are to be appropriate and effective. In Papua New Guinea (PNG), the major health problems have remained largely unchanged in the past 20-25 years. Infectious diseases, malnutrition, trauma and violence, and the complications of pregnancy and childbirth still persist as the main health problems for the majority of the population, which remains mostly rural (85%). The main epidemiological change has been the growing incidence of infectious diseases as a result of the increased size and mobility of populations and the growth of larger, denser populations in periurban communities.

Human resources in health have been a critical problem in PNG for many years. The key health workforce issues include shortages of some cadres but an underemployment of others, a skill mix imbalance, a maldistribution of health workers, and an ageing health workforce. In 2000, PNG had a staff to population ratio of 0.58 health care workers per 1000 people, considerably lower than international standards. There is a growing gap between the resources available for health personnel and the resources required to adequately staff health institutions and activities, despite a significant level of government health budget devoted to human resources. More importantly, declines in health budgets first affected the ‘goods and services’ component of health budgets. The lack of resources for outreach services in particular has had profound effects on the roles and activities of different health workers.

This paper has been prepared from a 2001 health workforce situation analysis, conducted to support the preparation of a Health Human Resource Development Strategy for PNG. The analysis showed that changes in health sector financing, population growth and changing health


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needs had created many human resource problems and challenges. The existing health workforce in PNG consists of an extensive list of 32 health cadres. Of this workforce, 85% are community health workers (CHWs), nurses, health extension officers (HEOs) or medical officers (MOs) (Department of Health, Human Resources Branch, Port Moresby, 2008). This paper focuses on these main categories of health worker in PNG. It presents analyses of workforce numbers and costs, and discusses future health system and human resource strategies, based on the 2001 study and subsequent developments.

Workforce analysis

Projected workforce costs

The gap between the resources available for health personnel and the resources required to adequately staff health institutions and activities is demonstrated in Figure 1. It shows the cost projections of the health workforce estimated for the period 2001-2010. Three different scenarios were examined, in addition to the baseline:

- Baseline: Maintain the current number of health workers, with no increase in their numbers
- Scenario 1: Maintain a constant population per staff ratio
- Scenario 2: Improve the population per staff ratio by 1% per year
- Scenario 3: Achieve the minimum standards for staffing rural health services and hospital facilities.

The cost of each category of staff, relative to other cadres, is influenced by the relative size of the average salary and the total number of health workers in each cadre. The wide salary ranges in 2001 between key categories of health worker are shown in Table 1. The table shows how staff allowances can be a substantial economic burden on government expenditure. Particularly for medical officers, overtime/on-call and domestic market allowance (DMA)

![Figure 1. Total salaries and allowances 2001-2010, by scenario (in millions of kina).](image-url)
have a substantial impact on the total costs of their salary and allowances.

Distribution and composition of the workforce

Workload Indicators of Staffing Need (WISN), developed in the late 1980s (1), were used to assess staffing needs, based on current activities. A comparison of the actual nurse and CHW staffing levels in rural health centres with the numbers that were predicted by workload indicators of staffing need suggested that both nurses and CHWs were underemployed or underutilized in most provinces (Figures 2 and 3). Overall in 2000, nurses were approximately 20% in excess of the number indicated by health centre workloads, while community health workers in health centres were 47% more than those required by their workloads. Nurses who previously spent the majority of their working days implementing the monthly program of mobile MCH patrols were spending their time with other nurses or CHWs, sharing an unchanged or reduced number of patients at the MCH clinics and general patient care at the health centre.

Previously, the HEOs had been doing much of the clinical care, especially the inpatient care at the health centre. Allegedly, in 2001, they spent most of their time at the health centre ‘doing administration’. In addition, approximately 90 HEOs were full time in district health manager or disease control positions as a result of the decentralization of health management to the district level. Many health centres were, therefore, overstaffed with nurses and had underemployed HEOs because of the changes in the health centre’s overall workload.

Minimum staffing standards are included in the policy document, Minimum Standards for District Health Services in PNG, 2001 (2). Table 2 compares workload-based staffing needs with minimum standards. According to this, 27% of all centres had workloads appropriate to the minimum standards. It is important to note, however, that 37% of government health centres and 66% of district health centres required less staffing than the minimum standards. In 2002, more than one half of the centres in the Southern Region required fewer nurses than the standard. In Momase, it was only a third. Momase had almost twice the number of

### TABLE 1

COMPARISON OF AVERAGE BASE SALARY VERSUS AVERAGE SALARY PLUS ALLOWANCES (2001)

<table>
<thead>
<tr>
<th></th>
<th>Average base salary</th>
<th>Average allowances</th>
<th>Average salary + allowances</th>
<th>Allowances as proportion of salary</th>
<th>Average PS grade and point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical officers</td>
<td>21,583</td>
<td>17,125</td>
<td>38,708</td>
<td>79%</td>
<td>12/4</td>
</tr>
<tr>
<td>Nursing officers</td>
<td>11,795</td>
<td>1,369</td>
<td>13,164</td>
<td>12%</td>
<td>7/4</td>
</tr>
<tr>
<td>HEOs</td>
<td>18,483</td>
<td>5,979</td>
<td>24,462</td>
<td>32%</td>
<td>11/1</td>
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<tr>
<td>EHOs</td>
<td>14,201</td>
<td>5,700</td>
<td>19,901</td>
<td>40%</td>
<td>9/1</td>
</tr>
<tr>
<td>CHWs</td>
<td>6,067</td>
<td>1,500</td>
<td>7,567</td>
<td>25%</td>
<td>2/6</td>
</tr>
</tbody>
</table>

PS = public service
HEOs = health extension officers
EHOs = environmental health officers
CHWs = community health workers
centres, thus needing more nurses than the Southern Region.

The above data suggest that minimum standards for rural health centre staffing were not helpful because staffing needs differed due to the great variation in workloads among all of these centres. This in no way diminishes the importance of the other standards. In the present economic circumstances, where cost efficiency is of great value, the use of workload-based indicators of staffing need is much preferred. These also provide a much more rational basis for allocation of other resources.

In 2002, approximately 60% of all rural health facilities had sufficient MCH attendances and deliveries to justify a nurse for those services alone (this assumes that an MCH and delivery workload requiring half or more of a nurse’s time justifies devoting a nurse to the role). Posting nurses to the other 40% of centres or to upgraded aid posts, therefore, accepts some strategic sacrifice of cost efficiency in order to improve use of services in communities with low utilization. This becomes an important strategic issue, given the loss of outreach MCH and immunization services from lack of transport.

**Community health workers at aid posts**

The number of aid posts had reduced over time and the actual status of many aid posts in 2001 was uncertain. It was not clear where to draw the distinctions between an aid post being open and temporarily closed and between temporarily closed and permanently closed. Equally confusing were the data on CHWs. No information was available about their ages or length of service, or when they
were expected to retire. On the basis of Workload Indicators of Staffing Need, rural health centres appeared to have almost 50% more CHWs than they needed in 2001. On the other hand, up to half of the aid post CHWs were reportedly cut in some provinces under the 1999 structural adjustment.

**Improving the skill composition to meet special needs**

**Midwifery**

The National Health Plan (2000-2010) has a policy goal to place a midwife in each health centre in the country. An improvement of the current 40% rate of skilled birth attendance will certainly require wider access to and use of midwives. Skilled birth attendance must include the competences to provide basic emergency obstetric care. The basic pattern of causes of maternal mortality remains unchanged. There are regional excesses of haemorrhage in coastal areas due to the high prevalence of anaemia. In the highlands, an excess of puerperal sepsis probably reflects the increased prevalence of sexually transmitted infections (STIs). The higher mortality ratios associated with grand multiparity continue everywhere as a consequence of persistent high fertility rates. Anaemia, malaria and STIs also contribute significantly to high perinatal mortality rates through low birthweight and congenital infections. Midwives should, therefore, bring a public health preventive approach, as well as a clinical contribution, to the solution of these problems. Antenatal care should aggressively address the problems of STIs and anaemia, and ensure that women have the possibility to use family planning to space and/or limit their number of pregnancies.
### TABLE 2

**Distribution of Facilities by Number of Nurses Required by Workload ISN Compared with Minimum Standards for Staffing**

<table>
<thead>
<tr>
<th>Number of nurses predicted by workload ISN compared to minimum standard staffing</th>
<th>No</th>
<th>%</th>
<th>No</th>
<th>%</th>
<th>No</th>
<th>%</th>
<th>No</th>
<th>%</th>
<th>No</th>
<th>%</th>
<th>No</th>
<th>%</th>
<th>Total facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of nurses equal to minimum standard</td>
<td>5</td>
<td>7</td>
<td>26</td>
<td>31</td>
<td>10</td>
<td>22</td>
<td>20</td>
<td>19</td>
<td>79</td>
<td>38</td>
<td>13</td>
<td>23</td>
<td>153</td>
</tr>
<tr>
<td>Need fewer nurses than minimum standard</td>
<td>46</td>
<td>66</td>
<td>31</td>
<td>37</td>
<td>5</td>
<td>11</td>
<td>65</td>
<td>61</td>
<td>79</td>
<td>38</td>
<td>29</td>
<td>52</td>
<td>255</td>
</tr>
<tr>
<td>Need more nurses than minimum standard</td>
<td>19</td>
<td>27</td>
<td>27</td>
<td>32</td>
<td>31</td>
<td>67</td>
<td>22</td>
<td>21</td>
<td>51</td>
<td>24</td>
<td>14</td>
<td>25</td>
<td>164</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>70</td>
<td>100</td>
<td>84</td>
<td>100</td>
<td>46</td>
<td>100</td>
<td>107</td>
<td>100</td>
<td>209</td>
<td>100</td>
<td>56</td>
<td>100</td>
<td>572</td>
</tr>
</tbody>
</table>

ISN = indicators of staffing need  
HC = health centres  
SC = subcentres  
1Minimum standard – 2 nurses and 5 community health workers  
2Minimum standard – 6 nurses and 7 community health workers  
3Minimum standard – 4 nurses and 7 community health workers  
*Because of rounding the totals do not add up to 100
Figure 4 shows the distribution of rural health facilities according to the number of deliveries in the year 2000. The cut-off points at 75 and 150 deliveries were used in the graph because 150 annual deliveries was the standard workload originally calculated for a midwife (1). The original standard workload was calculated for nurses with basic midwifery skills and so the standard workload for midwives with broader midwifery responsibilities now needs to be calculated separately. 75 or more deliveries still justified posting a full-time midwife. This means that 91 health centres and 54 subcentres qualified for at least one midwife. If the criterion for posting a midwife had been lowered from 75 to 50 or more annual deliveries (one per week), the number of facilities qualifying for a midwife would have increased to 100 health centres (50%) and 93 subcentres (30%).

Disease control

An intermediate level training program in disease control, which combines training in the clinical and public health skills required for such a role, is urgently needed. In 2002, HEOs were posted to Disease Control Officer positions in some provinces and districts. There was no qualification or coherent program of training for a Disease Control Officer, nor does one exist up till now. Such a program should be open to HEOs and nurses; both cadres have an appropriate level of entry competencies in clinical and public health skills. Targeted training would serve the disease control programs well. It would also provide another clearly defined career option for health workers. The School of Medicine and Health Sciences has the most appropriate set of resources to organize such a program.

Integration of health promotion into work programs

In 2001, there had been a renewed interest in health promotion. This included the Healthy Islands approach with its component programs for Healthy Schools, Healthy Markets, Healthy Villages and so on, as well as a renewed interest in improving nutrition. In order to promote these programs, there had been proposals for the training and appointment of health promotion officers and district nutrition officers in each district in the country. These did not represent the most effective approaches for the following...
reasons:

1. The budget could not support the training and employment costs of these health workers without sacrificing other important positions.

2. The transport upon which these workers would rely for access to rural communities to deliver their programs was no more accessible to them than to the MCH and other programs that had broken down for lack of transport.

3. The approach appeared to take insufficient account of the roles of other health workers. MCH nurses and CHWs already had frequent contact with these communities and had some of the behaviour change skills. Environmental health officers (EHOs) had many of the special skills required for the large environmental component of the Healthy Islands approach.

Meeting hospital staffing needs

Hospitals that provide secondary or tertiary health services are complex institutions. Most of the services that they provide require the interaction of different cadres of health workers in teams or work units. The effectiveness of each type of worker depends upon the contribution of another, or is justified by the needs of another. Thus, doctors and specialist medical officers, in particular, need the support of diagnostic, surgical and other therapeutic facilities and staff to make full use of the skills that they have developed in their training. Without this kind of support, it is difficult for a doctor to accomplish much more than other less qualified primary care workers.

A health care team effectively led by a doctor creates expectations of the team being able to provide a full range of high-level health services. This is, however, physically very difficult for a single doctor to accomplish and it has been argued for the past 30 years, therefore, that a hospital must have at least two doctors for the services to be sustainable over time.

The 1997 Hospital Standards (3) were developed with the principle of the work unit in mind. The general and specialist nurses and the different allied health personnel are all specified. In 2001, however, only incomplete data were available at the national level to demonstrate how close the actual staffing of hospitals was to those standards (4). The general picture was clearly one of understaffing in all categories. The deficits, however, seemed to be greatest among the more highly trained categories of staff. This made it difficult to assess how efficiently existing hospitals were using their expensive human and other resources.

Specialist nursing and career structures

Preliminary data from the National Inventory of Health Facilities (4) suggested that the staff strength of both general nurses and nurse administrators was approximately 50% in excess of standard, while the staff strength of specialist nurses was 60% below standard. This suggests, first of all, that the numbers of specialist nurses being trained were much too low. Secondly, the motivation to stay in this work may have been insufficient, due to the majority of opportunities for promotion within the nursing profession being in the ranks of nursing administration. In 2002, it was estimated that only 50%-70% of nurses who had trained in a clinical specialty were continuing to practise that specialty. It appeared that specialty nursing diplomas were not adequate for promotion, but were necessary for admission into nursing administration training.

Specialty nursing was an area that required much greater, more careful examination and future planning than had been the case. The skills are critical to hospital care, the numbers are relatively small, and the training in some cases involves expensive overseas training. Given the concentration of these critical resources in Port Moresby at that time, future recruitment needed to be much more deliberate in attempting to find individuals who were likely to return to the provincial hospitals from which they came.

Because of the variety of different nursing roles and positions, it is important to establish a career structure in which salary levels, positions, qualifications and experience are more clearly tied together. A position with greater responsibility should certainly be rewarded. Responsibilities should not, however, be defined only on the basis of the numbers of subordinates or the size of the budget that is managed. Specialist medical
officers are recognized for the additional professional responsibilities that their roles necessitate. Specialist nurses should be similarly recognized in order to encourage extended tenure within their specialty. This is particularly crucial for such specialist nurses as midwives who are needed for work in Level 4 and 5 hospitals and rural health centres.

Community health workers for hospitals

Earlier findings from a series of reviews of the status and work of CHWs in six hospitals revealed that:

• Up to 70% of hospital CHWs had been trained as enrolled nurses or nurse aides many years before; they had had little continuing education since then
• Many hospital CHWs were regularly performing nursing procedures for which they had not been trained
• The old CHW curriculum did not include a number of nursing skills considered very important for hospital practice (5).

A strategy to address this training gap in nursing skills for CHWs who are already in service still needs to be developed. The revised CHW curriculum does include a module on basic nursing skills, entitled Basic Nursing Care that now corrects this omission for future graduates.

Training

Two significant factors impose opposite pressures on a human resource planning process: the need for fiscal constraint and the desire to prepare for increased demands from a growing population. Fiscal constraint creates three challenges for the health sector:

• Unavoidable deliberate choices between the different cadres, according to the priorities of the sector
• Likelihood of not being able to employ all the graduates of training programs
• Pressure to close training programs, if there are not enough students to make the training cost-effective.

The values of quality and efficiency become more important when budgets become tight. These values can best be met by:

• Reviewing and revising rural health care strategies to maximize equity of access to priority interventions within the constraints of resources available
• Reviewing and revising the roles and responsibilities of the rural health team to match the new health services strategies, and planning numbers to be trained appropriate to needs
• Avoiding the creation of whole new cadres of health workers, when most of the desired functions can be carried out (sometimes more efficiently) by other health workers
• Balancing the output of different post-basic training programs to match needs and priorities.

Population growth is the second major pressure that constantly affects training programs. With a national population growth rate of almost 3% per annum, PNG can expect that the population will double in about 25 years. During the life of the 2001-2010 National Health Plan (NHP), therefore, population growth will have added about 45% to the year 2000 population. The health services workload can be expected to increase at least to the same extent. It is usually assumed that the numbers of direct care personnel such as doctors and nurses need to increase in step with population. In 2002, the training capacity for nurses and CHWs was not able to maintain the then current levels of staff. It certainly was not able to match the population growth rate during this NHP period either. This is one of a number of reasons why increased efforts are needed to make family planning services more available to people.

Medical officers

For many years, PNG strived hard to attain its required number of doctors and specialists. By 2002 this quota was almost filled and the challenge then became to slow down and adjust production in such a way that expensive excesses were avoided but future staff needs were met. Doctors and specialists are valuable health service resources; they are also several times more expensive to train and employ than other
health workers. For these reasons, it was particularly important to be as accurate as possible in estimating requirements for, and the consequent supply of, the different categories of medical officer in the health care system, and to make the most efficient use of the training capacity.

In 2001, the overall availability of doctors and some of the main specialist categories was soon to be sufficient to meet the projected needs, as set out in the hospital standards documents. Increased medical student intakes could not therefore be sustained if the graduates were expected to find places in the resident medical officer (RMO) and registrar training programs, or in subsequent employment. Intakes of 60 into the second year meant 50 to 55 graduates, leading to 100 or more doctors requiring residency posts over two years. With only 84 government-funded RMO positions and even fewer positions in hospitals with adequate Senior Medical Officer (SMO) supervision, this problem had already become apparent in the 2001 round of RMO post allocations. If the students already admitted and active in the program at that time were all employed in the public sector on graduation, they would have increased the number of doctors employed by the government by almost 50%, and added 4.88 million kina to the salary budget of 2005. The data in Table 3 are projections of the resulting number of doctors if medical school student intakes continued at the same rate as in 2000. The number of doctors employed by the public sector at the beginning of 2001 – 275 – will have doubled to 552 by the end of 2010. That number is 36% in excess of the number required to keep up with the current population to doctor ratio. It is 48% more than the number required to meet the minimum standards for doctors in both urban and rural hospitals. This would create a medical officer salary bill in 2010 equivalent to the whole ‘goods and services’ budget of 2001.

The budget constraints expected during this period were such that employing all of the medical graduates produced during that time would not be possible without severe sacrifices from the rest of the health system. The only way of avoiding this would be for the government to employ only the doctors it could afford. The 2002 Australian Agency for International Development (AusAID) Human Resources Report emphasized that allowing graduates to complete the two-year rotating residency was important because it would enable them to have full registration with the Medical Board. From there on, however, government would not be in a position to guarantee employment to all PNG medical graduates.

Paradoxically, shortages of some categories of doctors were possible in hospitals in the future. Several larger hospitals had come to rely on registrars in the specialty training programs to meet their service needs. As the need for more paediatric and surgical specialists – and consequently registrars-in-training – declined, these training hospitals and their specialist staff would have had to work out how they were going to meet those service needs. Possible medium-term responses included the development of a specialist training program in family medicine/rural health. Such a program would prepare multi-skilled doctors for work in Level 4 and 5 hospitals, the outpatient clinics of Level 1 to 3 hospitals, larger urban clinics, or private general practice.

The longer-term response to meeting hospital needs will involve a much more careful attempt to balance the supply and demand for doctors and specialists. The first step should be a re-evaluation of hospital staffing standards and the categories of medical officer that best suit different positions in specialty inpatient and outpatient units, general outpatient clinics and emergency care units. Secondly, it will require an adjustment of the intakes into the medical school and specialty training programs so that outputs more closely match the slower ongoing needs for replacement and population-based expansion.

**Nursing officers**

In 2000, the capacity to train nurses had dropped below the level where it could replace those lost through the estimated 6.7% annual attrition rate of nurses. This came about through the closure of six training schools. A further temporary decline was experienced due to Lae School of Nursing taking no intakes in 2000 and 2001, and the Sopas School of Nursing not taking an intake in 2000 because of its move from Enga to Pacific Adventist University outside of Port Moresby.
The report of the Taskforce on Preservice Nurse and Community Health Worker Education (6) analysed the situation for both nurses and CHWs. In order to regain the 1998 staff strength by 2004, nursing schools would have to produce 383 graduates to fill the deficit, plus an adequate number to replace the ongoing normal attrition (Table 4). The capacity of the training schools would have to almost double if this were to be achieved. In 2001, preliminary estimates of the capital costs required for increasing the capacity of the nursing schools were made. This amounted to over 9 million kina.

It was not yet clear in 2001 what numerical targets were best for nursing staff. As discussed above, the actual numbers of nurses in the rural health system in 2000 were about 260 (20%) more than what would be indicated by the workloads of those facilities. WISN were not available for hospitals, but in 2000 the actual number of nurses in hospitals was only 108 (7%) short of the number required by the 1997 Hospitals Standards. Many of the 260 excess rural nurses would have found productive work if resources could have been redistributed to upgrade aid posts to improve the declining MCH utilization rates.

Population growth until 2004 implied the need for an increase of another 1400 nurses at the 1998 population to nurse ratio. This was not feasible. A growing gap of this type made it important to search for other sources of staff. It also appeared that nurses had had a higher annual attrition rate (6.7%) from the service than other health staff (probably closer to 5%). The reasons for this were not documented, but it would be very worthwhile to do so. It may be that there are ways in which nurses could be persuaded to stay in service longer or to seek part-time employment, if full-time work is not viable for family or other reasons.

A final issue that needs to be better understood is why a much smaller proportion of younger nurses were in rural health work. Figure 5 shows the age distribution of a set of nurses for whom data were available in 2000. If this decline in the proportion of nurses in rural clinics represents a loss of interest in rural health work among young graduates, the change to university-based training programs for nurses is of concern, since it is likely to worsen the trend.

Specialist nurses

As already noted, there was a severe shortage of specialist nurses, especially in hospitals outside Port Moresby General Hospital. This reflected both inadequate numbers being trained and excessive losses to administrative positions that provided better status and remuneration.

The specialist training programs that build upon the diploma/certificate in general nursing can be organized into a vertically and horizontally integrated system (Figure 6). Following a diploma or certificate in general nursing and a minimum period of experience, a nurse could be accepted into one of the specialty clinical nursing programs. These programs are designed to meet the various needs of both the rural and hospital health sectors. On satisfactory completion of any one of these programs, the student would receive a Bachelor of Clinical Nursing degree. The midwifery and paediatric nursing curricula each need to be coordinated by up to four different universities towards a common set of entry qualifications and final expected competencies. The other four specialty clinical nursing programs would be offered at the University of Papua New Guinea (UPNG).

In 2001, there were three postgraduate diploma programs: community health, nursing education and nursing administration. The community health and nursing administration diplomas were preparing individuals for provincial and senior hospital administration positions. At some stage, an equivalent certificate course should be developed for ward sisters or other junior hospital nursing administration positions. These certificate programs could be offered at either UPNG or Divine Word University (DWU). If a hospital nursing administration certificate is desired, it may be necessary to run courses at both institutions to meet the potential need.

The postgraduate diploma programs should be located so as to make best use of the unique strengths of the different universities. The divisions of Public Health and Nursing at UPNG have the combined public health and specialty nursing skills capacity to be the most appropriate to offer the diplomas in community health and community health nursing (if two tracks are needed); DWU, with its developing strengths
<table>
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<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
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<th>2007</th>
<th>2008</th>
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<td>PNG population</td>
<td>5,130,365</td>
<td>5,268,885</td>
<td>5,411,145</td>
<td>5,557,246</td>
<td>5,707,291</td>
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<td>6,019,646</td>
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<td>Population per MO ratio, 2001</td>
<td>18,656</td>
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<td>18,656</td>
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<tr>
<td>Required number of MOs¹</td>
<td>275</td>
<td>282</td>
<td>290</td>
<td>298</td>
<td>306</td>
<td>314</td>
<td>323</td>
<td>331</td>
<td>340</td>
<td>350</td>
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<td>MOs for hospitals at MS²</td>
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<tr>
<td>Number of MOs employed at start of the year³</td>
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<td>304</td>
<td>338</td>
<td>369</td>
<td>401</td>
<td>430</td>
<td>457</td>
<td>483</td>
<td>507</td>
<td>530</td>
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<td>Intake of PNG medical students⁴</td>
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<td>54</td>
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<td>54</td>
<td>54</td>
<td>54</td>
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<tr>
<td>PNG graduates (90%)⁵</td>
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<td>49</td>
<td>49</td>
<td>50</td>
<td>49</td>
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<td>49</td>
<td>49</td>
<td>49</td>
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<tr>
<td>Attrition from workforce²</td>
<td>14</td>
<td>15</td>
<td>17</td>
<td>18</td>
<td>20</td>
<td>21</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>27</td>
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<tr>
<td>MOs at end of the year⁷</td>
<td>304</td>
<td>338</td>
<td>369</td>
<td>401</td>
<td>430</td>
<td>457</td>
<td>483</td>
<td>507</td>
<td>530</td>
<td>552</td>
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<tr>
<td>Excess MOs over 2001 level⁶</td>
<td>29</td>
<td>63</td>
<td>94</td>
<td>126</td>
<td>155</td>
<td>182</td>
<td>208</td>
<td>232</td>
<td>255</td>
<td>277</td>
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<tr>
<td>% excess over 2001 level</td>
<td>11</td>
<td>23</td>
<td>34</td>
<td>46</td>
<td>56</td>
<td>66</td>
<td>76</td>
<td>84</td>
<td>93</td>
<td>101</td>
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<tr>
<td>Excess MOs over population ratio⁵</td>
<td>22</td>
<td>48</td>
<td>71</td>
<td>95</td>
<td>116</td>
<td>134</td>
<td>151</td>
<td>167</td>
<td>181</td>
<td>194</td>
<td></td>
</tr>
<tr>
<td>% excess over population ratio</td>
<td>8</td>
<td>16</td>
<td>21</td>
<td>26</td>
<td>29</td>
<td>31</td>
<td>33</td>
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<tr>
<td>Excess MOs over MS&lt;sup&gt;10&lt;/sup&gt;</td>
<td>-53</td>
<td>-19</td>
<td>12</td>
<td>44</td>
<td>56</td>
<td>83</td>
<td>109</td>
<td>133</td>
<td>156</td>
<td>178</td>
<td></td>
</tr>
<tr>
<td>% excess over MS</td>
<td>-15</td>
<td>-5</td>
<td>3</td>
<td>12</td>
<td>15</td>
<td>22</td>
<td>29</td>
<td>36</td>
<td>42</td>
<td>48</td>
<td></td>
</tr>
</tbody>
</table>

PNG = Papua New Guinea  
MO = medical officer  
MS = minimum standards  
<sup>1</sup>The number of medical officers required to maintain the population to MO ratio at the 2001 level  
<sup>2</sup>The number of medical officers required by Minimum Standards for Hospitals (1997); in 2005 MOs for Level 5 hospitals increased to 2  
<sup>3</sup>Transferred from the number at the end of the previous year  
<sup>4</sup>This number does not include any students from other nations; the number was 51 in 1998 and 54 in 1999  
<sup>5</sup>Assumes a 10% failure rate from the intake four years earlier  
<sup>6</sup>Attrition is assumed to be 5% from the number at the beginning of the year  
<sup>7</sup>The number at the beginning of the year + PNG graduates – attrition from workforce  
<sup>8</sup>The number in excess of the 275 at the beginning of 2001  
<sup>9</sup>The number in excess of the number required to maintain the population to doctor ratio for that year  
<sup>10</sup>The number in excess of minimum standard requirements
Nursing schools’ output (actual)

<table>
<thead>
<tr>
<th>Year</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurses at beginning of year</td>
<td>3017</td>
<td>2972</td>
<td>2922</td>
<td>2871</td>
<td>2835</td>
<td>2775</td>
<td>2710</td>
</tr>
<tr>
<td>Workforce attrition (6.7% pa)</td>
<td>202</td>
<td>199</td>
<td>196</td>
<td>192</td>
<td>190</td>
<td>186</td>
<td>182</td>
</tr>
<tr>
<td>Nursing schools’ output (actual)</td>
<td>157</td>
<td>149</td>
<td>145</td>
<td>156</td>
<td>130</td>
<td>121</td>
<td>106</td>
</tr>
</tbody>
</table>

**Midwives**

The issue of how to determine the numbers of midwives needed for rural health and hospital services has already been addressed. An estimated 423 were required to meet the workloads of both health centres and hospitals in the year 2000. The actual number of active midwives in that year was about 275. The only established midwifery training program was in Port Moresby and a new one was due to start in Goroka in 2001. The Pacific Adventist University outside Port Moresby was planning, and succeeded in, the introduction of a midwifery program as an additional fourth year to their Diploma in General Nursing. A fourth program had been proposed at St Mary’s (Vunapope) in association with Nonga Base Hospital, but in fact was started in Madang in 2003.

A feasible program of targets for increasing the capacity and outputs of midwifery training by the year 2009 is shown in Table 5. The proposed timetable for commencing the different programs meant that there would be little impact on the midwife deficit until the second half of the decade. One of the
Figure 5. Age distribution of nurses (7). NO = nursing officer.

Figure 6. Possible scheme for academic progress and levels of responsibility in rural and hospital nursing. ICU = Intensive Care Unit. OIC = Officer in Charge.
anticipated costs of midwifery training was the removal of the nurses-in-training from their previous posts. In view of the low capacity of nurse training schools at the beginning of the decade, it was considered advisable that this cost to health services be deferred until later in the decade, when general nurse outputs were expected to increase.

Midwifery training programs need to prepare their students adequately and appropriately for the job they will be required to do as graduates. Firstly, the role of the midwife needs to expand from only midwifery to encompass the full scope of reproductive health. Midwives in PNG should be as confident and competent managing STIs and family planning as they are when conducting a delivery or providing basic emergency obstetric care. Secondly, their training should emphasize practical training to achieve competence. Thirdly, they need to be trained in public health to manage preventive obstetric care through antenatal clinics and by mobilizing and training village birth attendants.

Concern has been expressed about the quality of the midwifery training programs (8). Three of the four schools have combined programs with paediatrics. This raises concerns about the adequacy of time to develop competencies in either area of practice. This weakness is made worse by both the lack of time given to clinical practice in some programs and problems with the quality of training in clinical practice. This applies particularly to the management of complications of pregnancy and childbirth, which is the main reason for having trained midwives in health centres.

**Paediatric nurses**

The extent of the need for paediatric nurses was not clear in 2001. Most of the health centres with sufficient paediatric admissions to justify a paediatric nurse already had an HEO, who was trained to the same level of competence. There was probably a need for extra paediatric nursing skills in some of the biggest health centres in the Highland and Momase Regions, and in government and church rural hospitals. These skills were certainly required in urban referral hospitals. As with the midwifery training program, the public health dimensions of child health problems, as well as clinical skills, needed to be emphasized. It was recommended that the training curriculum should include a strong applied clinical and public health nutrition component, in view of the constraints on training a separate cadre of district nutritionists in the foreseeable future.

**Mental health nurses**

Estimates were hard to come by, but only 40% or less of mental health nursing graduates appeared to be continuing in mental health practice. In many cases, this reflected the poor commitment of hospital authorities to mental health compared to other areas. As a result, there may not have been a mental health program in many hospitals, or mental health-trained nurses may have been assigned to other areas of a hospital. This represented a waste of resources. The 2002 Human Resources Report recommended discouraging further training in mental health nursing until mental health programs had been developed at provincial hospitals and in provincial rural health services. It also recommended using the very capable mental health training staff in the Division of Nursing to undertake applied health services research to develop and evaluate innovative programs in mental health.

**Acute care nurses**

The training capacity in theatre and intensive care nursing was in the process of being developed in 2001. No data were available on the deployment of graduates of the earlier programs in theatre and intensive care nursing. Estimates of the needs were also not yet available. Numbers in both groups were likely to be small, making forward planning of the training programs all the more essential.

The staffing of accident and emergency care clinics required a careful needs assessment. Approximately 50 HEOs were deployed in hospital outpatient clinics and urban clinics in 2001. Their training was appropriate for this role. However, improving the range and quality of their skills in a special program in accident and emergency was considered a good investment. It could also provide a clear career step for those HEOs who preferred to remain in clinical care, rather than move to administration.
### TABLE 5

**Recommended Output of Midwife Training Schools, 2000-2009**

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
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</thead>
<tbody>
<tr>
<td>Target for hospitals</td>
<td>218</td>
<td>227</td>
<td>236</td>
<td>245</td>
<td>255</td>
<td>265</td>
<td>276</td>
<td>287</td>
<td>298</td>
<td>310</td>
</tr>
<tr>
<td>Target for rural HC</td>
<td>205</td>
<td>211</td>
<td>216</td>
<td>222</td>
<td>228</td>
<td>234</td>
<td>241</td>
<td>247</td>
<td>254</td>
<td>261</td>
</tr>
<tr>
<td>Total targets</td>
<td>423</td>
<td>438</td>
<td>452</td>
<td>467</td>
<td>483</td>
<td>499</td>
<td>517</td>
<td>534</td>
<td>552</td>
<td>571</td>
</tr>
<tr>
<td>New graduates</td>
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<td></td>
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<td></td>
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<td></td>
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<td></td>
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<tr>
<td>Port Moresby</td>
<td>23</td>
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<td>24</td>
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<td>24</td>
<td>24</td>
<td>24</td>
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<tr>
<td>Goroka</td>
<td>12</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
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<td>24</td>
</tr>
<tr>
<td>St Mary's/Nonga</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
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<td>Pacific Adventist University</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20</td>
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<tr>
<td>Attrition</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Leave service (6.7%)</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Loss to other jobs (25%) of training output</td>
<td>6</td>
<td>9</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>18</td>
<td>18</td>
<td>23</td>
<td>23</td>
<td>23</td>
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<tr>
<td>Total MW in service</td>
<td>274</td>
<td>283</td>
<td>301</td>
<td>319</td>
<td>355</td>
<td>391</td>
<td>442</td>
<td>473</td>
<td>504</td>
<td>535</td>
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<tr>
<td>Deficit</td>
<td>149</td>
<td>155</td>
<td>151</td>
<td>148</td>
<td>128</td>
<td>108</td>
<td>75</td>
<td>61</td>
<td>48</td>
<td>36</td>
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</table>

**Notes:**
- **HC** = health centres
- **MW** = midwives
- **ISN** = indicators of staffing need
- 1The number of midwives is the number determined by the workload ISN for all provincial hospitals in 2000 plus the additional midwives needed assuming an annual increase of 4% in urban populations
- 2The number of midwives is the number determined by the workload ISN for all rural health facilities in 2000 plus the additional midwives needed assuming an annual increase of 2.7% in rural populations
- 3Existing or proposed post-basic midwifery programs
- 4The final year of the proposed Bachelor of Nursing program at Pacific Adventist University is expected to produce equivalent competencies to the other midwifery programs
- 56.7% has been taken as the overall annual loss to service of nursing staff
- 6Currently, an estimated 30% of nurses with midwifery training are in other nursing jobs, mostly nursing administration; a lower rate of 25% has been adopted for these estimates, since the opportunities in administration will not grow as fast as the production of midwives
Estimating both the numbers of nurses needed in accident and emergency care and the competencies required would take careful planning on the part of a variety of medical and nursing specialists. The growing importance of urban lifestyle health problems would need to be addressed. This would be well worthwhile, and should lead to improvements in the quality of care in outpatient and casualty departments.

Community health workers

The situation with respect to CHWs in 2001 was confusing. It was also one of the best arguments for the creation of a comprehensive database of health workers. In 2000, workers falling under the official name of ‘CHW’ included those (mostly women) who were originally trained as state enrolled nurses and nurse aides, and others (mostly men) who were trained as aid post orderlies and hospital orderlies.

Preliminary data from the 2000 National Inventory of Health Facilities (4) gave a total of 5571 CHWs. In urban areas, the total number (1226) was divided between hospitals and urban clinics. In rural areas, more than half were in health centres, and the remainder were at aid posts. The number of CHWs employed in hospitals (973) was only 65% of the minimum standards recommendation (1487). Most were nurse aides or state enrolled nurses. Only small numbers of graduates of the previous ten years, who trained under the CHW curriculum, had taken positions in hospitals.

The actual number of CHWs working in health centres (2525) was 47% greater than the workload-derived number (1722). This is in keeping with the already noted pattern of overstaffing in relation to workloads in rural health centres. It was not known how many of these CHWs were at health centres because aid posts had been closed temporarily or permanently, or because they were old orderlies, now semi-retired but still drawing a salary (possibly because they had no retirement benefits to claim). Whatever the explanations, the situation was more difficult to understand in light of the reports that up to half of the CHWs in some provinces were terminated under the structural adjustment exercise of 1999. There were, however, no documented data at the NDoH on exactly who was retrenched at that time.

CHW training schools continued to close in the years before the 2001 Human Resource Study. There were no government CHW training schools left; all were run by church agencies. These tended to draw their recruits from the province in which they were located or from neighbouring provinces. Those planning the production of CHWs should bear this fact in mind so that regional needs can be met in the future.

The average annual output of the CHW schools was 215 between the years 1998 and 2000. That translated to an annual shortfall of either 64 or 168 between the numbers trained and estimated losses (for 5% and 6.7% attrition rates, respectively). As with the nurses, therefore, the capacity of the training schools needs to be increased to match this shortfall. Alternatively, the existing CHWs need to be redistributed from those facilities with too many staff.

Health extension officers

During the 1990s, there was increasing talk of ‘the HEO problem’. This appears to have been an ill-defined ‘problem’. There was and clearly remains a concern about the role of the HEO in the health centre, and speculation as to whether the time had come to replace HEOs in health centres with either doctors or nurses. There is probably more than one solution, and consideration needs to be given to the timing of any changes. First, however, it is essential to define the problem and its causes.

The key issue in 2001 was that the role and position of the HEO was no longer clearly defined. One consequence of this was the decline in enrolments for the HEO training course. The competency goals originally selected for the HEO training and residency programs were those required by the officer of CHWs in the different age groups remained high until the age of 45. The numbers declined fairly quickly in the age groups older than 45 years. This suggests an annual attrition rate closer to 5% than the official 6.7%. For the CHW workforce of 2000, these rates imply either 279 or 373 lost or retiring each year. The pattern of attrition was probably different from the large cuts in CHWs during the structural adjustment exercise of 1999. There were, however, no documented data at the NDoH on exactly who was retrenched at that time.

The actual attrition rate of CHWs from the service was not known. In 2000, the numbers
in charge (OIC) of a health centre. This involved clinical, public health and administrative roles. By 2001, however, almost 50% of HEOs had moved into full-time administrative positions. 116 HEOs (25%) were in provincial health administration positions and another 100 (22%) in district health administration. About 150 HEOs (33%) were clinical HEOs or OICs in health centres, and another 47 (10%) were in clinical practice in hospitals or urban clinics. The remainder were in hospital administration, training or the National Department of Health (HEO Association, Tables of HEO postings, Jun 2001).

The ‘HEO problem’ had two main causes. The first cause was the ‘nurse problem’. The overstaffing of nurses (relative to workloads) in health centres meant that the clinical role of the HEO had been largely taken over by nurses. The second was the proliferation of administrative positions as a result of the organizational changes from decentralization to districts. Almost 80% of government health centres had at least one HEO. District health centres with only a district health manager/coordinator constituted 17% of all health centres although it was not known how much involvement these HEOs had with the day-to-day running of the health centre. 60% of health centres had an HEO assigned as OIC or as an additional clinical HEO (many of the larger or district health centres). 22% of health centres had no HEO; most had catchment populations less than 10,000 people. A lack of any consistent criteria for posting HEOs to health centres was, therefore, a secondary cause of the ‘HEO problem’.

Most church health centres did not have HEOs, and appeared to manage quite well without them. This was one of the main reasons for suggesting that nurses should replace HEOs. The fact that several church health centres, subcentres and ‘hospitals’ did have HEOs suggested, however, that the absence of HEOs from most church centres may rather have been the result of a historical preference of the churches for appointing the nursing staff that they had trained in their own training schools.

There is no reason to believe that the job description of the HEO should change significantly from the original health centre OIC. Arguably, given the increase in infectious disease transmission resulting from population changes, there is an even greater need for their clinical and public health management skills. That being the case, the staffing needs and criteria of health centres need to be reconsidered. This includes the requirement that all health centres of a certain size and workload should have an HEO, whether run by government or church.

The implied complaint that HEOs were being wasted in ‘administration’ needs closer examination. Their role as health centre OIC includes both public health management as well as facility administration. Their public health management training and experience provides much of the explanation as to why HEOs have filled many of the leadership roles in both provincial and national health departments over the past 25 years. The Community Health Diploma at UPNG continues to provide the additional skills required for those positions.

**Conclusion**

The ‘problems’ of the different health cadres in Papua New Guinea cannot be understood or addressed as separate issues. They are bound up together with each other and with the still unresolved health system breakdown that developed during the 1990s with the declining operating budgets of the health system. The ‘HEO problem’ was significantly a result of the ‘nurse problem’. The ‘nurse problem’ started off with the loss of transport for outreach services and the consequent underemployment of nurses confined to health facilities. This was exacerbated by the similar ‘CHW problem’ of underemployment in health centres as a result of aid post closures and an ageing workforce.

Continuing low utilization rates of immunization, antenatal care, skilled birth attendant and family planning services suggest that the basic health system problems of equity of access remain unresolved, especially for women and children. Resumption of mobile outreach services may be necessary for some remote areas, but do not make up for the loss of regular access to curative services and to skilled birth attendants. Careful consideration needs to be given to expanding the network of fixed facilities with competent MCH staffing. That would require redistribution of appropriately trained and supervised nurses.
and CHWs but would result in greater utilization of services. Improved coverage of the population supports more effective health and nutrition promotion, and is much more effective and efficient than creating additional cadres of health staff.

Staffing levels for facilities would be best guided by the use of workload indicators of staffing need, rather than fixed Minimum Staffing Standards. The WISN approach should be used to develop staffing criteria for all health centre cadres, including HEOs and midwives. The workload standards should then be applied to church, as well as government, facilities.

The transfer of health professional training programs to universities has been a challenging but, so far, successful process. A long-term challenge is to match the training programs for specialty training of nurses and HEOs with career structures that reward those who remain in clinical practice and not just those who are able to move into administrative positions. The more pressing and immediate concerns are to a) avoid an inappropriate number of graduates from the medical school, and b) assure an adequate capacity to train nurses, midwives and CHWs for all parts of the country.

REFERENCES


