

## Review Article

# Slow but steady progress in child health in Papua New Guinea

T Duke

Centre for International Child Health, University Department of Paediatrics, Royal Children's Hospital  
Melbourne, Victoria, Australia

### INTRODUCTION

Most Australians would have seen media reports of electoral violence, corruption or financial mismanagement in Papua New Guinea (PNG), and the need for external law enforcement support makes front-page news.<sup>1</sup> But few would know of slow but steady advances being made in that country. Civil turbulence is newsworthy and reinforces the political paradigm; tranquillity and slow progress are also a part of the reality, but are not newsworthy. Improvements in child survival usually relate to background efforts over time, and often go unnoticed. This paper was partly to follow-up a publication from the late 1990s, which documented the tragic decline in child health services and the static child mortality rates over the previous 20 years.<sup>2</sup> In that paper there was criticism of the lack of public health services for mothers and children in rural areas, the inequitable distribution of doctors throughout the country, and poor organization of clinical care in rural hospitals. This current article does not seek to deny that some areas of the health service and other sectors crucial to child health have deteriorated, however, slow but important progress has occurred in many areas in the last 10 years. Successful areas can be explored to identify how to sustain improvements in the future. One response could be a 'third-way' of more mature inter-country collaborations and assistance in health.

### TRENDS IN CHILD MORTALITY

From the 1950s to the mid-1970s there was a steady reduction in child mortality rates in PNG (Fig. 1).<sup>3,4</sup> However from the late 1980s to late 1990s official mortality rates for children under 5 years of age remained unchanged or slightly increased at 100–112 per thousand live births, with an infant mortality rate of 77 per 1000. In the same period there was a doubling of the population in PNG. The sobering implication of a static mortality rate is that there were twice as many children dying each year in the late 1990s, as there were 20 years before. The latest official estimate, based on the 2000 national census has an under-5 mortality rate of 94 per 1000 live births and an infant mortality rate of 70 per 1000.<sup>3</sup> The validity of these figures is uncertain however, and may reflect differences in sampling or reporting compared to previous estimates. While a mortality of 9% in early childhood is still far too high, hopefully these latest apparent changes represent a new beginning of progress in child survival.

### THE VALUE OF INTEGRATING INTERNATIONAL EVIDENCE IN LOCAL POLICY

From the mid-1990s there was a measles epidemic in PNG that had a major impact on the health of children. From 1998 to 2001 over 30 000 measles cases were reported. In 2001 there were 294 deaths from measles among children in hospitals or health clinics, in addition to the unknown number who died without accessing health care. In the mid-1990s much effort was put into increasing the quality of vaccines delivered: solar powered refrigerators were installed into 70% of health facilities; and health workers were trained in cold-chain logistics. Despite this, measles vaccine coverage did not exceed 60%. It was clear that further intervention was needed to increase the quantity as well as quality of vaccine distribution. The Paediatric Society of PNG considered this problem at its annual meeting in 2001. The experience of how other countries had successfully controlled measles was reviewed. Throughout South America, in many countries in southern Africa and in some Pacific Island states, where geography and limited economies are similar to PNG, elimination of measles transmission has occurred after the introduction of supplemental vaccination campaigns.<sup>5</sup> The overall cost of such campaigns has been between \$US0.57–1.00 per child fully vaccinated.<sup>6</sup> Almost no

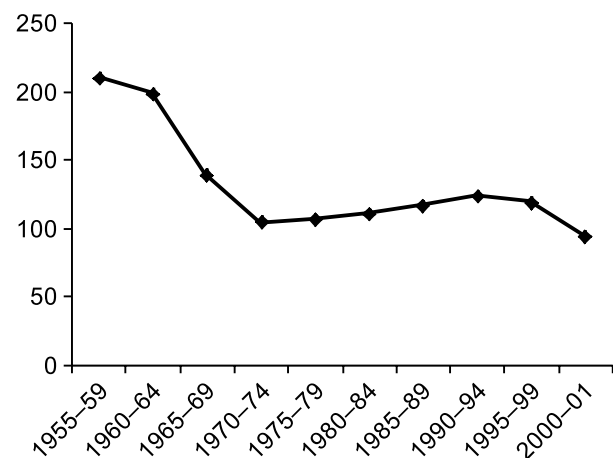


Fig. 1 Mortality trends for children in the first 5 years of life in Papua New Guinea, 1955–2001.<sup>3,4</sup> ◆, child mortality (per 1000 live births).

country in the world has controlled measles without supplemental immunization activities of some kind. This is even true of rich countries like Australia and the UK. In 1997 PNG had a supplemental campaign aimed at the elimination of polio, but this was a one-off vertical activity, and was followed by a decline in general immunization activity through routine health clinics. In countries where supplemental campaigns have been successful, they have been an integral part of, rather than replacing, the routine delivery of vaccines, and run every 3–4 years.<sup>7,8</sup>

Following the review of international experience, the Paediatric Society proposed a policy that regular supplemental mass vaccine campaigns be supported in PNG. This concurred with a WHO-funded report of vaccination services in the same year.<sup>9</sup> The PNG Health Department subsequently adopted this as part of the Expanded Programme of Immunization. Supplemental campaigns have begun in some provinces with encouraging early results (more than 90% coverage in three provinces so far). If a similar level of coverage can be reproduced throughout the country the next expected epidemic of measles will be prevented and hundreds of children's lives will be saved. Moreover, because other vaccines and vitamin A are being given during intermittent mass campaigns, reductions in other diseases and general health improvements are likely.

#### **THE VALUE OF POLICY INFORMED BY LOCAL RESEARCH**

Local research and local publications are more likely to influence clinical practice in developing countries than research conducted in other countries.<sup>10</sup>

Enteritis necroticans (pigbel) was previously the most common cause of deaths in children over the age of 12 months in the PNG highlands. There had been recent widespread perception that after the successful vaccination programme in the 1980s the disease had virtually disappeared, despite no pigbel vaccine being available since 1992.

In the mid-1990s the Commonwealth Serum Laboratories (Melbourne) developed a new vaccine, and the PNG Institute of Medical Research conducted studies that proved its safety and effective serological response in Melanesian children. However disease burden information that was necessary to support vaccine introduction was conflicting. Despite almost no pigbel having been reported from major hospitals there had been many reports to the National Health Information System of the disease from remote health clinics. By 1998 it was not clear if the PNG Health Department and AusAID should invest in the new vaccine and the infrastructure to administer it, at an annual cost of more than one million dollars, or if pigbel was no longer a major child health issue.

To improve on the available information, in 2001 a paediatric trainee from the University of PNG conducted a prospective survey of the aetiology of children presenting with acute abdomen at 30 remote health clinics in the highlands. Some of these health facilities can only be reached by more than a day's walk. The study lasted 12 months and found that pigbel still causes 9–16% of presentations with acute abdominal pain in children. However compared to the 294 known deaths from measles the same year, the overall pigbel disease burden was small: 19 cases and only three deaths throughout 2002. The Health Department has now concluded that there are higher priorities for immunization activities. Several million dollars have been saved which, hopefully, will be redirected to other priorities within the health service.

Bacterial meningitis is still a major cause of child mortality and severe neurological disability in PNG, and *S. pneumoniae* and *H. influenzae* are the most common pathogens. When the first cases of chloramphenicol-resistant *H. influenzae* type b (Hib) were reported in Australia in the early 1980s there was a rapid change to using cephalosporins as first-line treatment.<sup>11</sup> In PNG third generation cephalosporins are very expensive and supplies are scarce. Furthermore only two hospitals have facilities for antibiotic susceptibility testing: in Goroka through the Institute of Medical Research Laboratory, and at Port Moresby General Hospital. The rapid escalation of chloramphenicol-resistance in these two sites over the past 5 years has meant that standard treatment of Hib meningitis is ineffective for 30–50% of cases, and is associated with a 70% chance of death or severe neurological disability.<sup>12–14</sup> These alarming findings have led to a change in policy to make third generation cephalosporins first-line treatment for meningitis, and the PNG Government is now committed to introduction of conjugate Hib vaccine. A feasibility trial was conducted in 2003 but ongoing advocacy will be required if Hib vaccine is to stay on the National agenda.

These outcomes have occurred partly because of the increasing understanding at an administrative level of the need to base policy decisions on carefully collected evidence, and partly because there is increasing capacity among locally trained paediatricians to conduct and interpret research and health service monitoring in ways that are directly relevant to national health policy.

#### **PAEDIATRIC TRAINING AND STANDARD TREATMENT: GOOD LOCAL INSTITUTIONS SURVIVE**

The University of PNG has offered a Diploma of Child Health since 1976 and a Master of Medicine in Paediatrics since 1979. In that time there has been 69 DCH graduates, of whom 40 have gone on to complete the MMed (pers. comm. J. Vince). More than half the paediatricians trained are currently working within the Government health service of PNG or their home Pacific Island country. Others work within universities, health administration and public health.<sup>15</sup> Minimal drain to the private sector has meant that the training programme in PNG has genuinely supported the health needs of the least advantaged children. The PNG Paediatric Society is a cohesive group of paediatricians who have been influential in shaping most aspects of recent public child health policy.

In 1974 the first edition of the PNG Standard Treatment Manual of Common Childhood Illnesses was published. This contained guidelines for standardized treatment of the 17 most commonly encountered conditions.

In Australia and other western countries clinical guidelines have been increasingly used over the last 10 years to standardize paediatric care. In the 1990s the World Health Organization adopted an approach to primary care in developing countries that is algorithm based, the Integrated Management of Childhood Illness (IMCI).<sup>16</sup> The vehicle for delivering this have been predominantly in-service training, using information depicted on desk-charts. There have been several attempts at such training activities in PNG, two major exercises have been supported by external donors. In the early 1990s USAID and AusAID funded the UNICEF-managed Child Survival Program, which aimed to teach health workers an algorithmic approach to the sick child, based on the content of the PNG Standard Treatment Manual but using desk-charts. This was accompanied by a large amount of in-service training, but

5 years after the Child Survival Program finished, health workers were rarely using the desk-chart algorithm, and all training had ceased.<sup>17</sup> In 1998 the AusAID Women and Children's Health Project sponsored an integration of the generic IMCI approach with the local Standard Treatment Manual. Cascade in-service health worker training followed, where trainers were trained with the expectation that they would return to their districts and conduct further training. However by mid-2003 it was evident that such high-volume in-service training was unsustainable outside an externally funded programme, and that high expectations of impact, limited short-term evaluation and donor fatigue were eroding confidence and were risks to sustainability. Since 2003, drawing on experience from other countries (Fiji, Philippines and Vietnam), more effort is now being put into incorporating IMCI and Standard Treatment into institutions of training (preservice and post-graduate colleges). This is the only conceivable way that IMCI will become part of the health culture. It will be a slower approach but it is more likely to be sustained.

While a variety of strategies have come and gone, the PNG Standard Treatment Manual is now approaching its 8th edition.<sup>18</sup> Indeed, many of the origins of the global WHO IMCI strategy can be traced to standard treatment approaches in PNG.<sup>19</sup> Since its inception the Standard Treatment Manual has been produced on a minimal budget using a model of development that provides a good example of the important elements required for sustainable progress. Each year the PNG Paediatric Society meet to discuss important new developments in child health that may be relevant to PNG. Changes to the manual are increasingly requiring new evidence that is considered in the context of the resources available to the PNG health service. Although this is not a new approach, the number of potentially effective interventions has increased exponentially since the mid-1970s when Standard Treatment began, therefore the need for discrimination is greater now than in the past. Modifications for the eighth edition include: zinc for the treatment of diarrhoea, nevirapine for mothers and newborns to prevent vertical transmission of HIV, use of innovative spacer devices in asthma, ceftriaxone for first-line treatment of bacterial meningitis, and Hib vaccine. Each of these has been supported by research done in PNG or internationally, and critically

considered in the harsh local context. This process results in collaborative authorship and ownership of the guidelines by Paediatric Society members. It also emphasizes the need to use and understand research in context to support child health policy, and serves as a focus of continuing medical education. The guidelines serve as standards of care that are endorsed by the Health Department; this, and the evidence supporting them are the basis for advocating that sufficient resources should be available for implementation.

#### SUPPORT FOR NURSING CAPACITY IN RURAL AREAS

If as doctors we claim to be leaders of the health team, then all of its shortcomings are ultimately our responsibility. This includes nursing, and if this is bad, as it is in so many developing countries, then the development and welfare of the nursing profession is no less important to the care of the sick than the development of the medical profession.

David Morley  
Paediatric Priorities in the Developing World, 1973

As is still the case in most developing countries, child mortality in PNG is higher in rural areas than in urban areas,<sup>20</sup> and nurses provide front-line and often the only care for seriously ill children in most rural district hospitals and health centres. However few are specifically trained in child health or midwifery. During much of the 1980s and 1990s there was no formal maternal and child health nursing training outside the University of PNG in Port Moresby. The annual output of that course was only sufficient to provide specialist nurses for a fraction of the nation's 800 health facilities, and barely kept up with natural attrition. There was an inherent but perhaps unavoidable bias against remote rural areas, favouring urban hospital-practicing nurses. Before 1999 if a rural province wanted a nurse to be trained as a child or maternal health specialist they had to go to Port Moresby for a year, representing a major loss of nursing manpower to a small rural hospital or health centre. Recognizing this need, the PNG Health

**Table 1** Some important milestones of recent progress in Child Health in Papua New Guinea (PNG). Virtually all activities have elements that are ongoing

Years	Activity
1998–2004	Improvements to the vaccine cold chain in rural health facilities
2003–04	Supplemental Immunization Activities (SIAs) integrated with routine EPI services
2000–04	Local adaptation of WHO IMCI into Standard Treatment, health worker training and integration into preservice training institutions
1999–2004	Expansion of specialist Child Health and Midwifery training for nurses and health extension officers to colleges in provincial areas
2003–04	Revisions to the 8th edition of <i>Standard Treatment Manual for Common Illnesses in Children</i>
2003	Publication of 2nd edition of <i>Paediatrics for Doctors in Papua New Guinea</i> <sup>22</sup>
1979–2004	Training of 40 paediatricians at University of PNG <sup>15</sup>
2003	First PNG paediatric surgeon completed training <sup>23</sup>
2003–04	Development of national childhood cancer treatment policy
1993–2004	National visiting cardiac surgery programme sustained for over 10 years <sup>24</sup>
2004	Completion of HIV treatment policy for children
2004	Pilot introduction of nevirapine for prevention of mother to child HIV transmission
2002–03	Introduction of Vitamin A supplementation following a national survey of vitamin A status in children
2002–04	Hib vaccine pilot trial and building an evidence base for national implementation
2002	Pigbel disease burden study confirmed low incidence
2000	Publication of minimal standards of neonatal care in hospitals <sup>25</sup>
2000–02	Piloting of a primary care IMCI approach to neonatal care
2001–03	Introduction and evaluation of HIV awareness education into high school curricula

EPI, Expanded programme of immunization; Hib, *H. influenzae* type b; WHO IMCI, Integrated Management of Childhood Illness.

Department and AusAID have provided support for the development of postgraduate midwifery and child health nursing courses in three provincial training colleges. The elements are complex. Effectiveness will depend not only on high quality training, but also upon official empowerment for independent clinician status, appropriate financial reward for higher qualifications, and incentives for living and working in remote rural areas. The 22 graduates of the first new course in the Eastern Highlands in 1999–2000 are now in key positions of responsibility for child health and midwifery: in provincial and district hospitals, remote rural health centres, urban clinics, and in clinical teaching. To develop independent practitioner capacity for all health centres across the country will take time, considerable effort and ongoing external support, but achieving this will improve access to quality health services among poorly served populations.

### ELEMENTS OF PROGRESS AND INVESTMENTS FOR THE FUTURE

I have described several areas where steady progress has been made in child health over the last 10 years. There are many others (Table 1). Some of the important common elements have included:

- Supporting paediatricians and child health nurses to work at the interface between clinical practice and public child health
- Support for evidence-based capacity among paediatric leaders
- The generation and use of locally relevant evidence
- A focus on equity and access
- Support for vital national child health institutions, the PNG Paediatric Society, the University Department of Child Health at UPNG, and nursing and paramedical training colleges.

In rich countries like Australia, evidence-based medicine and policy, high-speed information technology, and quality improvement processes are imbedded within health systems, such that their contribution to everyday practice often goes unrecognized. New developments in technology and medicine have not narrowed the gulf in health outcomes between rich and poor nations. Indeed, the inequalities are likely to be exacerbated unless specific efforts are made to prevent this happening.

The elements of progress represent substantial investments for PNG's future. We cannot hope that they would have a measurable impact on child mortality within a short-term funding cycle of 1–3 years, but they almost certainly will in the longer-term. There is much that Australian medicine has that is currently of little value to PNG, and much that the PNG health service needs that Australia cannot provide, but there are a few areas where assistance would be both useful and possible. A 'third-way' of intercountry collaboration and assistance in health would be to provide long-term support for such investments for the future, without too much concern for whether or not they have short-term impact. There is value in supporting local institutions to develop capacity for an independently sustainable and equitable child health service,<sup>21</sup> while simultaneously acknowledging that factors like poverty, urbanization, low status of women, poor road conditions and corruption will at times constrain rapid improvement.

Many challenges lie ahead for PNG; child mortality rates will not fall to acceptable levels until there are better delivery of services to remote rural areas, improvements in childhood nutrition and neonatal survival, and control of tuberculosis and

HIV. Better governance and health service management will be vital to the provision and functioning of good quality clinical services. Progress will be slow, sometimes faltering and rarely newsworthy, but 90 years ago Victoria had an infant mortality rate similar to PNG today.

### ACKNOWLEDGEMENTS

I am grateful to Professor John Vince for his advice and suggestions, and to all the members of the PNG Paediatric Society whose work is described here.

### REFERENCES

- 1 Forbes M. Raskols, guns and money: How lawlessness and corruption are killing Papua New Guinea. *The Age* 2004; (A3), 4–5.
- 2 Duke T. Decline in child health in rural Papua New Guinea. *Lancet* 1999, 2004; **354**: 1291–4.
- 3 UNICEF. Statistical tables. *The State of the World's Children, 2003*, New York: Oxford University Press, 2003.
- 4 Ahmad OB, Lopez AD, Inoue M. The decline in child mortality: a reappraisal. *Bull. World Health Organ.* 2000; **78**: 1175–91.
- 5 Biellik R, Madema S, Taole A *et al.* First 5 years of measles elimination in southern Africa: 1996–2000. *Lancet* 2002; **359**: 1564–8.
- 6 Regional Office of the Western Pacific WHO. *Thirteenth Meeting of the Technical Advisory Group on the Expanded Programme on Immunization and Poliomyelitis Eradication in the Western Pacific Region (WP) /ICP/EPI/5.2/001-A. RS/2002/GE/10 (PHL)*. WHO: Manila, Philippines, 2003; pp. 17–8.
- 7 Progress toward interrupting indigenous measles transmission. Region of the Americas, January 1999–September 2000. *MMWR* 2000; 986–90.
- 8 Duke T, Mgone CS. Measles: not just another viral exanthem. *Lancet* 2003; **361**: 763–73.
- 9 Condon RJ. *Technical support for measles outbreak and control in Papua New Guinea*. Port Moresby: World Health Organization Draft Office Document, 2002; 1, 1–17.
- 10 Page J, Heller RF, Kinlay SL-Y *et al.* Attitudes of developing world physicians to where medical research is performed and reported. *BMC Public Health*, 2003; **3**: 16.
- 11 Forsyth K, Hansman D, Jarvinen A. Multiply-resistant Haemophilus influenzae type b causing systemic disease in Australia. *Pathology* 1986; **18**: 386–9.
- 12 Mokela D, Kiromat M, Danaya R. Bacteriology and sensitivity patterns in paediatric infections. *PMGH Proc. 35th Annu. Med. Symp.* 1999; **1**.
- 13 Michael A, Wal T, Duke T *et al.* Multi-drug resistance in paediatric meningitis patients admitted to the Goroka Base Hospital. *PNG Medical Society, 38th Annual Medical Symposium*. Alotau, Milne Bay Province, 2002; **1**: 43–44.
- 14 Duke T, Michael A, Mokela D, Wal T, Reeder J. Chloramphenicol or ceftriaxone, or both, as treatment for meningitis in developing countries? *Arch. Dis. Child* 2003; 2002; **88**: 536–9.
- 15 Vince JD. Medical postgraduate education in child health in Papua New Guinea. *PNG Med. J.* 2004; **43**: 54–9.
- 16 Patwari AK, Raina N. Integrated Management of Childhood Illness (IMCI): a robust strategy. *Indian J. Pediatr.* 2002; **69**: 41–8.
- 17 Samiak L, Vince JD. The use of the PNG Standard Treatment Book by clinic and health centre staff. *PNG Med. J.* 2000; **43**: 69–75.
- 18 Standard Treatment for Common Illnesses of Children in Papua New Guinea. *A manual for nurses, health extension officers and doctors*. Port Moresby: PNG Department of Health, 2000.
- 19 Shann F, Hart K, Thomas D. Acute lower respiratory tract infections in children: Possible criteria for selection of patients for antibiotic therapy and hospital admission. *Bull. World Health Organ.* 1984; **62**: 749–53.

- 20 PNG Department of Health. *National Health Plan*. Waigani, NCD: Papua New Guinea Department of Health, 1996; 2: 47–106.
- 21 Sitthi-amorn C, Somrongthong R. Strengthening health research capacity in developing countries: a critical element for achieving health equality. *Br. Med. J.* 2000; **321**: 813–17.
- 22 Shann F, Biddulph J, Vince J. *Paediatrics for Doctors in Papua New Guinea*. PNG Department of Health and Ausaid. Port Moresby: DWU Press, 2003.
- 23 Dewan PA, Mathew M. The development of paediatric surgery in Papua New Guinea. *PNG Med. J.* 2000; **43**: 60–4.
- 24 Tefuarani N, Sleigh A, Williams G, Vince JD, Hawker R. A history of surgery for congenital heart disease in Papua New Guinea. *PNG Med. J.* 2004; **43**: 65–8.
- 25 Paediatric Society of Papua New Guinea. Minimal standards of neonatal care in hospitals. *PNG Med. J.* 2000; **43**: 139–42.