

# The public health nutrition intervention management bi-cycle: a model for training and practice improvement

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## Abstract

*Objective:* The present paper describes a model for public health nutrition practice designed to facilitate practice improvement and provide a step-wise approach to assist with workforce development.

*Design:* The bi-cycle model for public health nutrition practice has been developed based on existing cyclical models for intervention management but modified to integrate discrete capacity-building practices.

*Setting:* Education and practice settings.

*Subjects:* This model will have applications for educators and practitioners.

*Results:* Modifications to existing models have been informed by the authors' observations and experiences as practitioners and educators, and reflect a conceptual framework with applications in workforce development and practice improvement. From a workforce development and educational perspective, the model is designed to reflect adult learning principles, exposing students to experiential, problem-solving and practical learning experiences that reflect the realities of work as a public health nutritionist. In doing so, it assists the development of competency beyond knowing to knowing how, showing how and doing. This progression of learning from knowledge to performance is critical to effective competency development for effective practice.

*Conclusions:* Public health nutrition practice is dynamic and varied, and models need to be adaptable and applicable to practice context to have utility. The paper serves to stimulate debate in the public health nutrition community, to encourage critical feedback about the validity, applicability and utility of this model in different practice contexts.

## Keywords

Public health nutrition  
Intervention management  
Capacity building  
Practice

Promoting optimal nutrition is the central focus of public health nutrition (PHN) as a discipline. While some progress has been made internationally in addressing undernutrition, progress has been too slow to achieve the Millennium Development Goals<sup>(1,2)</sup>. Overnutrition, as expressed by rates of overweight and obesity, is rising in most countries<sup>(3)</sup>, with many low- and middle-income countries now suffering a double burden. Many countries have responded by developing policies and action plans that are aimed at addressing these major nutrition problems<sup>(4)</sup>, but they usually ignore issues relating to capacity to implement and the determinants of capacity such as workforce development<sup>(5)</sup>. As a consequence, many nutrition policies and plans are not being effectively implemented<sup>(6)</sup>. Building strategic and operational capacity is recognised as a critical determinant of the effectiveness of local, national and international nutrition systems in delivering optimal nutrition outcomes for populations<sup>(2,7)</sup>. As both forms of capacity are dependent on purposive and multi-strategy investments in workforce

development at all levels in the system, workforce development remains an outstanding and often neglected challenge in our discipline area. Workforce capacity deficits in PHN are a universal problem, even in rich economies with well-developed health systems<sup>(5,7-9)</sup>. The key determinants of workforce capacity that are consistent internationally are summarised in Table 1.

Of the determinants outlined in Table 1 that impact on workforce capacity, workforce preparation and practice improvement are most amenable to change within, and by, the PHN community.

## Public health nutrition practice

PHN practice spans activities that range from academic and analytical work through to working 'in situ' with communities and stakeholders to address nutrition issues. A focus on assessing, strategically changing and evaluating the socio-economic, physical and cultural determinants of

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**Table 1** Determinants of public health nutrition (PHN) workforce capacity<sup>(5–9,17)</sup>

Workforce preparation Practice improvement and learning systems	Inadequate and/or non-specific training, reliance on clinically trained practitioners Workforce practices do not reflect required work, limited targeting of interventions to most needy groups, strategy utilisation more aligned to clinical practice, limited environmental change strategy use, limited workforce mentoring, barriers to continuing competency development
Human resource infrastructure	Small workforces relative to need, limited specialisation in PHN, high staff turnover, over-reliance on overworked health generalists
Organisation and policy environment	Inadequate resource allocation to support action, leadership limited to rhetoric, absence of systematic and strategic workforce development, workforce disorganisation
Intelligence access and use	Suboptimal access to PHN intelligence, under-developed workforce research culture, limited collaboration between practitioners and academics

nutritional status affecting health characterises PHN practice<sup>(10)</sup>. As a result, PHN practice involves a complexity that creates significant challenges for the strategic development of the practitioner workforce and its effectiveness. This is exacerbated by changing practice paradigms in the field of nutrition<sup>(11)</sup>, which makes it difficult to apply a comprehensive description of the nature of PHN practice across all practice settings. For the purposes of the present paper, PHN practice is defined as the work required to effectively develop, implement and evaluate interventions that address identified, population-based nutrition problems. In this context, intervention refers to actions that intentionally focus on changing health outcomes by addressing the determinants of nutritional exposures.

To date the PHN research literature has tended to apply an epidemiological focus on exploring and understanding the determinants and distribution of nutrition issues, and evaluation of interventions. This assumption can be tested by reviewing any issue of this journal. This work has been critically important in understanding what determinants cause nutrition problems, what strategies have merit in terms of producing desired changes in health status and how to measure these changes. Unfortunately, this literature does not provide adequate guidance about how to practise PHN effectively within specific contexts, what work is required and what competencies are required to effectively promote and maintain the nutrition-related health and well-being of populations.

### Core functions and competencies

The lack of consideration of the practice of PHN constrains PHN workforce development, practice effectiveness and overall capacity<sup>(12)</sup>. This has prompted efforts to identify, assess consensus and codify the core functions of the PHN workforce; core functions being those considered absolutely necessary to ensure public health capacity<sup>(13)</sup>. This has been done to help focus workforce development efforts in developed countries such as Australia and the European Union<sup>(14–16)</sup>. This consensus development work has identified intervention management (the design, planning, implementation and evaluation of public health interventions) as a dominant core workforce function (with as much as 50% of core functions identified reflecting

intervention management practices), reinforcing earlier findings in Australia about employer expectations<sup>(14)</sup> and workforce practices<sup>(17)</sup>. Capacity-building functions are similarly rated as core functions, reinforcing the long-held view of capacity building as an important strategic approach in developing country PHN practice<sup>(18,19)</sup>.

If an understanding of the core functions (the work) of the PHN workforce is a prerequisite for strategic workforce development, there is a powerful logic in aligning core functions with the competencies required to perform these functions<sup>(20)</sup>; competencies here referring to the knowledge, skills and 'ways of thinking' required to effectively perform a work function<sup>(21)</sup>. In practice, the competency mix required to effectively manage interventions and build capacity has been shown to be quite broad, drawing on a mix of analytical, management, strategic planning, leadership and organisational competencies<sup>(22,23)</sup>. Unfortunately, there is limited scholarship about the most effective and efficient methods to develop these competencies in our disciplinary literature. To help address this gap, the present paper describes a new model for PHN intervention management practice designed to facilitate practice improvement and provide a step-wise approach to assist with PHN workforce preparation.

### Step-wise processes to guide practice

Step-wise processes for practice and learning have been widely applied conceptual devices used to help bring order to this complexity in health practice and education. PHN practice borrows heavily from the related disciplines of health promotion, public health and dietetics, and has adopted many of the practice cycles that have evolved in these disciplines<sup>(24)</sup>, which are all loosely based on action research processes that include cycles of planning, acting, observing and reflecting<sup>(25)</sup>. Cyclical and systematic processes for intervention management and practice have been used for many years to inform strategic decision making and to enhance the quality and effectiveness of intervention management<sup>(26,27)</sup>. These have varied in terms of the degree of segmentation in the step-wise cycle. The Triple-A cycle<sup>(28)</sup> that includes three main steps of Analysis, Action and Assessment was developed to assist with interventions dealing with malnutrition.

Intervention mapping was proposed in the late 1990s as a sequential process of integrating theory, empirical findings from the literature and information collected from the population to inform strategic decision making about how best to address health promotion challenges<sup>(29)</sup>. Borrowing from these earlier models, the PHN cycle<sup>(24)</sup> has been proposed as a seven-step practice cycle to describe the nature of PHN practice. This model replicates the basic cycle of needs assessment, planning, implementation and evaluation used in earlier health promotion planning models. Both of these earlier PHN practice cycles have more recently been adapted in an attempt to more explicitly integrate capacity-building principles and practice as part of the process of developing sustainable interventions<sup>(30)</sup>.

As models for informing PHN practice and workforce development, we believe these earlier models have limitations in the context of workforce development and practice improvement in that they do not adequately deconstruct practice in a way that can inform responses to the ‘where do I start?’, ‘how?’ and ‘with who?’ type questions that are important in teaching students PHN practice competencies. They similarly do not reflect a notion of progress in practice (moving forward rather than going around-and-around), and they do not adequately integrate capacity-building strategies with project planning in a step-by-step sequence.

### **A bi-cyclic framework for public health nutrition practice**

We propose a bi-cyclic model for PHN practice (‘the bi-cycle’; Fig. 1) over three distinct stages, to inform workforce development and practice in the core practice area of intervention management. This model recognises the progressive and cumulative nature of PHN practice (i.e. moving forward) and integrates capacity building into the planning–implementation–evaluation sequence. This practice framework emphasises the process, tools and rationale for practice approaches in PHN. To encourage discipline in PHN practice, it is intentionally pedantic in the way that it has deconstructed earlier models into what may seem to be overly numerous discrete steps, which are summarised in Table 1.

#### ***Different phases in practice***

The intelligence phase, represented by the first loop in the bi-cycle, forces practitioners to engage with their communities and key stakeholders and understand the problem and contextual factors before acting; intelligence in this context referring to information from various sources and methods that help inform decision making about intervention design. Understanding before acting means careful and varied analysis of the community, the community’s capacity for action, the problems faced and

what determinants have a causal relationship with the problem – the logic being that until ‘upstream’ determinants that need to be changed are identified, it is difficult to develop strategies that will lead to a change in ‘downstream’ health outcomes. The action phase of PHN practice, represented by the connection between the intelligence and evaluation loops in the bi-cycle, focuses on planning and managing intervention implementation. The evaluation phase in the PHN practice bi-cycle focuses on the different levels and types of evaluation, and emphasises the importance of sharing practice leanings via dissemination and scholarship.

#### ***Feedback between cycles***

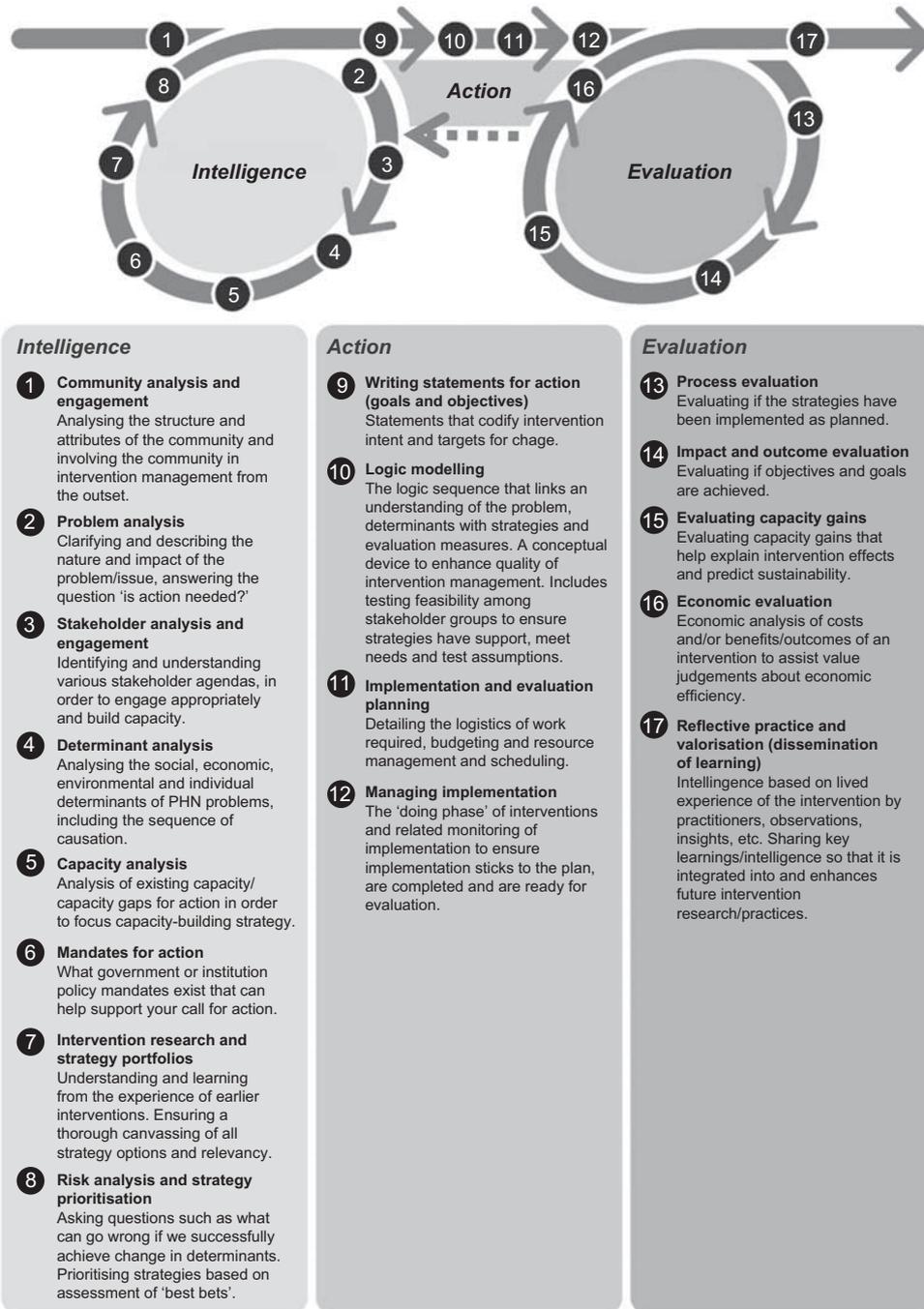
The backward arrow linking the action phase with evaluation and intelligence phases (the bi-cycle’s chain) represents the dynamic nature of intervention management that regularly requires practitioners to go back to the intelligence, to fine-tune strategies and adapt to changing contexts in practice. It also illustrates that evaluation builds on the intelligence required to inform practice.

#### ***Improving practice***

PHN practice, to be effective, needs to be dynamic, responsive and contextual to the setting, situation and available resources. Without an intentional and strategic emphasis on the capacity-building approach to practice, PHN practice and the resultant interventions are likely to produce disappointing returns on investment in terms of outcomes relative to resources used. The bi-cyclic model for practice provides a systematic process for intervention management that has applications irrespective of the issues being addressed, the practice context, the strategy mix and the level of intervention. It integrates capacity-building steps (steps 1, 3, 5, 6, 7, 15, 17) into the sequential practice cycle, making it an explicit approach to practice consistent with previous arguments about the need to bring capacity-building strategies to the forefront of PHN practice<sup>(30,31)</sup>. Our proposition then is that this model, if applied in practice, will enhance practice effectiveness compared with earlier less integrated approaches and serve a useful practice improvement function.

#### ***Workforce preparation***

We believe that the model has its greatest utility in the development of PHN practice competencies during workforce preparation, both in the pre-employment and post-employment (continuing education) stages of workforce development. We have previously used the bi-cycle model as a framework for curriculum development and instructional design in the courses and texts<sup>(32)</sup> we use to teach in our respective universities, as a framework for a PHN workforce mentoring intervention<sup>(33)</sup> and a suite of online learning modules has been developed as part of the JobNut Project funded by the European Union (<http://www.medicine.tcd.ie/nutrition-dietetics/jobnut/>).



**Fig. 1** The bi-cycle framework for public health nutrition (PHN) practice<sup>(32)</sup>

Each step provides an opportunity to engage students in learning and skill development regarding the rationale in practice, techniques and tools to assist with PHN practice in a sequential manner. We have used the model to guide students develop comprehensive PHN intervention plans as a basis for assessment and later practice-based implementation during professional internships. In the process, we believe we are preparing students to be employable, effective in practice and to be catalysts for change.

Table 2 aligns each step in the practice cycle with a summary of the competency elements derived from recently published PHN academic standards<sup>(21)</sup> required at each step and some of the learning and teaching strategies that can be used to build these competencies.

#### **Learning and teaching rationale**

From an androgogical (adult learning and teaching) perspective, the bi-cycle model provides a conceptual framework to structure experiential learning that reflects the key



**Table 2** Continued

		Competency elements <sup>(21)*</sup>												
Step	Learning and teaching exercises: examples	EK	NS	AN	PHSK	FNSK	NE	MGT	LDR	PROF	COM	NAMS	CB	IM
Action														
9	Writing statements for action	+	+	+	+	+	+	+			+	+	+	+
	Learning and teaching exercises: examples	Learners can be tasked to write goals and objectives that clearly relate to the determinants and problem defined in earlier steps, the emphasis being on identifying modifiable determinants, the anticipated change in the problem associated with change in determinants, so that action statements drafted are specific, measurable, achievable, realistic and time-specific (SMART)												
10	Logic modelling	+	+	+	+	+	+				+			+
	Learning and teaching exercises: examples	Logic modelling involves diagrammatically representing the logic and assumptions underpinning an intervention's strategy mix, including the anticipated cause-effect of strategy implementation through to evaluation of changes in determinants and related outcomes. Tasking learners to make explicit this logic forces learners to critically reflect on assumed cause-effect of strategies												
11	Implementation and evaluation planning	+	+	+	+	+	+	+			+			+
	Learning and teaching exercises: examples	Learners can be tasked to consider the logistics of strategy implementation by deconstructing strategies into work packages/tasks, considering the sequence of work required and the associated human and other resources required (budgeting). These exercises provide assessable products based on experiential learning (learning by doing)												
12	Managing implementation	+						+			+			
	Learning and teaching exercises: examples	Evaluability assessment involves assessing whether or not an intervention is ready for evaluation <sup>(38)</sup> . Learners can conduct an evaluability assessment on an intervention scenario using a step-wise assessment worksheet. This exercise focuses learners' attention to questions of strategy exposure, extent of implementation and available evaluation data												
13	Process evaluation	+	+	+	+	+	+	+			+	+	+	+
	Learning and teaching exercises: examples	The key learning task associated with issues of all forms of evaluation is in the design of evaluation methods to effectively measure achievement against goals and objectives, to assess intervention implementation, capacity gains and to make judgement about costs v. outcomes. Learners can be tasked to develop and justify evaluation plans, reflecting expectations in practice												



## References

1. Bryce J, Coitinho D, Darnton-Hill I *et al.* (2008) Maternal and child undernutrition: effective action at national level. *Lancet* **371**, 510–526.
2. Morris S, Coghill B & Uauy R (2008) Effective international action against undernutrition: why has it proven so difficult and what can be done to accelerate progress? *Lancet* **371**, 608–620.
3. World Health Organization (2011) *Overweight and Obesity: Fact Sheet 311*. Geneva: WHO; available at <http://www.who.int/mediacentre/factsheets/fs311/en/index.html>
4. Lachat C, Van Camp J, De Henauws S *et al.* (2005) A concise overview of national nutrition action plans in the European Union Member States. *Public Health Nutr* **8**, 266–274.
5. Margetts B (2009) *Promoting the Public Health Nutrition Workforce in Europe. Final Report of the Jobnut Project*. Southampton: University of Southampton.
6. Nishida C, Shrimpton R & Darnton-Hill I (2009) Landscape analysis on countries' readiness to accelerate action in nutrition. *SCN News* **37**, 4–9.
7. Hughes R (2006) A socioecological analysis of the determinants of national public health nutrition work force capacity: Australia as a case study. *Fam Community Health* **29**, 55–67.
8. Fox A, Chenhall C, Traynor M *et al.* (2008) Public health nutrition practice in Canada: a situational assessment. *Public Health Nutr* **11**, 773–781.
9. Haughton B & George A (2008) The Public Health Nutrition workforce and its future challenges: the US experience. *Public Health Nutr* **11**, 782–791.
10. Hughes R (2003) Definitions for public health nutrition: a developing consensus. *Public Health Nutr* **6**, 615–620.
11. Jonsson U (2010) The rise and fall of paradigms in world food and nutrition policy (Commentary). *World Nutr* **1**, 128–158.
12. Hughes R (2003) Public health nutrition workforce composition, core functions, competencies and capacity: perspectives of advanced level practitioners in Australia. *Public Health Nutr* **6**, 607–613.
13. National Public Health Partnership (2000) *National Delphi Study on Public Health Functions in Australia*. Victoria: NPHP.
14. Hughes R (2004) Employers expectations of core functions and competencies for the public health nutrition workforce. *Nutr Diet* **61**, 105–111.
15. Jonsdottir S (2008) Measurement and development of European consensus on core competencies and curricula required for effective public health nutrition practice. MSc Thesis, University of Iceland.
16. Hughes R (2007) Practices overview. In *Public Health Nutrition: From Principles to Practice*, pp. 265–272 [M Lawrence and A Worsley, editors]. Crows Nest, NSW: Allen & Unwin.
17. Hughes R (2004) Work practices of the community and public health nutrition workforce in Australia. *Nutr Diet* **61**, 38–45.
18. Elmadfa I (2006) Mysore declaration: capacity strengthening in nutrition. *Ann Nutr Metab* **50**, 403–406.
19. Shrimpton R (2002) Nutrition in communities. Nutrition: a foundation for development. [http://www.unscn.org/files/Publications/Briefs\\_on\\_Nutrition/Brief11\\_EN.pdf](http://www.unscn.org/files/Publications/Briefs_on_Nutrition/Brief11_EN.pdf) (accessed November 2010).
20. Hughes R (2003) A conceptual framework for intelligence-based public health nutrition workforce development. *Public Health Nutr* **6**, 599–605.
21. Hughes R, Shrimpton R, Recine E *et al.* (2011) A competency framework for global public health nutrition workforce development. Draft report. Gold Coast, QLD: Griffith University.
22. Jonsdottir S, Hughes R, Thorsdottir I *et al.* (2011) Consensus on the competencies required for public health nutrition workforce development in Europe – the JobNut project. *Public Health Nutr* **14**, 1439–1449.
23. Hughes R (2003) Competencies for effective public health nutrition practice: a developing consensus. *Public Health Nutr* **7**, 683–693.
24. Margetts B (2004) An overview of public health nutrition. In *Public Health Nutrition*, pp. 1–25 [B Margetts, M Gibney, J Kearney *et al.*, editors]. Oxford: Blackwell Publishing.
25. Lewin K (1947) Frontiers in group dynamics. *Hum Relat* **1**, 5–41.
26. Godin G, Gagnon H, Alary M *et al.* (2007) The degree of planning: an indicator of the potential success of health education programs. *Promot Educ* **XIV**, 138–142.
27. Ader M, Berensson K, Carlsson P *et al.* (2001) Quality indicators for health promotion programmes. *Health Promot Int* **16**, 187–195.
28. Jonsson U (1988) A conceptual approach to understanding and explanation of hunger and malnutrition in society. In *Hunger and Society. Cornell International Monograph Series* no. 17. Ithaca, NY: Cornell University Program in International Nutrition.
29. Bartholomew K, Parcel G, Kok G *et al.* (2001) *Intervention Mapping: Designing Theory- and Evidence-based Health Promotion Programs*. New York: McGraw-Hill Companies.
30. Baillie E, Bjarnholt C, Gruber M *et al.* (2009) A capacity-building conceptual framework for public health nutrition practice. *Public Health Nutr* **12**, 1031–1038.
31. Labonte R, Woodward C, Chad K *et al.* (2002) Community capacity building: a parallel track for health promotion programs. *Can J Public Health* **93**, 181–182.
32. Hughes R & Margetts B (2011) *Practical Public Health Nutrition*. Oxford: Wiley Blackwell.
33. Palermo C, Hughes R & McCall L (2010) Developing the nutrition and dietetics workforce after graduation: a mixed-method evaluation of a workforce development intervention. *J Hum Nutr Diet* **23**, 244–253.
34. Knowles M, Holton E & Swanson R (2005) *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development*, 6th ed. Boston, MA: Elsevier.
35. Miller G (1990) The assessment of clinical skills/competence/performance. *Acad Med* **65**, 9 Suppl., S63–S67.
36. Deutsche Gesellschaft für Technische Zusammenarbeit (2005) *Capacity Building Needs Assessment (CBNA) in the Regions (version 2.0) Module B. Methods and Instruments for the Capacity Building Cycle*. Jakarta: GTZ.
37. Pickett G & Hanlon J (editors) (1990) *Public Health: Administration and Practice*. St Louis, MO: Times Mirror/Mosby College Publishing.
38. Hawe P, Degeling D & Hall J (editors) (1990) *Evaluating Health Promotion: A Health Worker's Guide*. Sydney: MacLennan and Petty.