

3. 平等性：全ての世帯が、収入に応じた医療費を出資すること。つまり、富める者が、より貧しい者の為に資金的な補助をしていることでもある。³³

アジア・太平洋地域の保健医療財政には問題が多い。医療費の利用者負担の割合が高く、これが、貧富の差にかかわらず健康が確保されるという社会的保護が欠如する要因となっている。アジアにおいては、公的セクターや民間セクターにおける利用者負担が大きい。医療サービスを受けることによって生じる貧困のレベルがその結果として悪化するため、人々が必要な医療を受けない原因ともなっている。さらに、この利用者負担が多いことを利用して、サービス提供者側は需要を作りだし、適切な医療サービスをもたらしている。このような医療財源の不適切さの問題に加え、多くの加盟国において、医療費支出総額は不適切であり、政府の医療支出額も適切とは言えない。

“*Health Financing Strategy for the Asia Pacific Region (2010-2015)*”では、保健医療財政分析がなされている。この戦略では、PHCのコアバリューに基づいて、医療をすべての人々に行き渡らせ(universal coverage)、強固な保健システムをつくりあげるための、医療財政分野での明確な目標が掲げられている。ただし、各目標の妥当性は、各国の事情によって変わってくるかもしれない。目標は以下のとおりである。

- 医療費総額に占める利用者負担額の割合が 30-40%未満に抑えられる。
- 医療費総額が、少なくともその国の GDP の 4-5%となるようにする。
- 少なくとも 90%以上の国民が、前払い制とリスク・プーリングによって社会的に守られている。
- ほぼ 100%の社会的弱者が、社会的支援とセーフティー・ネット・プログラムの対象となる。

さらに、下の 8つの戦略がたてられている。

- 保健医療に対する投資と公的支出を増やすこと。
- 国際援助が主な医療財源となっている加盟国については、援助効果を改善すること。
- 保健システムの効率を改善すること。そのために不平等、非効率、低い質の問題に取り組み、支出に見合った成果を達成できるような医療費支出の合理化をはかること。
- 前払い制とリスク・プーリングを推進すること。

³³ World Health Organization. The world health report 2000. Health systems: improving performance. *Op cit.*

- 医療サービス提供者側の支払いの方法を改善すること。すなわち、コスト削減したらインセンティブの付与、消費者需要の改善、医療費の合理的な使用に対するインセンティブの付与などである。例えば、人頭請合診療報酬や出来高払い、特定のサービスを利用した場合のインセンティブの付与などである。
- 貧しい人々や社会的弱者へのセーフティ・ネットを強化すること。貧しい人々を保護することに特別な注意を払わない限り、本来は貧しい人々や社会的弱者のためであったはずの公的資金は、より恵まれた人々に対して使われてしまうことが多い。
- 政策立案のためのエビデンスと情報を収集すること。その際、より平等な資金配分とアクセスに関する情報を入手できるように配慮すること。
- 政策の変更をモニタリングし評価できるようにしていくこと。³⁴

f. リーダーシップとガバナンス

Stewardship とも言われる保健システムのリーダーシップとガバナンスは、複雑であり、保健システムにとってきわめて重要なものでもある。議論のあるところではあるが、最も重要なパーツとみなすむきもある。³⁵ 政府が保健サービスの主な提供者や財源となっていない場合でも、ガバナンスの役割が消えてしまうわけではない。必要なヘルスケアへのアクセスは、国民の基本的人権であり、それを保障する義務を負うのは政府である。したがって、保健セクターにおける国、民間、国外関係者を自国民と結ぶ役割は、政府が担っている。³⁶

野放しの、もしくは規制が不十分な保健セクターの商業化や市場化は、PHC の価値観に基づいた保健システムの構築とその持続可能性への最大の脅威の一つである。保健セクターが、たとうまく管理・規制されていたとしても、市場原理にまかせていただけでは、平等でユニバーサルなヘルスケアへのアクセスにつながることはない。平等でユニバーサルなアクセスは段階的に実現されていってもよい。しかしその場合、保健システムが強固であり続けかつ PCH のコアバリューを本当に達成するためには、全体目標は堅持されていなければならない。

³⁴ World Health Organization. *Health financing strategy for the Asia-Pacific region (2010-2015)*. Geneva, World Health Organization, 2009 (draft, unpublished document).

³⁵ World Health Organization. *The world health report 2000. Health systems: improving performance*. *Op cit.*

³⁶ UN Committee on Economic, Social and Cultural Rights (CESCR). General comment no. 14: the right to the highest attainable standard of health (Art. 12 of the Covenant). *Adopted at the Twenty-second Session of the Committee on Economic, Social and Cultural Rights; 25 April – 12 May 2000*. Geneva, 2000. Available at <http://www.unhcr.org/cgi-bin/texis/vtx/refworld/rwmain?docid=4538838d0&page=search>

保健分野におけるリーダーシップとガバナンスは、保健セクターの範疇を超えている。というのは、PHCの重要な価値観の一つとして、多分野連携があり、また、健康の決定要因には保健セクターの範疇を超えるものが多いことがわかっているからである。'健康的な公共政策'、'全ての政策への健康の視点の導入'、'健康的な環境'、そして'健康的な島'などはこの発想に基づいている。

ガバナンスにとって核となる責務が特定されている。³⁷ 責務の詳細や優先順位は加盟国によって異なるであろう。主なガバナンスの責務は以下のとおりである。

- 保健政策と保健体制づくり。それは国の開発政策に見合っており、PHCのコアバリューを推進させ、保健システムを強化するようなものでなくてはならない。コアバリューとしては平等性、差別のないこと、入手可能であること、効率的であること、持続可能であること、科学的であること、人権が守られていること、がある。多くの場合、国の保健計画は、保健政策実践のガイドとなる。
- 法律、規制、認定制度、および（医療の）標準化によって保健セクターのマネジメント。政府機関に属する医療サービス提供者も政府以外の組織に属する医療サービス提供者もこの対象となる。（医療の）標準化は、国レベルでも、地域レベルでも、さらには国際的レベルでも必要である。
- 一般住民への説明責任と透明性。保健セクターのガバナンスは、専門家集団（学会、医師会など）や様々な商業的利害関係者との協力の下に成り立つ。その際、ガバナンス構造が、専門家や商業的利害に過度に左右されたり、束縛されたりしないように気をつける必要がある。
- 知見や情報の創出とその解釈。特に政策分野における知見と情報が重要である。
- 保健セクター外部の機関との連携体制の構築。連携し得る組織としては、政府の他の部門や民間セクター、コミュニティ、労働者組織、市民社会、宗教組織など多くが考えられる。
- 海外からの開発援助が保健セクターで重要な位置をしめている地域においては、パリ宣言(the Paris Declaration on Aid Effectiveness, Harmonization and Alignment)に沿った、援助効果に関する政策の実施。

保健セクターにおけるガバナンスのモニターと評価は、包括的な保健情報システム的一端を担っている。保健システムにおけるガバナンスのモニタリ

³⁷ World Health Organization. Everybody's business: strengthening health systems to improve health outcomes. WHO's framework for action. *Op cit.* Ref 3: 24.

ング方法についてはまだ十分に研究がいきとどいていない。そのため、他のいくつかの分野におけるモニタリングのような、長い使用経験や確立された手法は未だにない。しかし、使用可能なフレームワークや指標はある。指標として提案されたものの一つに、政策インデックスがある。これは、保健セクター関連の10の核となる政策の有無で評価する。これとは別の、一連のガバナンス評価指標がある。ヘルス・ワーカーの欠勤、地域レベルの施設に配分される資金の割合、必須医薬品の在庫切れの割合、賄賂の授受がなされる割合、不正医薬品の割合、そして市民社会が効果的に機能しているかどうか、などを調べるものである。³⁸ これらを組み合わせて、保健セクター全体のガバナンスを総合評価することができる。ガバナンスのモニタリングにコミットすること自体がより優れたガバナンスを導くこともある。

8. 結論

PHCの価値観に基づく強固な保健システムは、健康成果を改善し、健康成果を平等に達成するための、最も効率的かつ有効的な保健システムである。

WPRの各加盟国は、PHC志向型の包括的保健システムの構築に積極的に取り組んでいる。各加盟国は、このビジョン達成のために、独自の道筋をとっている。加盟国は、各国の保健システムがもっているビジョンの性質と機能性についての公開の政策対話に参加していく。対話は開かれたものであり、双方向的で、持続的なものである。加盟国は、そのビジョンに沿うように国の保健政策を開発し、更新していく。多くの場合、国の保健計画はこのビジョンを達成し、維持していくためのフレームワークとなる。このビジョンの達成が、徐々になされていくのか、あるいは一気に抜本的な改革としてなされていくのかは、加盟国の事情により異なる。

WHOは、この変革を進めていくために技術協力をするを明言している。WHOは加盟国と共同して、保健システムの規範や基準を開発し改良していく。WHOは、各国の特定のニーズに合わせて、保健システムのパフォーマンスの評価方法を開発していくための支援を行う。WHOは、PHCの価値に基づいた保健システム強化の提唱者となり、必要があれば、よき仲介者としての役割を担っていく。

西太平洋地域の人々には、生涯にわたって、最良の健康状態を保ちながら生きる権利がある。一人一人の健康を保障できるわけではない。しかし、全ての人々は、利用可能で(available)、アクセスしやすく(accessible)、入手可能で(affordable)、文化的にも受けいれやすい(acceptable)、質の高い保健サービスを受ける権利がある。西太平洋地域の加盟国は、この理想を徐々に実現させるための活動に取り組んでいる。

³⁸ World Health Organization. *Toolkit on monitoring health systems strengthening: health systems governance*. Geneva, World Health Organization, 2008 (draft, unpublished document). Available at http://www.who.int/healthinfo/statistics/toolkit_hss/EN_PDF_Toolkit_HSS_Governance.pdf

付録案

- I 地域委員会決議案
- II 協議方法
- III 保健システム指標ツールキット
- IV 該当する国際的および地域的戦略リスト

II. 研究成果の刊行に関する一覧表

1) 書籍

2) 学術雑誌

発表者氏名	論文タイトル名	発表誌名	巻号	ページ	出版年
Yanagisawa S, Poudel KC, Jimba M.	Sibling caregiving among children orphaned by AIDS: synthesis of recent studies for policy implications.	Health Policy			2010 (In press)
Yasuoka J. Poudel KC, Poudel-Tandukar K, Nguon C, Ly P, Socheat D, Jimba M.	Assessing the quality of service of village malaria workers to strengthen community-based malaria control in Cambodia.	Malaria Journal	9	109	2010
Ayi I, Nonaka D, Adjovu JK, Hanafusa S, Jimba M, Bosompem KM, Mizoue T, Takeuchi T, Boakye DA, Kobayashi J.	School-based participatory health education for malaria control in Ghana: engaging children as health messengers.	Malaria Journal	9	98	2010
Nonaka D, Vongseththa K, Kobayashi J, Bounyadeth S, Kano S, Phompida S, Jimba M.	Public and private sector treatment of malaria in Lao PDR.	Acta Tropica	112	283-7	2009

3) 学会等発表 (神馬征峰)

日付	内容	依頼者	備考
2009.04.16.	Health workforce in Asia: beyond infectious disease control	国立ソウル大学	ソウル大学 50 周年 記念シンポジウム (韓国)
2009.06.25.	Challenges and opportunities for overcoming health workforce shortage against NCD threats in the Asia-Pacific region	環太平洋連合 (APRU) 世界機関 (AWI)	環太平洋連合 (APRU) 世界機関 (AWI) 公衆衛生会 議(ジョンズホプキ ンス大学, USA)
2009.09.06.	Bottom up facilitation to improve water management in Vietnam	Community Development Journal (Oxford University Press)	Community Development Journal 専門家会 議 (ロンドン, UK)
2009.11.24	TASK SHIFTING OR TASK TRANSFORMATION: WHO CARES MANAGEMENT?	WHO	アジア太平洋保健 人材機構・WHO 国際 保健人材会議 (ハノ イ、ベトナム)
2009.12.01	Health Promotion for Overcoming Health Workforce Shortage against Chronic, Non-Communicable Diseases Threats in the Asia-Pacific Region	香港中文大学	AWI 公衆衛生ワーク ショッププロジェ クト (香港中文大 学、香港)
2009.12.06	Arts as Assets for PHC in Asia	Asia Pacific Consortium for Public Health (APACPH)	Annual APACPH Conference (台北、 台湾)

学会等発表 (狩野繁之)			
日付	内容	依頼者	備考
2009.7.31.	Community-based malaria control in the Philippines, and its Social Capital development.	独立行政法人国際協力機構(JICA)	研修コース「食の安全確保のための人畜共通感染症対策」(帯広畜産大学原虫病センター)

学会等発表 (溝上哲也)			
日付	内容	依頼者	備考
2009.7.19	School health promotion for the prevention of lifestyle diseases in Sri Lanka	International Union for Health Promotion and Education (IUHPE)	The First Asian-Pacific Conference on Health Promotion and Education(千葉)

HRH Funding: a "checklist" for Global Health Initiatives

Campbell, J., Wilde D., Bernard, J., Buchan, J., Corner, B., Dieleman, M. Friedman, E.A., Harbick, D., Jimba, M., Kasungami, D., Martineau, T., Mullen, Z., and Oulton, J.

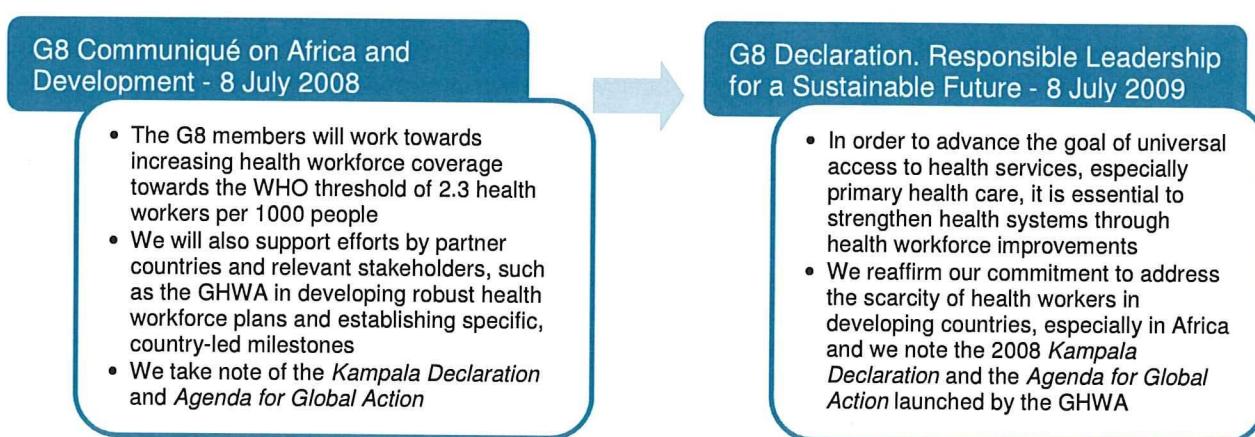
Human Resources for Health (HRH) is rightly prominent on the global health agenda as the countdown to 2015 and the achievement of the Millennium Development Goals (MDGs) grows in resonance. The global health community has made strides in generating evidence, sharing knowledge, and reaching agreements on how to advance HRH policy and achieve results¹.

The upcoming rounds of Global Health Initiative (GHI) funding decisions offer scope to further develop country HRH programming and put commitments into practice to improve health systems. HRH experts and practitioners recognize this window of opportunity and have been engaged in debate on how to support the development and review of proposals to GHIs to integrate and implement evidence-based, best practice and/or innovative HRH solutions within disease-focused funding channels.

A growing international consensus on the role of GHIs

The establishment in 2006 of the Global Health Workforce Alliance (the Alliance) and collaborative agreements such as the *Kampala Declaration*, the *Agenda for Global Action*ⁱⁱ (2008), and the *Venice Statement on Maximizing Positive Synergies between health systems and Global Health Initiatives*ⁱⁱⁱ (2009) have been key steps in clarifying HRH challenges and the role that GHIs can play in wider health systems strengthening and the achievement of the health MDGs.

The Alliance documents have received political backing at the highest possible level, with G8 official communiqués in both 2008^{iv} and 2009^v recognizing the challenge at hand:



The Venice Concluding Statement¹ acknowledges that “the impact of global health initiatives on health outcomes and health systems, though variable, has been positive on balance and has helped to draw attention to deficiencies in health systems”, yet recognises that there is an “urgent need to **develop and strengthen the health workforce** through increased education and training as well as **strategies to sustain and retain all categories of health workers**”.

The Venice Recommendations^{vi} (see below) provide the foundations for ‘a new paradigm in global public health – one in which more consistently productive and constructive interactions between Global Health Initiatives (GHIs) and country health systems will mean better value for money and better health outcomes’.

¹ As agreed at a WHO convened meeting in Venice (June 22–23) between countries represented by ministries of health, Global Health Initiatives (the Global Fund to fight Aids, Tuberculosis, and Malaria, Global Alliance for Vaccines and Immunisation, World Bank Multi-country AIDS Program, and the US President’s Emergency Plan for AIDS Relief), UN agencies, academia, and civil society.

The Venice Recommendations for Maximizing Positive Synergies between health systems and Global Health Initiatives.



These principles are further supported by many of the entities that are in effect the service providers and intermediaries that contribute to health system building and strengthening within the setting of increased aid flows to the health sector. The *NGO Code of Conduct for Health Systems Strengthening*^{vii}, that has been jointly developed by a number of leading health sector NGOs as a response to this changing working environment, places great importance on HRH elements. Furthermore, in recognising that vertical programs and selective approaches have at times exacerbated inequities in health systems and ignored underlying determinants of health, it pledges to “advocate with donors to support general health systems strengthening in the service of comprehensive national priorities”.

GHI ‘buy-in’: opportunities for HSS and HRH synergies

Against this backdrop of growing consensus around the building blocks necessary to sustainably strengthen health systems in the South, the imminent rounds of GHI funding offer a timely opportunity to put the agreed principles into practice. 2009 must be the year to move from ‘words to deeds, resulting in concrete progress on the ground’^{viii}

In addition to the relevance of the initiatives and declarations listed above, GHIs such as the GFATM, GAVI and PEPFAR have developed substantial research, monitoring and evaluation documentation to guide future funding strategies. They acknowledge the importance of wider health systems strengthening in addition to their vertical disease-specific concerns - as demonstrated by elements such as the GAVI HSS policy^{ix}. THE GFATM Five Year Evaluation, as per Finding 3 of its synthesis report^x presented to the Board in May 2009, also notes that “the weaknesses of existing health systems critically limit the performance potential of the Global Fund. However, the increasing focus on health systems strengthening among Global Fund partners presents a unique opportunity to collectively address these issues”.

- ✿ **GFATM**: The Technical Review of Round 9 Proposals is due to take place from 23 August – 4 September 2009. Following the Mid-Term Review of the Second Voluntary Replenishment in April 2009^{xi}, total donor contributions available for grants in the 2008-2010 replenishment cycle are now expected to reach at least US\$ 9.5 billion at current exchange rates – with an anticipated US\$0.9 billion for future rounds in 2008-2010^{xii}. Decisions on Round 9 funding will take place at the 20th Board Meeting in November 2009.
- ✿ **PEPFAR**: The Tom Lantos and Henry J. Hyde United States Global Leadership Against HIV/AIDS, Tuberculosis, and Malaria Reauthorization Act (H.R. 5501)^{xiii} (the ‘PEPFAR Reauthorisation’) was signed into law on 30th July 2008. It authorises a total budget of US\$ 48 billion for the 5-year period 2009 - 2013. President Barack Obama has since pledged to carry through this law^{xiv}, indicating that PEPFAR’s country operational programming should increase from the \$US3.94 billion in Fiscal Year 2009^{xv}.

- ✿ **GAVI:** The GAVI Alliance Board is due to meeting in Hanoi, Vietnam on 17-18 November 2009. This should prove an opportunity to react to the GAVI Health Systems Strengthening Evaluation results, due in September, and to profile future funding replenishments.

The HRH Exchange Community of Practice

With these GHI funding opportunities in mind, the Alliance's *HRH Exchange* Community of Practice has recently undertaken a moderated online discussion on the topic of 'Essential HRH Elements in Funding Proposals'. Over 9 days from 3-12 August 2009, the *HRH Exchange* – consisting of over 290 community members from 61 countries - deliberated over the key aspects that could guide HRH programming within GHI funding proposals – both in their development and their subsequent evaluation by the respective technical teams within the individual GHI procedures.

It was quickly established that it was certainly not the place of the *HRH Exchange* to undermine the guidelines or procedures of the GHIs, or question the leading role of the planning authorities of national governments. An agreement was reached that the place of the Community of Practice was to provide specialist input of a practical nature that could prove of value to the stakeholders involved in the GHI funding rounds.

A varied but moderated and focused discussion covered the nature of linkages between GHIs and wider health workforce plans and needs, and health systems as a whole. Specific HRH issues high on the agenda included workforce equity, cadre levels, skill-sets, excellence in training, geographical distribution, inclusive processes, productivity and efficiency of current staff, health worker migration, working conditions and incentives. The importance of reliable data and information systems and monitoring and evaluation of policy implementation was also deemed key to future advances.

Comment on all of these issues fed into the development of a tool that it is hoped will prove useful to GHI funding rounds in the near future. This tool takes the format of a '*checklist*' below that has been developed in accordance with the 'weight' of Exchange discussion dedicated to each theme (with point 1 having been the subject of the most comment etc.). The *checklist* is not intended to act as a pass/fail measure, i.e. certain questions may be less relevant to particular proposals, but instead as an additional resource for GHI stakeholders that may serve to:

- ✿ highlight key questions
- ✿ inform proposal development
- ✿ guide a process of critical appraisal
- ✿ prompt interaction and discussion
- ✿ increase support and funding for evidence-based, and/or innovative, HRH solutions that are coordinated with a country's overarching health plan

As participants and advisors in the HRH Exchange we thank all those who contributed to the online discussion and trust the checklist will have a positive impact on future HRH programming.

HRH funding – A 'Checklist'

1. Process - Design

Does the funding proposal demonstrate alignment with the country's health and HRH plans (as available or in development) and is there evidence that a broad range of stakeholders (i.e. line ministries, civil society, private sector, trade unions, training institutions, communities including marginalized members/groups) have been engaged in/signed on to its development?

2. Process - Implementation / Human Resource Management Capacity

Does the funding proposal demonstrate evidence that stakeholders (i.e. line ministries, civil society, private sector, training institutions, communities) are committed to its future implementation: respecting government policies; supporting national and sub-national capacity to coordinate and oversee implementation, and; addressing the change management processes that may/will result?

3. Evidence / Baseline

Does the funding proposal articulate the baseline from which it works and the evidence on which it is premised?

4. Monitoring and Evaluation

Is there evidence of a strong and inclusive approach to monitoring and evaluation (i.e. to 'Train, Retain and Track'), commensurate with the promotion of a country's own M&E Framework and Management Information Systems, which will enable the measurement of results, improved workforce surveillance, cost-effectiveness and active learning?

5. Access, Equity & Gender

Does the proposal (and if possible each intervention) include specific measures to increase access to the health workforce (especially for people that currently have the least access), advance equitable distribution, and address the specific dynamics to enable improved access for women, children and marginalized groups (e.g. ethnic minorities)?

6. Performance / Efficiency

Is the intervention supportive of improving the efficiency, effectiveness and performance of the workforce, in its current or future workplace and are any proposed incentives aligned with government policy?

7. Sustainability

Does the proposal take account of expressed needs, short-term/intermediate results and the long-term sustainability of the intervention as part of the evolving health plan, implementation and financing, recognizing that it might not yet be possible to identify the source(s) for long-term funding implications (beyond the grant period) of the proposal?

8. Synergy

Will the intervention maximise its impact on wider initiatives to strengthen the health system and does it capitalise on the comparative advantage of the funding stream from which it seeks financing?

9. Health cadres

Where an intervention targets a particular health cadre, does it take account of the respective professional association and/or regulatory body (if existing) and the longer-term strategic plans of these organizations as part of the country health plan?

ENDNOTES:

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RESEARCH

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Assessing the quality of service of village malaria workers to strengthen community-based malaria control in Cambodia

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Abstract

Background: Malaria continues to be a major public health problem in remote forested areas in Cambodia. As a national strategy to strengthen community-based malaria control, the Cambodian government has been running the Village Malaria Worker (VMW) project since 2001. This study sought to examine the nature and quality of the VMWs' services.

Methods: Data collection was carried out in February and March 2008 through interviews with one of the two VMWs who takes the lead in malaria control activities in each of the 315 VMW villages (n = 251). The questionnaire addressed 1) the sociodemographic characteristics of VMWs, 2) service quality, 3) actions for malaria prevention and vector control, and 4) knowledge of malaria epidemiology and vector ecology.

Results: VMWs were effective in conducting diagnosis with Rapid Diagnostic Tests (RDTs) and prescribing anti-malarials to those who had positive RDT results, skills that they had acquired through their training programmes. However, most other services, such as active detection, explanations about compliance, and follow-up of patients, were carried out by only a small proportion of VMWs. The variety of actions that VMWs took for malaria prevention and vector control was small (average action index score 12.8/23), and their knowledge was very limited with less than 20% of the VMWs giving correct answers to six out of seven questions on malaria epidemiology and vector ecology. Knowledge of vector breeding places and malaria transmission were significant determinants of both the quality of VMWs' services and the variety of their actions for malaria prevention and vector control.

Conclusions: VMWs' services focused primarily on diagnosis and treatment. Their focus needs to be broadened to cover other aspects of malaria control in order to further strengthen community-based malaria control. VMWs' actions and knowledge also need substantial improvement. Strengthening training programmes can help achieve better performance by VMWs.

Background

Malaria continues to be a major public health problem in Cambodia. The National Centre for Parasitology, Entomology and Malaria Control (CNM) reported 42,518 confirmed malaria cases in 2007, of which 87% were attributable to *Plasmodium falciparum* [1]. A recent large-scale malaria survey in Cambodia reported prevalence of 3.0%-12.3% in malaria-prone provinces [2].

Perennial malaria transmission is maintained in forest-covered hills and mountains, where the major vectors, such as *Anopheles dirus*, *Anopheles minimus*, and *Anopheles maculatus*, are widespread [3,4].

Despite continued efforts made by the CNM, there have been a number of obstacles to successful implementation of the malaria control programme. For example, malaria prevalence remains high in remote forested areas, which are difficult to access, especially in the rainy season [5]. It is hard to reach those who are at risk of malaria, especially migrants who recently moved into the remote forest, ethnic minorities living in thickly forested

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villages, and non-immune temporary forest workers [2,6]. Nearly 80% of patients with fever use private health services such as village vendors and private clinics, where government control is limited and the quality of diagnosis and treatment is often questionable [7,8]. It is very likely that widespread availability of counterfeit anti-malarials has been accelerating drug resistance in forested areas near the Thai-Cambodian border [9,10].

In order to increase access to accurate diagnosis and treatment in remote forested areas, the CNM launched the Village Malaria Worker (VMW) project in 2001. The CNM identified malaria-prone villages, where two VMWs (a male and a female) per village were selected through community consensus. During the last eight years, the project has been scaled up to 315 villages in seven remote provinces. The VMWs participated in a three-day training programme organized by the CNM, which covered malaria epidemiology, prevention, diagnosis using Rapid Diagnostic Tests (RDTs), treatment with artesunate and mefloquine (A+M), referral to hospitals, and recording of fever cases and positive RDT results. Different kinds of teaching materials were utilized in the training program, including RDT kits, blister-packed anti-malarials, bed nets, flipcharts, leaflets, and handouts with tables and figures. CNM also provided a refresher training programme. The curriculum contained practical demonstrations, such as recognizing the signs and symptoms of malaria, performing RDTs, prescribing correct dosages of anti-malarials, managing the VMW kit, and completing record forms. Trained VMWs are supposed to perform RDTs on any villager suspected of having malaria and, for test-positive cases, provide blister-packaged A+M according to the national guidelines. They are also encouraged to conduct active case detection, follow-up patients, and spread information on preventive measures to their villagers. VMWs are supervised and resupplied with RDT kits and anti-malarials monthly by the CNM [5,11]. The CNM directly supervise VMWs because they place high importance on the VMW project to promote community-based malaria control and because they aim at building strong working relationships with VMWs and obtaining timely information from the field.

Previous studies have demonstrated that VMWs are an effective means of improving access to early diagnosis and treatment of malaria in Cambodia. For example, the VMW project significantly increased the likelihood of villagers receiving a biological diagnosis and A+M [6,12]. Cost analysis of the VMW project showed that the cost per patient treated was \$5.14 per falciparum malaria patient treated, which was found to be more cost-effective than other malaria outreach interventions [11].

However, scientific evaluation of the quality of the VMWs' services (service quality), their actions related to

prevention, and their knowledge of malaria, has not been carried out in spite of the relatively long history of the project. Inadequate performance by community health workers is a widespread problem in many public health fields, including malaria [13-16]. Although a recent systematic review categorized and described several intervention models involving community health workers that aimed to improve case management at the community-level [17], few studies have conducted a detailed examination of the quality of malaria control activities by community health workers and determinants of their performance. Evaluation of community health worker performance, in general, is the focus of much attention at this time, as many countries invest in them as a strategy to reach the Millennium Development Goals [18,19]. A better understanding of the VMWs' services and their determinants is needed to evaluate and improve this project, and may contribute to improving community health worker performance in other areas as well.

This study, therefore, sought to: 1) examine the VMWs' service quality, their actions for malaria prevention and vector control, and their knowledge of malaria epidemiology and vector ecology; and 2) identify determinants of VMWs' service quality and actions for malaria control. Based on the results of this study, the importance of and strategies for improving community-based malaria control programmes will be discussed.

Methods

Study site

This cross-sectional study was conducted in seven remote provinces of Cambodia where the 315 VMW villages are located: Rattanakiri, Kratie, Mondulakiri, Stung Treng, Kampong Thom, Kampot, and Preah Vehear (Figure 1).

Data collection

Data were collected from February 10 to March 8, 2008, through interviews with one of the two VMWs who takes the lead in malaria control activities in each of the 315 VMW villages ($n = 251$). Interviews were conducted in designated health centres in each province. Sixty-four VMWs were not able to participate in the survey due to their sudden illnesses, unexpected family obligations, and transportation problems.

The questionnaire addressed 1) the VMWs' sociodemographic characteristics, 2) service quality, 3) actions for malaria prevention and vector control, and 4) knowledge of malaria epidemiology and vector ecology. The questionnaire was developed in English, referring to a previous study's questionnaire [20], and translated into Khmer by a local malaria expert. It was then back-translated to English by another expert for confirmation. It was piloted by the authors with VMWs in Kampot province to deter-

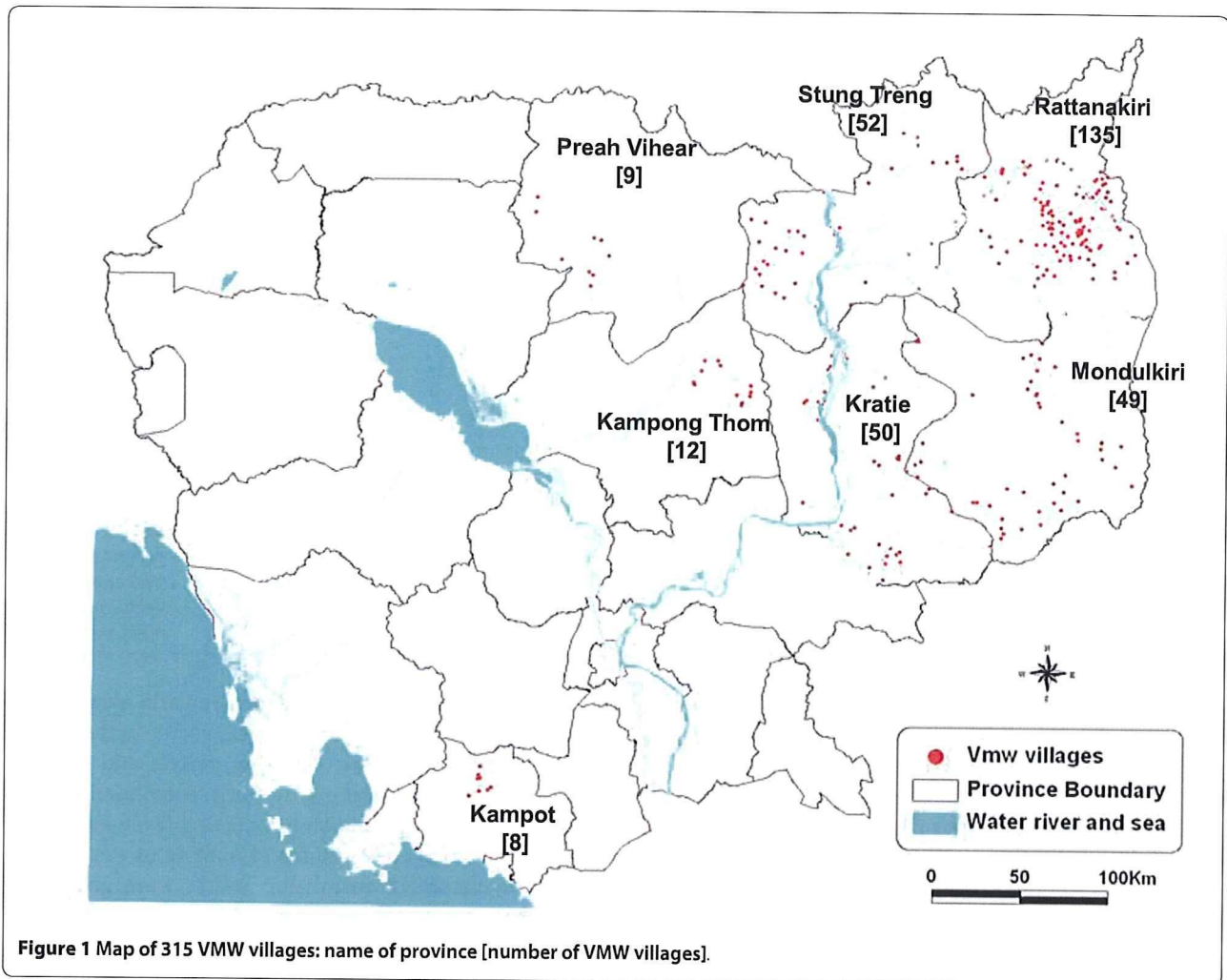


Figure 1 Map of 315 VMW villages: name of province [number of VMW villages].

mine if all items were understandable, if there were appropriate answers for each question, and to learn how comfortable VMWs felt taking the survey. Three CNM staff were hired and trained to conduct the survey, which was closely supervised by the authors.

Measures

Two additive indices were developed to quantify the quality of VMWs' services and the variety of actions they took for malaria prevention and vector control (Table 1).

The quality index was developed based on respondents' answers to questions regarding five items: active detection, diagnosis and treatment, prescription of anti-malarials, follow-up of patients, and dissemination of preventive measures. The action index was developed based on the variety of malaria preventive measures and vector control measures that the VMWs undertook themselves. The third topic, knowledge of malaria epidemiology and vector ecology, was measured by the respondents' correct answers on seven items related to those topics.

Quality index

Scores for active detection and follow-up were given according to the regularity or frequency of respondents' home visits to find malaria patients (regularly = 3, sometimes = 2, rarely = 1, never = 0) and to check if patients had recovered (always = 2, sometimes = 1, never = 0). Each service for diagnosis and treatment (conduct RDTs, observe symptoms, ask symptoms from family, take body temperature, and prescribe anti-malarials to those who had positive RDT results) was given a maximum of two points (always = 2, sometimes = 1, never = 0). Regarding prescription of anti-malarials, explanations about dosage and the importance of compliance were given a maximum of two points (always = 2, sometimes = 1, never = 0). Four items on how the VMWs explained about dosage and compliance were given one point each, if included. Dissemination of effective preventive measures was given a maximum of two points (always = 2, sometimes = 1, never = 0). Dissemination of less effective measures was given one point (always/sometimes = 1, never = 0), and of wrong measures, zero points (always/sometimes = 0,

Table 1: Indices to measure VMWs' service quality and actions for malaria prevention and vector control

Index	Number of items in index	Maximum possible score	Mean	SD	Reliability (Cronbach's alpha)	Item
Service quality	5	5	3.174	0.920	0.828	Active detection Diagnosis and treatment Prescription of anti-malarials Follow-up Dissemination of preventive measures
Actions	2	23	12.833	4.400	0.828	Malaria preventive measures Vector control measures

never = 1). The score for each of the five items was calculated as [total points divided by maximum points] so that each item is given a maximum of one point. These scores were added up to create the index (range: 0-5). The logic of combining these items was confirmed by a high Cronbach's alpha reliability score (0.828).

Action index

Each malaria preventive measure and vector control measure that the VMWs undertook themselves was given one or two points, according to its effectiveness and frequency. Effective measures were given a maximum of two points (always/most of the time = 2, sometimes/rarely = 1, never = 0). These measures included "come back home before dawn," "wear long-sleeved shirts/pants," "sleep under bed nets at home," "refrain from going to the forest," "bring hammock nets to the forest," "burn trash around house," "seal holes/cracks on walls/ceilings," and "cover water jars/tanks." Less effective measures were given a maximum of one point (always/most of the time/sometimes = 1, rarely/never = 0). These measures included "kill mosquitoes by hands," "use mosquito coils," "spray house," and "clear bush around house." A wrong measure, "plant flowers/grasses around house," was given 0 points (always/most of the time/sometimes/rarely = 0, never = 1). The total points became the index score, ranging from 0 to 23. The logic of combining these items was confirmed by a high Cronbach's alpha reliability score (0.828).

Knowledge

Knowledge of malaria epidemiology and vector ecology was measured based on the respondents' correct answers

to questions regarding seven items: malaria symptoms, malaria transmission, vector species, vector active time, vector development time, breeding places, and natural enemies. Regarding malaria symptoms, respondents were asked if stomach ache, diarrhoea, nausea, fever, and shivering are the correct symptoms of malaria or not. Seven choices on malaria transmission routes were given: by cough or sneeze, touching blood, touching utensils, sharing food, coming close to mosquitoes, mosquito bites, and other. For vector species, choices on mosquito genera and sex were given to respondents. Regarding the vector's most active time, respondents were asked to choose one of four time periods, morning, afternoon, dusk to dawn (evening/night), and other. Vector development time was asked by an open-ended question. Choices given for vector breeding places were trees (branches/leaves), on the ground, water pools around houses, water pools in the forest, and other. For natural enemies of the vector, five choices were given, dogs, birds, aquatic insects, small fish, and other.

Data management, statistical analysis, and ethical considerations

All survey data were coded, entered into data analysis software, and then double-checked by the authors to ensure accuracy. In order to identify determinants of the quality of VMWs' services and the variety of actions for malaria prevention and vector control (as represented by the quality index and action index), multiple linear regressions were run with sixteen independent variables: nine sociodemographic factors (age, education, gender, occupation, region, ethnicity, length of VMW career,

most recent VMW training attended, and reasons for becoming VMWs) and the seven knowledge items described above. Data analysis was done using STATA version 9.

Informed consent was obtained from all participants before the interview. The project protocol, consent forms, and survey questionnaires were approved by the Ethical Committee of the University of Tokyo.

Results

Sociodemographic characteristics

From the 315 VMW villages, 251 VMWs took part in the survey. Their sociodemographic characteristics are described in Table 2. Respondents' ages ranged from 15 to 70 years (mean 35.4) and school attendance from 0 to 12 years (mean 3.7). Male participation was higher (80.9%) than female, which indicates that male VMWs played a central role in VMW activities in the majority of VMW villages. Respondents have been serving as VMWs for about 3.3 years (mean), and the majority of them

(85.7%) attended VMW training (for new VMWs) or refresher training between 1 and 1.5 years ago. About half of them (51.8%) became VMWs because they were recommended by villagers, and the other half (48.2%) did so because they were interested in malaria control.

Service quality

The survey revealed a substantial gap in the VMWs' level of achievement on the various service items (Table 3). In general, VMWs were very effective in conducting what they had learned in VMW training programme. Almost all VMWs were able to perform RDTs and prescribe blister-packed A+M to those who had positive RDT results (99.2% and 97.6%, respectively). When prescribing anti-malarials, 99.2% of the respondents explained about dosage to their patients.

However, respondents' performance was inadequate related to service items that were not well covered in the training programme. For example, only about one-quarter of VMWs (27.1%) regularly conducted active detec-

Table 2: Selected sociodemographic characteristics of the study population

Characteristics (n = 251)	Mean	SD	Number	%Total
Age	35.4	12.3		
Education (final grade)	3.7	2.4		
Gender				
Male			203	80.9
Female			48	19.1
Occupation				
Farmer			237	94.4
Other			14	5.6
Region				
Mountainous			148	59.0
Other			103	41.0
Ethnicity				
Khmer			87	34.7
Other			164	65.3
VMW career (months)	40.2	14.2		
Most recent VMW training attended (months ago)	16.0	5.0		
Reason for becoming VMW				
Recommended by villagers			130	51.8
Interested in malaria treatment/prevention			121	48.2

Table 3: Responses from the study population (n = 251)

		n	%
Service quality			
Active detection	Visit villagers to find malaria patients (Regularly)	68	27.1
Diagnosis and treatment	Use RDTs (Always)	249	99.2
	Observe symptoms (Always)	119	47.4
	Ask symptoms from family (Always)	66	26.3
	Take body temperature (Always)	61	24.3
	Prescribe A+M to those who had positive RDT results (Always)	245	97.6
Prescription of anti-malarials	Explain about dosage (Always)	249	99.2
	Explain about the importance of compliance (Always)	140	55.8
	Compliance failure can result in incomplete treatment	182	72.5
	Inappropriate to save tablets to treat other people's malaria	174	69.3
	Inappropriate to save tablets for next infection	166	66.1
Follow-up	Compliance failure can cause/spread drug resistance	16	6.4
	Make home visits or ask patients' family to check if patients recovered (Always)	48	19.1
Dissemination of preventive measures	Sleep under bed nets (Always)	198	78.9
	Bring hammock nets to forest (Always)	145	57.8
	Clear bush around house (Always)	91	36.3
	Fill in water pools (Always)	70	27.9
	Wear long-sleeve shirts/pants (Always)	58	23.1
	Should not come close to malaria patients (Always/Sometimes)	53	21.1
	Should not share utensils with malaria patients (Always/Sometimes)	42	16.7
	Cover water jars/tanks (Always)	36	14.3
	Spray house (Sometimes)	24	9.6
	Use mosquito coils (Always)	1	0.4
Actions for malaria prevention and vector control			
Malaria preventive measures (Always/Most of the time)	Sleep under bed nets at home	227	90.4
	Bring hammock nets to the forest	138	55.0
	Wear long-sleeved shirts/pants	121	48.2
	Come back home before dawn	117	46.6
	Refrain from going to the forest	116	46.2
Vector control measures (Always/Most of the time)	Burn trash around house	117	46.6
	Clear bush around house	102	40.7
	Fill in water pools	81	32.3
	Kill mosquitoes by hands	80	31.9
	Cover water jars/tanks	65	25.9
	Seal holes/cracks on walls/ceilings	6	2.4
	Plant flowers/grasses around house	5	2.0
	Spray house	2	0.8
	Use mosquito coils	2	0.8
Knowledge of malaria epidemiology and vector ecology (VMWs who gave correct answers)			

Table 3: Responses from the study population (n = 251) (Continued)

Malaria symptoms	28	11.2
Malaria transmission	49	19.5
Vector species	25	10.0
Vector active time	246	98.0
Vector development time	17	6.8
Vector breeding places	14	5.6
Natural enemies of vector	4	1.6

tion of malaria patients. When diagnosing malaria, less than half of them (47.4%) took symptoms into consideration. When providing anti-malarials, only about one-half of them (55.8%) explained about the importance of compliance. Related to the contents of their explanations, the majority explained that compliance failure can result in incomplete treatment (72.5%) and that it is inappropriate to save tablets for other people or for a future infection (69.3%). However, only 6.4% explained that non-compliance can spread drug resistance. Only 19.1% of the respondents followed up with patients to make sure that they had recovered from malaria. Regarding their dissemination of information on preventive measures, the majority recommended bed net use at home (78.9%) and/or in the forest (57.8%). However, 21.1% told villagers not to come close to malaria patients and 16.7% told them not to share utensils with patients, which indicates considerable misunderstanding of the route of malaria transmission.

Actions for malaria prevention and vector control

VMWs' actions to protect themselves from malaria and to reduce the burden of mosquito vectors were found to be limited. Although bed net use was practiced at home by most of the respondents (90.4%), other self-protection measures were taken by only half of them (46.2%-55.0%). Regarding vector control, "burn trash around house" and "clear bush around house" were the most common measures taken (46.6% and 40.7%, respectively), but none of the measures were taken by more than half of them (0.8%-46.6%).

Knowledge of malaria epidemiology and vector ecology

The survey results clearly demonstrated VMWs' insufficient knowledge of malaria epidemiology and vector ecology. It was striking that less than 20% of them were able to give correct answers to questions about six topics: malaria symptoms, transmission, vector species, development time, breeding places, and natural enemies. The only topic well known by most of the VMWs (98.0%) was the vector active time, which can be answered based on their observations and experience, rather than by educa-

tion. There was little variation in knowledge level among the VMWs, and the level was quite low as a whole.

Determinants of service quality and action

With the survey data, multiple linear regression analysis was run to identify determinants of the quality of VMWs' services (Table 4). Significant determinants of the quality of VMWs' services were occupation (Beta = 0.558, $p = 0.003$), length of VMW career (Beta = 0.007, $p = 0.023$), reason for becoming a VMW (Beta = -0.649, $p < 0.001$), knowledge of malaria transmission (Beta = 0.989, $p < 0.001$), knowledge of vector species (Beta = 0.307, $p = 0.042$), and knowledge of vector breeding places (Beta = 0.574, $p < 0.001$). As a result, being a farmer was positively related to better service quality, compared to having other occupations, such as shop keeper, teacher, or forest worker. A longer VMW career was associated with better service quality. VMWs who said that they were recommended by villagers, as the main reason for becoming VMWs, were found to provide better quality services than those who became VMWs mainly because of their interests in malaria treatment or prevention. More knowledge of malaria transmission, vector species, and vector breeding places was associated with better service quality.

The other regression model revealed that significant determinants of the variety of VMWs' actions for malaria prevention and vector control included occupation (Beta = 5.634, $p < 0.001$), most recent VMW training attended (Beta = -0.168, $p < 0.001$), reason for becoming a VMW (Beta = -1.966, $p < 0.001$), knowledge of malaria transmission (Beta = 2.185, $p = 0.002$), and knowledge of vector breeding places (Beta = 3.749, $p < 0.001$) (Table 5). As a result, being a farmer was positively related to the variety of actions, compared to having other occupations. Attending VMW trainings (including refresher trainings) more recently had a positive impact on the variety of actions. VMWs who said that they were recommended by villagers, as the main reason for becoming VMWs, were found to conduct more variety of actions than those who became VMWs mainly because of their interests in malaria treatment or prevention. More knowledge of