

MANAGEMENT OF SICK CHILDREN BY COMMUNITY HEALTH WORKERS

INTERVENTION MODELS AND PROGRAMME EXAMPLES

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Intervention models and programme examples

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GLOSSARY

AIDS	acquired immunodeficiency syndrome
APROMSA	Asociación de Promotores de Salud/Community health promoter association (Peru)
ARI	acute respiratory infections
ARI/CDD	acute respiratory infections/control of diarrhoeal disease
ALRI	acute lower respiratory infections
BASICS	Basic Support for Institutionalizing Child Survival
BRAC	formerly the Bangladesh Rural Advancement Committee, now known as 'BRAC'
CDC	Centers for Disease Control and Prevention (United States)
CHW	community health worker
CICSS	Community Initiatives for Child Survival in Siaya (Kenya)
CORE Group	Child Survival Collaboration and Resources Group
COMPROMSA	Comité de Promotores de Salud/community health promoter committee (Peru)
CNLP	Centre National de Lutte contre le Paludisme/National Centre for Malaria Control (Burkina Faso)
CQ	chloroquine
CRS	Catholic Relief Services
HIV	human immunodeficiency virus
IMCI	Integrated Management of Childhood Illness
IPT	intermittent presumptive treatment
IRC	International Rescue Committee
NGO	non-governmental organization
ORS	oral rehydration salts or oral rehydration solution
ORT	oral rehydration therapy
SEARCH	Society for Education, Action, and Research in Community Health
SP	sulfadoxine-pyrimethamine (Fansidar®)
TBA	traditional birth attendant
TDR	WHO/UNICEF/World Bank Special Programme for Research and Training on Tropical Diseases
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

1. INTRODUCTION

An estimated 10.6 million children under five years of age still die each year from preventable or treatable diseases. Many of these deaths are attributable to the conditions targeted by Integrated Management of Childhood Illness (IMCI): acute respiratory infections, malaria, diarrhoea, measles and malnutrition. A large proportion of these deaths could be prevented through early, appropriate and low-cost treatment of sick children in the home or community, with antibiotics, antimalarials or oral rehydration therapy.

This report examines approaches for the community management of sick children, specifically antimicrobial treatment, through the use of community health workers (CHWs) or their equivalent. It is based on an extensive review of literature, including peer-reviewed studies, reports, programme descriptions and programme evaluations. Individuals and programme managers from various institutions were interviewed, and pertinent documents were solicited.

Chapter 2 presents a brief background of the issues surrounding community treatment. Chapter 3 describes the methods used for the review. In Chapter 4, CHW programmes are classified according to the CHW's role in the management of sick children in the community, based on use of antimicrobials, method of disease classification and referral mechanisms. Chapter 5 then presents operational

considerations in CHW programming, such as CHW performance and retention, drug supply systems and the appropriate use of antimicrobials. Chapter 6 examines the support of programmes, and factors affecting sustainability and scaling up of programme operations. Chapter 7 presents findings of the report and recommendations for strengthening current programmes and policies, as well as needs for future technical and operations research. Annex A contains the WHO/UNICEF Joint Statement on Management of Pneumonia in Community Settings. Annex B outlines further details about selected CHW programmes that were reviewed in the process of preparing this document. Annex C contains checklists related to programmatic recommendations.

Intervention models

CHW programmes that manage childhood illness in the community can be classified according to the following factors: use of antimicrobials, type of referral system, type of antimicrobial and use of systematic processes to classify sick children. The seven types of programmes considered are shown in Table 1 and discussed in further detail below. Programme case studies are presented extensively in Chapter 4 of the document and are examined with respect to the type of programmatic approach.

Table 1. Overview of intervention models for case management of children with malaria or pneumonia outside of health facilities

Number	Intervention model Title	Treatment with antimicrobials			Referral to nearest health facility: Verbal or facilitated
		CHW dispenses antimalarials	Family dispenses antimalarials	CHW dispenses antibiotics for ALRI	
Model 1	CHW basic management and verbal referral	No	No	No	Verbal
Model 2	CHW basic management and facilitated referral	No, may give initial treatment prior to referral	No	No, may give initial treatment prior to referral	Facilitated for all sick children needing an antimicrobial
Model 3	CHW-directed fever management	Yes	No	No	Verbal or facilitated
Model 4	Family-directed fever management	Family only or shared responsibility		No	Verbal
Model 5	CHW malaria management and surveillance	Yes	No	No	Verbal or facilitated
Model 6	CHW pneumonia case management	No	No	Yes	Verbal or facilitated
Model 7	CHW integrated multiple disease case management	Yes	No	Yes	Verbal or facilitated

Operational aspects

This report also reviews operational components that can contribute to the effectiveness of treating sick children in the community: community health worker performance, retention of CHWs, use of CHW services, drug supply systems and appropriate drug use. The operational considerations are not reviewed exhaustively; rather, other documents that have analysed or reviewed these relevant operational aspects are referenced throughout the text.

Support, sustainability and scale

Most CHW programmes rely on coordination and cooperation between many partners and stakeholders, and strong links between partners can improve the capacity of the programme. Yet the balance between the roles of each partner varies. Solid links with the community and the ministry of health can help foster more sustainable CHW programmes. The community (and community groups), non-governmental organizations and the ministry of health may all have unique roles in a CHW programme.

Box 1. Local names for community-based health workers

Name	Country or area
Agente comunitario de salud	Peru
Agente comunitário de saúde	Brazil
Basic health worker	India
Community health volunteer	Various
Community health worker	Various
Colaborador voluntario	Latin America
Community drug distributor	Uganda
Female community health volunteer	Nepal
Kader	Indonesia
Lady health worker	Pakistan
Maternal and child health worker	Nepal
Monitoras	Honduras
Mother coordinator	Ethiopia
Paramedical worker	India
Shastho karmis (leaders of shastho shebika)	Bangladesh
Shastho shebika	Bangladesh
Traditional birth attendant	Various
Village drug-kit manager	Mali
Village health helper	Kenya
Village health worker	Various

Findings and recommendations

The findings and recommendations are summarized in Chapter 7 of this report. A few key findings are highlighted here.

Despite stronger evidence supporting its effectiveness in lowering mortality, community-based treatment of pneumonia is less common than treatment of malaria or diarrhoea. This discrepancy is especially striking in Africa. A policy statement on pneumonia in the community emerged from this finding and is found in Annex A. The guidelines for treatment of malaria and pneumonia concurrently, especially outside of facilities, are outdated because of the emergence of comorbidities (HIV) and the development of antimicrobial resistance. Many programmes promote 'home treatment' and 'community-based treatment' of malaria in Africa. There is no standardization of these terms; both phrases are usually ill-defined and the differences are blurred in much of the documentation.

2. BACKGROUND

The past few decades have witnessed large and sustained decreases in child mortality in most low- and middle-income countries. However, an estimated 10.6 million children under the age of five still die each year from preventable or treatable conditions, including malnutrition (1–2). Many of these deaths are attributable to the conditions targeted by Integrated Management of Childhood Illness (IMCI): acute respiratory infections, diarrhoea, malaria, malnutrition and measles (1–4). A large proportion of these deaths could be prevented through early, appropriate and low-cost treatment of sick children in the home or community, with antibiotics, anti-malarials or oral rehydration therapy. Improvements in care at health facilities through IMCI and other initiatives are necessary but not sufficient. Children from the poorest families are significantly less likely to be brought to health facilities and may receive lower-quality care once they arrive (5–6). Preliminary results of the multicountry evaluation of IMCI (7) indicate that, even where impressive gains are made in the quality of care in health facilities, the level of care-seeking from these same facilities remains suboptimal (8–9). Despite clear evidence that large numbers of sick children have no contact with health facilities and that providing early treatment at the community level can lead to reduced mortality, few countries have made good-quality care for malaria or pneumonia available on a broad scale outside of health facilities.¹

¹A condensed version of the information in this paper has been published as Winch, P. J., et al., 'Intervention models for the management of children with signs of pneumonia or malaria by community health workers', *Health Policy and Planning*, vol. 20, no. 4, 2005, pp. 199–212.

Failure to reach these children is attributable in some cases to the difficulty of scaling up approaches that are successful at the community and district levels to the regional and national levels, and in other cases to an emphasis on improving care at the facility level to the exclusion of community-level initiatives. While there is no doubt that improvements in health facilities are necessary, these strategies have tended to neglect the large numbers of children in low-income countries who have little contact with the formal health system. When caregivers with sick children cannot or do not reach facilities, adequate treatment is often delayed or not given at all, resulting in a high level of unnecessary mortality and morbidity. Thus, there is increasing recognition of the need for large-scale, sustainable interventions that make effective care for sick children available outside of health facilities.

Although there is almost universal agreement on the need to expand community-based management of sick children for malaria, pneumonia² and diarrhoea, the approaches that should be used to achieve this goal are less obvious. There are no clear answers regarding the types of investments that would result in sustainable improvements in child health on a broad scale. Because several donors are again considering initiatives to scale up child health programmes, community-based approaches that are technically sound, operationally manageable and most promising in their potential for maximum impact should be reassessed (10). For example, in areas where community health workers are involved in the management of malaria, the failure to include management of pneumonia in community-based programmes is troubling. There is a documented clinical overlap between malaria and pneumonia, and CHWs providing only malaria treatment may not correctly identify, classify or treat pneumonia cases (11–13). Consequently, introducing the community-based management of pneumonia on a global scale and incorporating this strategy into the scope of existing community-based programmes both remain a critical concern.

While it is proven that rapid and appropriate treatment saves children's lives, the evidence base for which programmatic strategies can best serve children in need is less strong and much less straightforward. Most strategies have inherent strengths and weaknesses that compound the ambiguity. For instance, adopting the strategy of using a highly trained, paid cadre of community workers targeting one specific disease has been demonstrated to be effective in

field trials but may be difficult to maintain and scale up. Adopting a strategy involving community volunteers responsible for many aspects of child health may have a less measurable impact in the short term but may be more sustainable.

This report examines approaches to the community management of sick children through the use of community health workers or their equivalent. First, CHW programmes are classified according to the CHW's role in the management of sick children in the community, primarily based on their use of antimicrobials, methods of disease classification and referral mechanisms. This segment of the report has also been published in an accompanying peer-reviewed article (14). The document then presents programmatic considerations and selected operational aspects of CHW programmes managing sick children. Overall roles of the community, institutions such as non-governmental organizations and ministries of health in the support of programmes are examined. Factors affecting the sustainability and scaling up of operations are considered, with reference to the different technical approaches described in Chapter 4 of this paper. Finally, the document presents recommendations for strengthening current programmes and policies, along with identification of needs for future technical and operations research.

3. METHODS

Thousands of health programmes employ community health workers or their equivalent. This review focuses on programmes that employ CHWs to improve child health and specifically manage sick children in the community. It sought information on programmes having at least one of the following characteristics:

- Coverage of at least an entire district; preferably state or nationwide coverage.
- Use of antimicrobial agents to treat malaria and/or pneumonia in children younger than five.
- Innovative approaches to identification, classification, treatment, referral or follow-up for sick children.

In practice, while larger-scale programmes were sought for the review, many programmes operating in just a few communities are included in the discussion. Many of the smaller-scale programmes provide examples of innovative approaches that have the potential to be used more widely. We consider the broader literature on the social and political contexts of CHWs only where relevant to community-based management of sick children. The philosophy of CHW programmes and their usefulness in fulfilling

² The term 'pneumonia' is used throughout this document. While the acronym for acute lower respiratory infections (ALRI) has the advantage of referring to both pneumonia and non-pneumonia conditions such as bronchitis, it is much less familiar to the general public and is often confused with the acronym ARI (acute respiratory infections). ARI, however, includes upper respiratory tract infections for which antibiotic treatment is discouraged.

their various ideological mandates have been reviewed elsewhere (15–16).

CHW programmes were identified through four methods:

- A systematic search of the major databases, including PubMed and POPLINE®.
- Identification of referenced sources cited in documents.
- Nomination of programmes by organizations participating in this review (WHO, UNICEF, USAID, Johns Hopkins University and the CORE Group).
- Nomination of programmes by persons subscribing to the CORE Group LISTSERV on community IMCI.

WHO and UNICEF provided a number of documents, reports and articles. The UNICEF evaluation and library databases at its headquarters in New York were searched for relevant sources. Many documents, especially unpublished reports, were identified and shared through personal contacts. Articles were retrieved from Welch Medical Library in Baltimore, Maryland (USA). A few tools such as training manuals, videos and supervisor manuals were collected but did not become the focus of this review. The approximate numbers of documents reviewed were: 20 reports by ministries of health; 50 reports by UNICEF, WHO or USAID; 75 reports by non-governmental organizations; 5 master's or doctoral theses; 10 books or book chapters; and 220 published articles.

This review did not seek to formally analyse the effectiveness of different intervention models, but where data on effectiveness or formal meta-analyses are available, this is indicated. The overall documentation concerning community-based treatment of sick children varies in quality and relevance. For Africa, we collected a wide variety of documents, some of limited relevance to this review. The documents we obtained for Asia and Latin America are more narrowly focused on sick children and treatment because there is more systematic reporting of programmes and their results in these regions. Gaps in the research literature are apparent. Case management of pneumonia in the community has been almost exclusively studied in Asia; studies of pneumonia management in the community conducted in Africa or Latin America are scarce. The impact of community-based treatment of malaria has been widely studied in sub-Saharan Africa without conclusive results. Many of the malaria studies do not have comparison groups; even fewer are randomized. This lack of well-designed studies makes it difficult to draw inferences about community-based malaria treatment. Many of the case management and operational approaches we discuss in this report have

had insufficient formal evaluation with a comparison group. Throughout the document we include results from research supporting specific strategies and call attention to areas where no research exists. Although evidence was reviewed and is presented here, because of the variability in study design and quality of the evaluations conducted, no conclusions should be drawn regarding the relative effectiveness of different intervention models.

The literature reflects the movement towards primary health care and the widespread implementation of CHW programmes following the International Conference on Primary Health Care, held at Alma-Ata (Kazakhstan) in 1978. Many available reports and articles are older. Much literature is from the early 1980s, but the flow of literature tapers off significantly in the early 1990s. Fewer reviews, general characterizations of programmes or operational studies have been published recently. Many current programme reports and evaluations incorporated fewer operational details, so it was more difficult to characterize the programme or draw conclusions about its effectiveness. Perhaps this trend reflects changing emphases in programming or a diminished enthusiasm for such programmes after a number of publications questioned their usefulness (17–18). The documentation covers such operational topics as training, incentives/retention, recruitment and ideal CHW characteristics, quality of care provided, financing schemes (e.g., the Bamako Initiative) and community participation. Topics that are less prominent in the formal literature are integration of community health workers into health systems, the role of CHWs in data collection in health information systems, support of CHW programmes through supervision and supply chains, programme cost-effectiveness, and strategies for scaling up regional programmes and broadening the scope of existing programmes.

In addition to written documentation, this report is based on interviews with more than 20 informants from various institutions. The majority of interviews aimed to characterize specific programmes. Interview notes were examined for emerging themes, especially for overarching topics such as keys to successful programmes, barriers to successful programmes, current recommendations for programme managers and needs for future research. Informants also provided additional documents and referrals to other informants. Follow-up with informants on unanswered questions and further documentation was carried out. A draft of this paper was circulated to stakeholders at WHO, UNICEF, USAID, the CORE Group and private voluntary organizations, and their feedback and suggestions were incorporated.

4. INTERVENTION MODELS

Table 2 describes seven intervention models for community health workers to provide case management of children with signs of malaria or pneumonia outside of health facilities. Table 3 summarizes the level of available documentation and evidence for each model. This classification is based on what assessment of the sick child, if any, is performed by CHWs and family members; whether antimalarials or antibiotics are dispensed or sold by the CHW; the system of referral of sick children to the nearest health facility; and the location in the community of the drug stock or depot. In Intervention Models 3 to 7, CHWs use progressively more complex guidelines for assessing and treating sick children, and make greater use of antimicrobial agents. The seven intervention models are described below, with a focus on CHW roles in assessment of sick children, treatment, promotion of care-seeking, and referral to the nearest

health facility. Each intervention model is accompanied by programmatic examples. Further details of these and other programmes are given in Annex B, page 45.

In different countries, community health workers have local names (*see Box 1, page 2*). Where appropriate, the local names are used in describing particular programmes.

Intervention Model 1. CHW basic management and verbal referral

This intervention model is the most widely implemented by both governments and non-governmental organizations. Much of the CHW's role relates to communication and awareness creation about prevention and treatment through community meetings or visits to individual households, growth monitoring and promotion of appropriate feeding

Table 2. Classification of intervention models for case management of children with malaria or pneumonia outside of health facilities

Intervention model Number	Title	Assessment and diagnosis			Provision of treatment by CHW (or family)		Referral to nearest health facility: Verbal or facilitated
		Assessment of sick child by CHW	Family assesses need for anti-malarial	Malaria microscopy or rapid test	Provision of antimalarial treatment	Provision of antibiotics for pneumonia	
Model 1	CHW basic management and verbal referral	Limited	No	No	No	No	Verbal
Model 2	CHW basic management and facilitated referral	CHW assesses signs requiring referral	No	No	No, CHW may provide initial treatment prior to referral	No, CHW may provide initial treatment prior to referral	Facilitated for all sick children needing an antimicrobial
Model 3	CHW-directed fever management	Sometimes use simple algorithm	No	No	Yes, by CHW	No	Usually verbal
Model 4	Family-directed fever management	No	Yes	No	Yes, by family only or shared responsibility with CHW	No	Verbal
Model 5	CHW malaria management and surveillance	Usually limited	No	Yes	Yes, by CHW	No	Usually verbal
Model 6	CHW pneumonia case management	Check respiratory signs	No	No	No	Yes, by CHW	Usually verbal
Model 7	CHW integrated multiple disease case management	CHW uses algorithm to classify as malaria, pneumonia, or both	No	No	Yes, by CHW	Yes, by CHW	Verbal or facilitated

practices. Providing education about danger signs and appropriate care-seeking for sick children, as well as facilitating or directly using oral rehydration therapy in cases of uncomplicated diarrhoea, may be included in the CHW's responsibilities.

Assessment: Procedures typically taught to CHWs are basic, with little assessment of the child beyond detection of dehydration and fever, and no use of algorithms.

Treatment: CHW activities may include selling or providing such treatments as antipyretics, vitamins, ointments, antihelminthics or oral rehydration salts (ORS), as well as demonstrating the preparation and administration of ORS. CHWs do not sell or provide antimalarials or antibiotics.

Referral: If a sick child is identified as requiring treatment with antimicrobial agents, the CHW will generally refer the child verbally to an existing health facility. The CHW also promotes care-seeking from health facilities through education during meetings and household visits. This education could cover, for example, the signs of dehydration, malaria and respiratory diseases.

Programmatic example – BRAC in Bangladesh:

BRAC (formerly known as the Bangladesh Rural Advancement Committee) operates a nationwide programme in Bangladesh. Female community health workers, known as *shastho shebika*, are chosen by the community and receive 21 days of training and 1 day a month of refresher training. These CHWs do not treat patients with antimicrobials, but treat the 'essential 10 diseases': anaemia, cold, diarrhoea, dysentery, fever, goiter, intestinal worms, ringworm, scabies and stomatitis. Antimalarials and antibiotics have been used in smaller pilot programmes (45–47) but are not included as standard medications in the main programme. If CHWs see children with malaria or pneumonia, they verbally refer caregivers to health facilities run by the Government of Bangladesh or BRAC (19). An in-depth description of this programme is given in Annex B, page 45.

Evidence for the effectiveness of Model 1:

Despite the prevalence of this model, relatively little is known about its effectiveness. Increases in knowledge about appropriate health practices and care-seeking among caregivers in programmes using this model are well documented (57–61).

Table 3. Documentation of intervention models for case management of children with malaria or pneumonia outside of health facilities

Intervention model Number	Title	Selected examples of programmes using this intervention model	Reviews summarizing experience	Evidence for impact on mortality	Formal meta-analyses conducted
Model 1	CHW basic management and verbal referral	BRAC, Bangladesh (19) Brazil (20)	No	No	No
Model 2	CHW basic management and facilitated referral	CARE, northern Peru (21) CRS, Intibucá, Honduras	No	No	No
Model 3	CHW-directed fever management	Homapak, Uganda (22–23) Tigray, Ethiopia Malaria Control Project (24–26) Bougouni, Mali (27) Saradidi, Kenya (28–29)	Yes, unpublished	No, likely to be similar to Model 4	No
Model 4	Family-directed fever management	Burkina Faso (30–31) Tigray, Ethiopia mothers' groups (32)	No	Yes (32)	No
Model 5	CHW malaria management and surveillance	Latin America (33–35) Thailand (36–37) BRAC, Bangladesh (38)	Yes (36–37)	No, likely to be similar to Model 4	No
Model 6	CHW pneumonia case management	India/SEARCH (39–40) Nepal (41–44) BRAC, Bangladesh (45–47)	Yes (48–49)	Yes (39, 42)	Yes (50–51)
Model 7	CHW integrated multiple disease case management	Pakistan (52) Siaya, Kenya (53–54) Sudan (55–56)	No	No, likely to be similar to or greater than Model 6	No

There is evidence from a number of countries, including Sri Lanka, that increased levels of care-seeking have made a significant contribution to reductions in mortality among children under five (62). The remaining research question is whether promotion by CHWs of care-seeking from health facilities, combined with verbal referral and, in some CHW programmes, active case detection, is effective in increasing the proportion of children requiring antimicrobial treatment who receive an appropriate course of treatment from a health facility. This question has yet to be definitively answered. However, Roesin et al. (63) provide evidence that a community-based programme involving health education by CHWs increased care-seeking for pneumonia from health facilities in Indonesia, and a study from Thailand provides similar evidence (64). An evaluation of a community-based programme in Matlab, Bangladesh, provides some evidence that active case detection and referral to facilities by CHWs can have a beneficial effect on pneumonia mortality (65).

Intervention Model 2. CHW basic management and facilitated referral

In this model, the CHW performs activities comparable to those in Intervention Model 1 described above. The CHW does not dispense antimicrobials, but a number of steps are taken to ensure that the sick child is treated at a health facility where antimicrobials are available. This model has received comparatively little attention. It has traditionally been preferred where access to health facilities is good, but other factors might favour its selection in the future. For example, due to concerns about cost, limited supplies or drug resistance, governments may wish to restrict dispensing artemisinin-based combination therapy for malaria to health facilities (66–68).

Assessment: Assessment procedures typically taught to CHWs are basic, with no use of algorithms. CHWs may be given additional training on assessment of signs, such as elevated respiratory rate, which require immediate referral to the nearest health facility.

Treatment: Similar to Model 1, CHWs might provide treatments other than antimicrobials, such as oral rehydration salts. An initial dose of an antimicrobial might nevertheless be given to a child with signs of malaria or pneumonia prior to referral, particularly if the facility is distant (see Box 2, page 8) because referral could entail a significant delay in initiation of treatment. A proposed variant on this approach is initial treatment of severe malaria with an artesunate suppository prior to referral (69–70).

Referral: Facilitated referral (see Box 2, page 8) is the distinguishing characteristic of this model, and its components are: promotion of compliance with referral; monitoring of referral and supervisory support; addressing barriers to referral (geographic and financial access); and, in some cases, provision of initial treatment. Short of directly dispensing drugs, facilitated referral seeks to ensure that families reach a health facility where treatment will be provided.

Programmatic example – CARE Peru: The CARE Peru Enlace (1996–2000) and Redes (2000–2004) projects have been implemented with support from the Peruvian Ministry of Health and community health promoter associations (APROMSA) in two northern rural provinces. Training is decentralized, with Ministry of Health personnel in each health centre training all the CHWs of the APROMSA in diarrhoea and pneumonia case management. CHWs pay monthly visits to ‘high risk’ households (households in which there is an infant under one year old, a pregnant woman or a woman of reproductive age). If the child has rapid or difficult breathing or chest indrawing, the CHW assists in the evacuation of the child to a health facility. In more remote communities, an initial dose of cotrimoxazole is administered to the child. CHWs in these remote communities receive more extensive training and supervision. The system of facilitated referral is highly developed and includes provision of a referral slip to families by the community health worker, ‘counter-referral’ or feedback by the facility-based health worker to the CHW on the diagnosis and treatment of the child; formation of an ‘evacuation brigade’ to transport sick children to the nearest facility; and radio contact with facilities to announce the arrival of the sick person or child. Further details on this programme are presented in Annex B, page 47.

Evidence for the effectiveness of Model 2: There has been limited evaluation of the effectiveness of facilitated referral from the community to first-level facilities specifically for Intervention Model 2, where the CHW does not dispense full courses of antimicrobial therapy. An evaluation of the CARE Peru programme found that the percentage of children under two years of age with suspected pneumonia seen by a qualified provider increased from 32 per cent to 60 per cent over the four years of the programme. At the close of the project, it was found that more than 70 per cent of persons (adults and children) receiving care at facilities arrived with a referral slip from a CHW (71). This review did not find any published evidence related to the impact of Intervention Model 2 on health outcomes.

Intervention Model 3. CHW-directed fever management

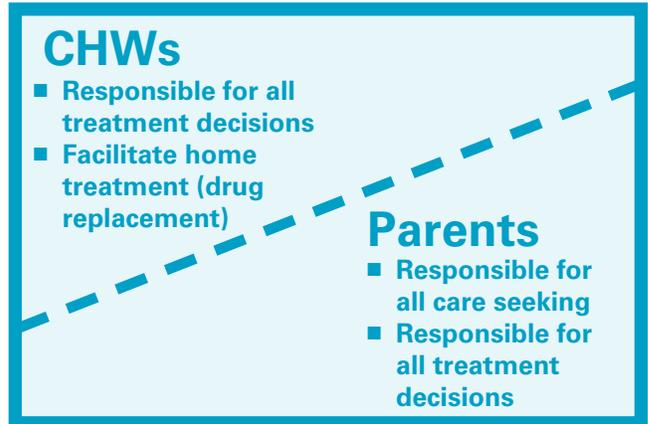
Many programmes that provide antimalarials in the community use CHWs to perform various functions. Presumptive treatment of febrile children is common throughout sub-Saharan Africa, where *Plasmodium falciparum* malaria is predominant. There is therefore little or no need for microscopy to distinguish between forms of malaria that do not have persistent liver stages (e.g., *Plasmodium falciparum*) and those that do (e.g., *Plasmodium vivax*) when selecting treatment. Intervention Models 3 and 4 both involve presumptive treatment of fever with antimalarials and are most commonly implemented in malaria-endemic areas in sub-Saharan Africa. The word 'fever' is used in the titles of Intervention Models 3 and 4 instead of malaria, because parasitaemia is not confirmed in febrile patients.

In some presumptive treatment programmes, the CHW is primarily responsible for the management of the sick child (Intervention Model 3), while in others

the family classifies and treats the sick child in the home and the CHW supports this process (Intervention Model 4).

The respective roles of the community health worker and families in the management of febrile children vary along a continuum (see Figure 1 below).

Figure 1. Range of approaches to community-based treatment of malaria



Box 2. Definition of facilitated referral

A community health worker is performing facilitated referral if, at a minimum, she or he performs all the actions in Components 1 and 2 (below) and at least one action in Component 3, in an effort to ensure that sick children requiring care reach the nearest facility.

Component 1. CHW promotes compliance with referral (both actions):

- CHW counsels families about why referral is necessary and promotes compliance with referral.
- CHW fills out a referral slip or writes in a referral book and gives it to the child's caregiver.

Component 2. Monitoring of referral (all three actions):

- CHW records all referred cases in a register.
- After examining and treating the child at a health facility, health worker writes a note to the CHW stating the outcome of the referral and explaining the follow-up that the CHW should perform in the home. This is sometimes called 'counter-referral'.
- Both referral and counter-referral are tracked in a health information system, and the outcome of the referral is discussed in supervisory visits or monthly meetings.

Component 3. CHW addresses such barriers to referral as geographic and financial access (at least one action):

- CHW inquires about barriers to referral and works with the family to address them.
- CHW has access to or can inform the family about a source of money at the community level to provide or lend funds that enable the family to seek care from a health facility.
- CHW has access to or can inform the family about a source of emergency transport at the community level.
- CHW accompanies the family to the health facility to ensure they receive immediate care.

Component 4. CHW provides initial treatment prior to referral:

- This is performed especially for cases where it will take several hours to reach the first-level facility and a delay in the initiation of treatment will put the child's life at risk.
- CHW may provide an initial dose of antimicrobial therapy, prior to referral, to children with signs of pneumonia such as an elevated respiratory rate.
 - CHW may provide an initial oral treatment for malaria prior to referral. It has also been proposed that CHWs could treat children with signs of severe malaria with artesunate suppositories, prior to referral.

There is much more heterogeneity in the functions of the CHW and respective responsibilities of the families in programmes providing presumptive treatment with antimalarials than in programmes treating pneumonia exclusively. In some presumptive treatment programmes, the CHW is primarily responsible for the management of the sick child, while in others the family is responsible for classifying and treating the sick child in the home and the CHW supports this process. In reality, programmes often use a mix of these strategies and may function differently from village to village within the same project, making categorization of programmes difficult in practical terms.

In Intervention Model 3, the CHW classifies and treats febrile children and maintains a supply of anti-malarial drugs. Beyond that, there is a wide range of functions the CHW may carry out depending on the programme.

Assessment: The need for treatment is based on presence or history of fever, and the CHW typically performs only minimal verification to make treatment decisions. Caregivers do not directly manage the child's febrile illness but are responsible for recognizing symptoms and deciding to seek care from the CHW. CHWs may be taught to recognize the signs of pneumonia as well as signs of severe disease that require referral to a health facility.

Treatment: The CHW sells or provides the drugs to families and relies on the family to administer the doses. Drug revolving funds, based on the Bamako Initiative, are a commonly used mechanism to recover costs. The drugs may be pre-packaged to assist families in correct administration in the home. Depending on the programme, the CHW may also monitor compliance with treatment; counsel caregivers or families about drug administration; promote and sell insecticide-treated mosquito nets; and provide intermittent malaria treatment for pregnant women.

Referral: In almost all programmes, CHWs perform only verbal referral for children they judge to require treatment in a health facility, but in a small number of programmes CHWs perform facilitated referral (see Table 4, page 48). While referral mechanisms for severely ill children exist in most malaria programmes, they are rarely well characterized or evaluated. In cases where community-to-clinic referral (or vice versa) has been examined, it has been found to be weak or non-existent (72).

Programmatic example – Uganda: In the Home-Based Management of Fever (Homapak) programme,

the Government of Uganda recruits local volunteers, called community drug distributors (22–23). These CHWs are trained for three days in drug distribution, counselling of caregivers on the signs of malaria, and drug dosage and administration. Caregivers are responsible for recognizing fever in their children. The community health worker, however, generally assesses the need for treatment. CHWs verbally refer severely ill children to health facilities. They also counsel caregivers on the importance of completion of treatment, compliance with referral and danger signs that require immediate care. Initially a pre-packaged combination of chloroquine and sulfadoxine-pyrimethamine (SP, Fansidar®) was distributed by the CHWs, but in 2004 Uganda selected artemether-lumefantrine (Coartem®) as its new first-line drug (68). Due to concerns about cost, limited supply and possible drug resistance, there have been calls to restrict the distribution of this drug to health facilities (68). Use of artemisinin combination therapy at the community level requires careful assessment, as well as close monitoring and evaluation, when the therapy is incorporated into home-based management of malaria activities. Annex B, page 50, contains a more detailed description of this programme.

Programmatic example – Mali: Save the Children USA, in collaboration with the Ministry of Health, has established more than 300 village drug kits in the southern region of Mali (27). CHWs receive 35 days of literacy training, followed by 1 week of training in drug-kit management. Assessment of sick children is based on history of fever. Children are treated with chloroquine tablets or syrup, and in pilot areas CHWs also sell SP (Fansidar®) as intermittent presumptive treatment for pregnant women. When community health workers see a child requiring referral, they record the child's name and the reason for referral in a notebook, place the notebook in a 'referral bag', and instruct the caregiver to take the sick child, along with the referral bag, to the nearest community health facility (27). More details on this programme are presented in Annex B, page 49.

Programmatic example – Malawi: In the Ntcheu District of Malawi, Africare, with the support of the ministry of health, sponsors one of many CHW programmes in the country based on drug revolving funds. Each community has two CHWs who classify and treat malarial disease; they also provide ORS, eye ointment, paracetamol, condoms and insecticide-treated mosquito nets. Training for community health workers was initially three days, followed by refresher training that emphasized the importance of a complete age-appropriate course of treatment

with SP (Fansidar®). Assessment is based on the presence or history of a fever. CHWs are trained to recognize signs of pneumonia and verbally refer both pneumonia and severe malaria patients to the nearest health facility (73).

Evidence for the effectiveness of Model 3:

Studies have found that programmes employing the presumptive treatment of malaria by CHWs (Intervention Model 3) can increase the number of patients receiving treatment (24–26, 74), increase the correct administration of drug regimens in the home (27), and decrease malaria morbidity and parasitological indices (74). For example, in Tigray, Ethiopia, the number of febrile patients receiving antimalarials steadily increased over six years of the programme from 76,163 to 949,091, while the proportion of patients treated by CHWs remained constant at 70 per cent (75). A geographic information system analysis confirmed that this CHW programme did increase the coverage of malaria treatment services beyond the reach of many health facilities (24). The facilitated referral mechanism used in Mali was associated with higher rates of referral and counter-referral (27). The impact of this model on malaria mortality, when examined, has been inconclusive (24–26, 74, 76–78).

Intervention Model 4. Family-directed fever management

In a number of programmes, families are given additional specific training, beyond the communication and awareness-raising activities in Intervention Model 3, to enable them to make informed decisions about treatment and referral of sick children. Instead of CHWs having the primary responsibility for assessment, selection of treatment and dispensing of drugs, responsibility is shared to a greater degree between CHWs and families. CHWs play various supportive roles, such as maintaining a central store of drugs where families restock their home supplies of antimalarial drugs.

Assessment: Both families and CHWs are trained in symptom classification. The family takes the lead role in assessing fever and deciding on the need for treatment.

Treatment: Both CHWs and families are trained in correct dosage schedules. After assessing a child with fever, a family either purchases malaria treatment from a CHW or initiates treatment directly from a stock of antimalarial drugs maintained in the home. Families therefore have a greater role in assessment and treatment decisions.

Referral: Little detail on the referral system is provided in programme documents.

Programmatic example – Burkina Faso: The National Centre for Malaria Control and provincial health teams sponsor a programme that promotes the treatment of uncomplicated malaria with pre-packaged drugs at the household level (30–31). Nurses from the health centres train core groups of mothers, village leaders and CHWs in symptom classification and correct dosage schedules. The core mothers and leaders then share the messages with other members of the community. Caregivers and CHWs assess sick children using a simple algorithm based on the presence of fever and absence of danger signs. Caregivers treat sick children, while CHWs supply colour-coded pre-packaged courses of chloroquine along with aspirin (30–31). Annex B, page 52, provides further information on this programme in Burkina Faso.

Programmatic example – Ethiopia: A study conducted in the Tigray Region modified an ongoing community-based malaria control programme in order to serve more women and young children. In this study, CHWs – known as ‘mother coordinators’ – educated other mothers to recognize malaria symptoms in their children, give appropriate doses of chloroquine and identify adverse reactions to chloroquine (32). The decision to treat was made by the family. The parents maintained a supply of chloroquine within their home and were taught how to administer age-appropriate courses of treatment to their children. Pictorial charts illustrating chloroquine dosage by age were used by mother coordinators and also given to every participating household (79). Rather than providing treatment directly, the mother coordinator functioned in a purely facilitative role. She was responsible for distributing chloroquine to households, reporting usage to supervisors and replenishing households’ supply, as well as referring children who did not improve within 48 hours (32). One mother coordinator in each cluster of villages (*tabia*) was chosen as a supervisor to collect reports of births, deaths, migrations and referrals, facilitate drug supply between mother coordinators and project supervisors, and report problems to their supervisor (32).

Evidence for the effectiveness of Model 4:

Interventions involving family-directed treatment of fever have been associated with improved administration of antimalarial drugs in the home, especially combined with the use of pre-packaged regimens (30, 31, 80). The use of this model, along with pre-packaged drugs, has also been shown to reduce the incidence of severe malarial disease (30–31), possibly due to reduced delay between the onset of symptoms and the initiation of treatment. To our knowledge, only one study, conducted in the Tigray Region, Ethiopia, has examined the impact of this model on mortality. It found that treatment of

malaria by mothers in the home reduced overall and malaria-related mortality, with an observed reduction in mortality among children under five years of age of 40 per cent in the intervention localities (95 per cent, confidence interval 29 per cent to 51 per cent) (32). It is not known if the striking results reported from Ethiopia can be reproduced in non-research settings or in other areas of Africa with differing patterns of malaria transmission. Further trials in Africa related to this model are under development.

Intervention Model 5. CHW malaria management and surveillance

Intervention Model 5 is more common in parts of Latin America and Asia, where malaria transmission is not intense and consequently many or most episodes of fever are attributable to other causes. This model is typically implemented through national malaria control programmes.

Assessment: The CHW provides antimalarials; the need for treatment is based on presence of a fever. The programmes generally function similarly to Intervention Model 3, although community health workers also take a blood smear to confirm malaria infection, and they often assess and treat both children and adults. The blood smear is read by a local or national laboratory or clinic; results are used by national control programmes for disease surveillance and decision-making, as well as to confirm the original diagnosis made by the CHW. No current large-scale programmes were identified that employ rapid tests, but the feasibility of their use by CHWs has been demonstrated (81–84). Use of microscopy or rapid tests may be attractive to programme planners seeking to limit the use of more expensive anti-malarial combination therapy (85).

Treatment: Initial treatment decisions may be modified based on the results of microscopy. Where both *Plasmodium falciparum* and *Plasmodium vivax* are present, blood smears serve to identify those patients who require additional treatment such as primaquine to eliminate the liver stage (hepatic phase) of *Plasmodium vivax*.

Referral: Few details were provided on the functioning of referral systems. The work of the CHW is typically supervised by the malaria control programme, and links to health facilities may not be well developed.

Programmatic example – Latin America: A programme involving volunteer CHWs who act as village malaria workers (*colaboradores voluntarios*) was established throughout Latin America in the 1950s. The system is still operating on a broad scale

and is a major source of the national data on trends in malaria incidence that are forwarded to the Pan American Health Organization. In Guatemala, training is carried out by supervisors in the homes of new volunteers over a two-day period. These CHWs have similar responsibilities throughout Latin America, including providing presumptive malarial treatment, taking blood smears and recording demographic information (33, 35, 86). In Guatemala, only the first dose of chloroquine is given presumptively; further treatment with primaquine is given after results are obtained for the blood smear from a central laboratory (34). In other countries, including El Salvador, full treatment is given presumptively and blood smear results are primarily used for programme decision-making (36).

Programmatic example – Thailand: The Malaria Division of the Thai Ministry of Health started the Village Voluntary Malaria Collaborator Program in 1961, with many similarities to the programmes in Latin America. CHWs are trained for two days and receive periodic refresher training. Blood smears are taken only in areas of high transmission and are collected weekly by malaria programme officers for epidemiologic surveillance (36–37). Treatment with SP (Fansidar®) or other first-line drugs is given presumptively. More details about this programme are provided in Annex B, page 53.

Evidence for the effectiveness of Model 5:

Several studies have evaluated the operational outcomes of these programmes, with favourable results (33–35, 87). The CHWs collect more than 10 per cent of malaria slides used for epidemiological surveillance and programme decisions in Latin America and Thailand (37, 88). Slides collected from patients seen by CHWs have positivity rates similar to or greater than those taken in health facilities (33). Because it employs presumptive treatment of malaria (with the added component of microscopy for surveillance) the impact of Model 5 can be expected to be similar to that of Intervention Model 3.

Intervention Model 6. CHW pneumonia case management

In this model, community health workers assess the signs of respiratory infections in young children and treat with antibiotics if there are signs of pneumonia. Extensive effort was invested in the development of this model by the WHO ARI Control Programme in the late 1980s and early 1990s (51, 89), resulting in development of a training package for CHWs (90). Of the seven intervention models described in this report, this is the model with the strongest evidence

for an impact on mortality (50–51), as well as a record of success in scaling up. Based on evidence presented at an inter-agency meeting in Stockholm in 2002 (49), WHO and UNICEF issued a joint statement in May 2004 in support of this approach (91), which is included in Annex A, page 40. Despite the fact that pneumonia is one of the top causes of mortality among children under five years of age (2, 4), treatment of pneumonia with antibiotics by CHWs is relatively uncommon, especially in Africa.

Assessment: The CHW performs a targeted physical examination, including detection of chest indrawing and determination of respiratory rate using a watch, stopwatch or timer. The CHW may use a classification algorithm to make treatment decisions. Treatment decisions are based on the respiratory rate and signs of severe disease, such as chest indrawing.

Treatment: The CHW both prescribes and dispenses antibiotic treatment, often cotrimoxazole or amoxicillin. The CHW may also monitor response to treatment by following up on the child in the home.

Referral: CHWs are trained to recognize the signs of severe pneumonia that require referral to a health facility for treatment and monitoring beyond what can be provided in the community by the CHW. Various programmes have developed referral cards for use by CHWs, but this review did not encounter examples of systems of facilitated referral, as described in Box 2, page 8.

Programmatic example – Bangladesh: In Bangladesh, BRAC and the Government of Bangladesh collaborated on a community-based pneumonia programme that expanded the activities of the CHWs (*shastho shebika*) described in Intervention Model 1. It covered 10 sub-districts (population 2.4 million) in the northern and central regions of the country. Community health workers were trained for five days, and were responsible for detecting, classifying and treating childhood pneumonia in approximately 150 to 250 households each. CHWs carried out active detection, visiting households monthly. Each CHW was given a stopwatch to time respirations and a supply of cotrimoxazole. CHWs also educated mothers about signs and symptoms of pneumonia and monitored sick children (45–47). CHWs were instructed to refer severe or complicated cases to BRAC or government facilities, and also to follow up children they had treated and refer any child who was not improving (47, 92).

Programmatic example – Nepal: A collaborative programme between the Government of Nepal, USAID, John Snow International, WHO, UNICEF and several non-governmental organizations was initiated with Intervention Model 6, in which female CHWs use the case management strategy to treat pneumonia. This programme was based on earlier pilot studies in Nepal that demonstrated substantial reductions in childhood mortality (41–42). Later, the programme evolved by adding diarrhoea, nutrition, vitamin A and immunization components. The programme is currently integrated with the community-based IMCI initiative in Nepal (44) and now has many characteristics of Intervention Model 7.

As of July 2004, the programme was operating in 21 of Nepal's 75 districts and covered approximately 43 per cent of the population under five years of age. There were plans to expand to an additional six districts so that 57 per cent of the population would be covered by July 2005.

CHWs are trained for seven days, and guidelines for assessing sick children are based on the IMCI guidelines. CHWs count respiratory rates and other signs. Pneumonia is treated with cotrimoxazole. CHWs verbally refer severe cases and infants less than two months old to health facilities. Traditional healers have also been included in some parts of the programme and refer children with suspected pneumonia to the CHW or to health facilities. More information is presented in Annex B, page 54.

Programmatic example – India (Maharashtra State): In rural Maharashtra State, the Society for Education, Action, and Research in Community Health (SEARCH), a non-governmental organization, has experimented with different approaches to improving the care of sick children in the community for over 20 years. CHWs, paramedics and traditional birth attendants were trained to assess and treat pneumonia in older children (39–40); the approach was later extended to neonatal pneumonia (93) and sepsis (94–96), prematurity and low birthweight (97), and birth asphyxia (98). In the earlier acute lower respiratory infections intervention, CHWs, traditional birth attendants and paramedics were trained in six 1.5-hour sessions. Innovative approaches were developed so that illiterate traditional birth attendants could assess the signs of ALRI, including a one-minute sand timer with an abacus to assist with counting (40). Workers were provided with cotrimoxazole syrup, paracetamol and salbutamol tablets to treat ALRI (40). A later study expanded the ARI case management approach considerably, introducing treatment of neonatal sepsis with gentamicin and cotrimoxazole (94–96).

Evidence for the effectiveness of Model 6: There is stronger evidence for this model than for any of the others. In the early 1980s, WHO commissioned a series of studies that found that CHWs were capable of managing pneumonia adequately in the community using simple guidelines for classification (89). Subsequent studies confirmed this finding (40, 43, 47, 99), although CHWs did have more difficulties managing severe disease (40, 47, 99). CHWs often fail to recognize chest indrawing, indicative of severe pneumonia (99), or may fail to refer cases to the hospital (40).

In Nepal, a large-scale programme significantly increased the number of suspected pneumonia cases receiving treatment (43). WHO-commissioned studies and others, which used the standard case management strategy and active case detection, showed a significant impact on mortality among children under five years of age (41–42, 89, 100–101). Infrequent or passive case detection by CHWs or traditional birth attendants, along with community education, has also been shown to significantly reduce both pneumonia-specific and all-cause mortality (39–40, 93, 95–96, 102). A recent update (50) of a previous meta-analysis (51) of community-based ALRI case management studies estimated a 20 per cent reduction in overall infant mortality and a 24 per cent reduction of overall mortality among children under five. Recent reviews also highlight and confirm the impact of such interventions on mortality among children under five (48).

Intervention Model 7. CHW integrated multiple disease case management

In this model, community health workers manage sick children having one or more of the diseases or conditions (such as malnutrition) targeted by Integrated Management of Childhood Illness (IMCI). Assessment and treatment of the different conditions are integrated. With respect to Intervention Model 7, management is integrated if it has the following five characteristics: CHWs are trained to systematically detect signs of the major causes of mortality among children under five years of age in the area where they are working; CHWs classify the child as having one or more of these conditions using an integrated algorithm or other decision-making tool; if the area is malarious, the algorithm or tool may take into consideration the clinical overlap of malaria and pneumonia (2, 13, 103); CHWs provide treatment for all of the conditions identified, or refer if the child is severely ill or requires a treatment the CHW does not keep in stock; and CHWs counsel the caregiver of the sick child on how to administer all of the treatments provided. An extension of this

model involves training CHWs to assess and manage neonatal infection, which accounts for a significant proportion of mortality among children under five (94, 104–105).

Assessment: The CHW manages multiple diseases using an integrated algorithm to classify children sick with pneumonia, malaria, diarrhoea or other conditions. The CHW performs a broader physical examination than in Intervention Model 6, including counting of respiratory rate and checking for fever, dehydration and chest indrawing. The starting points for many training programmes for CHWs are the IMCI algorithms and training materials for facility-based health workers, which are then considerably simplified for use by CHWs with limited formal education.

Treatment: CHWs dispense antimalarials and antibiotics, as well as basic treatments mentioned in Intervention Models 1 and 2, such as ORS and antipyretics.

Referral: Referral guidelines tend to be more developed for Intervention Model 7 than for many of the others. The specific form and wording of IMCI guidelines for referral from first-level to second-level facilities provide a template for the development of guidelines for referral from CHWs to first-level facilities (106). Record-keeping is emphasized in this model, and this emphasis extends to referral slips and monitoring of referral.

Programmatic example – Kenya: In 1995 in Kenya, CARE International initiated the Community Initiatives for Child Survival in Siaya (CICSS) Project. CHWs in the Siaya district, Kenya, use a simplified IMCI algorithm to treat children with multiple diseases. The guidelines allow CHWs to classify and treat malaria, pneumonia and diarrhoea/dehydration concurrently (54). CHWs are trained for three weeks and assigned to 10 households in their community. Community-based pharmacies are established and serve as resupply points for the CHWs' drug kits. CHWs sell the drugs to community members and use monies from sales to buy more drugs to restock their kits in a revolving fund scheme (107).

Programmatic example – Pakistan: A National Programme for Family Planning and Primary Health Care was initiated in Pakistan in 1993. The programme soon began to employ a cadre of salaried, female CHWs called lady health workers. The programme currently employs approximately 69,000 CHWs and covers about one fifth of the entire population of Pakistan (52). Initial CHW training lasts for three months and then occurs one week a month for

at least a year. Each CHW is responsible for approximately 1,000 individuals. CHWs use the WHO case management guidelines to classify pneumonia and treat fever presumptively and are provided with a kit that includes contraceptive pills, condoms, paracetamol tablets and syrup, eye ointment, ORS for diarrhoea, chloroquine for malaria and cotrimoxazole for respiratory infections. A referral form is used to direct children to next-level facilities should they need further care (52).

Evidence for the effectiveness of Model 7:

Broader roles for community health workers, including curative treatment of malnutrition, pneumonia and diarrhoea, have been found to improve the use of CHW services (108). Evidence also suggests that CHWs' ability to manage multiple diseases is generally adequate, but there are still important deficiencies that may vary by disease and severity (52, 54–55). For example, in Siaya, Kenya, an evaluation found that CHWs could adequately assess, classify and treat the majority of malaria cases, but they had difficulties managing pneumonia and severe disease. It is hypothesized that the complexity of the treatment algorithms contributed to the difficulties (54). CHWs in Pakistan also experience some difficulties in the adequate treatment of childhood disease. The impact of this model on health outcomes has been little studied. However, a rare evaluation of a primary health care programme in the Gambia that centred on the management and treatment of malaria, pneumonia, diarrhoea and malnutrition by CHWs found that measures of child morbidity decreased in the primary health care area, but that child and infant mortality declines were similar in areas with and without primary health care (109). Childhood mortality trends in locations served by CHWs in Pakistan and comparison areas were also found to be similar after adjusting for other factors (52).

Discussion

Recent studies of IMCI, including the multi-country evaluation (7) and the analytic review of IMCI implementation, have demonstrated that integrated approaches can produce significant improvements in quality of care (8–9, 110). However, in the United Republic of Tanzania and in Bangladesh only 38 per cent and 19 per cent, respectively, of children sick in the previous two weeks were reported to seek care at the IMCI facilities (8–9). Therefore, there have been urgent calls to implement interventions that can complement the IMCI facility approach, such as the household and community component of IMCI, in order to reach the large majority of sick children who never reach health facilities. One framework for household and community IMCI defines three

elements: improving partnerships between health facilities or services and the communities they serve, increasing appropriate and accessible care and information from community-based providers, and integrating promotion of key family practices, in addition to complementary multisectoral activities to support these elements (10). Varying emphases on these three elements will be found in different settings and programmes. Although CHWs may play a role in all three elements, the present review examines their potential and models relative to the second element in this framework.

This section of the report has identified seven intervention models based on the role of community health workers and families in assessment and treatment of children with signs of malaria or pneumonia, the system of referral (verbal or facilitated) to the nearest health facility, and the location in the community of the drug stock. Many CHW programmes promote 'home treatment' and 'community-based treatment', particularly in Africa. There is no standardization of these terms; the phrases 'home treatment' and 'community-based treatment' are usually ill-defined and the differences are blurred in much of the documentation. Standardization of terminology for intervention models using this framework or a similar classification could facilitate comparison and selection of models for improving health care for children outside of health facilities.

WHO and UNICEF have recently issued a policy statement on pneumonia management by CHWs (see Annex A, page 40), highlighting the strong evidence for the effectiveness of Intervention Model 6 (91). Most programmes reviewed were categorical, in that CHWs manage a single disease, usually malaria. In most countries in sub-Saharan Africa, malaria and pneumonia together account for about half of all mortality and exhibit a great degree of overlap in their clinical presentation (2, 13, 103). Nevertheless, most programmes follow Intervention Models 3 or 4, where CHWs assess and presumptively treat sick children for malaria only. This ignores the substantial overlap in the clinical presentation of malaria and pneumonia and puts the caregiver in the position of needing to make a presumptive diagnosis of either disease and seeking appropriate care: CHW for malaria treatment, health facility or private sector for pneumonia treatment. Also, a child sick with pneumonia or concomitant pneumonia and malaria may be treated solely with an antimalarial, possibly precipitating delays in parents seeking proper treatment at a health facility (49). Because children may be afflicted with multiple illnesses, those CHW programmes that target one specific disease are potentially limited in their impact (41, 74, 111).

Therefore, if national policy allows both antibiotics and antimalarials to be provided by CHWs, and safe and inexpensive antimalarials such as chloroquine and SP (Fansidar®) are still effective, then Intervention Model 7 may be more appropriate than Intervention Models 3 and 4 for African countries. Where more expensive combination therapy is being used, Intervention Model 2 may be appropriate if these drugs are available only in health facilities.

Artemisinin combination treatment is now being introduced in many African countries. Questions have been raised about where in the health system these new drugs should be available, out of concern for their high cost, the current limited supply of artemisinin-based drugs, possible difficulties of compliance and drug resistance (66–68). These concerns are often voiced specifically in relation to programmes following Intervention Models 3 or 4, but also apply to treatment obtained from facilities with limited diagnostic capabilities. Close monitoring of financial access to treatment, patterns of care-seeking, treatment compliance and drug resistance is needed as combination therapy is introduced through any of the intervention models. Where these therapies are restricted to use only in health facilities, interventions in the community should include some form of facilitated referral (Intervention Model 2). Unfortunately, of all the models, there is the least evidence for Intervention Model 2, so research is urgently needed on how facilitated referral can be made to work.

Any intervention to improve management of sick children at the community level should ideally be part of a larger package that includes improving quality of care at facilities and conditions of health systems. A recent editorial on IMCI points out that investigators working on the multi-country evaluation of IMCI found that “weakness in the basic health system was preventing more than nominal execution” in most sites considered for inclusion in the evaluation (112). Health systems need to provide CHWs with medications and other supplies, regular supervision and a system of referral for cases that surpass CHW competencies.

There is a growing demand for CHWs to take on the management of the entire range of conditions targeted by IMCI, including not only management of malaria and pneumonia, but also diarrhoea treatment with zinc and ORS (113) and treatment of neonatal infections (94, 105). Yet there are real constraints imposed by weak health systems, and limited training and monetary incentives for CHWs. Programmes will need to make hard choices about what responsibilities it is realistic to assign to CHWs. It should

be noted, however, that significant reductions in mortality among children under five years of age have been achieved through community case management in a number of settings where facility-based care was unavailable and health systems were weak. A number of the programme examples cited have been in operation for more than 10 years, mostly in Asia and Latin America.

This review did not systematically identify programmes training CHWs to assess and treat children with diarrhoea or neonatal infections. Few programmes train CHWs to identify signs of severe dehydration or dysentery, or to manage neonatal infections (94). WHO and UNICEF have recently issued another policy statement on management of diarrhoea in children, including the recommendation that children with diarrhoea receive a 10 to 14 day course of zinc supplementation and that a newer low-osmolarity formulation of ORS be used (113). Further efforts are also needed to integrate management of neonatal infections into CHW programmes (104–105). These new recommendations could be integrated in different ways into all of the intervention models described in this paper, but with the caveat that simultaneous efforts are needed to strengthen health systems and ensure that the overall workload of CHWs is reasonable.

5. OPERATIONAL CONSIDERATIONS

There is a large body of literature that examines operational components of programmes based on community health workers, including selection and training of CHWs, programme supervision, health information systems, drug supply systems, sustainability and scalability. A number of operational tools have also been designed for use in CHW programmes. For example, a recent WHO publication, *Scaling up home-based management of malaria: From research to implementation* (114), provides a guide in the design and implementation of home-based malaria programming; this document is available online at <http://www.who.int/tdr/publications/publications/pdf/home_2004.pdf>. UNICEF provides an inventory of the tools available for community programming (115), also online at <http://www.unicef.org/health/files/health_UNICEF_inventory.pdf>.

Rather than provide a comprehensive review of all operational aspects of CHW programmes, we consider how operational components can contribute to the effectiveness of treating sick children in the community. The following section on operational

considerations is organized by essential programme elements: performance of CHWs, retention of qualified CHWs, use of CHW services, drug supply and appropriate use of antimicrobials. Section 6 then discusses the role of different institutions in the support and initiation of CHW programmes and the scale and sustainability of CHW services. Previous documents that have reviewed operational aspects of CHW programmes are referred to throughout the text.

Performance of CHWs

One of the foremost concerns in any community health worker programme is how to ensure a high level of performance by the CHWs, resulting in high quality of assessment and treatment of sick children who are brought to them for care. Many operational aspects can affect the performance of CHWs in managing diseases. Previous studies have found that increased (regular) supervision, less population to cover and more experience are all associated with higher-quality CHW services (116). Operational components contributing to CHW performance can be viewed as a chain of events that should occur in any CHW programme. Programme managers should ensure that the following steps are taken:

- Establish the roles and responsibilities of CHWs and identify the competencies CHWs need to successfully carry out the tasks assigned to them.
- Establish criteria and methods for recruitment of CHWs.
- Carry out competency-based training.
- Provide tools to enhance and maintain performance after competency-based training, including job aids and algorithms.
- Take actions to maintain performance after competency-based training, including supervision and support.
- Measure performance after competency-based training to identify problem areas and provide feedback based on monitoring and evaluation.

CHW roles, responsibilities and competencies

A key component in developing an effective programme is collaboration of all partners in defining and negotiating the roles, responsibilities and required competencies of the workers from the inception of the project (117). The community, health officials, programme sponsors (donors), and CHWs themselves all need to be aware of the project's scope and objectives. It has been noted previously that health personnel involved in CHW projects usually have expectations for CHWs that are distinct from the expectations held by the CHWs and the communities they serve (118–119).

CHWs often desire to become part of the formal hierarchy of the ministry of health and to have prospects for career advancement (74). Planners of CHW programmes may expect communities to become responsible for medical treatment, while CHWs themselves expect professionals to make decisions (120). Communities may also expect CHWs to deliver more comprehensive services than they are qualified to deliver (74). In the child survival project in Siaya district, Kenya, it was found that communities and the CHWs perceived the CHW's role as principally curative, while programme planners felt the need for CHWs to engage in health promotion and disease prevention (121).

Involvement of communities and the CHWs themselves in the initial programme development and adaptation of the programme to local conditions can lead to greater CHW understanding and appreciation of the programme and greater motivation (21). A clear job description with identified responsibilities – such as the relative time spent in preventive versus curative activities, the types of diseases the CHW is qualified to treat, how many households the CHW is responsible for, if the CHW will perform household visits and the position of CHWs within the ministry of health hierarchy – should all be agreed upon and understood by everyone from the outset. Clear delineation of CHW roles and responsibilities can also facilitate monitoring and evaluation of CHW and programme performance by providing a point of reference. Community awareness of the role and responsibilities of the CHW, and even of what types of incentives or compensation CHWs will receive, is also important. If community members misunderstand the programme structure, they may resent CHWs for benefiting from the drug sales or even the programme itself (122). Winch et al. (117) provide an informative example of a job description for CHWs, while Bastien (123) provides an excellent, in-depth case study of CHWs in Colombia, which highlights the need for all partners to help define and understand the roles and responsibilities of CHWs.

Criteria for and methods of recruitment

Community health workers' overall performance and acceptability to the community can be affected by who is chosen as a CHW. The most important qualification of a community health worker is implicit within the job title; the individual must be from the community that he or she will serve. The cultural, political and social contexts of the programme area will influence the recruitment methods that are established and the criteria defining the best-qualified CHWs and those most acceptable to the community. Many programmes recommend the selection of women in

the post of CHW to increase acceptability and accessibility to target populations. For example, in many parts of India, women do not leave the house with neonates; therefore traditional birth attendants alone or in combination with CHWs may be appropriate for treatment of birth asphyxia, neonatal pneumonia and sepsis (40, 95, 97–98).

In programmes that use treatment guidelines or algorithms, literacy and numeracy may be important skills for the CHW to possess. The majority of programmes – especially those that use guidelines for standard case management of pneumonia (Intervention Models 6 and 7) – include literacy as a requirement for CHWs. Activities to support CHWs, such as training and record keeping, may also be operationally less complicated when the individual CHWs have some ability to read and write. In the village drug-kit (*caisses pharmaceutiques*) programme in Mali, because of very low rates of literacy, the programme provides literacy training in Bambara to those individuals chosen as CHWs (27). Individuals who cannot read and write have also been employed to serve as CHWs in some community malaria-treatment programmes (87, 124–126). In the malaria volunteer collaborators programme in Guatemala, illiterate community volunteers had comparable operational inputs and performance compared to literate volunteers. Both literate and illiterate volunteers required similar lengths of time for training and supervision, treated the same average number of patients per month, had similar frequencies of record-keeping and treatment errors and were equally accepted by their communities (87).

The overall educational level of CHWs is another important consideration in the selection of CHWs. In India, it was found that village health worker services for sick children were used more than those of traditional birth attendants or paramedical workers. The village health workers were in most respects in the middle range of CHWs; they had less formal education, less health training and fewer official functions than the paramedical workers, but more education, training and management skills than the traditional birth attendants (40). It has also been found repeatedly that recruiting and supporting more than one CHW per village or community is required because often one CHW is absent, busy or unacceptable to certain sectors of the community (40, 127). In some programmes this is achieved through the use of one male and one female volunteer.

In areas where there are many other options for health care, CHWs may just be added to the mix of care options. Programmes may want to consider recruiting and training other providers of treatment,

such as patent medicine vendors who can function as CHWs (75, 128). Other stable, valued members of the community, such as Buddhist monks, have also been trained to work as CHWs (129). Recruitment of well-respected members of the community or individuals who already provide treatment in the community may increase the acceptability and use of CHW services. For example, approximately 25 per cent of the volunteers in the Thailand malaria volunteer programme are traditional practitioners, and in a survey, 94 per cent of those practitioners stated that their involvement with the programme had improved their medical practice in the community (130). Those volunteers who reported having traditional healer as their primary or secondary occupation were more likely to see the volunteer position as increasing social respect and less likely to consider dropping out of the programme than other volunteers. The traditional healer volunteers also were more active in the programme; they collected more slides, had higher rates of positive slides, made more home visits and delivered slides to the clinic more often than their non-healer volunteer counterparts (131). However, 47 per cent of the traditional healer volunteers also reported treating malaria patients with their own medicines (130). A WHO monograph (132) provides more information about traditional healers as CHWs.

Training

In order for CHWs to provide high-quality services in disease management, they must be trained to do so. In Bangladesh, it was found that the more exposure BRAC-supported CHWs had to 'basic' training, the better diagnosis and management of pneumonia they provided (47, 133). A competency-based approach to training is commonly used for training CHWs who treat sick children. In this approach, the skills and competencies required of the CHW are defined and usually expanded into steps and standardized procedures required for a specific skill. The training materials and activities all focus on the learners' mastery of the specifically chosen competencies. The competencies that are achieved during training are also those that should be assessed during supervisory visits or follow-up, frequently with the checklists used during training (117). A one-day refresher course developed and tested in Bolivia to improve CHWs' management of pneumonia in children provides an excellent example of effective, competency-based training for pneumonia management (99). Although on-the-job training by peers has been used effectively in other primary health care programmes (134), to our knowledge this training method has not been used or examined in CHW programmes that treat sick children.

Commonly cited problems in the training of CHWs include: training that is too classroom-based with little practical hands-on experience; training and materials that are too complex for the CHWs; and training and materials that are not well adapted to the specific context or community. Evaluations have also found that the knowledge and skills taught to CHWs are lost over time (135), and therefore periodic refresher training is often provided. The ideal location of training, where CHWs will have sufficient opportunity to practise, varies by CHW programme. Some programmes recommend that the training take place in the community rather than in health facilities to provide hands-on experience in the work environment of the CHW. In other contexts, training may take place in the facilities because there are more cases of sick children presenting within the training period, thus providing more opportunities for the trainer to demonstrate skills in a real-life situation and for CHWs to practise newly learned skills.

Because CHWs work within the constraints of the community and usually have limited formal education, programmes often develop or adapt training materials and activities specifically for CHWs rather than using training packages developed for facility-based workers. For example, CARE India, in collaboration with the Government of India and WHO, has developed an IMCI training package for basic health workers, or CHWs, based on the facility-based IMCI course but with simpler language, more illustrations and more interactive components for the less-educated basic health workers (136–137). The difference in the prevalence and severity of childhood illnesses seen by community health workers versus facility-based workers is also an important consideration when adapting or developing CHW training materials.

Tools to enhance performance after competency-based training: Job aids and algorithms

Job aids can be used to improve the quality of services provided by CHWs by helping them remember information or providing simplified guidelines to more complex processes. For example, a laminated notebook or flip chart might provide information about illness classification and treatment. A job aid can guide the CHW's performance of a task in the correct sequence, can give clear signals for when to take some kind of action, and can call attention to important information. Job aids should be developed to assist with the CHWs' gaps in knowledge, skills or time, or to address health workers' forgetfulness. For example, the SEARCH programme in India found that traditional birth attendants had difficulty counting high numbers when classifying pneumonia, thus an

abacus-like device was developed to help them count respiratory rates (40, 93). This simple tool is low-cost and effective.

In programmes that treat pneumonia or integrate the treatment of multiple childhood diseases, treatment guidelines, or algorithms, are one of the job aids most commonly used by CHWs. They are usually indicated on posters, wallcharts, other visual reminders, pocket manuals or recording forms to help CHWs remember steps in the disease management process. The WHO ALRI standard case management guidelines (90) are used almost universally for classifying pneumonia in the community. They involve the following steps: examining the child for the signs of raised respiratory rate and the presence of chest indrawing; classifying the severity of the child's respiratory illness (no pneumonia, pneumonia, or severe/very severe pneumonia); and taking action according to the classification of severity (appropriate home care, oral antibiotic treatment in the home or first dose of antibiotic and immediate referral). The predictors on which the guidelines are based have proved to have adequate specificity and sensitivity in various settings and sub-populations (138–144).

Algorithms and treatment guidelines for malarial disease have been more controversial, are used less often in malaria programmes and need much more adaptation to the local epidemiology. A review of studies of algorithms for malaria in areas of varying intensity of malaria transmission concluded that in areas of high malaria endemicity, the presumptive treatment of malaria based on fever is appropriate. However, in areas of low transmission, currently used guidelines for treating malaria are not highly sensitive or specific and may need revisions according to the local situation (145). With growing drug resistance and the introduction of more expensive treatment regimes using artemisinin combination therapy in many parts of the world, there has also been renewed interest in the role of microscopy for the diagnosis of malaria in the community (85) or rapid diagnostic tests in areas where microscopy capabilities are limited. It has been shown in various research studies that CHWs or their equivalents are able to use rapid diagnostic tests adequately (81–82, 84); however, the current use of these tests in routine programming is limited.

For the management of multiple diseases, the IMCI programme initiated by WHO and UNICEF has developed algorithms to improve the performance of facility-based workers (146). Some programmes have modified these facility-based, integrated algorithms for use by CHWs (54, 136). However, in at least one

programme evaluation, these adapted algorithms have been considered too complex for CHWs to manage (54). Other programmes, such as in Sudan (55), have developed highly simplified algorithms for CHWs based solely on general danger signs, fever, cough and diarrhoea. Catholic Relief Services (CRS) has recently developed a handbook on the community component of IMCI for CHW programme facilitators and CHWs. It includes colour-coded disease management guidelines, counselling guidelines and job aids developed specifically for CHWs (147). The package is meant to be adapted to local realities and can be modified for CHWs who are authorized to treat with antimicrobials in the community or for those who refer to health facilities cases needing antimicrobial treatment. CRS is currently using and evaluating this package in El Salvador, Kenya and the Philippines (148).

Some CHW programmes use an innovative record-keeping form that includes either written or visual guidelines such as disease identification, classification and treatment (21, 39, 147, 149). The recording form serves as a memory aid to the CHW and allows supervisors to monitor the CHW performance at each step of the management process. The record-keeping form can also be a source of data for programming or health information systems (148). Other job aids, such as counselling cards or visual aids, have also been used to counsel caregivers in appropriate home management of sick children; this use of job aids is discussed further below under the heading 'Appropriate disease management at home.' A more comprehensive review of health worker job aids is available from the Quality Assurance Project (150) and can be downloaded from the Internet at: <<http://www.qaproject.org/pubs/pdfs/issuesja.pdf>>.

Actions to maintain performance after competency-based training: Supervision and support

Supervision is an essential tool in maintaining worker and volunteer performance. Community health workers are most in need of supervision because they are trained for short periods, and tend to have fewer skills than other health personnel and to work alone in rural areas (15). However, irregular or inadequate supervision is almost universally cited as a key problem in CHW programmes (54, 111, 151–153). Regular supervision has been associated with better project outcomes (154) and more accurate classification and treatment of childhood illness by CHWs (45, 47). Supervision of CHW programmes usually involves visits to the CHWs' communities by programme supervisors or meetings in health facilities. Supervisors may fill out forms based on CHW

tasks and responsibilities in order to help guide their supervisory visits (154). Information collected through community-based health information systems (see Box 3, page 20) may also be discussed during supervisory visits or meetings.

Groups or cooperatives of CHWs have also been used effectively to provide support and supervision in monthly meetings. For example, health promoters' associations (APROMSA) in Peru provide supervision and support to CHWs in the field through the board members (leaders) of these associations. Board members meet on a regular basis to share information and experiences between associations in order to strengthen their effectiveness. The motivation of promoters and a high level of volunteer retention (88 per cent over four years) have been attributed to this type of supervision (155). These hierarchical associations of CHWs foster formal links with the health facilities (ministries of health) and other partners, such as local governments and non-governmental organizations. Thus, the needs of the CHWs are properly represented within the ministry of health and the activities of CHWs can reflect the needs of the ministry of health. The organized nature of the associations makes logistics concerning activities such as training, meetings or patient follow-up more efficient because the health system is not overburdened in dealing with large numbers of individual CHWs (21, 155). Regional associations of CHWs have also been formed in Brazil and the state government pays the salaries of CHWs participating in this mechanism (156).

Other programmes have used teams of community health workers or other health personnel to provide support in the field. In Honduras, *monitoras* work in small teams of at least three members (60), while in Brazil under the Family Health Programme (Programa Saúde da Família), community agents work on a team with a physician, nurse and nurse auxiliary (156–157). World Relief has implemented a hierarchical support mechanism called 'care groups' in community programmes operating in Malawi and Mozambique. Within this system, a volunteer mother represents 10 households in her community and is part of a care group that consists of 8 to 10 volunteers and one volunteer leader. These care groups meet with a facilitator (a paid programme employee) twice a month for health surveillance activities, refresher training and monitoring; they also provide a forum for peer support, encouragement and problem-solving for the volunteers (158–160). Laughlin (161) provides an in-depth examination of this approach; the document can also be downloaded from the Internet at <http://www.coregroup.org/diffusion/Care_Manual.pdf>. Support from the

communities that CHWs serve can also positively influence CHWs' performance. It was found in Colombia that feedback and rewards from the community had a greater influence on CHW job performance than factors associated with the health system, such as official supervision (162). Support from the community, including the presence of a health

Box 3. Community-based health information systems

The collection of information about the community and its health can be an important function of the community health worker. Data collected by the CHW may be used by programme managers to make more informed programming decisions and thus provide more effective services. The information can also be used by community members and CHWs themselves to identify and recognize their needs and propose solutions (163). For example, in Brazil community agents realized that infant mortality increased in a period when fishing was banned. Once the problem was identified, the village was able to buy a freezer, thus improving nutrition and finances (156). Community-based health information systems can also be used to link the community to the formal health system. In Peru, the CHW maps the community, indicating the high-risk (fertile women, young children) households. This map helps programme managers and facility-based personnel identify target populations and can also be used by the community (164–165).

The International Rescue Committee (IRC) in Rwanda uses community-based health information systems as an effective way of providing supervision and support to CHWs. Information collected by CHWs is compiled in brief reports by health centre managers who submit summaries to district staff each month. At the district level, the data are compiled and discussed by the district health team. In turn, the information is discussed among the health centre managers and with the CHWs at monthly meetings. IRC has found that the information system provides a reason for the managers and the CHWs to meet on a monthly basis, and that lack of reports signals inadequate supervision and contact. The simple information system, which links CHWs and Rwandan Ministry of Health personnel, serves as a motivator and has increased community-to-facility referrals; CHWs have become an important focus of district health activities (166). More information about community-based health information systems is available from Debay et al. (167) and can be downloaded from the Internet at <http://www.childsurvival.com/documents/CSSTS/C-HIS_Final.pdf>.

committee, has also been associated with CHW knowledge (135).

Measurement of performance after competency-based training: Monitoring and evaluation

Monitoring and evaluation activities are essential elements in identifying problems and identifying solutions in order to improve the quality of case management performed by CHWs. Measurement of CHW performance can help supervisors identify low-performing CHWs for additional help and detect specific problem areas within the case management process.

Methods that can be used to monitor and evaluate CHW performance include: direct observation of CHW activities in the community or during training; review of records retained by the CHW or clients (mothers); interviews directly with the CHW, interviews with caregivers after consultation with CHW; and rapid household surveys. Review of records at the health facilities can also be used to evaluate performance with respect to referral and counter-referral activities.

Lot quality assurance sampling is a sampling method that has been used to monitor the quality and coverage of services in various community programmes (168–170) and has also been applied specifically to assess CHW performance for supervisory purposes (171–172). A key advantage of lot quality assurance sampling for monitoring CHW performance is that estimates of whether performance is adequate can be produced for the area covered by each CHW, allowing supervisors to identify and target those CHWs who most need supervision. This is particularly useful when a supervisor is responsible for large numbers of CHWs. Winch et al. (117) provide a detailed description of methods for monitoring health worker performance.

Retention of qualified CHWs

The retention of qualified workers or volunteers is one of the most significant operational challenges in almost any CHW programme. Programme managers and technical experts alike have cited retention of CHWs as an operational issue needing a great deal of attention. Attrition rates in CHW programmes are often as high as 30 per cent over nine months (173). Loss of qualified CHWs can lead to poorer programme coverage and the necessity for greater operational inputs of further recruitment and training, resulting in increased costs (174). CHW dropout can also disrupt programme continuity in relationships between individual CHWs, the community and health systems (175). In some contexts,

CHW attrition can also be considered problematic because of the fear that CHWs may 'set up shop', performing unauthorized and unsupervised activities in the community. Retention of CHWs can be affected by numerous interrelated factors, including:

- Operational inputs of the programme
- Importance of programme activities to the individual CHW and the community
- Monetary and non-monetary incentives.

These factors are discussed briefly in the following sections. For further information, Bhattacharyya and colleagues (175) offer an in-depth discussion of incentives, disincentives and retention of CHWs; also available online at <www.basics.org/publications/abs/abs_chw_eng.html>.

Operational inputs

The operational aspects and technical inputs of community health worker programmes, many discussed above in the context of CHW performance, can have a great impact on the retention of CHWs. Retention can be affected by the clarity of CHW roles and responsibilities defined by the project. In the CARE Siaya programme, some CHWs anticipated compensation, and when it was clear that compensation was not forthcoming, they dropped out (122). A similar trend was seen in Bangladesh, where most *shastho shebika* (CHWs) stated that the main reason for their dropping out was that profits from drug sales were much lower than predicted by programme managers during their recruitment (174).

The characteristics of selected CHWs can also affect retention; for example, the sex, age or education of CHWs may affect their continued participation in programmes. It has been observed that single female volunteers have a higher turnover rate than male or married workers (36). In other instances, older CHWs (over 30 years old at the time of enrolment) are more likely to drop out (37). In general, more educated workers tend to have higher rates of attrition than their less-educated counterparts (36, 126, 176–177).

Good, regular supervision can also improve retention rates. In the Thailand malaria volunteer programme, volunteers who reported that the frequency of malaria slide collection by supervisors was insufficient were significantly more likely to drop out than those who thought it was sufficiently frequent (37). The support of ministry of health or programme officials, through regular meetings and visits, is also an important aspect of CHW retention (175).

Value of programme activities to individual CHWs and their communities

CHWs commonly continue participating in programmes because of the value that they and their community place on the programme activities they perform (22, 122, 162, 175, 178). CHWs often appreciate the opportunity to learn new skills and assume new responsibilities, which can increase their self-esteem as well as their standing in the community. These factors have often been cited as having a positive effect on retention (122, 162, 178–179). Many CHWs continue to provide or volunteer their time because of the health impact in their own families and other families in the community. When people appreciate the health impact of CHW activities, they will also encourage the CHWs to continue serving.

A CHW programme in Mozambique initiated by Save the Children provides an example of a programme with exceptional rates of volunteer retention. During an evaluation to examine what factors helped sustain the CHWs in their activities, the primary reasons CHWs cited for remaining with the programme were health changes seen in their own families, value placed on their activities by the community and opportunities to learn (178–179). Similarly, an evaluation of the CHW programme in the Siaya district, Kenya, found that reasons cited by CHWs for staying included duty to the community, new skills and ability to help improve the health of children, and confidence and self-esteem (122). The importance to CHWs of seeing a change in the community's health and having influence in the community has also been observed in Colombia (162).

CHWs who provide curative care may have higher levels of motivation than those whose activities do not include curative services; provision of treatment for common diseases is usually highly valued by the community, often even more so than disease prevention programmes (17, 108, 119, 175). In fact, CHWs often express interest in expanding their curative roles (180–181). Accordingly, in programmes where disease treatment is among a CHW's activities, a consistent and timely supply of drugs can be important to a CHW's credibility in the community and his or her own motivation. Interestingly, in Thailand, malaria endemicity had an impact on volunteer attrition: Volunteers in areas with greater incidence of malaria were less likely to drop out than volunteers in less endemic areas (37), probably because of the perceived value of treatment services to the community.

Monetary incentives

Programmes may compensate CHWs for their time, and in some programmes CHWs are paid salaries. Although the main rationale for paying CHWs is increased retention and motivation, other programmatic considerations include increased time commitment by CHWs, greater accountability of CHW activities, and the ability to use negative reinforcement, such as dismissal. Regular, adequate compensation can also lend credibility to the CHW in the eyes of the community (175). The sponsor of the CHW programme (for example, non-governmental organizations, national or local governments) or the community itself may provide the monetary compensation.

In some national programmes, such as the Lady Health Worker Programme in Pakistan and the community health agents programme in Brazil, the CHWs are employees of the respective ministries of health. In Pakistan, lady health workers are considered civil servants with one-year contracts, and retention is quite high. In the first three years of the programme, an average of 5.4 per cent of lady health workers dropped out per year. In recent years, dropouts have averaged less than 1 per cent per year (177). In Brazil, the CHWs are paid approximately twice the average local income; no information on retention is available.

Various issues arise when CHWs are paid salaries or cash incentives. Obviously, such incentives can increase the cost of operating CHW programmes. Remuneration is often irregular and may end when outside funding of the project concludes, which may have a negative effect on programme sustainability. Salaries or cash incentives can create resentment between CHWs and other workers, other CHWs or the communities served by the compensated CHWs (175). Cash incentives or salaries can also lessen CHWs' accountability to the communities they serve, with CHWs instead becoming obligated to programme structures (15).

Monetary incentives that are tied to cost-recovery mechanisms or individual drug sales can also create related problems. CHW compensation through drug sales may result in increases in inappropriate drug use (over-prescribing) and may decrease prevention activities in favour of curative care and drug sales. The indebtedness of drug funds, as a result of borrowing by community members or the CHWs themselves, can lead to contention between CHWs and the programme or community, triggering higher rates of CHW dropout (122).

Other incentives

Non-monetary incentives are often employed by programmes to foster CHW motivation and decrease attrition. The communities that CHWs serve frequently donate in-kind incentives in the form of agricultural or household labour. Programme-related materials or supplies are often provided as incentives to increase CHW motivation. Many of these items, such as identification badges, T-shirts, uniforms, saris or other types of attire identify CHWs as working with a particular programme. Because they show a CHW's affiliation, these incentives serve several purposes: providing a material incentive to CHWs, generating pride and recognition of CHWs within the community and promoting group solidarity (182). Other types of equipment directly related to the CHW's duties, such as stopwatches to assist in the counting of respiratory rates, bags to carry drugs or other supplies, or other job aids, can have a positive effect on CHWs' motivation (119, 175). Allowances given for transport and for training, attending meetings and so on are often cited as reasons why volunteers or workers continue with programmes and can be used as incentives. Free or preferential treatment at the health centre is also a common incentive for individuals in CHW programmes (183).

Rotation of responsibilities

One alternative to focusing on CHW retention is rotating the responsibilities of the CHW to different individuals in the community (49, 79). 'Volunteer fatigue' was also found in the voluntary malaria collaborator programme in Thailand (36). If a programme is properly functioning and sustainable, communities may recognize the need to replace workers, and systems can be put in place to recruit and train new workers (125). Former CHWs may take their skills with them and continue to benefit the community, even after leaving the formal CHW programme.

Use of CHW services

The goal of most CHW programmes is to expand primary health care to greater proportions of the population, especially to the poorer segments of society. Bringing care into the community may remove the barriers to seeking care in health facilities, such as distance, transport costs, travel time and fixed hours of operation. Individuals chosen from the community may also be more acceptable sources of care to villagers than facility-based personnel. A geographic information system analysis conducted in Tigray, Ethiopia, found that the CHW programme there increased the coverage of malaria treatment services beyond the reach of many

health facilities (24). An influential review of CHW programmes in the late 1980s also found that programmes did indeed expand services to a greater proportion of the population than did clinic-based services. In contrast to clinic-based services, community health worker services were more equitable – they were not biased to higher socio-economic status clients and in some cases biased to lower socio-economic status clients (18). In a community health volunteer scheme in India, it was also found that coverage was representative of the population and was not biased towards upper castes or larger landholders (184).

It has also been observed that the use of CHW services remains less than optimal in many areas (72, 74, 185), or that CHW services may not reach the targeted population, for example rural women and young children (75, 186). The use of CHW services is impeded by various factors. A mortality study in the Siaya district found that only 26 per cent of caregivers whose sick child subsequently died sought care from a CHW. The main reason cited for not seeing a CHW was that families did not know that they existed (185). Inconsistent drug supplies are another commonly mentioned barrier to use of CHW services (22, 187).

Studies have also shown that many families prefer to self-treat febrile episodes at home (188), even in areas where CHW services are available (72). Time constraints related to women's workloads, long distances to the CHW's village and lack of knowledge of the importance of early diagnosis and treatment were cited as reasons for underuse of CHWs by women and young children in Tigray, Ethiopia (26, 186). Barriers to seeking care often include lack of money to pay for services. Malaria incidence is generally at its highest during the rainy season in African nations, and during this season families have an even more difficult time paying for health care because of household financial fluctuations associated with agricultural activities (189–190).

Community participation, especially women's groups, in the CHW programme can be an important factor in improved use of CHW services (72). Many programmes have also noted that when male CHWs are chosen, this may have a negative impact on the use of CHW services by women and their young children (25, 72, 164). In some programmes, supervisory visits actually encourage community members to use services provided by the CHWs. In the Latin America volunteer collaborator programme, when programme personnel make a supervisory visit to volunteers, they are also supposed to make household visits to encourage families to use the CHW malaria services (35).

Monitoring, through simple techniques such as review of records or drug sales, can help ensure that use of CHW services is adequate. Communities where the targeted population is not using services can be identified, or CHWs who are not providing services can also be identified and remedial actions taken. In an innovative approach in Indonesia, radio spots were used to increase community awareness and appreciation of CHW (*kader*) activities and help improve the performance of CHWs (191). In some programmes, household visits have offered an opportunity to encourage families to use CHW services. In the case of Nepal, household visits were initially employed to actively detect cases of pneumonia. Over time, caregivers began seeking the services of CHWs for their sick children, making the active detection component of the programme much less important (192–193).

Drug supply

For those CHWs who provide curative treatment, the continuous supply of drugs is an essential part of their effectiveness. Replenishment of drug supplies is necessary to provide curative services in the community. It can also be an important component of CHW motivation – if CHWs are irregularly supplied, it decreases their morale and the community's perception of their effectiveness (15, 151). Intermittent drug supplies often lead to great declines in care-seeking for CHW services. When CHWs do not have the drugs to treat the illness, community members are often aware of the stock-out and seek care elsewhere. The decreased demand for the drugs can then cause CHWs or CHW programmes to subsequently supply fewer drugs.

Systems of drug supply vary by CHW programme. Some community health workers restock their supplies through ministry of health facilities, which may also provide supervision and support to CHWs. Other programmes directly supply CHWs with drugs purchased by the programme. However, the most important consideration in the continued supply of drugs is how the system is financed. Government or donor provision of drugs and community cost-recovery mechanisms were the financing strategies most commonly encountered in the CHW programmes reviewed for this report. The issues surrounding cost and supply may become even more important. The growing levels of drug resistance had led to changes in the first-line drugs used in many malaria treatment programmes, and relatively inexpensive chloroquine and SP therapies are being replaced by more expensive combination therapies (artemisinin combination therapy). In addition to the higher cost, there have also been international

shortages in the supply of these therapies (194–195). The different approaches to financing of drugs that have been used in CHW programmes and a discussion of associated considerations are presented below.

Donor- or government-supplied drugs

In some CHW programmes, drugs and ORS are distributed at no cost to users or are financed by either the national government or outside donors. The highly successful acute respiratory infection programme in Nepal distributes cotrimoxazole free of charge. The government provides the cotrimoxazole and encourages community pharmacies to hold the drug to restock CHWs (193). In the BRAC acute respiratory infection programme in Bangladesh, cotrimoxazole was supplied free of charge to BRAC and the Government of Bangladesh by UNICEF. To distribute the drug, the Government gave cotrimoxazole to family welfare visitors working for the Government in family welfare centres and to BRAC who gave the drug to *shastho shebika* in pilot project areas. The CHWs, in turn, were permitted to charge a small fee for the drug as an incentive (196).

The programmes in Nepal and Bangladesh reveal both the strengths and weaknesses of such a financing strategy. This approach often involves fewer administrative structures, with the responsibility for drug resupply and programmatic decisions usually at a more central level, outside the community (197). If supplies are maintained, as in Nepal, the drugs are more widely available and accessible to all sectors of the population, independent of economic constraints. A majority of mothers (82 per cent) interviewed in Bangladesh expressed satisfaction with the services provided by the CHWs; one of the primary reasons was that the five taka (US\$0.09) charged for antibiotics was inexpensive and more affordable than obtaining the drugs from other sources of care. Other mothers also expressed appreciation for the flexibility of payments to CHWs (133).

However, government-financed or donor-financed drug supplies do not increase or maintain resources for health at the local level and are dependent on outside inputs for programme sustainability. For example, in Bangladesh in 2000, UNICEF stopped the free supply of cotrimoxazole and the CHW programme ceased functioning (196). The shortage of external donor funding and national government funding is also a threat to the continuation of the Homapak initiative in Uganda, which provides free blister-packed antimalarials.

Community cost-recovery

In many community health worker programmes, financing of drugs or services is linked to a community cost-sharing (cost-recovery) system. This strategy is often synonymous, or at least highly associated with the Bamako Initiative (see Box 4, page 25). The fee structure for cost-recovery may be based on payment for the drugs, a fixed fee for each consultation, or community insurance systems. In the majority of CHW programmes that use this financing mechanism, a drug revolving fund is established in which the initial drug stocks are provided, and then drug stocks are replenished through the sale of these initial stocks (197–199).

Cost-sharing aims to empower local communities through participation in the management of locally collected resources (197). Community health management or development committees are often involved in much of the implementation and management of cost-recovery activities (200). The committees are usually composed of community members and leaders chosen by the community; they make decisions regarding the use of collected funds, overseeing CHW activities, identifying mechanisms to pay for the poorer members of the community and communicating between the community and health services (including CHWs). In Malawi, village health committees manage the revolving funds out of the local post office, to order new drug stocks (201). In the Siaya district, Kenya, committees manage Bamako Initiative pharmacies and are also charged with establishing profit margins and accountability mechanisms for drug sales and supplies. The community is also responsible for managing the drug inventory and the related bank account. CHWs resupply their stock at these Bamako Initiative pharmacies (180). In the Kisumu district, Kenya, the system works similarly and CHWs are also required, once a month, to staff the collective Bamako Initiative pharmacy, which sells to CHWs and the public (202).

Cost-sharing initiatives are generally introduced to increase the financial sustainability and viability of treatment programmes. Through increased resources for health services, they aim to increase accessibility, availability and quality of health services. For example, in Honduras, a mechanism similar to a drug revolving fund enables the stocking of ORS and medications for childhood pneumonia and helminthic infections in remote areas not reached by other primary health-care services. Based on morbidity records, these community drug funds fill an important gap in treatment coverage (203). Health services may also be more affordable through cost-recovery mechanisms; if health services are made

more accessible and available, sick individuals will not have to seek alternative, high-cost sources of care (197). However, the fact that not all sick individuals have the money to purchase drugs, essentially further marginalizing the poorest of the poor, is often raised as a concern regarding cost-recovery approaches (204–205). Fees associated with drug revolving funds can discourage use of CHW services, especially among the poorest socio-economic groups (180). Although cost-recovery mechanisms have improved curative services (198), it has been shown that user fees introduced at health facilities can negatively affect use (197, 206–207).

The use of cost-recovery mechanisms, especially drug revolving funds, adds the complexities of financial management to CHWs' responsibilities. There have been many cases in which CHWs found it difficult to manage the funds, resulting in CHWs becoming heavily indebted to the drug revolving fund. Families and neighbours may also exert pressure to 'borrow' monies associated with the funds (180). In some instances, community members cannot afford the medicine they or their children require and take out loans, offering to pay them back in several days. This can impair the functioning of the drug revolving fund and may place the CHW in the position of debt collector (122). In Honduras, it was found that stock-outs, expired inventory, inadequate pricing and managerial issues were the greatest threats to the continuation of community drug funds (equivalent to drug revolving funds) and continued participation of the CHWs who managed them (203). Money-management issues associated with drug revolving funds also jeopardize the sustainability of the efforts of CHWs in the Siaya district, Kenya (122).

In some cost-sharing mechanisms, community members resent having to pay for services or drugs provided by the CHW and feel that the services or drugs should be provided free of charge. The CHW may be perceived as benefiting from the project or even selling drugs that he or she receives free of charge (121–122). This resentment may be exacerbated if drug costs are not consistent. For example, in Malawi, non-governmental organizations initially established drug revolving funds and later the drugs were given away free of charge. Implementation of a policy that provided drugs at no cost after a fee-based programme confused villagers and created resentment among those who had paid (201), leading to a loss of programme credibility.

Appropriate use of antimicrobials

Concerns are often raised about the distribution of drugs in the community and the appropriate use of

Box 4. Bamako Initiative

In 1987, the Bamako Initiative was launched at a meeting of the African Ministers of Health, with support from the WHO Regional Office for Africa and UNICEF. While often considered an initiative focused on drug revolving funds and cost recovery, the foundation of the Bamako Initiative is to encourage improved quality and increased accessibility of health services through both community participation and cost-sharing (200). Bamako Initiative programmes are usually national in scope. While UNICEF headquarters supported many initial Bamako Initiative activities, many other agencies, such as the World Bank, non-governmental organizations and bilateral agencies, use the Bamako Initiative principles in their support for primary health care. A certain degree of decentralization of health administration is required for the Bamako Initiative. Although the type of implementation and focus of setting has varied by country, the initiative has always been concerned with more peripheral health services. In some countries, such as Guinea and Uganda, activities are focused on community health facilities (197–199), while in other countries Bamako Initiative activities extend coverage through CHWs.

antimicrobial drugs. Inappropriate use can speed the development of antimicrobial resistance. Failure to complete a full course of an antimalarial can also result in poorer disease outcomes; compliance with a full course of antimalarials has been correlated with improvements in children with malaria and shorter duration of illness (208). In many areas, families with limited financial resources purchase an incomplete course of antimalarials (209–211) or antibiotics from underground sources for their sick child. Community health worker programmes, whether facilitating treatment in the home or directly providing treatment, can assist families in acquiring appropriate quantities and qualities of drugs, and then the completion of appropriate courses of treatment. In CHW programmes that manage sick children, the appropriate use of antimicrobials must be considered at two levels: The CHW must recommend (prescribe) the correct antimicrobial at the correct dosage, and the medication must be properly administered in the home.

These two aspects of appropriate antimicrobial use – correct community-based distribution and appropriate home care – are examined briefly here. Radyowijati and Haak (212–213) provide further discussion of the determinants of appropriate antibiotic use and approaches to improve this use; their report can be downloaded from the Internet at <www.childhealthresearch.org>.

Distribution of antimicrobials by CHWs

The rational distribution of antimicrobial drugs is a key factor in providing treatment outside of facilities. Concerns specifically relate to community health workers' ability to correctly classify children and recommend antimicrobial treatments only when they are indicated. Most evidence suggests that CHWs' recommendations of antibiotics are generally appropriate (40, 43, 47, 89, 99); this phenomenon has been less studied with regard to dispensing of anti-malarials by CHWs, as the assumption in the past has been that presumptive treatment of fever is less complex. In a large-scale programme in Nepal, quality of care is monitored through record reviews and direct observation of community-based workers' assessment and treatment of sick children. In 80 per cent of cases appropriate care was given, including the correct treatment regimen. The CHWs (female community health volunteers) prescribed antibiotics in only 2.6 per cent of pneumonia cases where they were not indicated (44). In Bangladesh, a research study found 87 per cent agreement between treatments recommended by CHWs and by a study physician for children with suspected pneumonia, and that illness classification and treatment recommendations were more accurate among those CHWs who received routine supervision (45, 47). Over-prescription and the consumption of multiple medications are concerns in CHW programmes that link drug sales to financial incentives (196); this kind of inappropriate distribution has been problematic in programmes based on the Bamako Initiative in Nigeria and Guinea (200, 214).

The diversion of antimicrobial drugs for uses other than childhood illnesses has also been raised as an issue in community-based distribution. There is little information available concerning the diversion of drugs supplied by CHW programmes for uses other than child illness. However, a pilot programme in Senegal for pneumonia found low rates of inappropriate distribution (1.5 per cent); two out of 113 CHWs inappropriately dispensed cotrimoxazole tablets to older patients. One technique that has been used to discourage diversion involves calling programme antibiotics 'pneumonia drugs' instead of by their common name and educating community members about the medication and its use exclusively for children (215).

Appropriate disease management at home

After a sick child receives care or treatment from the community health worker, appropriate disease management in the home is an essential step for that child to recover. Appropriate supportive care

provided in the home, such as increased fluids and continued feeding in the case of diarrhoea, has been repeatedly shown to increase with community education programmes. It has been found that families treating febrile illnesses at home generally do not administer appropriate amounts of medication (209, 216). Administration of a full drug regimen to the child in the home, often referred to as compliance or adherence, is, however, especially important to improve the health of the individual child and to avoid or slow the development of antimicrobial resistance.

Different strategies have been used to encourage compliance with recommended drug regimens in the home. Ensuring the appropriateness of home management involves training and supporting CHWs to counsel caregivers about appropriate treatment regimens, appropriate supportive care and danger signs requiring immediate care outside the home. In Nepal, CHWs use visual aids (flip charts) to educate mothers about signs of pneumonia requiring care outside the home and supportive home care for mild respiratory illness (217). In Mali, an intervention consisting of a refresher training course and visual aids to help the drug-kit managers (CHWs) communicate more effectively with parents of sick children was associated with more appropriate administration of chloroquine (27). The mother coordinators programme in Ethiopia used visual aids to facilitate appropriate home management; all of the mothers in the village received pictorial malaria treatment charts to keep in their homes (32, 79).

Pre-packaging of drug regimens, often in association with pictorials of appropriate usage on packages or in package inserts, is an effective strategy to increase compliance in the home (218–221). While most of the evidence is based on the distribution of pre-packaged regimens from health facilities, some community-based programmes, especially those in which families have more responsibilities related to treatment, use pre-packaged drugs that may be colour-coded or include pictorial inserts (30–31). The Homapak initiative in Uganda (22–23), the National Centre for Malaria Control (*Centre National de Lutte contre la Paludisme*) programme in Burkina Faso (31) and the Accelerated Child Survival Programme in Senegal and West Africa (222–223) use this strategy to encourage appropriate drug use in the home. A study associated with the programme in Burkina Faso, in which anti-malarials are dispensed to families through CHWs, showed an increase in the proportion of children receiving the correct dosage of chloroquine and a decrease in children progressing to severe malaria amongst those children receiving pre-packaged antimalarials (30–31).

In many programmes, CHWs are responsible for follow-up visits after they have seen a sick child. During follow-up visits, CHWs may encourage compliance with correct dosages of drug regimens or promote and inform mothers about appropriate supportive care in the home. In cases where the CHW has referred a child to a health facility, the CHW may check to see if the child was taken to a health facility and determine the outcome of the visit. Some programmes include a component of counter-referral through which facility-based health workers refer patients to CHWs for follow-up, a strategy discussed in Intervention Model 2, which includes facilitated referral. During the counter-referral visit, CHWs are usually given the task of helping caregivers follow the instructions or prescriptions they receive from the facility-based workers, which may include ensuring proper administration of antimicrobials.

6. SUPPORT, SUSTAINABILITY AND SCALE OF PROGRAMMES USING COMMUNITY HEALTH WORKERS

Programme support

CHWs cannot be successful as individual health workers; they require a functioning support network and initial support for their selection and training. The community (and community groups), non-governmental organizations and the ministry of health may all have distinct roles in supporting a CHW programme. The participation of all stakeholders in programme planning, especially when initially negotiating the roles and responsibilities of the community health workers, is essential (224). The support network can also have multiple functions in programme operations: to select and hold the CHWs accountable; to offer incentives; to train and update skills; to provide clinical supervision and guidance; to serve as a communications and equipment link; and to collect, analyse and use health statistics.

Collaboration and strong links between partners can improve the capacity and sustainability of CHW programmes, even if the role of partners varies greatly between programmes. Empirical evidence shows that the more support the CHWs receive, the more likely that a programme will be successful. A programme in Benin that was based on the Bamako Initiative and provided antimalarials and antibiotics, was limited in its impact and scope because of failure to link with health facilities for supervision and support (199). In most of the programmes examined, the ministry of health, non-governmental organizations

and communities were the major institutions that supported CHW activities, with varying levels of engagement. The role of these partners and their degree of involvement in programme initiation, support and continuation is described and considered below. Although the roles of ministries of health, communities and non-governmental organizations are discussed separately, most CHW programmes rely on continued coordination and cooperation between these entities and other partners and stakeholders.

Role of the ministry of health

Ministries of health have varying degrees of involvement in CHW programmes. In the majority of programmes we have examined, the ministry of health is an active partner, collaborating with other institutions or the community, but it could not sustain the programme without outside support. In such programmes, CHWs are often seen as extension agents (official or unofficial) of first-level health facilities. They may be accountable for certain catchment areas, collaborating with workers based in health facilities, assisting with outreach activities and satellite clinics, and providing regular reports to facilities on activities within their area. The facility-based workers in turn may be responsible for CHW supervision and support. In a limited number of programmes, the ministry of health provides few inputs or support, and the collaboration between community health workers and facility-based health workers or facilities is weak or absent. Consequently, there is limited accountability to the health facility, and community-level information collected by CHWs is not regularly reported to the health facilities.

In some countries, the CHW programmes are initiated and operated by the ministry of health. Community health programmes managed by ministries of health feature prominently in our discussion, even though in some of the literature these cadres of workers have not been considered as 'true CHWs' (18, 86). The reasons for our consideration of this type of CHW are various. Ministry of health programmes generally cover greater areas; therefore lessons in efficiency can possibly be learned from their operational structures. Also, in the era of health sector reform and decentralization, a community health worker supported by a ministry of health is not an oxymoron. Local governments and health districts in many regions have gradually gained more decision-making power, thus programmes can be developed that better fit local needs. Also, CHWs who manage child illnesses but do not use antimicrobials must generally be linked to or intensively cooperate with first-level health facilities because many sick children must be referred.

In programmes supported by ministries of health, CHWs are government employees or recognized volunteers with some official status and benefits. The CHWs may not be residents of the village where they work; the government or government officials – not the community – may be responsible for choosing CHWs. The CHWs are integrated into the hierarchy of the ministry of health with a designated cadre of ministry of health supervisory personnel, have regular contact with the local health facility, and may work as part of a team with facility-based health workers. Information collected by the CHWs is fed directly into the facility-based health information system. Programmes that are supported and initiated by governments often extend preventive health services and curative care. In Brazil, the community health agents' activities are part of the official ministry of health's package of services. Lady health workers in Pakistan are also an essential part of the ministry of health's extension strategy.

A high level of ministry of health involvement in CHW programmes has advantages and disadvantages. In a programme run by a ministry of health, CHWs are usually compensated for their time and efforts through a standardized salary, which can influence motivation and retention (175). The CHWs are part of the hierarchy of the ministry of health, thereby enjoying official status in the communities they serve. Because they are part of the health system, they may receive more supervision and support than in programmes that are not run by a ministry of health. The hierarchical structure of a ministry of health or governmental programme can provide fixed management responsibilities at each tier, which can clarify the chain of command above a CHW. For example, the Lady Health Worker Programme in Pakistan has a hierarchical structure with a separate, vertical programme, but it also has close links and sometimes overlaps with the government health system. This fixed structure provides regular management, supervision and training. However, CHW programmes that rely heavily on ministry of health structures may also increase the existing workload of the health facility staff (74).

CHWs chosen and paid by the ministry of health or government may feel more accountable to these institutions than to the community they serve. CHWs supported by the ministry of health may not enjoy as much community support because residents often distrust the government. After the ceasefire in El Salvador's civil war, for example, CHWs supported by non-governmental organizations were much better received by communities than CHWs supported by the ministry of health, and one of the main factors contributing to this preference was political (225–226). Within such systems, there

is also the risk that the CHW becomes part of the government bureaucracy and loses the role of community advocate as originally envisioned. In Botswana, for example, health facility personnel planned a national programme of family health educators (CHWs). However, possibly because of conflicts of interest during the development and implementation stages, the family health workers spent most of their time working in the health centres rather than in the community (15, 17).

Role of the community

The involvement of the community is an essential element in primary health care initiatives, including CHW programmes. There can be innumerable benefits, including increased use of CHW services, increased accountability of CHWs to the community they serve, and fewer misunderstandings of programme structures and activities. Strong community involvement has several potential disadvantages that also need consideration. Because curative services are most valued by community members, programmes with greater community involvement may concentrate on curative services, to the exclusion of health promotion or disease prevention. Comprehensive community participation may be a difficult component to include when coverage is being expanded. Most large-scale programmes employ an approach in which intervention activities are somewhat standardized; communities may carry out limited programme activities, but they are not usually directly involved in programme design or management.

In a few cases, the community has initiated a programme in order to fulfil a particular need. The Saradidi Rural Health Development Programme in Kenya is one example of a community-initiated CHW programme. In this programme, Anglican Church members mobilized the community to initiate activities, including the introduction of CHWs for malaria treatment, to reduce disease and increase income in the area (29). Programmes such as Saradidi, which are initiated and supported solely by the community, are relatively rare. CHW programmes usually aim to increase health-care coverage to marginalized populations that seldom have the financial and human resources required to support and sustain a community-health programme on their own.

In most programmes the community is not solely responsible for initiation and implementation, but rather, participates to varying degrees in programme development, implementation and maintenance. In many cases, the community participates in the implementation of the programme but does not define the health problem or solution. In the

Thailand malaria volunteer programme, for example, the programme strategies and disease target are defined, but programme activities are carried out by communities (36). In some cases, the community is directly responsible for supervising and providing benefits or incentives to the CHW, often through such formal mechanisms as a community health committee. Community-based health information systems are another approach that facilitates collaboration between CHWs, the community and programme managers. This approach is discussed in Box 3, page 20.

Innovative, context-appropriate approaches to overcome operational difficulties are often a result of strong community involvement. For example, community health promoter associations (Asociaciones de Promotores de Salud, APROMSA) in Peru were developed by the CHWs themselves. Health promoters (CHWs), trained by the Catholic Church, realized that their work was not well coordinated and they were not well recognized by the ministry of health, the state, non-governmental organizations or their communities. Thus, approximately 80 promoters formed and legalized a health promoter association to remedy the situation in 1980. The APROMSA in San Marcos is still functioning and has received support and resources from the ministry of health, local government and various non-governmental organizations. The association has served as a model for other regions and is the basis for the Enlace project supported by CARE (155).

A detailed field guide that considers the operational steps and related issues in mobilizing communities in health programmes had been compiled by Howard-Grabman and Snetro (227).

Role of non-governmental organizations

International and local non-governmental organizations (NGOs) often play a crucial role in community-based programming. They are frequently the institutions that foster collaborations between diverse partners, such as the ministry of health, the community, community-based groups, other NGOs, universities, and bilateral or multilateral organizations. Non-governmental organizations can help communities meet their health needs and contribute to broader changes through capacity-building, advocacy, applied research and service delivery (228). Hard-to-reach populations are often provided with services only by NGOs. The crucial integration of CHW programmes within the existing formal health systems and other programmes in the community is often initiated by NGOs. In many countries, including Eritrea and Indonesia, CHW programmes are the

national policy, but they are rarely implemented by the ministry of health without the support and assistance of NGOs (119).

Non-governmental organizations and their support networks can offer technical skills and approaches to community-based programming that may not be available in the community. They are often uniquely placed to attract resources for primary health-care initiatives from private individuals, corporations, foundations, and bilateral and multilateral institutions. Advocating on behalf of primary health-care programmes, such as those that involve CHWs, is frequently done best by individual non-governmental organizations or groups of NGOs such as the CORE Group (228). Non-governmental organizations also tend to have prolonged field presence and have built trust within the communities they serve, and thus are able to function as advocates for these communities. Typically, community participation and community empowerment are both built into CHW programmes run by NGOs and are programme goals themselves. Often, international NGOs start or support local-level grass-roots NGOs that can more effectively represent the goals and desires of the community.

The evaluation and dissemination of innovative methods in CHW programming are frequently carried out by international NGOs. Through such forums as the CORE Group and its working groups, non-governmental organizations are able to share knowledge and experience with other NGOs working internationally. For example, through seminars and symposia, such as Data for Action, a conference with proceedings available on the Internet at <www.childsurvival.com>, NGOs are able to learn about innovative technical approaches that have worked in other programmes and may be well suited for their own programmes. NGOs have also collaborated among themselves and with other agencies to assist in the development of technical approaches. CORE Group non-governmental organizations, for example, contributed greatly to the household and community IMCI framework (228). They are also able to pool resources to expand coverage. In the Nepal acute respiratory infection programme, four non-governmental organizations – Save the Children, Adventist Development and Relief Agency, CARE International, and Plan – worked with the Nepalese Ministry of Health and WHO to expand the community-based pneumonia treatment provided by female community health volunteers.

Sustainability of CHW programmes

Sustainability is a desired programmatic aspect. The failure to maintain or continue programme activities

is of concern because a continued effect on health is usually necessary; initial investment of resources, both financial and human, is lost if programmes are terminated; and programme cessation may negatively affect future programmes in the same communities (229). Sustainability has been defined in various ways, from focusing on financial aspects or on the health benefits, to focusing on the functioning and process of systems (230–231). Bossert, cited in (232), succinctly defined the outcome of sustainability as "... project activities and benefits continued at least three years after the life of the project." In this discussion, we will use the definition of sustainability in child development projects given by Sarriot et al. (230–231):

"... the development of conditions enabling individuals, communities, and local organizations to express their potential, improve local functionality, develop mutual relationships of support and accountability, and decrease dependency on insecure resources (financial, human, technical, informational), in order for local stakeholders to negotiate their respective roles in the pursuit of health and development, beyond a project intervention."

Sustainability is complex to measure and can be influenced by a diversity of organizational, human, social and political factors required for programme maintenance. External factors – such as changes in national priorities or policies, competing development needs, macroeconomic policies, organizational problems, natural disasters or climatic conditions, humanitarian emergencies or epidemics often explain why similar programmes are more sustainable in one region than another. For example, health programmes as a whole were found to be more sustainable in Central America than in Africa because of the economic and political context in which the programmes were implemented (230–231).

Recently, a framework for assessing sustainability has been developed that includes the following three dimensions contributing to project maintenance or continuation: health and health services; organizational capacity and viability; and community and social ecological systems (230). We use this framework loosely to examine factors associated with sustainability in community treatment programmes. For a more in-depth discussion on sustainability in child survival programmes, see recent companion papers by Sarriot et al. (230–231), as well as the Child Survival and Technical Support Sustainability Initiative web page at <<http://www.childsurvival.com/documents/CSTS/Sustainability.cfm>>.

Health and health services

The type and breadth of activities included in programming can have a great impact on sustainability (233). The reputation of effectiveness or perceived effectiveness of activities during a project's lifespan is one of the greatest predictors of sustainability after a project's close (230–231). Because communities typically place a high value on curative treatment, these types of programmes may be more sustainable, as communities are more likely to allocate or find local resources to maintain programme activities.

Organizational capacity and viability

Well-managed organizations with strong leadership are more effective in sustaining programme activities; institution-building activities may be important if sustainability is a goal (230–231). Programmes that foster collaboration, partnerships and integration between many sectors may also be more sustainable because greater numbers of stakeholders and institutional actors will value the continuation of the programme. Collaboration can also improve the capacity of local organizations to access financing, support and technical assistance (231). The CARE Enlace project in Peru focused on relationship-building and included a strong component of promoting community health worker associations and their capacities. While the project officially came to a close in 2000, many of the alliances the programme fostered, including links between the ministry of health, CHW associations and the community, are intact and even expanding (21, 155, 164).

Often, programmes create separate hierarchies and distinct administrative structures, which may raise serious concerns about sustainability (234). Failure to integrate may even result in fragmentation within the ministry of health, which can lead to decreased sustainability by requiring separate management, budgeting and reporting structures within the ministry (230–231). Nevertheless, vertical programmes are sometimes more effective than integrated programmes because ministry of health bureaucracies can be avoided and resources can be focused on specific activities (230–231). Some CHW programmes are the continuation of earlier vertical malaria-control programmes and have been operating for many years. For example, the volunteer collaborator programmes in Thailand and Latin America started in the 1950s with the global malaria-eradication programme (35, 87). These CHW programmes may be considered semi-autonomous institutions, in that they were initiated by and retain the support of vertical national malaria-control programmes (36). Such semi-autonomous institutions tend to be better

managed and less disjointed (230–231). The narrow focus and lack of operational complexity may have a positive impact on programme sustainability because fewer inputs, such as training, drugs and supplies, are required.

Community and social-ecological systems

If a programme strengthens the way a community recognizes and acts upon a health problem, that programme will be sustainable (231). Ideally, CHWs can act as catalysts to help communities examine their own health problems. Community-based health information systems can foster this process and are discussed in Box 3, page 20. Community involvement has also been found to contribute to programme sustainability. In an evaluation of an onchocerciasis treatment programme in Uganda, it was found that community selection of the community-based distributor (equivalent to a CHW) was the strongest predictor of programme sustainability (235). The majority of CHWs were chosen by their communities in a CHW programme started in the 1980s in the Kalabo district of Zambia; a recent evaluation found that the communities' knowledge and use of well-defined CHW selection criteria was highly associated with continued activity by community health workers (151). The facilitation of home management of childhood illness can increase sustainability; mothers are taught to manage sick children in the home, and this knowledge may be passed on to the next generation. This phenomenon has been documented with the use of oral rehydration therapy in the management of diarrhoeal disease in Bangladesh (19).

CHW programme scale

The idea of delivering programmes on a broad scale has been defined in various ways; most definitions are built around the concepts of increased impact or expanded coverage. The expansion of programme impact and activities is a laudable goal; the challenge is to achieve these outcomes on a wide scale without decreasing the quality of the original programme (227, 236–237). Therefore, the ability of CHW programmes to deliver high-quality services on a wide scale has been debated much more heatedly than the effectiveness of community health workers in small, well-managed programmes (18). Strategies and models to achieve programme impact on a wide scale are various. Howard-Grabman and Snetro (227) cite typically used methods of scaling up as planned expansion, explosion, association, grafting and diffusion. An in-depth review of scaling-up models as they relate to child survival is available from BASICS II (238). A review

of these models and their strengths and weaknesses is outside the scope of the present review. We will, however, briefly consider the CHW programmes operating on a wide scale, their commonalities and factors that may have a positive or negative impact on scaling up. Further discussions and examples of expanding the impact of child health programmes are available from a variety of sources (19, 114, 227, 236–239).

Many programmes where CHWs do not provide treatment in the community (Intervention Model 1) have achieved coverage on a large scale. The Atención Integral a la Niñez programme in Honduras and the *kader* system in Indonesia operate at national levels. The community health agents programme in Brazil (described further in Annex B, page 46) covers a large proportion of the population. Through the work of BRAC, and in part through their cadre of *shastho shebika* (CHWs), oral rehydration therapy has reached 13 million households in Bangladesh. More detailed descriptions of the BRAC programme and the factors enabling its success and scale are available (19, 239). Community-based malaria treatment is also commonly expanded, and many programmes operate at the national level, including Uganda's Homapak programme, the Centre National de Lutte contre le Paludisme programme in Burkina Faso, the Thailand malaria volunteer programme, or at the international level, the Latin America volunteer collaborators. Fewer programmes that treat pneumonia or multiple diseases in the community operate on a broad scale, although the Nepalese programme and the Lady Health Worker Programme in Pakistan both provide excellent examples; these programmes are described further in Annex B, pages 54 and 56.

Programmes identified for this review that operate on a wide scale all have strong support and collaboration from the national ministry of health. In many of these programmes, for example in Brazil and Pakistan, the cadre of CHWs is integrated into the ministry of health hierarchy, with strong links to health facilities or other health agents. Larger-scale programmes tend to be found in contexts where existing health systems are stronger; few CHW programmes operate on a wide scale in sub-Saharan Africa, for example, where health systems are generally weak.

Expanded coverage is also more common in those CHW programmes that are limited in their technical scope or do not treat illness in the community. Among all the programme approaches (intervention models), those not providing antimicrobial treatments in the community most frequently operate on a

broad scale. Malaria treatment programmes in which CHWs have very focused responsibilities also commonly operate at a national scale. Possibly because of the complexity of management or treatment and the related logistics, large-scale programmes that treat pneumonia or multiple diseases are rare. Management of pneumonia is more complex; diagnosis is relatively complicated, equipment (e.g., timers) is required, and a continuous drug supply is necessary. Therefore operations such as training, supervision and supply chains require much more effort (and financing) than those of programmes providing antimalarials presumptively for fever, or programmes that do not provide antimicrobials in the community. The cost and cost-effectiveness of programmes may also affect the scaling up of programmes; these factors are discussed in Box 5, *below*.

Expanding the impact or reach of programme activities is an undisputedly good concept. Nevertheless, there may also be important trade-offs to consider when planning the scaling up of a programme. In CHW programming, concentrating on the needs of the community and tailoring activities to fit these needs can greatly influence the effectiveness of the programme and its sustainability. Programmes that are highly adapted to local communities usually target a defined area and may be limited in their coverage. Expanding effective intervention packages to cover greater populations may shift the focus from the community to health systems and ministry of health hierarchies, and programmes operating on a broad scale are often criticized for their failure to meet communities' needs or fit within local contexts.

Box 5. Cost of programmes using community health workers

There are few analyses of the cost-effectiveness of community health worker programmes, particularly those that treat sick children, probably due to lack of information and difficulties in measuring outcomes (18). There is, however, some evidence that the cost of providing disease management services through CHWs is less expensive than clinic-based services. For example, in Bangladesh, the treatment of tuberculosis by BRAC community health workers was 50 per cent less expensive than clinic-based government programmes – with approximately the same cure rates (240). Another study, conducted in Brazil, in which CHWs treated pneumonia and diarrhoea in children, found that the cost was US\$12.90 per capita and US\$8.12 per child per month in 1998 (241).

7. FINDINGS AND RECOMMENDATIONS

The following section reports the many findings emerging from this extensive review of management of sick children in the community. The findings and recommendations are listed in three sections: management of sick children at the community level, including referral of sick children to health facilities; operational considerations of community health worker programmes; and support, sustainability and scale of programmes. Some of the findings presented are summaries of themes that were encountered throughout the development of the report and do not necessarily emerge from one specific section of the report. Other findings emerge primarily from one area of the document and are reiterations of conclusions presented in those sections.

Integrated management of sick children by community health workers at the community level

Overall findings

Several sources we came across indicated that among some ministry of health officials, policy-makers and programme managers there is a perception that there is strong evidence to support the community-based management of malarial disease, while the evidence to support community case management of pneumonia is weak. However, most research findings support community case management of pneumonia, while the evidence for malaria is somewhat equivocal. This may contribute to the lower priority given to pneumonia in many current programmes. While a meeting in Stockholm and other previous forums

have presented evidence for the effectiveness of pneumonia treatment in the community, we did not encounter high awareness of this evidence or of the recommendations that emerged from the meeting. WHO and UNICEF recently issued a joint statement on the management of pneumonia by CHWs (see *Annex A, page 40*), which highlights the evidence for community-based treatment of pneumonia.

Very few programmes were encountered in this review in which community health workers treat children with pneumonia in the community. In programmes where CHWs manage other childhood illnesses in the community and pneumonia significantly contributes to childhood morbidity and mortality, pneumonia is usually not included within the CHW's responsibilities. Some existing programmes that formerly treated children with pneumonia in the community no longer do so, indicating that the total population covered by these approaches may very well have decreased over the past decade.

Pneumonia is a significant cause of childhood mortality, even in malaria-endemic areas. Despite a significant clinical overlap, pneumonia and malaria are rarely managed together in the community in the programmes we reviewed

Many programmes promote 'home treatment' and 'community-based treatment' of malaria in Africa. There is no standardization of these terms; both are usually ill-defined and the differences are blurred in much of the documentation. The evidence base for the benefits of one programmatic approach over another is weak.

Initiatives to improve management of sick children outside of health facilities occur in a broader context in which health programmes are being asked to provide treatment on a large scale for AIDS, tuberculosis, sexually transmitted infections, trachoma, helminths and other conditions. Some programme managers have indicated that their organizations are struggling to respond to several initiatives that involve identifying cases, providing treatment and managing drug stocks. Thus, prioritizing limited resources for curative care and medication is difficult, and this broader context affects the willingness and capacity of organizations to also promote treatment in the community of pneumonia, malaria and diarrhoea.

In the majority of programmes we encountered, there is a recognition of the need for community and home management of diarrhoeal disease. However, in many of the CHW programmes that provide treatment in the community, diarrhoeal

disease appears to be of secondary concern. Specifically, many programmes include education, promotion, or provision of oral rehydration salts or oral rehydration therapy, but most do not include the identification of dehydration danger signs and the referral of children who require additional care at health facilities.

Recommendations

1. Disseminate existing evidence. There is a need for much greater dissemination of existing research findings on treatment of pneumonia, malaria and diarrhoea in an understandable form. This has already started with the recent issue of two WHO/UNICEF joint statements, on management of pneumonia in community settings, and on clinical treatment of acute diarrhoea (91, 113). The review conducted in advance of the Stockholm meeting (49) and the recommendations that emerged from the meeting should also be disseminated to a wider audience. A concerted effort needs to be made to include evidence about the community management of pneumonia and diarrhoea in discussions and presentations at all international malaria research and programming workshops and conferences. The importance of the clinical overlap between pneumonia and malaria should also be emphasized in forums such as tropical medicine or public health meetings and Multilateral Initiative on Malaria conferences.

2. Increase support for community programming of pneumonia management. The support for improved case management of pneumonia needs to be strengthened at all levels (referral facility, first-level facility and community) within the context of on-going health initiatives or programmes. Steps should be taken to increase financial support of community health worker programmes targeting pneumonia through new or existing funding mechanisms.

3. Integrate pneumonia and malaria case management in the community. In places where both malaria and pneumonia are major causes of childhood morbidity and mortality, they should be managed together by CHWs in the community. Because there is community-based treatment of malaria in most areas where malaria is present, the community case management of pneumonia can be incorporated into these programmes. One option is to adopt and adapt simplified community IMCI guidelines that have been developed by a number of programmes (Pan American Health Organization, WHO Regional Office for South-East Asia, CARE Kenya and Catholic Relief Services).

4. Promote integration of pneumonia and malaria case management at all levels. The importance of the integrated case management strategy should be advocated at all levels. Promotion of this strategy should occur within all the concerned divisions of international bodies such as WHO and UNICEF, in national ministries of health and malaria control, within public health research and training institutions, within local and international non-governmental organizations, and among CHWs and their supervisors. Checklist 1 in Annex C, *page 60*, presents venues where advocacy for the integration of malaria and pneumonia management could be carried out.

5. Clarify intervention models. The definitions of 'home treatment' and 'community-based treatment' need to be clarified in programme and research documents. Because there is a range of options for treatment that involves both home and community components, it is important to define the differences between these two strategies. One option to assist in defining community-based and home-based treatment would be to adapt the seven intervention models developed in this document to describe programmes' treatment of malaria outside of health facilities. These models are realistic because they are based on existing programmes and pilot projects, and they thoroughly characterize the roles of the community health worker and family in the management of sick children. Therefore, these models may be well suited to describe any treatment taking place in the home or the community.

6. Integrate diarrhoea management within all existing programmes. Community health worker programmes that do not promote the use of oral rehydration salts or oral rehydration therapy to manage non-severe diarrhoeal disease need to integrate these strategies. All programmes should also make efforts to incorporate a simplified classification of diarrhoeal disease, in order to refer children with diarrhoea who require additional care to health facilities.

Technical aspects

Existing treatment guidelines for management of pneumonia and for concurrent management of pneumonia and malaria were developed in the early 1990s. If a programme manager were to decide that CHWs should be trained to manage and treat children with malaria, pneumonia or both in the community, it is not clear what antimalarial-antibiotic combination should be used, given current patterns of resistance to antimalarials and antibiotics and the introduction of combination chemotherapy for malaria in some countries. There is also increased concern about using sulphadoxine-pyrimethamine (SP) as a

first-line antimalarial along with cotrimoxazole as the first-line antibiotic. Many countries have adopted cotrimoxazole as prophylaxis for opportunistic infections in HIV-infected infants. However, there is concern about the toxicity of SP and cotrimoxazole given together.

There are no guidelines that indicate which antimicrobial regimens (of those that have replaced or will replace standard first-line drugs as a result of resistance) should not be used outside of health facilities because of expense or difficulty in administration.

With the introduction of artemisinin combination therapy as the first-line malaria drug in many African countries, there is growing concern over where in the health system these new drugs should be available. The high cost of these drugs, the current limited supply of artemisinin-based drugs, levels of compliance and development of drug resistance have been cited as possible difficulties.

The identification and management of severe disease has been identified as a difficulty in many programmes. CHWs frequently fail to recognize signs of severe disease, such as chest indrawing, and referral of severely ill children is often inadequate.

Within the majority of CHW programmes reviewed in this document, sick children who require care outside the CHW's responsibilities (for example, severely ill children or children who need antibiotics) are referred to health facilities. However, the procedures for community-to-facility referral are usually informal and may not be operationally well developed.

Strategies such as the use of referral slips and increased counselling are relatively simple steps that have shown promise in increasing community-to-facility referral and compliance with referral. 'Facilitated referral' is an innovative strategy that incorporates these steps and is being used by a few CHW programmes to increase compliance with community-to-facility referral and to increase the impact of referral on health outcomes.

Recommendations

7. Clarify recommendations on antimicrobial management of pneumonia and malaria.

Guidelines for the antimicrobial choice in treatment of malaria and pneumonia need to be developed and adopted. New guidelines must take into consideration drug resistance patterns, national policies regarding first-line and second-line treatment of malaria, and the availability of newer antimalarial drugs. Guidelines should also take into account emerging co-morbidities, such as HIV/AIDS, possible

drug interactions and current recommendations for prophylaxis for opportunistic infections.

8. Clarify recommendations on antimicrobial use in the community. Multilateral organizations need to clarify their recommendations for management of pneumonia and malaria by CHWs outside of health facilities, including situations where it is and is not advisable to use recommended drugs and drug combinations. In areas of high drug resistance where recommended treatment regimens may be more complex or more expensive, it must be decided if community-based treatment is a feasible option (67).

9. Introduce artemisinin-based combination therapy. As combination therapy is introduced through any of the intervention models, close monitoring and documentation of financial access to treatment, patterns of care-seeking, treatment compliance and drug resistance are needed. Where use of these therapies is restricted to health facilities, interventions in the community should include some form of facilitated referral (Intervention Model 2).

10. Develop and incorporate technically sound referral mechanisms. In programmes where referral is used as a management strategy, approaches to increase referral and compliance with referral should be developed, tested and incorporated into programme operations. Programmes might consider implementing aspects of a facilitated referral strategy for evacuation of sick children from the community to health facilities. Such aspects include referral slips, transport schemes, financial assistance and counselling to encourage and facilitate referral compliance.

11. Examine different referral mechanisms and their impact on compliance with referral and health outcomes. The different approaches used in community-to-facility referral need to be formally evaluated with respect to caregivers' compliance with referral. The role of referral in possibly reducing childhood morbidity and mortality also needs to be explored.

Documentation and evidence

While there is strong evidence of the effectiveness of community case management for pneumonia in Asia, there have been very few studies of this intervention in Africa or Latin America.

Community-to-facility referral as a strategy to improve the management of sick children has not been formally examined. There is insufficient evidence for a beneficial impact of referral on health outcomes in children, and some evidence that children with pneumonia who are referred do worse than children who are

treated immediately. Specific approaches to increase caregivers' compliance with community-to-facility referral have also received limited evaluation.

Descriptions of how referral mechanisms function and the expected outcomes of including a referral component are usually not included in most programme documentation. The outcomes of referral are infrequently included in the monitoring or evaluation components of programmes.

The quality of CHW programme documentation is highly variable. Many programme reports and documents fail to provide sufficient detail in their characterization of programme activities. Some programmes lack adequate monitoring and evaluation of the quality of services provided and health impacts of CHW programme activities related to the management of sick children. In some programmes we encountered, strong documentation and evaluation played a large role in expanding the programme and securing support from partners, such as the ministry of health.

Recommendations

12. Seek further evidence or undertake further evaluation regarding community case management of pneumonia in Africa. The community case management of pneumonia requires further evaluation in African and Latin American setting, which may have different health systems and disease epidemiology from those previously examined. Operational research and evaluation need to be developed and conducted to provide stronger evidence for programme strategies in these regions. It is recommended that evaluations of effectiveness occur within the context of existing CHW programmes, instead of under the heavily supervised, more ideal conditions of a research trial.

13. Seek further evidence or undertake further evaluation regarding malaria treatment strategies. Different approaches to community management of malaria, which involve community health workers and families in different roles, need further examination. Evidence for using one approach over another or assigning responsibilities to CHWs and families differently in certain situations and areas with differing patterns of malaria transmission could provide useful guidelines to programme managers.

14. Improve documentation and evaluation of referral practices. Programmes should characterize referral policies in a comprehensive manner. Checklist 2 in Annex C, page 60, provides a guide to components that might be included in referral systems and that should be described in detail in

programme documents. The expected outcomes of community-to-facility referral need to be explicitly stated in programme documentation. Both the process and impact of referral activities need to be evaluated. The measurement of referral activities should also be conducted for individual CHWs to ensure uniform quality of service.

15. Improve overall documentation. The thorough description and documentation of community health worker programme activities is highly recommended. This documentation could: ensure that programme activities are functioning according to plan; assist in the adoption of strategies by other programmes; support scaling-up activities; and allow for greater comparisons across programmes. Checklist 3 in Annex C, *page 61*, provides a guide for CHW programme characterization.

16. Improve overall evaluation. The monitoring and evaluation of management of sick children by CHWs, especially the quality of services and impact on children's health, should be strengthened. The results of evaluations that demonstrate project success can be used to influence commitment of potential partners, such as ministries of health, and to leverage additional project funding.

Operational considerations

It was commonly noted that the expectations of the community health worker differ markedly among health officials, members of the community and the CHWs themselves. The inconsistent demands on CHWs and the different perceptions of the CHW programme, especially concerning financial aspects such as cost-recovery schemes and remuneration, often lead to misunderstanding and frustration.

In some settings, such as Nepal and Thailand, traditional healers have worked in collaboration with CHWs or been recruited as CHWs, to the benefit of both CHW programmes and the traditional practitioners themselves.

Associations and teams of CHWs, sometimes along with other health agents, have been used effectively to provide support and supervision in a variety of settings.

Even though most CHW programmes are initiated to extend basic health services to greater segments of the population, the use of CHW services remains suboptimal in many areas. Commonly cited reasons for underuse include lack of knowledge of CHW services, preference for self-treatment, financial constraints, unreliable drug supplies and logistical constraints (such as time or transport).

The retention of qualified workers or volunteers is one of the most significant operational challenges in almost any CHW programme. Many factors can have an impact on CHW retention, including: the types of operational strategies employed, such as CHW recruitment and supervision strategies; the perceived value of CHW activities to the CHWs themselves, their families and the communities they serve; and monetary and non-monetary incentives. The second factor is most often mentioned by CHWs serving for long periods of time, and a good relationship between the community and CHWs is an essential element in CHW retention.

Financing of drugs by donors or governments can increase programme coverage, thereby reaching more children, regardless of ability to pay. However, the continuation of programmes is uncertain when outside funding ends. The use of cost-recovery mechanisms can help ensure programme sustainability, although the ability to reach all segments of society equitably may be compromised. Extra operational inputs such as training, supervision, support and financial management, distinct from those related to quality of disease management, are necessary to maintain drug revolving funds associated with cost-recovery mechanisms.

Research or programme evaluations specifically examining the distribution of antibiotics by CHWs have found it to be generally appropriate; appropriate distribution of antimalarials by CHWs has been less examined. Administration of antimicrobials in the home is often less than adequate. The use of visual aids (in counselling activities or as reminders to caregivers) and the use of pre-packaged regimens are strategies that have proved effective in increasing rates of correct administration of antimalarials in the home.

Community involvement influences the effectiveness of all programme operations. Community health workers are more likely to continue providing good-quality services if they have the community's support. Communities are more likely to use CHW services when they have played a role in making those services available. Lack of community participation can lead to misunderstandings about the programme and its activities.

Operational aspects such as training, incentives/retention, recruitment and ideal CHW characteristics, quality of care provided, financing schemes such as the Bamako Initiative, and community participation are commonly described in the literature. Much less information is available about integration of community health workers into health systems,

CHWs and data collection in health information systems, support of CHW programmes through supervision and supply chains, programme cost-effectiveness, programme sustainability, and strategies for scaling up regional programmes and broadening the scope of existing programmes.

Operational approaches are often described in programme documents and formal literature. However, there are very few evaluations that test or compare operational strategies. Where new operational strategies have been introduced and described, their impact on relevant programmatic outcomes is rarely evaluated or measured.

Recommendations

17. Define the roles and responsibilities of community health workers. The roles of CHWs must be well defined and focused from the outset of the project. It is necessary for all programme stakeholders, including CHWs, the communities, ministry of health officials and funding agencies, to be involved in defining the responsibilities and expected roles of CHWs. It is also necessary that all involved parties, especially the communities served by CHWs, agree upon and understand what cost-recovery mechanisms will be used and what financial and in-kind incentives should be provided to CHWs.

18. Improve the selection of community health workers. Programme managers must carefully weigh a number of competing factors in the recruitment and selection of CHWs. Selected CHWs should have the capacity for high performance, be acceptable to the community and have a high probability of continuing service. In some contexts, programmes may want to recruit or collaborate closely with persons already providing services in the community, such as traditional practitioners. The programme can gain enthusiastic volunteers who are in contact with sick individuals, while practitioners can gain community standing and a larger clientele. However, great caution must be exercised to ensure that these practitioners treat children according to programme norms and do not deviate from agreed treatment protocols.

19. Promote community health worker associations and teams. CHW programmes need to include approaches that enable CHWs to organize themselves for peer support and supervision. Such organizations and structures can improve many facets of the CHW programme, including CHW motivation, CHW support and supervision, collaboration with ministry of health officials and operational logistics.

20. Improve retention of community health workers. Because of the large number of factors that have an impact on CHW motivation and retention, programme planners should not rely on one type of incentive or operational input to achieve CHW retention. Methods of recruitment, selection, supervision and peer support must be chosen with retention in mind. The relationship between CHWs and the communities they serve must be promoted in all programme activities in order to lessen CHW attrition. Multiple incentives, including non-monetary items such as certificates, badges or job aids, should be included in plans to encourage CHWs in their work.

21. Maximize the use of community health worker services. CHW programmes must consider incorporating operational approaches to maximize the use of CHW services. Steps must be taken to raise awareness of programme services and activities. Approaches might include: community meetings or visits to leaders and other influential persons during supervisory visits; involvement of women's groups in programme activities; periodic household visits by CHWs; and publicity spots, such as local radio announcements. Community involvement in all phases of the programme, especially the selection of individual CHWs, is fundamental in ensuring use of CHW services.

22. Provide training and support for community health workers who manage cost-recovery mechanisms. Programmes need to support CHWs who manage drug revolving funds and train them in small business concepts, such as basic accounting, inventory control, record keeping and pricing. Village health committees, which often oversee and manage the revolving funds, must also be provided with training and continued support. In programmes where incentives are linked to drug sales, rational drug use must be strongly supported and monitored.

23. Ensure consistency in drug cost. Once a drug supply and fee structure is chosen, it is important for programme credibility to use a consistent system across regions and over time. If cost-recovery mechanisms are not implemented in the entire health system but only in primary health care, such as community clinics and CHW services, this may encourage underuse of these services. Sick individuals may bypass this level of health care, seeking free care at higher levels. Changes in drug cost structures, for example from donor-provided drugs to cost-recovery mechanisms, can cause community resentment and should be avoided.

24. Ensure appropriate drug use. Programmes need to train, support and monitor CHWs in the appropriate distribution of antimicrobials. In order to facilitate and improve administration of antimicrobials in the home, the use of visual aids and pre-packaged drug regimens should be implemented.

25. Improve evaluation of operational aspects. Operational approaches need to be evaluated using rigorous study and evaluation designs, rather than relying solely on description and anecdotal evidence. New operational strategies should be tested using comparison groups and relevant operational outcomes. For example, two different packages of CHW incentives could be implemented in two distinct areas; retention rates could then be compared to evaluate the relative impact of the two incentive packages. Where comparison groups are not feasible, before-and-after evaluation designs should be employed.

Support, sustainability and scaling up of successful implementation models

The integration of community health workers into the ministry of health hierarchy is common to those programmes that cover large percentages of the target population, such as CHW programmes in Brazil, Honduras, Nepal and Pakistan. Strong links between CHWs and health facilities appear to strengthen both the work of the CHW and the functioning of the health facility.

Programmes operating on a large scale and for longer periods of time are commonly the ones in which CHWs have well-defined, focused responsibilities (for example, volunteer collaborators for malaria in Latin America and Thailand). Very focused responsibilities, or even concentration on a single disease, simplify operations such as training, supply chains and information systems. It is not always clear that an integrated approach is preferable where the objective is to implement a programme on a very large scale.

In Africa, efforts are being made in several countries to scale up management of malaria by community health workers. To date, relatively little effort has been invested in scaling up management of diarrhoea and pneumonia by CHWs.

In Asia, management of pneumonia has been scaled up in Nepal, and the management of diarrhoea has been achieved on a wide scale in Bangladesh. The Lady Health Worker Programme in Pakistan is one of the few programmes to provide treatment for malaria, pneumonia and diarrhoea on a broad scale. The pneumonia programme in Nepal comes under the ministry of health, with support from four

non-governmental organizations, while the Lady Health Worker Programme is an integrated part of the ministry of health hierarchy.

In Latin America, there are various programmes supported by the ministry of health that are functioning on a wide scale. In Brazil, CHWs within the community health agents programme (Programa Agente Comunitário de Saúde), provide education and promote health to a large proportion of the population. Volunteer collaborators have been working throughout the Latin American region to treat malaria in the community. In El Salvador and Honduras, CHWs' activities are centred on child growth monitoring and are an integral part of national programmes. The community management of pneumonia has recently been introduced into the Honduras programme.

Most support and funding available for community management is for children sick with malaria, most notably through the Global Fund for AIDS, Tuberculosis and Malaria.

Scaling up of pneumonia management is more difficult, or at least is perceived to be more difficult, than presumptive treatment of febrile children with antimalarials because more clinical signs need to be evaluated, often using equipment such as timers.

Recommendations

26. Promote community participation and mobilization. Because community involvement affects so many facets of programming, community mobilization needs to be a fundamental component of all stages of CHW programmes. Programme structures should be flexible enough to allow different approaches to community participation and mobilization to be adopted, depending on the specific community. Since community mobilization may be conducted in very different ways, programmes that include a strong community role may be more difficult to scale up.

27. Integrate community health workers into ministry of health hierarchies. Focusing on management issues and formally integrating CHWs into the ministry of health (or other programme) hierarchies needs to be considered when scaling up smaller programmes. Even though the idea of a community-based health worker evokes a grass-roots perspective, programmes benefit from well-defined supervisory and support hierarchies. Programmes should foster strong relations between CHWs and health facilities to enhance services provided in both the community and the facilities.

28. Integrate pneumonia and diarrhoea into global malaria initiatives. One approach would be to support existing initiatives to promote better management of malaria in the community and look for opportunities to integrate diarrhoea and pneumonia management into these initiatives at all levels. The management of pneumonia and diarrhoea could be included within global initiatives, institutions and funding mechanisms for malaria. The incorporation of pneumonia and diarrhoea can be justified in malaria-specific programmes because their inclusion constitutes more effective management of malaria.

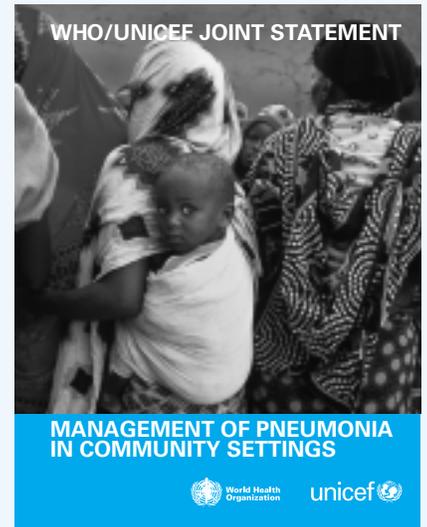
29. Support community case management of pneumonia, malaria and diarrhoea as an essential part of the global IMCI strategy. WHO and UNICEF should consider supporting the community management of pneumonia, malaria and diarrhoea as an important element in the IMCI approach. With guidance from WHO and UNICEF, the ministry of health and health districts should include the role of CHWs working in the community, within broader IMCI strategies. WHO and UNICEF should consider developing or adopting, endorsing and disseminating a set of simplified IMCI algorithms, training materials, supervisory guidelines, and monitoring and evaluation plans for use in CHW programmes managing diseases in the community.

30. Assess sustainability. Programmes need to be examined after non-governmental organization or other support ceases. It is difficult to assess the sustainability of programme impact and factors that influence sustainability while the project is ongoing. Many articles were published in the 1980s about CHWs, but there is little up-to-date documentation on how these programmes are currently functioning. Investigations into which programme components had lasting impacts and which activities were not sustainable or require more continuous inputs could help to guide current and future programmes.

Annex A: WHO/UNICEF JOINT STATEMENT ON MANAGEMENT OF PNEUMONIA IN COMMUNITY SETTINGS

This document was published by UNICEF and WHO in May 2004.

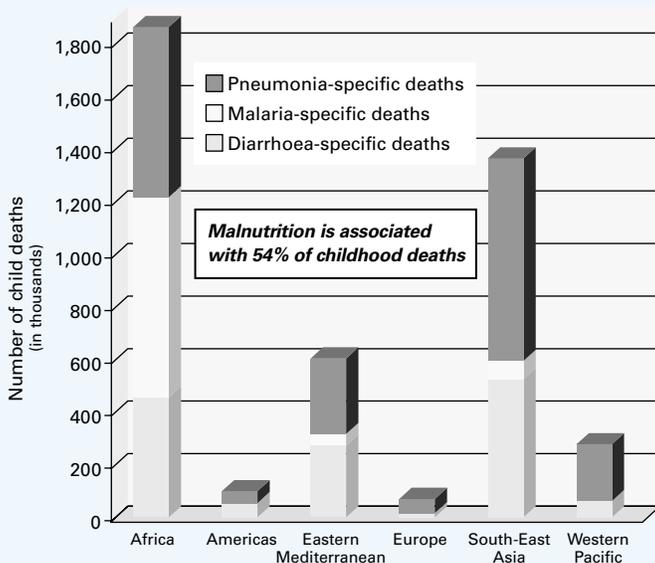
Pneumonia remains a major killer of children under five years of age. The best way to reduce pneumonia-related mortality is to provide effective treatment promptly. A meeting of experts, national and international agencies, a meta-analysis of trials, and a comprehensive review of community treatment programmes all came to the same conclusion: Pneumonia can be effectively treated in the community. UNICEF and WHO therefore recommend that community-level treatment be carried out by well-trained and supervised community health workers.



LEADING CAUSE OF DEATH AMONG UNDER-FIVES

Pneumonia accounts for nearly one fifth of childhood deaths worldwide, with approximately 2 million children under five dying each year. The majority of deaths occur in Africa and South-East Asia.

Annual child deaths from pneumonia, malaria and diarrhoea, by WHO region



Sources: For total mortality, estimates from 'Proportionate mortality among under fives by region, 2000', Ahmad, O. B., A. D. Lopez and M. Inoue, 'The Decline in Child Mortality: A reappraisal', *Bulletin of the World Health Organization*, vol. 78, no. 10, 2000. For proportionate mortality, estimates from *The World Health Report 2003*, World Health Organization, Geneva, 2003. For malnutrition, Pelletier, D.L., E.A. Frongillo, and S.P. Habicht, 'Epidemiological evidence for a potentiating effect of malnutrition on child mortality', *American Journal of Public Health*, vol. 83, no. 8, August 1993, pp. 1130-1133.

Note: The figures for proportionate mortality related to children under five are currently under review by UNICEF and WHO.

THREE STRATEGIES TO REDUCE PNEUMONIA MORTALITY

In addition to preventive interventions such as routine vaccination, exclusive breastfeeding and complementary feeding, three main treatment strategies that rely on community capacity development can reduce pneumonia mortality in developing countries.

- Improving quality of care at first-level public health facilities and ensuring they are financially, logistically and geographically accessible.** Even then, there may be barriers preventing parents from using the facilities.
- Improving quality of care in the private sector.** In many settings, especially in urban areas, children are often treated in the private sector. Although active collaboration between public and private sector is a relatively new strategy, and there is no conclusive evidence showing which approach is most effective, interventions involving private practitioners should continue to be pursued.
- Increasing access to quality care can be achieved through community-based care.** Community health workers can be trained to assess sick children for signs of pneumonia; select appropriate treatments; administer the proper dosages of antibiotics; counsel parents on how to follow the recommended treatment regimen and provide supportive home care; and follow-up sick children and refer them to a health facility in case of complications. There is strong scientific and programmatic evidence to support the effectiveness of this approach.

MANY SICK CHILDREN ARE NEVER BROUGHT TO HEALTH FACILITIES

Utilization of health facilities remains low in many parts of the world and children are treated at home, through the informal sector or by traditional healers. Studies consistently confirm that many sick children do not reach health facilities, and children from poorer families are even less likely to obtain care. In **Bangladesh**, for example, only 8 per cent of sick children are first taken to appropriate health facilities.¹ A study in **Bolivia** found that 62 per cent of children who subsequently died had not been taken to a formal health-care provider while ill²; a similar study in **Guinea** found that of children who died, 61 per cent had not been seen by a formal health-care provider.³ A recent study found that in **the United Republic of Tanzania**, 41 per cent of sick children are taken to appropriate health facilities, and that children of poorer families are less likely to receive antibiotics for pneumonia or antimalarials.⁴

NEED FOR PROMPT TREATMENT

Prompt and effective treatment with antibiotics often involves bringing treatment closer to where the sick children are. Preventive measures such as vaccination against measles, pertussis and *Haemophilus influenzae* type b, and improved nutrition – including breastfeeding and micronutrient supplementation – can help decrease the incidence and lessen the severity of respiratory infections. Newer vaccines against respiratory infections are not widely available in developing countries and target only a limited spectrum of causes of pneumonia. However, more effective prevention measures are currently being sought.

TREATMENT IN THE COMMUNITY SIGNIFICANTLY REDUCES MORTALITY

When children suffering from pneumonia are treated promptly and effectively with antibiotics their chances of survival increase significantly. Early intervention studies and subsequent research show that case management by community health workers has a significant impact on both overall and pneumonia-specific under-five mortality. A recent meta-analysis of community-based pneumonia case management studies estimated a 20 per cent reduction in all-cause under-one mortality, and a 24 per cent reduction in all-cause under-five mortality.⁵

Studies show that community health workers can effectively manage uncomplicated pneumonia in the community. The case management they performed included



classifying respiratory infections based on respiratory rates and lower chest indrawing, treating non-severe pneumonia with antibiotics, and referring severe pneumonia cases, where possible.

PROGRAMME COMPONENTS REQUIRED

Effective community treatment of pneumonia requires knowledge of the community, adequate training of community health workers, support, supervision and close links with functional health centres that have skilled professional staff, and adequate drug supplies. National policies are needed that support identification and treatment of pneumonia by community health workers, authorize the use of appropriate antibiotics in the community, and reinforce the link between community health workers and health facilities. Supervision structures, health information systems, referral mechanisms and drug supply chains all require strong relationships between health systems and community health workers. Programme activities must include procedures for monitoring the coverage and quality of services provided by community health workers.

USE OF ANTIBIOTICS IN THE COMMUNITY

Health specialists are often concerned about whether antibiotics can be safely given in the community, specifically:

- Can community health workers classify and differentiate among conditions requiring antibiotic treatment?
- Can they dispense antibiotics appropriately?
- Do caregivers provide children with the full course of treatment?

Community-based programmes that treat pneumonia have shown that monitoring the quality of care to ensure that antibiotics are being used appropriately is effective and feasible. In a large-scale programme in **Nepal**, quality of care is monitored through record reviews and direct observation of community-based workers' assessment and treatment of sick children. In 80 per cent of cases appropriate care was given, including the correct treatment regimen, and in less than 3 per cent of cases antibiotics were incorrectly recommended.⁶

Approaches to promoting the appropriate use of antibiotics in the community, including adherence to treatment regimens in the home, need further evaluation. In community-based malaria programmes, providing caregivers with clear, illustrated instructions describing the required drug regimens has improved compliance. Pre-packaged antibiotic treatment or blister packs, which contain the full drug regimen, may be an effective strategy to increase appropriate dispensing practices and facilitate adherence to treatment at home.

Adherence may also improve if community health workers counsel caretakers on how to administer drug regimens and on the importance of taking the full course of antibiotics. Ongoing evaluations and operational research will help identify and improve strategies that encourage the appropriate use of antibiotics and improve access to quality care.

LARGE-SCALE, SUSTAINABLE COMMUNITY-LEVEL TREATMENT

Community-level treatment of pneumonia can be widely implemented and is sustainable. Below are examples of community-based programmes that include pneumonia treatment and cover large proportions of the target population. Strong government commitment

and solid collaboration between communities and external partners have helped these programmes achieve greater scale.

- In Africa, **the Gambia** has a nationwide programme addressing pneumonia in the community. In the Siaya District of **Kenya**, a non-governmental organization-led programme includes the treatment of pneumonia and other childhood diseases by community health workers and operates effectively. In other African countries, operational research to demonstrate the feasibility and efficiency of community management of acute respiratory infections is being conducted.
- In **Honduras**, pneumonia treatment has been incorporated into the national integrated community child-care programme (Atención Integral a la Niñez en la Comunidad, AIN-C). Community volunteers provide growth monitoring, health education and treatment of pneumonia and diarrhoea in more than 1,800 communities.
- In **Nepal**, the ARI Strengthening Programme was implemented by the Ministry of Health in 1993. The programme, based in the community, uses trained female community health volunteers to detect and treat pneumonia. Supported by donors and non-governmental organizations, the programme has expanded to cover more than one third of the country's under-five population.
- The Lady Health Worker programme in **Pakistan** employs some 69,000 women who work in communities providing education and health services, including management and treatment of childhood pneumonia, to over 30 million people.

Programmes that provide treatment of pneumonia in the community can be sustainable. The programmes in Nepal and Pakistan have both been in operation for more than 10 years.

OTHER COMMON CHILDHOOD ILLNESSES

CLINICAL OVERLAP OF PNEUMONIA AND MALARIA

In areas where malaria is also a major cause of sickness and death among young children, there is a substantial overlap in the clinical presentations of malaria and pneumonia. For both diseases, fever is present in the majority of cases. A fever or a history of fever may be sufficient criteria to treat with antimalarials in malaria-endemic areas, but these treatment criteria

are not specific enough to rule out other diseases such as pneumonia. A raised respiratory rate is used to classify the severity of respiratory infections. However, malaria episodes may also be associated with a cough and a raised respiratory rate in some children. In malaria-endemic areas, a child classified as having pneumonia, based on a raised respiratory rate or chest indrawing, or both, might also have malaria.

CHILDREN MAY HAVE MORE THAN ONE ILLNESS

Episodes of pneumonia commonly occur along with diarrhoeal illnesses, and mortality in children sick with both pneumonia and diarrhoea is greater than mortality from either illness alone. In areas where malaria is common, children may have concurrent malaria and pneumonia infections that both require treatment. For example, in **Uganda**, 30 per cent of children under five years old who came to a health centre had symptoms compatible with both pneumonia and malaria, necessitating treatment for both illnesses. Of those children with a fever, which in a high-risk setting like Uganda means a diagnosis of malaria, 37 per cent also satisfied the case definition for pneumonia.⁷

WHAT COUNTRIES CAN DO

COUNTRIES CAN REDUCE PNEUMONIA-RELATED MORTALITY IN COMMUNITY SETTINGS BY:

1. Adopting and promoting policies that

- Support the role of community health workers to identify and treat pneumonia with antibiotics under appropriate monitoring and supervision, promoting close linkages with health facilities
- Authorize the use of antibiotics by trained community health workers
- Strengthen regulatory and quality controls for the distribution and appropriate use of antibiotics
- Encourage families to seek care from trained community health workers for management of children with pneumonia.



2. Providing the resources needed for community health programmes for

- Training of existing or new community health workers in pneumonia case management, counselling and referral
- Adequately supervising community health workers' pneumonia case-management activities
- Strengthening drug supply systems, ensuring the consistent availability of antibiotics and monitoring their use
- Monitoring and evaluating community health worker programme activities.

3. Defining and clarifying

- The role of community health workers within the health system, including providing treatment and promoting care-seeking
- The overlap between pneumonia and malaria treatment at the community level
- Guidelines for the types and dosages of antibiotics and other medicines to be used for different age groups
- The appropriate sources for obtaining antibiotics.

4. Integrating community pneumonia treatment activities

- With other efforts and initiatives that promote child health, especially malaria and diarrhoea treatment, at the household and community levels.

5. Strengthening family and community practices related to pneumonia prevention and treatment by

- Improving care practices such as recognition of signs and symptoms, knowing when and where to seek care, compliance with treatment and recognition of danger signs
- Developing effective communication or information, education and communication strategies related to family and community practices
- In areas where IMCI activities are being conducted, integrating community capacity development for pneumonia with community IMCI programming.

6. Partnering with non-governmental and community-based organizations to

- Identify, recruit and train community health workers and monitor their performance
- Ensure the integration of pneumonia case management with other disease management and health-promotion activities in the community.

7. Developing a three- to five-year plan for pneumonia mortality reduction that includes

- Improving case management at first-level facilities
- Training, supervising and equipping community health workers with appropriate supplies
- Strengthening the links between communities, community health workers and health facilities.

If an IMCI training package for health workers is already being implemented, programme staff should:

- Review the quality of services provided
- Evaluate the coverage and identify first-level facilities not covered by the IMCI health worker training
- Integrate the IMCI training plan with the 3- to 5-year plan for pneumonia mortality reduction, avoiding duplication of effort.



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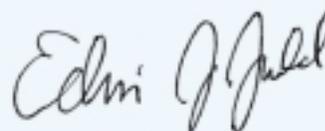
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Page 40: Women with their children wait at a UNICEF-supported clinic in Rabdure village, Somalia, ©UNICEF/HQ00-0485/Radhika Chalasani;

Page 41: A health-care worker of the Aini indigenous group takes the temperature of a child suffering from pneumonia in Yunan Province, China, ©UNICEF/HQ93-1692/Roger LeMoyné;

Page 43: This young girl in Nepal can benefit from an existing government-implemented programme that uses female community health volunteers to detect and treat pneumonia, ©UNICEF Nepal/2003/Amatya.



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Annex B: SELECTED PROGRAMMES USING COMMUNITY HEALTH WORKERS, BY INTERVENTION TYPE

This Annex provides further descriptions of community health worker programmes that serve as examples for each intervention model. Each model is briefly presented, then examples of programmes are described. The setting and programme overview are outlined, including: the name of the programme or the CHWs; the institutions initiating and supporting the programme; the roles and responsibilities of the CHW; the types of antimicrobials used; the basis for decision to treat; and the financing of the drug supply. This outline is followed by a description of the operational aspects and considerations, which include selection of CHWs, training, types of job aids used, supervision, incentives, data collection activities and system of referral. Innovative operational approaches are also highlighted. If available, programmatic outcomes, such as CHW performance, coverage or measures of sustainability, are presented, as well as measures of health impact. In some cases, where information was partly unavailable, not all factors are presented. For Intervention Models 3 to 7 (pages 49–59), tables are presented that highlight and compare the operational aspects of programmes using that model.

INTERVENTION MODEL 1 – OVERVIEW

Many CHW programmes use Intervention Model 1; they are often based on a growth-monitoring or health-promotion framework and do not provide antimicrobials at the community level. More in-depth descriptions of two examples – BRAC-supported *shastho shebika* in Bangladesh and the nationally sponsored community health agents in Brazil – are presented here. Many other excellent programme examples were reviewed but are not comprehensively described here. In the ministry-of-health-supported Atención Integral a la Niñez programme in Honduras, CHW activities are based on monitoring the adequate growth of children, with referral of sick children to health facilities (60). In Indonesia, through support from World Vision and others, a cadre of village-level volunteers, called *kaders*, assist in growth-monitoring and health-promotion activities at monthly health-post meetings called *posyandus*. Sick children requiring care are referred to health facilities at this time. The *kaders* also visit children and pregnant mothers in their homes between *posyandus* (57–58, 61, 243). The services provided by *kaders* have been found to increase both coverage and equity within the Indonesian approach to health care (244).

Intervention Model 1 - BRAC nationwide *shastho shebika* programme

Programme overview

The BRAC programme in Bangladesh provides a nationwide, NGO-organized health programme in which community health workers do not treat with antimicrobials but provide other simple treatments to the community and are involved in other health initiatives. The cadre of volunteer CHWs, known as *shastho shebika* ('health sisters'), are responsible for treating the essential 10 diseases: anaemia, cold, diarrhoea, dysentery, fever, goiter, intestinal worms, ringworm, scabies and stomatitis. They sell medications for these ailments for a nominal fee. Each CHW is responsible for approximately 300 households and visits about 15 households each day. Antimalarials and antibiotics have been used in smaller pilot programmes but are not standard medications in the main programme.

In addition to treating the 10 diseases and referring patients, the *shastho shebika* work in many different programmes (treatment of tuberculosis cases through directly observed therapy, control of diarrhoeal disease, immunization, family planning and prevention of arsenic poisoning), encourage people to seek care at BRAC and government clinics, and assist at satellite clinics that focus on antenatal care and immunization (92, 196). BRAC has also recently initiated a programme with a similar structure in Afghanistan; the female community health volunteers there have responsibilities very similar to the *shastho shebika* in Bangladesh (245). More information about BRAC's health programmes is available on the Internet at <<http://www.brac.net/health.htm>>.

Operational aspects and considerations

The *shastho shebika* are women chosen by the community and are members of the BRAC-sponsored village organizations. They receive 18 days of basic training and an additional 3 days for tuberculosis control. Each month they participate in one day of training to update their knowledge and learn new topics; during this session supervisors also address issues they have encountered and provide feedback. The *shastho shebika* are supervised by a recently introduced cadre of CHWs called *shastho karmis*. In addition to overseeing the work of the *shastho shebika*, the *shastho karmis* provide pregnancy-related care and hold community meetings to promote

health and nutrition. The *shastho karmis* are also community-based workers, but they are required to have a 10th-grade education, are paid a small salary and are trained more extensively (38, 196). While the *shastho shebika* are volunteers, they support themselves through the sale of commodities provided by BRAC, such as oral contraceptives, birth kits, iodized salt, condoms, essential medications, sanitary napkins and vegetable seeds. The *shastho shebika* use a system of verbal referral. They are trained to recognize severe diseases, such as malaria or pneumonia, and if they see a child who requires more advanced care, they verbally refer caregivers to government health facilities called family welfare centres. In some areas, BRAC has established its own health centres called *shushastho*, and in these areas the work of the *shastho shebika* is closely integrated with the health centres (38, 92, 196).

Coverage and effectiveness

BRAC was formed in 1972 and has been supporting CHW programmes in Bangladesh since 1977 (196). BRAC programmes have achieved extensive coverage and have been associated with marked improvements in children's health. Oral rehydration therapy was first used clinically for diarrhoeal illness in Bangladesh, and BRAC was the first organization to implement a community-based programme promoting oral rehydration therapy on a wide scale.

Reductions in neonatal, post-neonatal and infant mortality were observed in study districts after the introduction of the oral therapy extension programme (19). The evolution of BRAC's work with community-based workers, promotion of oral rehydration therapy and scaling up the programme is examined in depth in a recent monograph (19).

Intervention Model 1 - Community health agents programme, Ceará State, Brazil

Programme overview

In Brazil, the ministry of health sponsors and manages the family health programme (Programa Saúde da Família), in which CHWs called *agentes comunitários de saúde* are part of a team of health workers. The programme evolved from a primary health care initiative (community health agents programme) in the north-eastern state of Ceará that started in the late 1980s. The community health agents programme (Programa Agente Comunitário de Saúde) focused on a limited number of priority concerns but sought universal coverage (156). In the mid-1990s, the programme was expanded into the family health programme, which integrates the curative and preventive aspects of primary health care using a team

of workers assigned to a specified geographic area. The team consists of one physician, one nurse, nurses aides and four to six community health workers. The CHWs are responsible for monthly home visits in which they promote healthy practices, link families to health services and provide simple treatments such as oral rehydration salts or analgesics. Curative care is carried out by the other members of the team in health facilities and in the community (20). Their activities ensure the implementation of a community component in IMCI (246). More information on this programme is available on the Internet at <http://portal.saude.gov.br/saude/visao.cfm?id_area=149>.

Operational aspects and considerations

The CHWs are selected by the programme. They must live in the programme area and have a primary-school education; 95 per cent are women. Training takes place at an eight-week residential course, with an additional four weeks of highly supervised fieldwork. Further training is provided in monthly and quarterly meetings (156). The team, including the CHWs, is based in first-level health facilities, and the CHW is supervised by a nurse who also works part-time in the facility. The CHWs are paid the national minimum wage by the ministry of health. The programme uses a team approach for referrals of sick children.

A unique operational aspect of both the Programa Agente Comunitário de Saúde and Programa Saúde da Família is the way they have been introduced into new municipalities. In the Programa Agente Comunitário de Saúde the state government would pay the CHWs' salaries only if the municipal government agreed to provide a salary for a nurse supervisor (156). Similarly, in the Programa Saúde da Família a municipality must apply to the federal government and agree to partial financial responsibility for the programme (20). This scheme ensures local commitment before the government initiates the programme in that area. The programme generally employs 30 to 150 local residents per municipality who are paid out of central state funds, making the programme attractive to local leaders (156).

Coverage and effectiveness

This programme has increased coverage rapidly; when the community health agents programme was officially initiated in 1989, there were approximately 35 participating municipalities with 1,500 *agente comunitário de saúde*. In 1998, there were more than 150 participating municipalities with more than 8,000 CHWs employed (156). The initiative was

expanded in 1994 to the family health programme, a team approach to primary health, and adopted at a national level. In 2001, there were 13,000 family health programme teams covering 3,000 municipalities, with an estimated coverage of more than 25 million people (20). Programme activities – including expanded vaccination coverage, promotion of breast-feeding, increased use of oral rehydration salts, management of pneumonia and growth monitoring – have been associated with declines in the infant mortality rate (247).

INTERVENTION MODEL 2 – OVERVIEW

In Intervention Model 2, antimicrobials are not provided in the community; rather, the model is based on a system of facilitated referral. This model is relatively rare. A community health worker programme operating in Peru that uses this model is highlighted here in depth, with special emphasis on its referral system strategies. A programme in the Intibuca region of Honduras, supported by Catholic Relief Services, uses a strategy similar to that of the CARE Peru programme in managing sick children. The CHWs (*monitoras*) work within a growth-monitoring framework used in other areas in Honduras (248) but also facilitate referral and emergency evacuation for obstetric emergencies and sick children (148, 249). This programme is not comprehensively reviewed here; however, elements of its referral system are underscored in Table 4.

Intervention Model 2 – CARE Peru Enlace and Redes programmes

Programme overview

In northern Peru, *agentes comunitarios de salud* perform a variety of activities related to sick child management that complement the existing facility-based services. CARE Peru, in close collaboration with both the ministry of health and community health promoter associations and committees (APROMSA and COPROMSA), has supported these activities through the child survival projects Enlace (1996–2000) and Redes (2000–2004). Within this programme, the CHWs do not provide antimicrobial treatments, but they are responsible for case management of diarrhoea and acute respiratory infection and refer cases needing care at higher facilities. They employ a comprehensive system of referral that is described below under operational inputs. The CHWs are also responsible for mapping out the population, identifying and tracking high-risk households (e.g., with young children and pregnant women), visiting households monthly, and various health education activities. The information collected

by the CHWs is used to better target health activities to households' and individuals' needs and to plan community health activities in response to the health needs of the population (21, 71, 165).

Operational aspects and considerations

The *agentes comunitarios de salud*, both men and women, are selected by the communities in which they serve. Many of those selected have served previously as community-based agents in other projects. They are taught by ministry of health personnel who are trained as instructors, with emphasis on adult education methodologies. Each health centre under the ministry of health is responsible for training its corresponding community health workers. In order to promote prevention and appropriate care for diarrhoeal illness and early identification and treatment of acute respiratory infection, the CHWs use flip charts during community meetings and home visits. The various recording forms that are associated with the health information system also serve as job aids to the CHWs. Supervision and support are provided by facility-based ministry of health personnel, as well as promoter associations. The board members (leaders) of these associations provide supervision and support to CHWs in the field (155). They also meet on a regular basis to share information and experience between associations in order to strengthen the effectiveness of the CHWs. The use of this type of supervision has been associated with promoters' motivation and a high level of volunteer retention (88 per cent over four years) (155). The primary motivations for the CHWs to participate include their training and their association in the promoters and community groups.

One of the most distinctive features of this programme is its referral system. Through both active and passive detection, CHWs locate and refer children with symptoms of severe diarrhoea or pneumonia to the nearest health facility. If a sick child is identified as needing treatment at a higher-level facility, various referral activities are set in motion. This system of facilitated referral is further described in Section 4 under Intervention Model 2 (page 7), and in Table 4 (page 48). If the child is not severely ill, the caregiver will be given a referral card and instructed to go to the hospital, and the child will be given priority admission for care at the facility. For cases of both uncomplicated and severe illness, the referral process involves three illustrated cards: a promoter's (CHW) card, a health facility card and a counter-referral card. The promoter's card and health facility card are identical and are filled out in duplicate when the child is referred. The health facility card is given to the caregiver to take

to the facility, while the other card is completed and retained for the promoter's records and later analysis. The health facility also retains the card for its files and later analysis and use.

The follow-up of all cases treated in the health facility is accomplished using a counter-referral card, which is filled out by facility personnel and sent with the patient back to the community. It contains information about the diagnosis, treatment and recommendations for follow-up, all of which assist the community health worker in monitoring treated cases in the community. The CHW keeps a duplicate referral card for his or her records. Cases treated in the health facility are then counter-referred (using a third referral card) by the facility to the CHW working in the community in order to assist the mother in supportive care of the child, as well as to ensure compliance with treatment regimens. The information recorded on all three referral cards is discussed in monthly meetings between a health facility worker and the CHWs in their sectors. The records are used for supervisory purposes and analysed for programme decision-making (164, 250–251). In remote areas of the region, CHWs are authorized by the ministry of health and trained extensively to give the first dose of cotrimoxazole before referring children with pneumonia (21, 164).

The CHW is also responsible for planning for possible emergency evacuations of severely ill children from the community to the facility. He or she encourages families to save funds for health emergencies and is responsible for organizing members of the community into a group called the 'evacuation brigade'. This group is then responsible for the evacuation of the sick child, using a community stretcher if necessary, and informing the health facility of the evacuation so that facility personnel may prepare for the emergency case. Radios are used to communicate from the community to the facility, as well as coordinate activities and share supplies between facilities. The system of referral cards and follow-up for severely ill children is the same as described above (164).

A community-based health surveillance system, *Sistema de Vigilancia Comunal de Salud*, has been implemented in this programme to improve the quality of health services provided by the community health workers and by ministry of health facilities. This system also allows supervisors and promoter associations to better monitor the work of the CHWs. In collaboration with the referral system, vital information about women and children is collected systematically in the community and shared with the community, promoter associations and the ministry of health facilities (21, 71, 252). This approach is currently being expanded to other areas of Peru, with the support of the ministry of health (165). The surveillance approach has been well documented (21, 71, 165, 251), and videos and manuals are available in English and Spanish for guidance on implementation (250, 253).

Coverage and effectiveness

During the Enlace programme, more than 70 per cent of individuals in need of facility-based care were referred from communities with referral slips, and approximately 50 per cent of these referred cases were counter-referred to the CHW for follow-up (165). The proportion of children in the community with suspected pneumonia seen at a health facility increased from 37 per cent at baseline (1996) to 71 per cent at the end of the Enlace project (2000). Over the five years of this project, the follow-up visits (counter-referrals) of CHWs increased from 40 per cent of sick children monitored at baseline to 81 per cent monitored during the final evaluation (21, 71). The overall number of childhood deaths from pneumonia in these communities decreased (39 baseline, 23 final). However, the total population at risk – children under five years of age – is unknown. The number of children classified with pneumonia at the health facilities also decreased (733 baseline, 407 final) and the pneumonia case fatality rate for children in the health facility remained similar (5.3 per cent at baseline, 5.7 per cent at final) (71). Thus, it is unclear if the drop in deaths reflects an

Table 4. Intervention Model 2: Description of facilitated referral in Peru and Honduras

	Enlace/CARE, Peru	Catholic Relief Services/Honduras
Facilitation of referral	<ul style="list-style-type: none"> ■ Formation of evacuation brigade ■ Use of radio contact with facilities so emergency cases receive immediate attention 	<ul style="list-style-type: none"> ■ Counselling for referral ■ Promotion of emergency transport committees (for obstetric emergencies; also used for sick children)
Initial treatment prior to referral	<ul style="list-style-type: none"> ■ Provision of first dose of cotrimoxazole in remote areas 	<ul style="list-style-type: none"> ■ Provision of first dose of cotrimoxazole
Monitoring of referral	<ul style="list-style-type: none"> ■ Use of 3 referral slips <ul style="list-style-type: none"> * Promoter * Health facility * Counter-referral ■ Use of data for supervision ■ Use of data for programming 	<ul style="list-style-type: none"> ■ Use of referral slip ■ Implementation of counter-referral activities

accompanying drop in pneumonia cases or if there is an increased specificity in pneumonia case detection in the facilities.

INTERVENTION MODEL 3 – OVERVIEW

Intervention Model 3, which is characterized by the presumptive treatment of fever with antimalarials, is commonly encountered in sub-Saharan Africa. A recent WHO publication, *Scaling up Home-Based Management of Malaria: From research to implementation* (254), provides programmatic examples, recommendations for the use of strategies linked to Intervention Models 3 and 4, and modules to assist in the implementation of such a programme; it is available on the Internet at <http://www.who.int/tdr/publications/publications/pdf/home_2004.pdf>.

While community health worker programmes operating in Mali and Uganda are highlighted here, many other previous and existing CHW programmes that we reviewed also used such a model. For example, in a well-documented, community-initiated programme in Saradidi, Kenya, two CHWs in each village were selected to provide health education and information, as well as administer chloroquine treatment (28–29, 76, 126, 255–259). In a programme initiated in Tigray, Ethiopia, by the Tigray Branch of the National Malaria Control Programme, the Tigray Health Bureau and the Tigray Regional Government in collaboration with WHO, CHWs presumptively treated uncomplicated malaria with age-specific doses of antimalarials, as well as referring children with severe cases of malaria and those individuals who did not improve after treatment to district health clinics. Distribution of chemoprophylaxis to pregnant women, health education, coordination of vector control activities during the rainy season and submission of weekly reports for a community-based surveillance system were among the CHWs' other activities (26, 186). Table 5 presents the relevant operational components of these programmes, along with information on programmes in Mali and Uganda, which are discussed below.

Because of rapidly changing malaria drug policies, the antimalarials used by CHWs in programmes that are presented here – for Intervention Models 3, 4, 5 and 7 – may change. Where possible, we indicate where policy changes have affected or may affect the anti-malarial drugs used by CHWs.

Intervention Model 3 - Village drug kits, Bougouni, Mali

Programme overview

During the late 1990s, a period of decentralization, Save the Children USA, in collaboration with the Malian Ministry of Health, implemented a system of

village drug kits in southern Mali. A *gérant de caisse pharmaceutique*, or village drug-kit manager, manages a kit containing eye ointment, paracetamol, oral rehydration salts, alcohol, bandages, chloroquine tablets and chloroquine syrup. Antimalarial treatment is given presumptively. In limited areas, zinc treatment for diarrhoea is also distributed (260) and sulfadoxine-pyrimethamine (Fansidar®) is provided as intermittent presumptive treatment for pregnant women. The drug supply in Mali is based on cost-recovery principles. Mali has recently decided to change its recommended first-line malaria drug to an artemisinin combination therapy; it is still unclear how malaria treatment at the community level will be affected by this policy change.

Operational aspects and considerations

Village drug-kit managers are selected by the villages they serve, generally by a committee of village leaders. Because of low levels of literacy in the population, these community health workers first receive a 35-day literacy class in Bambara, the local language. They are then trained for one week in treatment of malaria (and other minor illnesses), counselling of caregivers, management of the drug kit, basic accounting and record-keeping. The CHWs are provided with visual aids to help them explain to caregivers how to administer chloroquine to children in various age groups, and describing the symptoms, such as convulsions and difficulty breathing that require immediate referral to a health facility. Save the Children personnel and facility-based workers are jointly responsible for support and supervision; they perform supervisory field visits and direct monthly meetings of village drug-kit managers at health facilities. Village committees are also charged with the day-to-day supervision of the village drug kits. The CHWs and village oversight committees split the minimal revenues from the drug revolving fund as a reward for their work. In some areas, rural radio announcements have recognized outstanding CHWs. Village drug-kit managers use notebooks to collect information about the cases they treat; this information is used for supervisory, monitoring and evaluation purposes. The referral system in Mali includes a referral book in which drug-kit managers record the child's name, the date and the reason for the referral. Parents bring the referral book to the health centre and back to the CHW for follow-up (261).

Coverage and effectiveness

An evaluation of this CHW initiative found that the drug kits were successful in increasing the availability of chloroquine at the village level (127). The evaluation also found that incomplete courses of treatment were often sold, minimal counselling was

provided by the managers of these village drug kits to people coming for treatment of febrile illnesses, and there was concern that children with lower respiratory tract infection, severe malaria or other conditions that could not be managed at the village level were not being referred to health facilities. To address the observed deficiencies in the village drug-kit strategy, an intervention was developed that included visual aids, a referral system and additional training for the drug-kit managers. This intervention was associated with significant increases in knowledge of danger signs requiring referral, reported quality of counselling by the manager of the drug kit and correct administration of chloroquine in the home. In household interviews, parents reported that 42 per cent of children in the intervention group were referred to the community health centre by the drug-kit manager, versus 11 per cent in the comparison group (odds ratio=7.12, 95 per cent confidence interval=2.62–19.38) (27). This intervention is now implemented in all the village drug-kit programmes established by Save the Children in collaboration with the local health services.

Intervention Model 3 – Homapak Programme, Uganda

Programme overview

In collaboration with WHO and UNICEF, the Ugandan Ministry of Health has developed and implemented a programme to encourage the prompt treatment of malaria in children, called the Home-Based Management of Fever/Malaria programme. In this programme, community drug distributors are responsible for dispensing an age-specific, pre-packaged combination of chloroquine and sulfadoxine-pyrimethamine (Fansidar®). These packages are called 'Homapaks' and are targeted to children under five years of age who are treated presumptively for fever. The drugs are provided free of charge. The drug distributors also counsel caregivers on the importance of completion of treatment, compliance with referral and danger signs that require immediate care (22). In 2004, Uganda selected artemether-lumefantrine as its new first-line drug. Due to concerns about the distribution of this drug at the community level, it is currently unclear if, and under

Table 5. Intervention Models 3 and 4: Comparison of community health worker management of presumed malaria

	Uganda (Homapak)	Tigray, Ethiopia	Bougouni, Mali	Saradidi, Kenya	Burkina Faso	Ethiopia (Kidane and Morrow study)
Intervention Model	3	3	3	3	4	4
Name for CHW or equivalent	Community drug distributors	CHW	Village drug-kit manager (<i>Gérant de caisse pharmaceutique</i>)	Village health helpers	CHW and core mother	Mother coordinator
Type of antimalarial drug	Pre-packed CQ and SP tablets (pending recent national policy change)	CQ tablets	CQ syrup and tablets (pending recent national policy change)	CQ tablets and syrup	Pre-packed CQ tablets (pending recent national policy change)	CQ tablets
CHW per population	2 drug distributors per village	1 CHW per 2,500 people	1 CHW and 1 back-up CHW per 500–2,000 people	1 village health helper per 100 households (maximum)	N/A	1 CHW per 10–20 households
CHW role in education and key messages	Counsel caregiver on compliance, danger signs requiring referral, appropriate home care, prevention of malaria	Community education about malaria transmission, importance of early diagnosis and treatment	Counsel caregiver, during drug sale, on appropriate dose, compliance, danger signs requiring referral	N/A	Messages on treatment and referral; other education by nurses from health centre	Teach mothers symptom recognition, CQ doses for age, sharing of drugs, adverse reaction recognition
Classification	Presumptive treatment of fever by CHW	Presumptive treatment of fever by CHW	Presumptive treatment of fever by CHW	Treatment given to all stating they have malaria	Families decide whether to treat child	Mothers classify sick children
CHW role in treatment or drug distribution	Distribute drugs to community members (free of charge)	CHWs supervise first dose given: supervise all 3 doses for patients in close proximity. Family responsible if far or very sick	Sell CQ to mothers at pre-approved price; replenish drug stock at community health centre	CHWs supervise all doses. Family doses if individual is very sick	Sell CQ to mothers at pre-approved price, replenish drug stock at health centre drug store	Drug distribution to households and drug replenishment
Other activities related to malaria	Counselling about insecticide-treated nets and intermittent presumptive treatment (IPT) for pregnant women	CQ prophylaxis for pregnant women, education about malaria, environmental vector control	Recently started to sell mosquito nets and SP for IPT of pregnant women in some areas	Record-keeping	Malaria treatment for adults	Report drug usage to supervisor

what operational conditions, the community-based distribution of malaria medications will continue (68).

Operational aspects and considerations

The drug distributors are democratically selected by community members, with the assistance of parish and village leaders. One man and one woman per village are selected, and many (about 70 per cent) are also involved in other community-based health programmes (22). These CHWs are trained for two days on drug distribution and administration, referral, malaria prevention, counselling of caregivers and recording of health information. They are given job aids, such as posters, flip charts and educational flyers, to assist in

promotion of the programme and counselling activities. The drug distributors are supervised by local leaders and health workers from the nearest facility. The leaders provide day-to-day support, while the facility-based health workers are expected to make quarterly supervisory visits. The facility-based health workers also provide feedback to drug distributors based on the collection of health registers. The drug distributors receive T-shirts, badges and stickers that help to identify them as participating in the programme and serve as incentives. Some drug distributors are given certificates and in-kind incentives by local authorities. Drug distributors verbally refer severely ill children to health facilities (22).

Table 5. (continued)

	Uganda (Homapak)	Tigray, Ethiopia	Bougouni, Mali	Saradidi, Kenya	Burkina Faso	Ethiopia (Kidane and Morrow study)
Additional therapies sold or non-malaria activities	Most drug distributors also work with other community programmes such as community component IMCI and there is some formal collaboration	N/A	Eye ointment, paracetamol, oral rehydration salts, alcohol, bandages, zinc (in pilot areas)	Environmental health and sanitation	N/A	N/A
CHW selection	Democratically elected by the community; literate	Elected by villagers; permanent residence, communication skills, community standing and literate (many previously trained)	Selected by village committee	Selected by village and village health committee	From previous CHW network; core mothers selected by community	Neighbourhood selection; literate mothers
CHW training	2 days	7-day course	35-day literacy course; 1 week on drug kit operations and malaria management and control	2 weeks + 2 days per month + one week per year sessions (3 months total)	By nurses	Mother coordinators train mothers
Job aids	Flip chart 'How to prevent and treat malaria at home', posters and stickers	Guidebook and pictorial diagram	Visual aids on dosage and danger signs	N/A	Poster in villages; simple algorithm for malaria diagnosis	Black-and-white pictorials provided to mothers about age-specific dosage
Supervision and support	Support from village leaders; health centre workers provide feedback and quarterly visits	Monthly meetings at clinic, close supervision by malaria staff in early implementation phase	Monthly supervisory visits by health centre nurse, monthly meeting at health centre	Replenish drug stocks at clinic and show record book	Nurses in health centre visit monthly	Coordinator at <i>tabia</i> (small cluster of villages) level
Incentives	T-shirts, badges, other in-kind incentives	N/A	Small percentage on drug sales, radio announcements	Small allowances and in-kind payments	10 per cent of sales of CQ	N/A
Referral	Verbally refer severe cases or those not responding to treatment	Verbally refer severe cases or those not responding to treatment	Referral slip, bag, counter-referral	Refer if not well on third day and severely ill patients	Refer severe malaria and those still febrile 48 hours after treatment	Yes
Health information system	Monthly submission of registers to health centres	Community-based surveillance system, record births and deaths, weekly reports by CHWs	Drug sales and referral recorded in separate notebooks	Village health helper records date, patient's age and personal identification, treatment given and previous treatments	Monthly report of drug sales	Tracking of births and deaths
References	(22–23, 262)	(24–26, 186)	(27, 127, 260)	(28–29, 76, 126, 255–259)	(30–31)	(32)

Key: CHW: community health worker; CQ: chloroquine; SP: sulfadoxine-pyrimethamine (Fansidar®); N/A: not applicable.

Coverage and effectiveness

As of 2004, out of the 30 districts in Uganda, this programme fully covered 10 districts, with a drug distributor in every community, and had partial (50 per cent) coverage in an additional 5 districts (23). An evaluation found that children living in the areas covered by programme activities were five times more likely to receive an appropriate antimalarial than children in comparison districts (23). Two recent, in-depth evaluations of this programme, including operational components, provide more details and are available from the Internet at <http://www.basics.org/pdf/HBMF+in+Uganda_Final.pdf> and <http://www.basics.org/pdf/HBMF_UGANDA_Final_report.pdf>.

INTERVENTION MODEL 4 – OVERVIEW

Intervention Model 4, in which families have more responsibility for treatment decisions, is not as commonly encountered in sub-Saharan Africa as Intervention Model 3. A national-level programme sponsored by the Centre National de Lutte contre le Paludisme in Burkina Faso is presented here. A study employing this model – based on a programme modified from the community-based malaria treatment programme in Tigray, Ethiopia – demonstrated a significant decrease in overall mortality in intervention villages and a reduction in mortality attributable to malaria (32). This research project is described above in Section 4, and its operational components are presented in Table 5, along with those of the Burkina Faso programme.

Intervention Model 4 – Malaria Control Programme, Burkina Faso

Programme overview

A pilot programme in Burkina Faso sponsored by the National Centre for Malaria Control (Centre National de Lutte contre le Paludisme) relies on caregivers to classify and treat sick children, while community health workers supply antimalarial drugs at the community level. The role of the family in treatment decisions for the sick child is emphasized in this intervention, and the family's diagnosis of malaria is presumptive, based on the child's symptoms of fever. The CHWs sell the pre-packaged chloroquine regimens to mothers under a cost-recovery mechanism, in accordance with Bamako Initiative principles. The CHWs are given the first stock of drug packages and are expected to sell the drugs at a pre-approved price. The set price allows CHWs to replenish their supplies by purchasing drugs at health facilities; they also collect a 10 per cent incentive margin.

Operational aspects and considerations

'Core mothers' are chosen by the communities, and CHWs are often those already operating in the community. Nurses from the health centres train core groups of mothers, village leaders and CHWs in symptom classification and correct dosage schedules. The core mothers and leaders are then responsible for sharing the messages with other members of the community. The CHWs and community leaders are responsible for providing advice about treatment and referral, acting as intermediaries between the health system and the community. Posters depicting the correct dosage of antimalarials by age are placed in the villages and are given to core mothers, village leaders and CHWs. Health centre nurses are responsible for supervision of the CHWs through monthly visits and reviewing the sales of packages. Referral is indicated for those patients with convulsions or other neurological complications and for those who are febrile 48 hours after treatment (30–31).

One of the important features of this programme is the use of pre-packaged chloroquine regimens to facilitate appropriate dosage. Packages contain a full course of chloroquine tablets, aspirin and pictorial inserts with administration instructions in a closeable plastic bag. Colour-coded packages containing the dosages for four different age groups (0–6, 7–11, 12–35 and 35–83 months) are prepared at local health facilities and distributed to CHWs. Drug store managers are responsible for packaging the drugs at the facility before distribution to CHWs. (30–31).

Coverage and effectiveness

In a study evaluating this programme, it was found that 59 per cent of those children treated with pre-packaged tablets received the treatment over the recommended three days. The correct dosage packet for age was received by 52 per cent of the children, with 31 per cent under-dosed (given a packet for younger child) and 17 per cent over-dosed (with packet for older child). Risk of progression to severe malaria was less (5.1 per cent) in those children receiving pre-packed chloroquine from CHWs versus those receiving the standard care (11 per cent) with a risk ratio of 0.47 (95 per cent, confidence interval 0.37–0.60). The association did not change after accounting for the child's sex, the child's age or maternal literacy. However, the results demonstrated that CHWs played an important role; the use of the pre-packed drugs was highly correlated to the number of CHWs per population in the village (31).

INTERVENTION MODEL 5 – OVERVIEW

This model has been used predominantly in Latin America and Asia, especially where malaria is not highly endemic or where *Plasmodium falciparum* is not the predominant strain. A programme in Thailand sponsored by the Thai Ministry of Public Health is presented here in more depth. This model is also employed throughout Latin America. CHWs, called *colaboradores voluntarios*, presumptively treat malaria and take blood smears. In the states of Tabasco and Campeche, Mexico, it was found that 17 per cent of febrile patients used CHW services (263), and in Guatemala the CHW services were used by 20 per cent of febrile patients (33). The blood smears collected by the *colaboradores voluntarios* are a major source of information concerning epidemiological trends of malaria in this entire region (88).

This strategy is also used by BRAC in the Chittagong Hill Tracts, Bangladesh, in an extension of the *shastho shebika* programme, which is described under Intervention Model 1 (page 45). CHWs presumptively treat uncomplicated malaria. Before treatment, the CHW takes a finger-prick blood sample and sends it to the BRAC office for confirmation by microscopy. After

initiating treatment, the CHW goes door-to-door to ensure compliance. Each sub-district has two or three programme organizers and one laboratory technician, all part of the local community, who supervise the activities of the CHW. BRAC supervisors visit the *shastho shebika* every two weeks and examine and treat unresolved cases. Complicated cases are referred to programme organizers. The operational components of the programmes operating in Bangladesh, Guatemala and Thailand are presented in Table 6 (below).

Intervention Model 5 - Thailand Village Voluntary Malaria Collaborator Program

Programme overview

The Malaria Division of the Thai Ministry of Public Health, Department of Communicable Disease Control, started the Village Voluntary Malaria Collaborator Program in 1961. The volunteers collect blood smears and record demographic characteristics of cases. They used to provide presumptive treatment with sulfadoxine-pyrimethamine (Fansidar®) (36–37), but such treatment was phased out at the end of 2001 (264). Volunteers are also trained to provide education about malaria prevention methods,

Table 6. Intervention Model 5: Comparison of programmes using community management of malarial disease with microscopy verification

	Guatemala	Thailand	BRAC Chittagong Hills
CHW or equivalent	<i>Colaborador voluntario</i>	Village voluntary collaborator	<i>Shastho shebika</i>
Full course of treatment given on basis of presumptive diagnosis	No	Yes (discontinued in 2002)	Yes, with CHW visits to ensure correct drug administration
Initial treatment given only pending results of blood smear	Yes	No	No
Use of smears for epidemiological surveillance	Epidemiological surveillance for national and international planning	Epidemiological surveillance in areas of high levels of transmission	Used by programme managers
Population covered by one CHW	Approximately 1 CHW per 580 persons	N/A	Approximately 1 CHW per 200 persons
Selection	Community survey performed by programme supervisor; candidate must be literate and willing to volunteer	Elected through meetings with village leaders; candidates must be literate; majority selected are male farmers over 30 years old; 25 per cent are traditional healers	Women selected from village organizations; same process as CHW selection in other BRAC areas
Training	4–6 hours over 2 days	1–2 days + periodic refresher courses	21 days + 3 days malaria training + 1 day per month refresher training
Motivation	Prestige, specialized training, preferential treatment at health facilities, exemption from local taxes	Per diem for training, free medical services, service certificates	Fees for other drugs
Supervision	Evaluators visit CHW every 8–12 weeks	Malaria field officers	2–3 programme organizers and 1 laboratory technician per sub-district
Referral	N/A	N/A	Referral of severe illness and cases of treatment failure
Scale	Malarial areas 9 operational zones	All malarial areas; approximately 35,000 – 40,000 volunteers in Thailand	15 of 25 malaria- endemic sub-districts
References	(33–36, 87, 118).	(36–37, 130–131, 264)	(265)

chemical and biological vector control practices, writing of reports, and community motivation techniques. Blood smears are taken only in areas of high transmission and are collected weekly by malaria programme officers for epidemiologic surveillance (36–37).

Operational aspects and considerations

Malaria volunteers are selected using a variety of methods. They are chosen from an established group in the community, identified by a malaria field officer in collaboration with the village leader, or selected by community leaders at a community meeting. The majority of volunteers are males over 30 years old who have completed their compulsory education and farm as their main occupation (36–37). More than 25 per cent of the volunteers are traditional healers (131). Training takes place over one to two days, with periodic refresher training. Topics covered during the training include: general information about malaria, such as basic epidemiology, prevention, and signs and symptoms; vector control, including spraying and biological control; management of malaria, including blood slide collection and preparation, and presumptive treatment; completion of patient records; and sensitization of the community. Programme officers are supposed to collect blood smears on a weekly basis and supervise the activities of the volunteers at this time. Incentives for volunteers consist of a per diem for initial and refresher training, free care at government health facilities and certificates of recognition (36, 131).

Coverage and effectiveness

In 1990, there were approximately 40,000 malaria volunteers in Thailand. The volunteers took 15 per cent of all the smears used for epidemiological surveillance. Case detection by volunteers was, however, less efficient than in clinics, with only 9 per cent of the volunteers' smears positive, in comparison with 54 per cent of smears positive at the malaria clinic and 26 per cent positive through other passive detection (36–37).

INTERVENTION MODEL 6 – OVERVIEW

Most CHW programmes that use Intervention Model 6 are based in Asia. This model has been widely studied, and there are numerous examples of field trials using this model (39, 41–42, 93, 102). An in-depth description of a large-scale programme in Nepal, formerly the ARI Strengthening Programme, now called the Community-Based ARI/CDD, is described here. A pilot programme sponsored by the Government of Bangladesh and BRAC, which is briefly described in Section 4 (page 6), also employed this model (46). An extension of the

Atención Integral a la Niñez programme in Honduras, which was originally based on growth monitoring, trained more than 1,500 CHWs to manage pneumonia in the community (49). A recent project in Senegal provides a rare example of community-based pneumonia treatment in an African setting using pre-packaged cotrimoxazole (266). The examples from Bangladesh, India, Nepal and Senegal are presented in Table 7 (page 55).

Intervention Model 6 - Nepal Community-Based ARI/CDD programme

Programme overview

In the Community-Based ARI/CDD programme in Nepal, female community health volunteers, village health workers, and maternal and child health workers use the case management strategy to treat pneumonia. The ensemble of these community workers in Nepal will be referred to as community health workers in this programme example. The programme is based on earlier pilot studies in Nepal that demonstrated substantial reductions in childhood mortality (41–42) and on operational research carried out in earlier phases of the programme (43–44). The original programme, called the ARI Strengthening Programme, was implemented by the Nepalese Ministry of Health in 1993 with help from USAID, John Snow International, UNICEF and WHO. A national policy in 1994 helped support implementation of the programme. In 1998–1999 five additional districts were added with the collaboration of the Adventist Development Relief Agency, CARE, Plan and Save the Children USA. Diarrhoea, nutrition/vitamin A supplementation and immunization have been added to the training. The programme is currently integrated with the community-based IMCI initiative. CHWs classify acute respiratory infection (ARI) based on the WHO case management strategy, which involves counting respiratory rates and observing for danger signs, such as chest indrawing. The female community health volunteers are also responsible for facilitating health education sessions in their communities. The cotrimoxazole is provided by donors and the Nepalese Ministry of Health; it is distributed free of charge (44). To assess strategies to improve sustainability, a cost-recovery mechanism for cotrimoxazole tablets and oral rehydration salts has been introduced in two pilot districts (267).

Operational aspects and considerations

The CHWs are trained for five days and two to three months later for an additional two days. The first five days are spent on management of ARI (diagnosis and treatment), orientation of local mothers and

leaders, and clinical practice. Posters and brochures on ARI and diarrhoea are used for community education. Review and monitoring meetings take place in the community in order to identify strengths and weaknesses of the programme operations and to sensitize community leaders about the programme. Supervisory visits are conducted by ministry of health staff and field personnel of partner organizations (193, 268). The main incentives given to the CHWs are job aids, such as timers for use in diagnosing ARI, bags and record-keeping manuals. CHWs are also provided with a small per diem or

stipends for certain activities (44). The CHWs use recording forms to collect information about cases managed; these forms are used in the monitoring of programme quality (193, 267). Cases of severe pneumonia are referred to the nearest health facility.

One unique operational component of the ARI Strengthening Programme involves engaging traditional healers and selected drug retailers – who are probably already providing care to sick children – and working with them to refer children with pneumonia to the female health volunteers in the community

Table 7. Intervention Model 6: Comparison of programmes providing antibiotics to manage pneumonia in the community

	Nepal	BRAC ARI control pilot programme	Maharashtra State India	Senegal
Name of CHW or equivalent	Female community health worker, village health worker, maternal child health worker	<i>Shastho shebika</i>	Village health worker, traditional birth attendant (TBA)	<i>Agent de santé communautaire</i>
Active detection	No	Informal through monthly household visits or other community contacts	No	No
Drugs	Cotrimoxazole	Cotrimoxazole	Cotrimoxazole	Blister-packed cotrimoxazole
Education by CHW	Teach community leaders and mothers' groups about danger signs	Yes	Intensive education on acute respiratory infection: CHW community-based education and audiovisual aids	Another community-based health promoter (<i>relais</i>) performs educational activities
CHW treats infants under 2 months of age	No	Yes	No	No
Facilitation of referral	Referral slip	Referral slip	No	Referral slip
Follow-up after treatment	Yes	Yes	Yes	Yes
Incentives	Per diem, work supplies (timer for diagnosing ARI, record-keeping manual, bag); villages may give sari or stipend	Fees for drugs	Part-time pay for research from Society for Education, Action and Research in Community Health; US\$3 per month	Drug revolving fund
Training	5 days + 2 days refresher training	21 days + 5 days specific training in ARI + monthly refresher training	6 sessions, 1.5 hours each	3 days + refresher training
Supervision	Monthly meetings	Monthly visit	Monthly meetings	Monthly meetings and community visits
Additional responsibilities	Diarrhoea, nutrition, vitamin A, immunization (malaria in one district)	Diarrhoea, dysentery, goiter, scabies, anaemia, ringworm, intestinal worms, cold, fever and stomatitis; oral contraceptives, birth kits, iodized salt, condoms, essential medications	Maintain population registration, record vital events, treat minor ailments	Use of counselling cards; community education
Malaria endemic	Only in southern region	No	Yes	Yes
Population covered by 1 CHW	Average: 1 CHW per 197 (45–394) children	1 CHW per 150–250 households	1 village health worker per 1,920 people; 1 traditional birth attendant per 558 population	Average 1 CHW per 425 children aged 0–5 years
Scale	17 districts (35 per cent of children under 5 years of age: approximately 940,000 children)	10 sub-districts (population 2.4 million)	1 district (58 villages covered by 25 village health workers + 86 traditional birth attendants)	4 health districts
References	(44, 108, 267, 269)	(45–47, 92, 133)	(39, 40, 93, 95)	(266)

(193, 267). A recent study in Nepal also found that the majority of traditional healers receiving training had adequate knowledge of signs, symptoms and preventive measures for diarrhoea, acute lower respiratory infection, malnutrition and HIV/AIDS. The trained traditional healers were more likely to appropriately treat diarrhoea cases in the community, and more than 90 per cent had referred patients needing further care to health posts (269).

Coverage and effectiveness

The Community-Based ARI/CDD programme in Nepal has had great success in its scale and sustainability. It currently operates in 17 of 75 districts in the country, covering approximately 35 per cent of the population under five years of age. As of 2001, there were more than 9,000 community health workers trained in pneumonia case management. Many partners help maintain the programme, and it is estimated that a much larger proportion of pneumonia cases are treated in programme areas (43–44).

An operations research project in the early pilot stages of this programme compared the effectiveness of two intervention strategies. In the 'community-based treatment' arm, female CHWs were trained to classify children with pneumonia, treat pneumonia with cotrimoxazole, refer severe pneumonia cases and follow up three days after treatment. Female CHWs in the 'referral' arm classified pneumonia (but did not provide treatment) and were trained to refer all pneumonia cases (43–44). Approximately 80 per cent of cases were appropriately managed in both strategies; most misclassification of pneumonia was with regard to respiratory rates, while assessment of chest indrawing was generally adequate. Female CHWs in the treatment arm prescribed antibiotics in only 2.6 per cent of acute lower respiratory infection cases where they were not indicated. The community-based treatment strategy was estimated to double the proportion of pneumonia cases that were identified and appropriately treated (43). In the areas that implemented the referral strategy, only 25 per cent of children referred presented at the government facilities with a referral slip. Most caregivers who did not go to health facilities sought care elsewhere; approximately 72 per cent went to medical halls (where drugs can be purchased), and 21 per cent went to a hospital. The primary reasons cited for non-compliance with referral were the proximity of the facility, lack of trust in the facility and confidence in the other sources of care (43).

INTERVENTION MODEL 7 – OVERVIEW

Intervention Model 7, which is based on the treatment of multiple illnesses in the community, is relatively uncommon. Two detailed examples are presented here: the Lady Health Worker Programme in Pakistan and the Community Initiatives for Child Survival in Siaya, Kenya. Operational aspects of these programmes, along with information from a programme in the Sudan, described briefly below, are presented in Table 8 (page 58).

Other programmes, not exhaustively presented here, have employed this model in areas where basic health services are weak or non-existent because of crisis conditions. The Haitian Health Foundation supports a system in which well-supervised CHWs provide a basic package of health services to remote areas, including nutritional recuperation, vaccination, pneumonia case management and diarrhoea management with oral rehydration salts (270). A programme in southern Sudan, called Essential Community Child Health Care, which was initiated in the late 1990s by various non-governmental organizations and WHO, also uses this intervention model. Because of the conflict in the Sudan, much of the infrastructure in this area has been destroyed and many children lack access to any health-care facilities. Volunteers use very simple guidelines (algorithms) for the identification and treatment of general danger signs, malaria, pneumonia and dehydration. Because referral to facilities is usually not possible in this area, the prompt treatment of illness is emphasized and amoxicillin, which can treat severe pneumonia, is used instead of cotrimoxazole for all pneumonia cases (55, 271). An evaluation of the programme found that rates of correct classification by community health workers are consistent with other IMCI evaluation studies, although they tended to be less precise in the first year after training. Improvements were generally noted in subsequent years, although pneumonia was greatly over-classified in all years, with 70 per cent (2001) and 80 per cent (2002) of all children presenting with respiratory symptoms classified as pneumonia cases (55).

Intervention Model 7 – Pakistan Lady Health Worker Programme

Programme overview

A National Programme for Family Planning and Primary Health Care was initiated in Pakistan in 1993. This programme soon began to employ a cadre of salaried, female CHWs, called lady health workers, to provide health education, promote healthy behaviours, supply family planning methods

and provide basic curative services. Their duties include monitoring the health of pregnant women, monitoring the growth and immunization status of children, and promoting family planning. The lady health workers are provided with a kit that contains materials such as bandages, scissors, cotton, a thermometer, health education posters and a child scale. The kit also contains contraceptives and drugs, including contraceptive pills, condoms, paracetamol tablets and syrup, eye ointment, oral rehydration salts for diarrhoea, chloroquine for malaria and cotrimoxazole for respiratory infections (177). The lady health workers use the WHO case management guidelines to classify pneumonia and treat fever presumptively (272).

Operational aspects and considerations

Lady health workers are all women; 70 per cent are under the age of 35 years, and 72 per cent are currently married or have been married. The written requirements for a lady health worker are to be female, educated to 8th grade, a permanent resident where she will serve, 20 to 50 years of age and preferably married. The lady health workers are generally recruited through advertisements placed in local newspapers, and they are interviewed and selected by staff at first-level health facilities along with a member of the local community. All lady health workers receive at least three months initial training, which covers the basics of primary health care. The training takes place at first-level care facilities and comprises both classroom and clinical practice. Usually 6 to 12 women are trained at a time. Part of the lady health worker training also involves in-service training that occurs for one week each month for 12 months following the initial training, although this varies between provinces (52, 177).

The direct supervisors of lady health workers are the nurses and physicians at the first-level care facility. Lady health workers have frequent contact, in some areas daily, with the first-level staff (52, 177). A supervisory visit to the lady health worker's community takes place every month, and monthly meetings are held at the health facility. During community visits, supervisors are supposed to meet with the lady health worker and her clients, as well as visit clients independently. Monthly meetings are used to review previous work and plan for future work. Supervision in the programme occurs regularly, and more than 80 per cent of lady health workers reported having met their supervisor within the past 30 days and 70 per cent having had a supervisory visit. On average, each supervisor is responsible for the supervision of 11 to 40 lady health workers and performs 31 supervisory visits each month (177).

Lady health workers are paid a salary of 1,600 rupees a month by the government. The salary is deposited directly into their accounts and they are considered civil servants (272). The lady health workers have one-year contracts and can be dismissed by the District Programme Implementation Unit. The overall rate at which lady health workers drop out is low; an evaluation of the programme found that drop-out was more common among lady health workers with more education but did not vary significantly by age, marital status or urban/rural location (177). The lady health worker is responsible for recording information about births and deaths in the community, use of family planning methods, immunization of children, diagnosis and treatment of her clients, and pregnancies and care provided. She also refers her clients to next-level facilities if they need further care (177, 272).

Coverage and effectiveness

The programme covers a relatively large proportion of the population of Pakistan. It currently employs approximately 69,000 lady health workers (272), each being responsible for approximately 1,000 individuals. This coverage equals approximately one fifth of the entire population of Pakistan and one third of the target population of the programme. Coverage varies by region and type of area, with the higher-income and urban areas having better coverage (177). The use of lady health workers for sick children is relatively low. Of children who were sick with diarrhoea in the previous 14 days and consulted any provider, 14 per cent consulted a lady health worker; 18 per cent with a respiratory infection consulted a lady health worker. The main reasons cited for not consulting a lady health worker included the lady health worker was not available or helpful, the caregiver preferred consultation elsewhere or consultation was not necessary (52). Childhood mortality trends in those areas served by lady health workers and comparison areas were found to be similar, after adjusting for other factors (52). An in-depth analysis of this programme, including operational aspects and health impacts is available (52).

Intervention Model 7 - CARE Community Initiatives for Child Survival, Siaya, Kenya

Programme overview

In 1995, CARE Kenya implemented the Community Initiatives for Child Survival in Siaya. The original project ended in 1999, and activities continued until 2003 in the second phase of the project. The second phase is a comprehensive intervention package aimed at improving child and maternal health in the

Siaya district, one of the least developed areas of Nyanza province (107). Community health workers in this district have been trained to treat children with multiple diseases by using simplified IMCI guidelines. Promotion of family planning, immunization and AIDS prevention are also included in the education package. The CHWs are assigned to 10 households in their community. The supply of drugs in this programme is based on the Bamako Initiative. Community-based pharmacies are established and serve as resupply points for the CHWs' drug kits. The CHWs sell the drugs to community members and use monies from sales to buy more drugs to restock their kits in a revolving fund scheme (107).

Operational aspects and considerations

The CHWs are selected by the communities they serve. They are trained for three weeks in the use of guidelines to classify and treat the diseases covered by the project, communication skills, referral when necessary and promotion of compliance with regimens. One-week refresher training includes classroom-based learning and clinical practice. Simplified IMCI guidelines allow community health workers to classify and treat malaria, pneumonia and diarrhoea/dehydration concurrently, and flow sheets are used to assist in the application of these algorithms (54, 180). At the start of the programme, CARE field staff were primarily responsible for

Table 8. Intervention Model 7: Comparison of programmes providing antimalarials and antibiotics in the community

	Essential Community Child Health Care, Sudan	Siaya, Kenya	Lady Health Workers, Pakistan
Name of CHW or equivalent	Village volunteer	Community health worker	Lady health worker
Diseases managed	Pneumonia, malaria, diarrhoea, general danger signs	Pneumonia, malaria, diarrhoea	Pneumonia, malaria, diarrhoea
Active detection	Yes	No	Household visits for growth monitoring and other
Passive detection	Yes	Yes	Yes
Antimicrobial drugs	Amoxicillin, chloroquine	Cotrimoxazole, sulfadoxine-pyrimethamine	Cotrimoxazole, chloroquine, mebendazole
Classification	Simplified algorithm of four flow charts – use of recording form with algorithms to “assess, classify, and treat”	Simplified IMCI algorithm	WHO guidelines for pneumonia, presumptive treatment for fever
CHW treats infants under 2 months of age	No	No	Yes (uses special treatment charts)
Facilitation of referral	Usually no referral	No	Yes (referral slips, sometimes accompany to health facility)
Follow-up after treatment	Yes, if necessary	Yes, but very poor	Yes
Additional responsibilities	Counselling about danger signs, care-seeking, home treatment; Guinea worm activities	Sales of mosquito nets, vitamin A, community education	Immunizations, growth monitoring, prenatal, postnatal, family planning
Selection	Previous Guinea worm volunteers; one-day walk from health facility;	Proposed, nominated and confirmed in local meeting literate	Advertisements in local or regional newspapers; female, educated up to 8th grade, resident, married, age 20–50 years
Training	7 days	3 weeks; participatory refresher training	3-month full-time course + 1 week training per month for 12 months
Supervision	Nurse or medical assistant trained by programme visits village volunteer every 2 weeks – observes for quality control, uses forms for supervision; feedback from village chief on village volunteer activities	Village health committees; CARE personnel	Hierarchy of support: federal ministry of health, provincial ministry of health, district health officers, lady health supervisors
Motivation	In-kind incentives, T-shirts, bags, soap, raincoat	Communities provide in-kind incentives	Monthly salary
Health information system	Recording form used for supervision and programme evaluation	CHWs keep clinical registers	Data collection and monitoring
Scale/coverage	6 districts; 250,000 population in 2001	1 district; population 140,000 in 2001	35 per cent of population of Pakistan = 30 million
References	(55, 271, 274)	(54, 185, 275)	(52, 177)

supervision of the CHWs. Subsequently, community health committees and ministry of health staff have been increasingly involved in supervision of the CHWs and the Bamako Initiative pharmacies (180). The CHWs are offered no financial incentives for their work and turnover has been a problem (122), possibly because of the lack of incentives, issues surrounding the maintenance of the revolving funds, and the collection of fees for drugs provided in the community by the CHWs (273). Referral is verbal, and referred cases are taken to the front of the line to receive treatment at facilities (273). The CHWs use clinical registers to track health information; the registers are also used to monitor and supervise the CHWs' work (180).

Coverage and effectiveness

In cooperation with the Centers for Disease Control and Prevention (CDC) in the United States, a sample of 120 community health workers is assessed for clinical proficiency every two years. To help improve quality of care, the results of this evaluation are applied to the development of a refresher course for the CHWs (107). An evaluation demonstrated that 85 per cent of the cases that the CHWs treat are classified as malaria, acute lower respiratory infection or diarrhoea. CHWs adequately treated 90.5 per cent of malaria cases, but they had difficulty in classifying and treating sick children with pneumonia. The complexity of the treatment algorithms probably contributed to their difficulties (54). Another study in the Siaya district found that only 26 per cent of caregivers consulted a CHW during an illness from which their child died. Of those caregivers who did not visit a CHW, 26 per cent stated that they did not know about the existence of CHWs (185). Nevertheless, four years after the implementation of the project, a reduction (49 per cent) in the child mortality rate was noted. Families sought medical care more quickly, and the cost of medical care was reduced (107).

Annex C: CHECKLISTS TO SUPPORT RECOMMENDATIONS

Checklist 1. Possible forums in which to advocate integration of pneumonia and malaria management

Level of programming	Agencies	Possible areas to incorporate pneumonia into malaria programming or research
International bodies/initiatives	Multilateral Initiative on Malaria (MIM)	Conferences, presentations, research dissemination, further research initiatives
	Roll Back Malaria (RBM)	Resident pneumonia adviser/expert operational research on incorporation of pneumonia
	Tropical Disease Research (TDR)	Research dissemination, further research initiatives
	Tropical Disease Research malaria home-management task force	Research dissemination, further research initiatives
	Global Fund to Fight AIDS, Tuberculosis and Malaria	Encourage the integration of other diseases within programmes supported by Fund
National agencies	Ministries of health	Integrated community programming
	National malaria departments	Training in acute respiratory infection
	Malaria research institutes	Clinical and population-based research, pneumonia/malaria clinical overlap
Other agencies/forums	CORE malaria working group and working group meetings	Promote incorporation of pneumonia into malaria programs
	CORE/Child Survival Technical Support Project training	Sessions about pneumonia, pneumonia/malaria clinical overlap, and diarrhoea included in malaria training
	Schools of public health	Lectures about pneumonia, pneumonia/malaria clinical overlap and diarrhoea in children incorporated into malariology courses

Checklist 2. Suggested components to include in characterizations of referral

Explicit criteria of children requiring referral	
Referral mechanism	Verbal Written Referral slip
Counselling messages about referral given by CHW	
Facilitation mechanisms for evacuation	Transport committees Financing mechanisms Accompaniment of caregiver to facility
Treatment of referred cases at facility	Preferential Standard
Counter-referral activities	Counter-referral slip Automatic for all children referred
Tracking and use of referral information	Programme supervision Health information system for epidemiological data

Checklist 3. Suggested components to include in programme characterizations

Programme components		Aspects to consider
Selection	CHW selection	By whom
	CHW qualifications	Literacy Education
Training	CHW initial and refresher training	By whom Content Duration Location
	Family training or education	By whom Content Duration Regularity
Care-seeking	CHW disease detection	Active Passive
	Families' role or education about disease recognition and care-seeking	
Classification and treatment	Diseases or conditions classified	Criteria used for classification
	Diseases or conditions treated Diseases or conditions referred	Criteria used for treatment Referral systems
Drugs	Drugs dispensed	Type and formulation of antimalarial Type and formulation of antibiotic Type and formulation of other drugs
	Other therapies or supplies sold or provided	Oral rehydration salts or oral rehydration therapy Others
	Location of drug supply	Central location CHW's home Family's home
	Replenishment of drug supply	Facilities Supervisory visits
Financial	Cost-recovery mechanism	Donor-supplied Cost-recovery mechanisms
Other	Other duties of CHWs	
Supervision	Supervisory meetings or individual supervisory visits	Duration Regularity Location
Health information system	Types of information collected Use of information	
Incentives and motivation	CHWs' remuneration	
Coverage	Scale	
	Number of families per CHW	

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