

Community case management of pneumonia: at a tipping point?

David R Marsh,^a Kate E Gilroy,^b Renee Van de Weerd,^c Emmanuel Wansi^d & Shamim Qazi^e

Abstract Pneumonia is the leading cause of child mortality globally. Community case management (CCM) of pneumonia by community health workers is a feasible, effective strategy to complement facility-based management for areas that lack access to facilities. We surveyed experts in the 57 African and Asian countries with the highest levels and rates of childhood mortality to assess current policies, implementation and plans regarding CCM of pneumonia. About one-third (20/54) of countries reported policies supporting CCM for pneumonia, and another third (18/54) reported no policy against the strategy. Half (27/54) the countries reported some implementation of CCM for pneumonia, but often on a small scale. A few countries sustain a large-scale programme. Programmes, community health workers and policy parameters varied greatly among implementing countries. About half (12/26) of non-implementing countries are planning to move ahead with the strategy. Momentum is gathering for CCM for pneumonia as a strategy to address the pneumonia treatment gap and help achieve Millennium Development Goal 4. Challenges remain to: (1) introduce this strategy into policy and implement it in high pneumonia burden countries; (2) increase coverage of this strategy in countries currently implementing it; and (3) better define and monitor implementation at the country level.

Bulletin of the World Health Organization 2008;86:381–389.

Une traduction en français de ce résumé figure à la fin de l'article. Al final del artículo se facilita una traducción al español. الترجمة العربية لهذه الخلاصة في نهاية النص الكامل لهذه المقالة.

Introduction

Pneumonia is the leading cause of mortality among children under five years of age,¹ despite effective vaccines and nutritional and environmental interventions.^{2,3} Most children with signs of pneumonia in developing countries need antibiotics, as they are more likely to have a bacterial etiology.⁴ Expanding the coverage of antibiotic treatment for pneumonia is vital to meet the Millennium Development Goal 4 (MDG 4) of reducing under-five mortality by two-thirds by 2015, compared to 1990 levels.^{5,6} However, many children with pneumonia do not receive timely, appropriate treatment at health facilities,⁷ especially children from poorer families.⁸ Community case management (CCM) of pneumonia,⁹ complementing facility-based management, is a strategy to deliver antibiotics outside health facilities where access to treatment is poor.

CCM of pneumonia requires training community health workers (CHWs) to use algorithms developed in the 1980s¹⁰ to assess danger signs in children with a cough, count respiratory

rates, and look for chest in-drawing to classify respiratory illness. CHWs recommend and dispense oral antibiotics for cases classified as simple pneumonia, usually in children 2–59 months of age, and refer to health facilities young infants or children with danger signs or chest in-drawing.

CHWs can effectively manage respiratory illness and prescribe antibiotics appropriately,^{11–14} with few exceptions.^{15,16} A meta-analysis of nine studies found that CCM of pneumonia reduced overall mortality in children 0–4 years by 24% (95% confidence interval, CI: 14–33) and pneumonia-specific mortality in children 0–4 years by 36% (95% CI: 20–49).¹⁷ In 2002, WHO convened experts to review the evidence and field experience of CCM of pneumonia. Their consensus statement called for the national health authorities, WHO, the United Nations Children's Fund (UNICEF) and nongovernmental organizations (NGOs) to support implementation of CCM of pneumonia.¹⁸ A 2005 joint policy recommendation from WHO and UNICEF also recommended that

“community-level treatment [of pneumonia] be carried out by well-trained and supervised CHWs”.¹⁹

The global health community has renewed appeals for more action to prevent and treat child pneumonia to reach the MDG 4.^{3,5,20} Pneumonia case management with antibiotics remains a central control strategy, both through facilities and in the community.³ Here, we review the policies, implementation and plans for CCM of pneumonia in countries with the highest levels of child mortality.

Methods

The study examined CCM of pneumonia among the 57 Asian and African countries included in the 60 countries that were the focus of the first Countdown to 2015²¹ and accounted for 94% of global mortality among children less than five years of age in 2004; Latin American countries (Brazil, Haiti and Mexico) were excluded from the analysis. We defined CCM of pneumonia as oral antibiotics for simple pneumonia in a child 2–59 months of age, administered

^a Save the Children USA, Amherst, MA, United States of America (USA).

^b Johns Hopkins University, Baltimore, MD, USA.

^c UNICEF, New York, NY, USA.

^d BASICS, Arlington, VA, USA.

^e Child and Adolescent Health and Development, World Health Organization, Geneva, Switzerland.

Correspondence to David Marsh (e-mail: dmarsh@savechildren.org).

doi:10.2471/BLT.07.048462

(Submitted: 9 October 2007 – Revised version received: 11 March 2008 – Accepted: 12 March 2008)

by a health worker in the community, as defined by the respondent.

Data sources

We drafted, pilot-tested and refined a self-administered questionnaire regarding countries' CCM of pneumonia policies, implementation and plans. Questionnaires were distributed electronically in June 2007 from UNICEF and WHO headquarters and regional offices to WHO and UNICEF in-country Integrated Management of Childhood Illness (IMCI) experts, requesting that they and Ministry of Health counterparts jointly complete the questionnaire. We tracked responses to maximize return and clarified inconsistencies or omissions through follow-up e-mail requests, phone calls and/or face-to-face encounters. Representatives from non-responding countries received four requests.

Respondents were asked about their countries' community IMCI (C-IMCI) policies and components, policies and implementation regarding CHWs dispensing oral antibiotics for pneumonia, other treatments for childhood illnesses provided in the community, and future plans for CCM of pneumonia. Countries currently implementing CCM of pneumonia were also asked about: lead institution(s); start-up year; CHW characteristics; programme characteristics; and programme scale and scope.

In November 2007, we directed a brief, follow-up questionnaire to WHO and UNICEF in-country experts in those countries reporting implementation of, and/or supportive policy for, CCM of pneumonia, to further characterize their situations.

Data analysis

Data were entered, cleaned and analysed using Excel (Microsoft, Seattle, WA, United States of America). We received six first-round and four second-round duplicate questionnaires from different sources in the same countries. All had some discrepancies, for which we contacted in-country child health experts not among the original respondents for clarification.

The country was the principle unit of analysis; we calculated proportions describing policy, implementation and plans for the total sample and for the subsample of countries with CCM of pneumonia. We stratified countries

geographically into continental Africa and Asia.²² For description of CHWs, the CHW cadre was the unit of analysis because seven countries reported two types of CHW.

We further prioritized high-mortality countries into those 35 countries with under-five mortality rates greater than 125 or with over 100 000 deaths annually among children less than five years of age, according to estimates from the most recent *State of the world's children*.²³ We defined "supportive policy" as explicitly permitting CCM of pneumonia and "permissive policy" as the absence of a policy against the strategy.

Pneumonia treatment gap

The "pneumonia treatment gap" estimated the fraction of childhood pneumonia cases that failed to access appropriate treatment and were at greater risk of dying. We calculated this gap for each country using the estimated number of pneumonia cases annually²⁴ in each country multiplied by the estimated proportion of children not receiving appropriate case management for pneumonia, i.e. 100% minus the per cent reported to have sought appropriate care for cough and difficult or rapid breathing.²³

Results

Description of respondents

We received first-round questionnaires from 54 countries in Asia and Africa, which represented nearly all the pneumonia mortality (97%) and incidence (97%) in the original 60 MDG priority countries. Data were not received from Gabon, Sierra Leone and Somalia, and these countries were excluded from the analysis. Respondents included UNICEF country officers (45), national Ministry of Health officials (39), WHO country officers (16) and others (12). Most questionnaires had two (28) or three (17) respondents; WHO, UNICEF and the Ministry of Health completed only one jointly. We received 25 second-round questionnaires from the 31 countries that reported supportive policies or implementation of CCM of pneumonia in round one. Respondents included Ministry of Health officials (13), UNICEF country officers (12), WHO country officers (10) and others (4). Fifteen questionnaires had one respondent; five had two respondents, and WHO, UNICEF and the Ministry of Health completed five jointly.

Policy, implementation and plans

Most countries (45/54) reported policies endorsing C-IMCI, more commonly in Africa (34/38 countries) than in Asia (11/16 countries). Approximately one-third of countries (20/54) reported policies supporting CCM of pneumonia, and one-third (18/54) had no policy explicitly against the strategy (Table 1). The policy environment was thus permissive in most high mortality countries (38/54), especially in Asia. Three permissive countries reported CCM of pneumonia limited to: emergency settings (Uganda), nomadic or sparsely populated states (Sudan), and a specific NGO (Bangladesh).

Half the surveyed countries (27/54) reported some implementation of CCM of pneumonia (Table 1). More countries reported implementation of CCM of pneumonia than had explicitly supportive policies for the strategy. Approximately two-thirds of countries (26/38) with a permissive policy environment implemented CCM of pneumonia, more commonly in Asia than in Africa. One country implemented CCM of pneumonia despite a prohibiting policy, while four did not implement the strategy despite an explicitly supportive policy – all five in Africa.

Most countries currently implementing CCM of pneumonia (22/27) reported, at the time of data collection, intentions to expand the strategy, usually gradually (20), occasionally rapidly (2). Other country directions included implementation of what donors would fund (2), pilot-test (2) and no plan (1). Almost half of the 26 countries without current CCM of pneumonia implementation for which we have data (12/26) were interested in moving ahead with CCM of pneumonia through policy dialogue (4), pilot-test (2), gradual expansion (1), rapid expansion (3) or whatever donors would fund (2); but more (14/26) had no plan to implement the strategy.

Programme characteristics

The Ministry of Health was the lead agency in most of the 27 countries implementing CCM of pneumonia, especially in Asia, although NGOs and research institutions played important roles in some countries (Table 2). CHWs were usually community workers in Africa and government or NGO

Table 1. Reported CCM of pneumonia policies and implementation among 54 high mortality countries, by geographic region

Policy	Implementation								
	Yes			No			Total		
	Asia ^a	Africa ^b	Total	Asia ^a	Africa ^b	Total	Asia ^a	Africa ^b	Total
Supportive	9	7	16	0	4	4	9	11	20
Neither supportive nor against	3	7	10	2	6	8	5	13	18
Against	0	1	1	2	13	15	2	14	16
Total	12	15	27	4	23	27	16	38	54

CCM, community case management.

^a Afghanistan, Azerbaijan, Bangladesh, Cambodia, China, India, Indonesia, Iraq, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Tajikistan, Turkmenistan and Yemen.

^b Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of Congo, Djibouti, Egypt, Equatorial Guinea, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, United Republic of Tanzania, Togo, Uganda, Zambia and Zimbabwe.

workers in Asia. A third of countries reported that their CHWs were paid, more commonly in Asia. About half of countries reported that clients paid for care, and of these, half offered fee exemptions, more commonly in Asia. Nearly all countries reported quality assurance through various methods.

Countries implementing CCM of pneumonia commonly delivered other curative interventions at the community level. All reported dispensing oral rehydration solution, but far fewer dispensed zinc to treat diarrhoea. Most countries delivered community-based treatment for malaria, except for four countries in Asia where the burden of malaria was low. Artemisinin combination therapies (ACT) were dispensed in about half the countries, either solely (5) or in addition to other antimalarials (8).

We obtained further details on the type of policy support for 24 countries initially reporting supportive policy for or implementation of CCM of pneumonia (Table 2). More than two-thirds of countries reported official written policies or official recommendations. In fewer countries, the strategy was locally recommended (3) or permitted in pilot areas (4).

Respondents from 24 countries reported the scale of CCM of pneumonia either as a percentage of administrative units or of population covered. Scale of implementation was limited in many countries, with four countries (Bangladesh, Cambodia, Ethiopia, Zambia) reporting < 1% coverage and an additional seven countries reporting < 10% coverage. Afghanistan, the Gambia, Malawi, Nepal, Pakistan and Senegal reported more than 50% coverage nationally.

Implementation of CCM of pneumonia commenced early in some countries [the Gambia (1980), India (1990), Myanmar (1991), Pakistan (1994)], but more than half of responding countries had started CCM of pneumonia since 2004.

The 30 CHW cadres from 23 countries reporting implementation of CCM of pneumonia varied in educational background and training (Table 3). Asian countries employed more highly educated workers and provided longer training than African countries. Typical work settings also varied, with Asian CHWs more likely to work from government facilities, while their African counterparts more likely worked from home. Sixteen of the 23 countries reported a single CHW cadre, and 11 of these worked only in their communities – from home, community buildings, or both. They were less educated and less trained than their facility-attached counterparts. In two countries (the Gambia and Nepal), illiterate CHWs were commonly employed.

Most countries (19/22) used oral co-trimoxazole to treat suspected pneumonia, either solely (13) or with amoxicillin as an alternative (6); three countries used only amoxicillin. Four countries (Afghanistan, China, Madagascar and Nepal) used a 3-day treatment regimen. Nearly all CHWs (23 of 25 cadres in 20 countries) referred severe pneumonia, many (9/23) without administering the first dose.

Treatment gap

The 35 countries with the highest child mortality accounted for approximately 120 million cases of childhood pneumonia annually, of which 43 million

children failed to see an appropriate provider – the “pneumonia treatment gap” (Table 4). An estimated 1.7 million children died from pneumonia in these countries, accounting for 85% of the world's estimated 2 million deaths due to childhood pneumonia annually.

We received information from 33 of these 35 highest mortality countries. Only 14 of the 33 reported permissive policies and implementation of CCM of pneumonia. These 14 countries accounted for much of the pneumonia burden among these 35 highest mortality countries (82% of cases, 70% of treatment gap and 63% of mortality), but the scale of implementation was often small. Other countries that had heavy burdens of childhood pneumonia and large treatment gaps reported piloting the strategy (Ethiopia) or were planning to implement it soon (Mozambique, Nigeria and Rwanda, among others). As of writing, some countries with high pneumonia burden and large treatment gaps (e.g. Angola, Cameroon, the United Republic of Tanzania) reported no plans to test or implement the CCM of pneumonia.

Discussion

Countries accounting for nearly half of all pneumonia deaths reported *some* CCM of pneumonia, with more progress in Asia than Africa. Reported plans to introduce or scale-up CCM of pneumonia underscore widespread acceptance of the strategy, no doubt spurred by international policy recommendations^{18,19} and some mature programmes with over a decade of

experience,^{25,26} including some on a very large scale.²⁶ Indeed, the fact that Nepal is not among the 35 priority countries is probably due, in part, to its CCM of pneumonia programme, which currently covers 69% of children under five. Indeed, more than half of Nepal's expected pneumonia cases (56%) in 42 programme districts (of 75 districts) currently receive treatment, and CCM of pneumonia provides over half of that treatment.⁹

However, sustained effort is still needed to ensure that children receive appropriate treatment for pneumonia. Countries accounting for nearly a quarter of annual global pneumonia mortality (502 000), most with low coverage of facility-based treatment, do not implement CCM of pneumonia (Table 4). Where CCM of pneumonia is implemented, it often occurs on a limited scale or in pilot projects, commonly supported by international agencies and donors, especially in Africa.

Challenges in policy and programming

Health professionals in many developing countries believe that only health professionals at a health facility should treat pneumonia. A common reason for caution is concern about CHWs' possible misuse of antimicrobials and increased drug resistance.²⁷ However, CCM of pneumonia, which uses IMCI algorithms, could reduce both the improper use of antibiotics for cough and cold and increase their proper use for algorithm-positive pneumonia^{28,29} provided that supervision reinforces CHW performance. We found that most countries support the distribution of antimalarials in the community, often the expensive ACTs. Implementation and policy discussions regarding introduction of antimalarials in the community can reinvigorate dialogue about CCM of pneumonia. Furthermore, accessible treatment needs to be made available for both pneumonia and malaria in the community; overlapping, indistinguishable presentations of malaria and pneumonia in malaria-endemic areas are well documented.^{30–32}

The challenge to increase coverage of appropriate treatment for childhood pneumonia is twofold: expanding and reinforcing existing facility-based health

Table 2. Description of programmes among 27 countries reporting implementation of CCM of pneumonia, by geographic region

Characteristic	No. of reports ^a		
	Asia ^b	Africa ^c	Total
Lead agency of CCM programme^d			
Ministry of Health	11/12 (92)	10/15 (67)	21/27 (78)
Research institution	0/12 (0)	3/15 (20)	3/27 (11)
NGOs	3/12 (25)	4/15 (27)	7/27 (26)
CHW characterization^d			
Community worker	3/12 (25)	13/15 (87)	16/27 (59)
Government worker	8/12 (67)	4/15 (27)	12/27 (44)
NGO/project worker	6/12 (50)	3/15 (20)	9/27 (33)
Financial payment for CHW			
Client pays for treatment	4/12 (33)	8/14 (57)	12/26 (46)
If pays, some exemptions	3/4 (75)	3/8 (38)	6/12 (50)
Quality monitoring			
10/11 (91)	14/14 (100)	24/25 (92)	
Scope of programme^d			
ORS	12/12 (100)	15/15 (100)	27/27 (100)
Zinc for diarrhoea	3/12 (25)	7/15 (47)	10/27 (37)
Antimalarials (non-ACT)	6/12 (50)	12/15 (80)	18/27 (67)
Antimalarials (ACT)	4/12 (33)	9/15 (60)	13/27 (48)
Type of supporting policy			
Official written policy	2/10 (20)	2/14 (14)	4/24 (17)
Official recommendation	7/10 (70)	6/14 (43)	13/24 (54)
Locally recommended	0/10 (0)	3/14 (21)	3/24 (13)
No policy, but allowed in pilot	1/10 (10)	3/14 (21)	4/24 (17)

ACT, artemisinin combination therapies; CCM, community case management; CHW, community health worker; NGO, nongovernmental organization; ORS, oral rehydration solution.

^a Values in parentheses are percentages.

^b Afghanistan, Bangladesh, Cambodia, China, India, Indonesia, Myanmar, Nepal, Pakistan, Tajikistan, Turkmenistan and Yemen.

^c Benin, Democratic Republic of Congo, Ethiopia, Gambia, Ghana, Madagascar, Malawi, Mali, Niger, Senegal, Sierra Leone, Sudan, Togo, Uganda and Zambia.

^d Multiple responses possible.

care and introducing and/or scaling-up CCM of pneumonia. Where CCM of pneumonia is most needed, it is most difficult to implement – in high-mortality countries with weak infrastructure, limited access to health services and dispersed, rural populations. In these areas, the existing weak support for facility-based care renders supporting CHWs all the more challenging.³³ Clearly, experience from similar contexts³⁴ and technical assistance are invaluable. Save the Children, CORE Inc. and the United States Agency for International Development (USAID)'s Basic Support for Institutionalizing Child Survival (BASICS), with support from UNICEF and WHO, are developing and testing "CCM Essentials", a forthcoming guide for district health officers to implement CCM of pneu-

monia and other infections (personal communication, Lynette Walker, 2008). Policy need not be a barrier for implementation of CCM of pneumonia. We found that official, written policies were, in fact, uncommon. Key documents, such as memoranda from Ministry of Health officials and/or adaptations of treatment guidelines³⁵ – as well as closely monitored pilot sites³⁶ – may speed the uptake of CCM.

Programmes differed greatly in their attributes, CHW profiles, scope and scale, as noted by others.³⁷ Programmes and projects in Asian countries were more likely to be led by the Ministry of Health, while in Africa they were more commonly led by academics or NGOs. Some countries, commonly in Asia, reported employing paid professional workers, while others employed

Table 3. Characteristics of 30 CHWs from 23 countries^a reporting implementation of CCM of pneumonia, by geographic region and work setting

Characteristic	Work from health facility			Work from community only			Total		
	Asia	Africa	Total	Asia	Africa	Total	Asia	Africa	Total
Total (<i>n</i> = CHW cadre)	11	8	19	4	7	11	15	15	30
Average education of worker									
Primary school or less	2	1 ^b	3	3	6	9	5	7	12
Middle school	0	4 ^b	4	0	1	1	0	5	5
High school	3	2 ^b	5	1	0	1	4	2	6
Graduate/professional	6	0 ^b	6	0	0	0	6	0	6
Duration of training									
< 2 weeks	0	3 ^b	3	1	3	4	1	6	7
2–12 weeks	4	2 ^b	6	1	4	5	5	6	11
4–12 months	0	1 ^b	1	2	0	2	2	1	3
> 1 year	7	1 ^b	8	0	0	0	7	1	8
Work site^c									
Home	5	6	11	4	6	10	9	12	21
Community building	5	4	9	2	3	5	7	7	14
Government health facility	9	4	13	0	0	0	9	4	13
Private health facility	1	0	1	0	0	0	1	0	1
NGO health facility	3	5	8	0	0	0	3	5	8

CCM, community case management; CHW, community health worker; NGO, nongovernmental organization.

^a Countries with one CHW: Benin, Democratic Republic of Congo, Ethiopia, Gambia, Ghana, Malawi, Mali, Niger, Senegal, Sudan, and Togo (in Africa); Afghanistan, Cambodia, China, Nepal and Pakistan (in Asia). Countries with two CHWs: Madagascar and Uganda (in Africa); Bangladesh, India, Indonesia, Myanmar and Tajikistan (in Asia).

^b Missing data from one country.

^c Multiple responses possible.

community-based volunteers trained for shorter periods, specifically in CCM of pneumonia. Different contexts have different models.

Introducing, scaling-up and sustaining programmes will require careful consideration of the country context, including continued funding and organizational support. Some countries achieved scale through the Ministry of Health collaborating with multilaterals, bilaterals, NGOs and other partners for initial district-wide implementation in selected districts,^{34,38} where all partners implemented a defined CCM package with standardized training materials, supplies, reporting mechanisms, and monitoring and supervision systems. The initial results and experiences could engage other partners and donors to expand this approach. In other countries, the CCM approach was adapted as national policy and incrementally expanded by the Ministry of Health.²⁶

Methodological limitations

We relied on respondents' definitions of CHWs, which included some cadres, especially in Asia, that were more

professional than CHWs limited to their communities. The approximate geographical or population coverage of CCM of pneumonia programmes was difficult to assess; no standard measure was available that accounted for the population served. Our results surely overestimated the implementation of CCM of pneumonia, given that the coverage of the more highly trained CHWs was probably limited, that some of the cadres included in our analysis would not be considered CHWs by some definitions,^{39,40} and that the reported scale was likely a best-case scenario. Responses from different experts in the same country were sometimes inconsistent. We reconciled these as much as possible. Some discrepancies may have resulted from policy and programme information that was changing.

We derived the "pneumonia treatment gap" from the product of modelled estimates of annual incidence of pneumonia and reported care-seeking for suspected pneumonia (defined in surveys as "cough" and "difficult or rapid breathing"). Care-seeking for

suspected pneumonia to an appropriate health provider was used as a proxy for appropriate treatment in our analysis. This indicator has several limitations, including mothers' uncertain ability to recognize⁴¹ and recall⁴² signs of childhood pneumonia, and the lack of information about antibiotic treatment. New rounds of Multiple Indicator Cluster Surveys and Demographic Health Surveys are directly assessing the proportion of children with suspected pneumonia that received an antibiotic, but further methodological work is needed.

One might ask whether the international health community needs another pneumonia indicator in addition to expected cases per year, care-seeking, and deaths per year, especially one that derives from the first two, both of which are estimates. We propose the treatment gap as an intuitively understandable measure of need, especially for non-technical audiences. The gap characterizes the scale of the challenge for which CCM of pneumonia is likely to be part of the response, along with strengthening availability

Table 4. Priority countries by CCM of pneumonia policy and implementation profiles, under-five mortality rate, pneumonia burden and reported scale

Country	< 5 mortality		Pneumonia burden				Reported scale
	Rate (per 1000 live births) ²³	Deaths/year ^a (1000s) ²³	Cases/year ^a (1000s) ²⁴	Care-seeking (%) ²³	Treatment gap: untreated cases/year (1000s)	Death/year (1000s) ²⁰	
Permissive policy and CCM of pneumonia implemented							
Afghanistan	257	327	1 980	28	1 425	89	259/398 (65%) districts
Bangladesh	69	277	6 439	30	4 507	51	~1% of total population
Benin	148	53	358	35	233	11	2/77 (3%) communes
China	24	415	21 159	unknown	unknown	72	unknown
Congo (Democratic Republic of)	205	620	3 854	36	2 466	132	28/515 (5%) districts
India	76	2 067	42 952	69	13 315	410	CHW in 25/700 (4%) districts
Indonesia	34	151	6 023	61	2 349	25	unknown
Mali	217	126	837	36	536	34	pilot in 1/59 (2%) districts
Niger	253	173	1 002	27	732	48	350/10 000 (3.5%) villages
Pakistan	97	423	9 824	66	3 340	92	~60% total population
Sierra Leone	270	71	380	48	198	18	pilot in 1/13 (8%) districts
Sudan	89	109	2 014	57	866	16	6/15 (40%) northern states
Uganda	134	188	1 200	67	396	41	9/81 (11%) districts
Zambia	182	86	513	69	159	19	~2% of total population
Subtotal	–	5 086	98 535	–	30 522	1 058	–
No permissive policy but CCM of pneumonia implemented							
Ethiopia	123	389	3 951	19	3 200	114	2/587 (0.3%) districts
Subtotal	–	389	3 951	–	3 200	114	–
Permissive policy but CCM of pneumonia not implemented							
Central African Republic	175	27	223	32	152	5	0
Chad	209	101	601	12	529	21	0
Côte d'Ivoire	127	87	868	35	564	25	0
Equatorial Guinea	206	4	24	unknown	unknown	1	0
Mozambique	138	118	1 106	55	498	25	0
Nigeria	191	1 129	6 170	33	4 134	211	0
Rwanda	160	67	305	28	219	17	0
Subtotal	–	1 533	9 296	–	6 095	305	–
No permissive policy and CCM of pneumonia not implemented							
Angola	260	206	1 050	58	441	48	0
Burkina Faso	204	131	994	39	606	27	0
Burundi	181	69	380	38	236	14	0
Cameroon	149	97	865	35	562	18	0
Congo	126	17	203	48	105	3	0
Djibouti	130	3	20	62	7	1	0
Guinea	161	60	490	42	284	12	0
Guinea-Bissau	200	16	73	57	32	4	0
Kenya	121	175	1 576	49	804	32	0
Swaziland	164	5	45	60	18	1	0
United Republic of Tanzania	118	188	1 889	59	774	37	0
Subtotal	–	967	7 584	–	3 870	197	–
No information about CCM of pneumonia							
Liberia	235	43	157	70	47	9	–
Somalia	145	54	655	13	570	19	–
Subtotal	–	97	812	–	617	28	–
Grand total	–	8 072	120 178	–	43 455	1 702	–

CCM, community case management; CHW, community health worker.

^a Numbers rounded to nearest thousand.

David Marsh et al.

and quality of case management at existing service delivery points and mobilizing demand for such care. In addition, the treatment gap summarizes the challenge across countries with different levels of care-seeking. We recognize that the “percentage of expected cases treated” would perform similarly, assuming available, reliable treatment counts.

The way forward

Standardization is needed, including a definition of CCM of pneumonia, and indicators and measures of coverage that take into account the population needing the strategy. The global public health community needs an operational definition of this strategy to better describe, monitor and evaluate CCM of pneumonia programmes. Additionally, monitoring and reporting progress will require methodologically sound, standardized indicators of programme processes and progress, as well as national and local policies.

CCM of pneumonia has a broad and growing constituency: WHO, UNICEF, Ministries of Health, donors, academics and NGOs, including technical groups like BASICS, are important sources of technical support and advocacy. Countries with supportive policies and successful CCM programmes can provide technical support and exchange lessons learned with interested neighbouring countries. Development partners and countries will need to work together while implementing CCM of pneumonia programmes to address the key operational issues of microplanning, supply-chain management, logistics, supervision, training, coaching, and monitoring and evaluation. Operational research, pilot projects, and monitoring and evaluation results can guide introduction and scale-up of CCM of pneumonia. Where supportive policy for CCM of pneumonia is lacking, development partners and academic institutions should jointly advocate for policy change and

support implementation. Momentum for community-based treatment of malaria should facilitate introduction of CCM of pneumonia. WHO, UNICEF and other technical assistance partners should support the development and adoption of policies, projects, programmes, indicators and tools for CCM of pneumonia, taking advantage of the momentum around community-based strategies and approaches as key to achieving MDG 4 and other health-related MDGs.²³ ■

Acknowledgements

We thank Jasmina Acimovic (UNICEF-NY), Eric Starbuck (Save the Children), Martin Weber (WHO-Indonesia), colleagues at WHO and UNICEF regional offices, and colleagues at national MoH, UNICEF, WHO, BASICS and Save the Children offices.

Competing interests: None declared.

Résumé

Prise en charge communautaire des cas de pneumonie : une stratégie sur le point de l'emporter?

La pneumonie est la principale cause de mortalité de l'enfant dans le monde. La prise en charge communautaire (PCC) des cas de pneumonie par des agents de santé appartenant à la communauté est une stratégie faisable et efficace, permettant de compléter la prise en charge en établissement de soins pour les habitants des zones ayant peu accès à ces établissements. Nous avons mené une enquête par l'intermédiaire d'experts dans les 57 pays d'Afrique et d'Asie supportant les plus forts niveaux de mortalité et de taux de mortalité de l'enfant pour évaluer au stade actuel les politiques, la mise en œuvre et les plans concernant la PCC de la pneumonie. Environ un tiers des pays (20/54) ont indiqué qu'ils avaient des politiques appuyant la PCC de la pneumonie et un autre tiers (18/54) n'ont signalé aucune politique à l'encontre de cette stratégie. La moitié des pays (27/54) ont rapporté que la PCC de la pneumonie était mise en œuvre sur leur territoire, mais

souvent à petite échelle. Un petit nombre de pays soutiennent des programmes à grande échelle. Les programmes, les agents de santé communautaires et les paramètres politiques varient fortement d'un pays appliquant la PCC à un autre. Environ la moitié (12/26) des pays qui n'appliquent pas la PCC prévoient d'adopter cette stratégie. Le développement de la PCC de la pneumonie, en tant que stratégie pour faire face aux lacunes de la prise en charge classique et aider à la réalisation de l'objectif du millénaire pour le développement n° 4, s'amplifie fortement. Il reste à surmonter les difficultés suivantes : (1) intégrer cette stratégie à la politique sanitaire et la mettre en œuvre dans les pays fortement touchés par la pneumonie ; (2) accroître la couverture de cette stratégie dans les pays qui l'appliquent actuellement ; et (3) mieux définir et suivre la mise en œuvre au niveau national.

Resumen

Tratamiento comunitario de los casos de neumonía: ¿punto de inflexión?

La neumonía es la causa principal de mortalidad en la niñez a nivel mundial. El tratamiento comunitario de los casos (TCC) de neumonía por los agentes de salud de la comunidad es una estrategia viable y eficaz para complementar el tratamiento basado en los centros sanitarios en las zonas que carecen de acceso a esos centros. Encuestamos a diversos expertos de los 57 países africanos y asiáticos que presentan los niveles y tasas más altos de mortalidad en la niñez a fin de evaluar las políticas, la aplicación y los planes actuales respecto al TCC

de la neumonía. Alrededor de una tercera parte (20/54) de los países informaron de políticas de apoyo al TCC, y otra tercera parte (18/54) no informó de ninguna política en relación con esa estrategia. La mitad (27/54) de los países notificaron cierta aplicación del TCC de la neumonía, pero a menudo a pequeña escala. Unos cuantos países mantienen un programa a gran escala. Los programas, los agentes de salud comunitarios y los parámetros normativos diferían mucho entre los países que aplicaban el TCC. Alrededor de la mitad (12/26) de los países

que no lo aplican están planteándose adoptar la estrategia. Gana terreno la idea de adoptar el TCC de la neumonía como estrategia para solucionar la brecha terapéutica asociada a esa enfermedad y ayudar a alcanzar el cuarto Objetivo de Desarrollo del Milenio. No obstante, persisten los retos para: (1) incluir esa

estrategia en la política y aplicarla en los países con alta carga de neumonía; (2) aumentar la cobertura de esta estrategia en los países que ya la están aplicando; y (3) definir y vigilar mejor su aplicación en los países.

ملخص

هل يمر التدبير المجتمعي لحالات الالتهاب الرئوي بنقطة حاسمة؟

من البلدان على تنفيذ برنامج واسع النطاق للتدبير المجتمعي. ولوحظ تفاوت كبير في المعايير الخاصة ببرامج المعالجة وبالعاملين في صحة المجتمع وبالسياسات، في ما بين البلدان المنفذة للتدبير المجتمعي. كما لوحظ أن نحو نصف البلدان غير المنفذة للتدبير المجتمعي (26/12) تخطط لتنفيذ الاستراتيجية. ويجري حالياً حشد الزخم لتبني التدبير المجتمعي لحالات الالتهاب الرئوي كاستراتيجية للتصدي لفجوة المعالجة، وللمساعدة على بلوغ المرمى الرابع من المرامي الإجمالية للألفية. ولا تزال هناك تحديات تتمثل في ما يلي: (1) إدخال هذه الاستراتيجية في السياسات، وتنفيذها في البلدان التي ترزح تحت عبء الالتهاب الرئوي الثقيل؛ (2) زيادة التغطية بهذه الاستراتيجية في البلدان التي تنفذها حالياً؛ (3) وتحسين عملية تعريف ورصد أنشطة تنفيذ الاستراتيجية على المستوى القطري.

الالتهاب الرئوي هو المسبب الرئيسي لوفيات الأطفال في العالم. ويمثل التدبير المجتمعي لحالات الالتهاب الرئوي، على يد العاملين في صحة المجتمع، استراتيجية مجدية وفعالة وعنصراً مكملاً للمعالجة التي تتم في المرافق الواقعة في المناطق التي يصعب فيها الوصول إلى تلك المرافق. وقد قام الباحثون في هذه الدراسة بتقصي آراء الخبراء في 57 بلداً أفريقياً وآسياً تقع بها أعلى مستويات ومعدلات وفيات الأطفال، بغرض تقييم السياسات الحالية المتعلقة بالتدبير المجتمعي لحالات الالتهاب الرئوي، ومدى تنفيذها، وخططها. وقد أبلغ نحو ثلث البلدان (54/20) عن وجود سياسات تدعم التدبير المجتمعي للحالات، في حين أشار ثلث آخر (54/18) إلى عدم وجود سياسات تعارض الاستراتيجية. وأبلغ نصف البلدان (54/27) عن تنفيذ جزئي للتدبير المجتمعي، ولكن على نطاق محدود غالباً. ويحافظ عدد قليل

References

1. Bryce J, Boschi-Pinto C, Shibuya K, Black RE. WHO estimates of the causes of death in children. *Lancet* 2005;365:1147-52. PMID:15794969 doi:10.1016/S0140-6736(05)71877-8
2. Roth DE, Caulfield LE, Ezzati M, Black RE. Acute lower respiratory infections in childhood: opportunities for reducing the global burden through nutritional interventions. *Bull World Health Organ* 2008;86:356-64.
3. Mulholland K. Childhood pneumonia mortality – a permanent global emergency. *Lancet* 2007;370:285-9. PMID:17658399 doi:10.1016/S0140-6736(07)61130-1
4. *Technical basis for the WHO recommendations on the management of pneumonia in children at first-level facilities*. Geneva: WHO; 1991 (WHO/ARI/91.2).
5. Wardlaw T, Salama P, Johansson EW, Mason E. Pneumonia: the leading killer of children. *Lancet* 2006;368:1048-50. PMID:16997649 doi:10.1016/S0140-6736(06)69334-3
6. Bryce J, Victora CG, Habicht JP, Black RE, Scherpbier RW. Programmatic pathways to child survival: results of a multi-country evaluation of Integrated Management of Childhood Illness. *Health Policy Plan* 2005;20 Suppl 1:5-17. doi:10.1093/heapol/czi055
7. *Progress for children: a world fit for children* [Statistical Review. Number 6]. New York: UNICEF; 2007.
8. Schellenberg JA, Victora CG, Mushi A, de Savigny D, Schellenberg D, Mshinda H, et al. Inequities among the very poor: health care for children in rural southern Tanzania. *Lancet* 2003;361:561-6. PMID:12598141 doi:10.1016/S0140-6736(03)12515-9
9. Dawson P, Pradhan Y, Houston R, Karki S, Poudel D, Hodgins S. From research to national expansion: 20 years' experience of community-based management of childhood pneumonia in Nepal. *Bull World Health Organ* 2008;86:339-43.
10. Shann F, Hart K, Thomas D. Acute lower respiratory tract infections in children: possible criteria for selection of patients for antibiotic therapy and hospital admission. *Bull World Health Organ* 1984;62:749-53. PMID:6334573
11. Hadi A. Diagnosis of pneumonia by community health volunteers: experience of BRAC, Bangladesh. *Trop Doct* 2001;31:75-7. PMID:11321276
12. Charleston R, Johnson L, Tam L. CHWs trained in ARI management. *Sante Salud* 1994;4:14. PMID:12179550
13. Mehnaz A, Billoo AG, Yasmeen T, Nankani K. Detection and management of pneumonia by community health workers – a community intervention study in Rehri village, Pakistan. *J Pak Med Assoc* 1997;47:42-5. PMID:9071859
14. *Case management of acute respiratory infections in children: intervention studies*. WHO: Geneva; 1988 (WHO/ARI/88.2). p. 31.
15. Rowe SY, Kelly JM, Olowe MA, Kleinbaum DG, McGowan JE Jr, McFarland DA, et al. Effect of multiple interventions on community health workers' adherence to clinical guidelines in Siaya district, Kenya. *Trans R Soc Trop Med Hyg* 2007;101:188-202. PMID:17064747 doi:10.1016/j.trstmh.2006.02.023
16. Kelly JM, Osamba B, Garg RM, Hamel MJ, Lewis JJ, Rowe SY, et al. Community health worker performance in the management of multiple childhood illnesses: Siaya District, Kenya, 1997-2001. *Am J Public Health* 2001;91:1617-24. PMID:11574324
17. Sazawal S, Black RE. Effect of pneumonia case management on mortality in neonates, infants, and preschool children: a meta-analysis of community-based trials. *Lancet Infect Dis* 2003;3:547-56. PMID:12954560 doi:10.1016/S1473-3099(03)00737-0
18. Meeting report: *Evidence base for community management of pneumonia, Stockholm, 11-12 June*. Geneva: WHO; 2002 (WHO/FCH/CAH/02.23).
19. *Joint statement: management of pneumonia in community settings*. Geneva: New York: WHO/UNICEF; 2004.
20. *Pneumonia: the forgotten killer of children*. New York/Geneva: UNICEF/WHO; 2006.
21. Bryce J, Terreri N, Victora CG, Mason E, Daelmans B, Bhutta ZA, et al. Countdown to 2015: tracking intervention coverage for child survival. *Lancet* 2006;368:1067-76. PMID:16997661 doi:10.1016/S0140-6736(06)69339-2
22. Composition of macro geographical (continental) regions, geographical sub-regions, and selected economic and other groupings. United Nations Statistics Division. Available from: <http://unstats.un.org/unsd/methods/m49/m49regin.htm#africa> [accessed 4 April 2008].
23. *State of the world's children*. New York: UNICEF; 2007.
24. Rudan I, Boschi-Pinto C, Biloglav Z, Mulholland K, Campbell H. Epidemiology and etiology of childhood pneumonia. *Bull World Health Organ* 2008;86:408-16.
25. Bang AT, Bang RA, Tale O, Sontakke P, Solanki J, Wargantiwar R, et al. Reduction in pneumonia mortality and total childhood mortality by means of community-based intervention trial in Gadchiroli, India. *Lancet* 1990;336:201-6. PMID:1973770 doi:10.1016/0140-6736(90)91733-Q
26. Lady Health Worker Programme. *External evaluation of the national programme for family planning and primary health care*. Quantitative Survey Report. Oxford: Oxford Policy Management; 2002.

David Marsh et al.

27. D'Alessandro U, Talisuna A, Boelaert M. Editorial: should artemisinin-based combination treatment be used in the home-based management of malaria? *Trop Med Int Health* 2005;10:1-2. PMID:15655007 doi:10.1111/j.1365-3156.2004.01375.x
28. Qazi SA, Rehman GN, Khan MA. Standard management of acute respiratory infections in a children's hospital in Pakistan: impact on antibiotic use and case fatality. *Bull World Health Organ* 1996;74:501-7. PMID:9002330
29. Gouws E, Bryce J, Habicht JP, Amaral J, Pariyo G, Schellenberg JA, et al. Improving antimicrobial use among health workers in first-level facilities: results from the multi-country evaluation of the Integrated Management of Childhood Illness strategy. *Bull World Health Organ* 2004;82:509-15. PMID:15508195
30. English M, Punt J, Mwangi I, McHugh K, Marsh K. Clinical overlap between malaria and severe pneumonia in Africa children in hospital. *Trans R Soc Trop Med Hyg* 1996;90:658-62. PMID:9015508 doi:10.1016/S0035-9203(96)90423-X
31. Källander K, Nsungwa-Sabiiti J, Peterson S. Symptom overlap for malaria and pneumonia – policy implications for home management strategies. *Acta Trop* 2004;90:211-4. PMID:15177148 doi:10.1016/j.actatropica.2003.11.013
32. O'Dempsey TJ, McArdle TF, Laurence BE, Lamont AC, Todd JE, Greenwood BM. Overlap in the clinical features of pneumonia and malaria in African children. *Trans R Soc Trop Med Hyg* 1993;87:662-5. PMID:8296367 doi:10.1016/0035-9203(93)90279-Y
33. Haines A, Sanders D, Lehmann U, Rowe AK, Lawn JE, Jan S, et al. Achieving child survival goals: potential contribution of community health workers. *Lancet* 2007;369:2121-31. PMID:17586307 doi:10.1016/S0140-6736(07)60325-0
34. Dawson P. Community-based IMCI in Nepal: partnerships to increase access, quality, and scale of childhood pneumonia treatment through female community health workers. Paper presented at meeting: *Reaching Communities for Child Health: Advancing PVO/NGO Technical Capacity and Leadership for HH/C IMCI, 17-19 January 2001, Baltimore, MD*. pp. A52-9.
35. *Treating children with a cough or difficult breathing: a course for community health workers*. Geneva: WHO; 1992.
36. Sylla A, Gueye EH, N'Diaye O, Sarr CS, Ndiaye D, Diouf S, et al. Low level educated community health workers training: a strategy to improve children access to acute respiratory treatment in Senegal. *Arch Pediatr* 2007; 14:244-8. PMID:17175144 doi:10.1016/j.arcped.2006.11.022
37. Winch PJ, Gilroy KE, Wolfheim C, Starbuck ES, Young MW, Walker LD, et al. Intervention models for the management of children with signs of pneumonia or malaria by community health workers. *Health Policy Plan* 2005; 20:199-212. PMID:15965032 doi:10.1093/heapol/czi027
38. *Senegal child survival case study: technical report*. Arlington, VA: BASICS II for the United States Agency for International Development (USAID); 2004.
39. Lewin SA, Dick J, Pond P, Zwarenstein M, Aja G, van Wyk B, et al. Lay health workers in primary and community health care. *Cochrane Database Syst Rev* 2005;(1):CD004015. PMID:15674924
40. *Strengthening the performance of community health workers in primary health care* [Technical Report Series, No. 780]. Geneva: WHO; 1989.
41. Muhe L. Mothers' perceptions of signs and symptoms of acute respiratory infections in their children and their assessment of severity in an urban community of Ethiopia. *Ann Trop Paediatr* 1996;16:129-35. PMID:8790676
42. Harrison LH, Moursi S, Guinena AH, Gadowski AM, el-Ansary KS, Khallaf N, et al. Maternal reporting of acute respiratory infection in Egypt. *Int J Epidemiol* 1995;24:1058-63. PMID:8557440 doi:10.1093/ije/24.5.1058