

# Community-based interventions for diarrhoeal diseases and acute respiratory infections in Nepal

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**Problem** Acute diarrhoeal diseases and acute respiratory infections (ARIs) are the most common causes of child mortality worldwide. Safe, effective and inexpensive solutions are available for prevention and control, but they do not reach needy communities.

**Approach** Interventions based on research were designed to train and engage community health volunteers (CHVs) to implement a community-based control programme in Nepal. With the advent of the Integrated Management of Childhood Illnesses (IMCI) strategy, this programme subsequently emerged as a community-based IMCI but retained its mainstream activities. We reviewed and analysed policy decisions and programme development, implementation and expansion.

**Local setting** Severe resource constraints and difficult terrain limit access to health-care facilities in many parts of Nepal.

**Relevant changes** In districts with interventions, more cases of acute diarrhoea and of ARIs (including pneumonia) were reported. The proportion of diarrhoea cases with dehydration and the proportion of ARI cases with pneumonia were significantly lower in districts with interventions. Case fatality rates due to acute diarrhoea and the proportion of severe pneumonia among ARI cases across the country showed a significant trend towards a decrease from 2004 to 2007. Nepal has succeeded in training many CHVs and is on course to meet the Millennium Development Goal for child mortality.

**Lessons learnt** The burden of acute diarrhoea and ARIs can be reduced by training and engaging CHVs to implement community-based case management and prevention strategies. Monitoring, supervision and logistical support are essential. Policy decisions based on evidence from national research contributed to the success of the programme.

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

Acute diarrhoeal diseases and acute respiratory infections (ARI), especially pneumonia, remain the leading causes of child mortality globally. They are also the leading causes of disability-adjusted life years across all age groups.<sup>1</sup> The South-East Asia Region (<http://www.who.int/about/regions/searo>) of the World Health Organization (WHO) carries 30% of the global burden, and these diseases affect mostly poor and marginalized groups. Simple, safe and inexpensive interventions with proven effectiveness are now available, but low coverage has resulted in poor control of these diseases.<sup>2</sup> This article describes a strategy that involves community health volunteers (CHVs), and that has worked in Nepal. As a result of the interventions we report here, Nepal is headed towards achieving Millennium Development Goal 4: to reduce child mortality. Our findings are relevant for countries with similar demographics and high burdens of these diseases.

## The context

Nepal recorded high under-five mortality averaging about 170 annual deaths per 1000 in the early 1980s, and now reports 61 per 1000.<sup>3,4</sup> WHO-supported programmes for the control of diarrhoeal diseases and respiratory infections started during the 1980s and reduced child mortality. More recently, Nepal developed innovations including a community-based programme for the control of ARI and

diarrhoeal diseases. As a result, Nepal is now on course to meet Millennium Development Goal 4 despite many constraints and challenges. However, many other countries in the region that report higher disease burdens<sup>5,6</sup> may benefit from community-based interventions similar to those used in Nepal.

## Approach

We reviewed the evolution of relevant health policies and programmes used during the preceding 20 years, examined the processes and events that influenced these policies and evaluated the impact of community-based interventions. Our analysis was based on interviews with past and present policy-makers and programme managers and a review of the literature, annual reports and work plans of the Ministry of Health.<sup>7</sup> To evaluate impact we analysed quantitative data from the Health Management Information System. Incidences of diarrhoea and ARI in Nepal's 75 districts were calculated with each district's under-five population according to the 2001 national census as the denominator.

## Programme development

A community-based national programme to control diarrhoeal diseases was launched in 1982. A working group oversaw planning, budgeting, management and logistics. Strategies included promoting home-based oral rehydration

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therapy and case management in health facilities. In 1991, district-level planning and community mobilization were included, and strategies were expanded to include oral rehydration therapy, together with oral rehydration corners in health centres and hospitals, and case management by peripheral health workers. In addition, district health managers were involved in social mobilization, programme planning and training. Diarrhoea case management was also assisted by traditional local practitioners and drug sellers.

Research based on national data established that CHVs could be trained to correctly diagnose and categorize the severity of pneumonia, as well as to improve case management at the community level.<sup>8,9</sup> Close monitoring, supportive supervision and proper management of logistics and supplies ensured quality of care. A working group for ARI created in 1992–1993 expanded case management of childhood pneumonia by involving women from the community who worked as volunteers. A programme to improve community-based care began with a case-control study in 1995: in two districts women volunteers participated in diagnosis and treatment, and in two other districts they participated in diagnosis and referral of cases to formal health facilities. In 1997 an evaluation supported by WHO found that the proportion of expected pneumonia cases that received correct treatment nearly doubled in the treatment group but there was no change in the referral group.<sup>10</sup>

Subsequent integration of programmes led to the establishment of a community-based ARI and diarrhoea control programme. Women – some with basic school education and some semi-literate or illiterate – are trained as CHVs by the Ministry of Health to diagnose, assess disease severity and danger signs, treat children and refer them to health facilities. This programme also provides nutritional and immunization services. Training curricula and modules based on WHO's Integrated Management of Childhood Illness (IMCI) strategy were simplified and adapted to make them interactive and suited to participation by these groups.<sup>4</sup> The value of modifying IMCI training is being recognized by many, including WHO.<sup>11</sup>

In its first year the programme was launched in five districts, including

two very remote districts with difficult terrain and access. The choice of sites for initial intervention was based on consensus between the Ministry of Health and Population, its development partners and district administrations. This approach ensured logistical support, monitoring and supervision, in contrast with IMCI programmes elsewhere, which often select facilities that can be easily accessed and equipped.<sup>12,13</sup> In 1999, this community-based control programme merged with the newly advocated IMCI strategy and acquired a new name: "community-based IMCI". The core components and functions of the original programme, however, remained unchanged.

The programme expanded gradually to cover 48 districts by the end of 2007, with plans to cover the remaining 27 districts by the end of 2009. In districts without the programme, current facility-based care and immunization programmes continue. Similarities in the terrain and social conditions in the country's 75 districts lead us to assume that pre-intervention patterns of disease epidemiology and risk factors are similar in districts that received and did not receive interventions. This assumption, however, has not been formally tested.

## Results

The impacts of community-based interventions were evaluated on the basis of data for 2006 and 2007, before the programme was expanded to 15 more districts. The rate of reported episodes of diarrhoea was higher in the 33 districts with community-based interventions. The 377 770 diarrhoea episodes reported in a total under-five population of 1 798 668 in districts with interventions represented 0.21 episodes per child per year. In the 42 districts without interventions, the 303 049 episodes reported in a total under-five population of 1 873 982 represented 0.16 episodes per child per year ( $\chi^2$  for the difference in proportions = 14 186;  $P < 0.01$ ).

In districts with interventions the proportion of diarrhoea episodes with some dehydration (110 956/377 770, 29.4%) was significantly lower than in districts without interventions (107 238/303 049, 35.4%;  $\chi^2 = 2820.4$ ;  $P < 0.01$ ). Likewise, the proportion of diarrhoea episodes with severe dehydration was lower in dis-

tricts that received interventions (3108/377 770, 0.8%) than in those without interventions (4465/303 049, 1.5%;  $\chi^2 = 646.5$ ;  $P < 0.01$ ). Between 2004 and 2007 more districts were included in the programme. During this period the proportions of diarrhoeal episodes with some dehydration or severe dehydration nationwide, as well as the national case fatality rates for acute diarrhoea, showed a significant trend towards a decrease (Table 1).

The rate of reported ARI cases was also higher in intervention districts (Table 2). In districts with interventions, 996 369 cases of ARI (55.4%) were reported in a total under-five population of 1 798 668, whereas in the 42 districts without interventions 501 990 cases (26.8%) were reported in a total under-five population of 1 873 982 ( $\chi^2 = 310 971$ ;  $P < 0.01$ ). In districts with interventions, pneumonia cases reported as pneumonia and severe pneumonia numbered 282 201 (15.7%) in the under-five population, whereas districts without interventions reported 200 297 cases (10.7%) ( $\chi^2 = 20 115$ ;  $P < 0.01$ ). In districts with interventions, the proportion of ARI cases reported as pneumonia (27.6%) was significantly lower than in districts without interventions (37.7%;  $\chi^2 = 15 802.6$ ;  $P < 0.01$ ). The proportion of ARI cases reported as severe pneumonia was also lower in districts that received interventions (0.7%) than in non-intervention districts (2.2%;  $\chi^2 = 6439.5$ ;  $P < 0.01$ ).

During the period from 2004 to 2007, the national pneumonia incidence remained unchanged at around 0.13 episodes per child per year, but the proportion of cases of ARI with pneumonia or severe pneumonia showed a significant trend towards a decrease. The ARI mortality rate remained low and did not show a trend towards a decrease (Table 1).<sup>14</sup>

If the programme were expanded to the remaining 42 districts, it could potentially detect 442 372 more cases of ARI and 97 597 more cases of pneumonia per year. This would prevent severe pneumonia in 3860 more children each year. If applied nationwide, the programme would also detect 83 486 more episodes of diarrhoea, including 8283 more episodes of diarrhoea with some dehydration and 1218 more with severe dehydration each year.

Antimicrobial resistance has not emerged in these community-based programmes.<sup>15</sup>

## Conclusion

The experience in Nepal has shown that community members with minimal prior education can be trained and engaged in their own communities to scale up safe and effective interventions. An important factor in the success of these interventions is their integration into comprehensive community-based programmes for the prevention and control of diarrhoea and respiratory infections in children (Box 1). Engaging CHVs to implement simple strategies to manage cases of diarrhoea and ARI, along with improved nutrition and vaccine coverage, help maintain the focus on problems of national importance.

Success of the programme is ensured by simplifying and modifying the training appropriately so that it meets the needs and uses the capacities of community health workers. Scale-up is best done in a step-wise fashion based on the estimated disease burden in different districts rather than on ease of access. The scaling-up process is facilitated by piloting and monitoring. Outcomes are also improved by the simultaneous use of common human and technical resources at the community level. Supervision and logistical support are essential.

National research data are used to develop policy and are essential to identify and refine effective local tools to prevent and control health problems of national priority. This research-guided shift in emphasis – from externally advocated facility-based strategies to strategies that integrate existing community strengths – is working in Nepal and is likely to be useful in other countries as long as programmes are adapted appropriately for different local contexts. ■

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Table 1. Trends in acute respiratory infection, pneumonia, diarrhoea and death from diarrhoea in Nepal, 2004–2007

Year	Population aged < 5 years	New ARI cases		New pneumonia cases		New severe pneumonia cases		Episodes of diarrhoea		Cases of diarrhoea with some dehydration		Cases of diarrhoea with severe dehydration		Diarrhoea deaths					
		No.	ECY <sup>a</sup>	No.	Per-centage of ARI cases	No.	ECY <sup>a</sup>	No.	Per-centage of ARI cases	No.	ECY <sup>a</sup>	No.	Per-centage of total diarrhoea visits	No.	ECY <sup>a</sup>	No.	CFR (deaths per 1000)		
2004–05	3 587 477	1 290 632	0.36	430 700	33.37	0.12	27 103	2.1	0.007	785 336	0.22	296 844	37.8	0.08	17 506	2.2	0.005	244	0.3
2005–06	3 633 687	1 472 562	0.40	468 838	31.8	0.13	23 560	1.6	0.0065	739 915	0.20	248 717	33.6	0.07	10 068	1.4	0.003	82	0.11
2006–07	3 672 650	1 498 359	0.41	464 460	31.0	0.13	18 038	1.2	0.005	680 819	0.18	218 284	32.1	0.06	7 573	1.1	0.002	113	0.17
$\chi^2$ for linear trend in proportions		18 449.6*		1 706.4*		3 087.5*		12 554.9*		5 182.8*		2 824*						35.6*	

\*  $P < 0.01$ .

ARI, acute respiratory infection; CFR, case fatality rate; ECY, episodes per child per year. Data obtained from the Ministry of Health and Population.<sup>14</sup>

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**Competing interests:** None declared.

Table 2. **Cases of acute respiratory infection and diarrhoea per 100 000 children under 5 years of age in districts in Nepal with and without a community-based programme for the control of diarrhoeal diseases and acute respiratory infections, 2006-2007**

Diagnosis	Intervention districts <sup>a</sup> (n = 33)	Non-intervention districts <sup>b</sup> (n = 42)
Non-pneumonia ARI	39 705	16 099
Pneumonia	15 304	10 096
Severe pneumonia	386	592
Diarrhoea without dehydration	14 661	10 206
Diarrhoea with some dehydration	6 169	5 727
Diarrhoea with severe dehydration	173	238

ARI, acute respiratory infection.

<sup>a</sup> Population under 5 years of age: 1 798 668.

<sup>b</sup> Population under 5 years of age: 1 873 982.

Data obtained from the Ministry of Health and Population.<sup>14</sup>

**Box 1. Summary of main lessons learnt**

- Safe, effective and inexpensive interventions are available and can be integrated into community-based programmes to control diarrhoea and acute respiratory infections.
- Community members with minimal prior education can be trained to assess children and provide appropriate treatment or referral to health-care facilities.
- Simplifying and appropriately modifying the training to better meet the needs and use the capacities of community health workers help the programme to succeed.

**Résumé**

**Interventions au niveau communautaire contre les maladies diarrhéiques et les infections respiratoires aiguës au Népal**

**Problématique** A l'échelle mondiale, les maladies diarrhéiques et les infections respiratoires aiguës (IRA) sont les causes les plus courantes de mortalité de l'enfant. Des solutions sûres, efficaces et peu onéreuses sont disponibles pour prévenir et combattre ces maladies, mais elles n'atteignent pas les communautés qui en ont besoin.

**Démarche** Au Népal, des interventions ont été mises au point à partir de travaux de recherche pour former et engager des volontaires communautaires de santé en vue de mettre en œuvre un programme de lutte contre les maladies diarrhéiques et les IRA à l'échelle communautaire. Avec la mise en place de la Stratégie de prise en charge intégrée des maladies de l'enfant (PCIME), ce programme a ensuite été converti en PCIME au niveau communautaire, mais a conservé ses principales activités. Nous avons examiné et analysé les décisions politiques, ainsi que le développement, la mise en œuvre et l'élargissement de ce programme.

**Contexte local** De fortes contraintes financières et la difficulté du terrain limitent l'accès aux établissements de soins de santé dans de nombreuses parties du Népal.

**Modifications pertinentes** Dans les districts bénéficiant des interventions, davantage de cas de diarrhée aiguë et d'IRA (et notamment de pneumonie) ont été notifiés. Dans ces mêmes districts, la proportion de cas de diarrhée avec déshydratation et celle de cas d'IRA avec pneumonie étaient significativement plus basses. Sur l'ensemble du pays, les taux de létalité dus à la diarrhée aiguë et la proportion de pneumonies sévères parmi les cas d'IRA présentaient une tendance significative à la baisse entre 2004 et 2007. Le Népal a réussi à former de nombreux volontaires communautaires de santé et progresse vers la réalisation de l'Objectif du Millénaire pour le développement concernant la mortalité des enfants.

**Enseignements tirés** La charge de diarrhées aiguës et d'IRA peut être réduite en formant et en engageant des volontaires communautaires pour mettre en œuvre des stratégies de prise en charge des cas et de prévention au niveau communautaire. La surveillance, la supervision et l'appui logistique sont essentiels. Des décisions politiques fondées sur des résultats de la recherche nationale ont contribué au succès du programme.

## Resumen

### Intervenciones comunitarias contra las enfermedades diarreicas y las infecciones respiratorias agudas en Nepal

**Problema** Las enfermedades diarreicas agudas y las infecciones respiratorias agudas (IRA) son las causas más comunes de mortalidad en la niñez en todo el mundo. Existen soluciones seguras, eficaces y de bajo costo para su prevención y control, pero esas soluciones no llegan a las comunidades necesitadas.

**Enfoque** Sobre la base de investigaciones previas, se diseñaron intervenciones destinadas a capacitar y hacer participar a voluntarios de salud comunitarios (VSC) para implementar un programa de control basado en la comunidad en Nepal. Con la llegada de la Atención Integrada a las Enfermedades Prevalentes de la Infancia (AIEPI), este programa evolucionó posteriormente hacia una AIEPI basada en la comunidad, pero mantuvo sus actividades principales. Hemos revisado y analizado aquí las decisiones de política y el desarrollo, ejecución y expansión del programa.

**Contexto local** La grave falta de recursos y las dificultades del terreno limitan el acceso a los servicios de salud en muchas zonas de Nepal.

**Cambios destacables** En los distritos con intervenciones se notificaron más casos de diarrea aguda e IRA (incluida neumonía). La proporción de casos de diarrea con deshidratación y la proporción de casos de IRA con neumonía fueron significativamente menores en los distritos con intervenciones. Las tasas de letalidad por diarrea aguda y la proporción de neumonía grave entre los casos de IRA en todo el país mostraron una tendencia importante a la baja entre 2004 y 2007. Nepal ha logrado formar satisfactoriamente a muchos VSC y está bien encaminado para alcanzar el Objetivo de Desarrollo del Milenio relativo a la mortalidad infantil.

**Enseñanzas extraídas** La carga de diarrea aguda y de IRA puede reducirse mediante la formación y participación activa de VSC en la aplicación de estrategias de tratamiento y prevención de casos basadas en la comunidad. El monitoreo, la supervisión y el apoyo logístico son fundamentales. Las decisiones de política basadas en la evidencia aportada por las investigaciones nacionales contribuyeron al éxito del programa.

## ملخص

### المدخلات المجتمعية المعنية بأمراض الإسهال والعدوى التنفسية الحادة في نيبال

من حالات الإسهال الوخيم والعدوى التنفسية الحادة (ومنها التهاب الرئوي). وكانت نسبة حالات الإصابة بالتجفاف بسبب الإسهال ونسبة الإصابة بالالتهاب الرئوي بسبب العدوى التنفسية أقل بصورة يعتد بها إحصائياً في المناطق التي تطبق المدخلات. كما أظهرت معدلات وفيات الحالات الناجمة عن الإسهال الوخيم ونسبة حالات التهاب الرئوي الحاد بين الحالات المصابة بعدوى التهاب التنفس الحاد انحساراً يعتد به خلال الأعوام من 2004 و 2007. وقد نجحت نيبال في تدريب أعداد من المتطوعين الصحيين في المجتمع وهي في سبيلها لتحقيق المرمى الإنمائي للألفية الخاص بوفيات الأطفال.

**الدروس المستفادة:** يمكن خفض العبء الناجم عن الإسهال الوخيم والعدوى التنفسية الحادة من خلال تدريب المتطوعين الصحيين في المجتمع وإشراكهم في تنفيذ الاستراتيجيات المجتمعية الخاصة بالتدبير العلاجي والوقاية. كما ساهمت أيضاً القرارات السياسية المسندة بالبيانات المستقاة من نتائج البحوث في نجاح البرنامج.

**المشكلة:** أمراض الإسهال الوخيمة والعدوى التنفسية الحادة هي أكثر الأسباب شيوعاً لوفيات الأطفال في العالم. وبالرغم من توافر الحلول المأمونة والفعالة واليسيرة التكلفة للوقاية من هذه الأمراض ومكافحتها، إلا أنها لا تصل إلى المجتمعات التي تحتاجها.

**الأسلوب:** صُممت مداخلات ارتكزت على البحوث من أجل تدريب المتطوعين الصحيين في المجتمعات وإشراكهم في تنفيذ البرامج المجتمعية للمكافحة في نيبال. ومع انطلاق استراتيجية التدبير العلاجي المتكامل لأمراض الطفولة، ظهر بالتالي هذا البرنامج كبرنامج متكامل للتدبير العلاجي لأمراض الطفولة ولكن مع الاحتفاظ بأنشطته المعتادة، وقام الباحثون باستعراض وتحليل القرارات السياسية التي اتخذت وخطوات إعداد البرنامج ومراحل تنفيذه والتوسع فيه.

**المواقع المحلية:** أدى شح الموارد ووعورة الأراضي إلى صعوبة الوصول إلى مرافق الرعاية الصحية في مناطق عديدة من نيبال.

**التغيرات الملموسة:** في المناطق التي طبقت فيها المداخلات، أُبلغ عن المزيد

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