

# Implementation of a Mass Measles Campaign in Central Afghanistan, December 2001 to May 2002

N. Dadgar,<sup>1</sup> A. Ansari,<sup>1</sup> T. Naleo,<sup>1</sup> M. Brennan,<sup>4</sup> P. Salama,<sup>1</sup> N. Sadozai,<sup>2</sup> A. Golaz,<sup>5</sup> F. Lievano,<sup>4</sup> H. Jafari,<sup>4</sup> M. Mubarak,<sup>2</sup> E. Hoekstra,<sup>6</sup> A. Paganini,<sup>6</sup> and F. Feroz<sup>3</sup>

<sup>1</sup>United Nations Children's Fund (UNICEF) Afghanistan Country Office, <sup>2</sup>World Health Organization Country Office, and <sup>3</sup>The Ministry of Public Health, Islamic Transitional Government of Afghanistan, Kabul; <sup>4</sup>Centers for Disease Control and Prevention, Atlanta, Georgia; <sup>5</sup>UNICEF Regional Office for South Asia, Kathmandu, Nepal; <sup>6</sup>UNICEF, New York, New York

**In Afghanistan health services have been disrupted by 23 years of conflict and 1 of 4 children die before age 5 years. Measles accounts for an estimated 35,000 deaths annually. Surveillance data show a high proportion of measles cases (38%) among those  $\geq 5$  years old. In areas with complex emergencies, measles vaccination is recommended for those aged 6 months to 12–15 years. From December 2001 to May 2002, Afghan authorities and national and international organizations targeted 1,748,829 children aged 6 months to 12 years in five provinces in central Afghanistan for measles vaccinations. Two provinces reported coverage of  $>90\%$  and two  $>80\%$ . Coverage in Kabul city was 62%. A subsequent cluster survey in the city found 91% coverage (95% confidence interval [CI], 0.85–0.91) among children 6–59 months and 88% (95% CI, 0.87–0.95) among those 5–12 years old. Thus, this campaign achieved acceptable coverage despite considerable obstacles.**

Afghanistan, a landlocked central Asian country, shares borders with Pakistan, Iran, Turkmenistan, Uzbekistan, Tajikistan, and China. Life expectancy, estimated at 47 years for women and 45 years for men [1], is among the lowest in the world and 25% of children die before their fifth birthday [2]. The population is placed at about 23 million [3, 4]; however, figures are unreliable because of large internal and external migrations. From 1 March to 30 May 2002, the United Nations High Commissioner for Refugees (UNHCR) estimated that 1,300,000 refugees returned to Afghanistan under its voluntary repatriation program; another 200,000 returned without UN assistance [5].

In 2001, 8762 measles cases were reported from 328 sites throughout Afghanistan established to conduct surveillance for acute flaccid paralysis (AFP). (AFP surveillance monitors sensitivity of detection and accuracy of reporting of suspected cases. The target is an annual rate of  $>1$  non-polio AFP case per 100,000 children  $<15$  years old.) The measles cases occurred among the following age groups: 0–4 years, 62%; 5–9 years, 29%; and  $\geq 10$  years, 9% (World Health Organization [WHO] Afghanistan, Kabul, surveillance data).

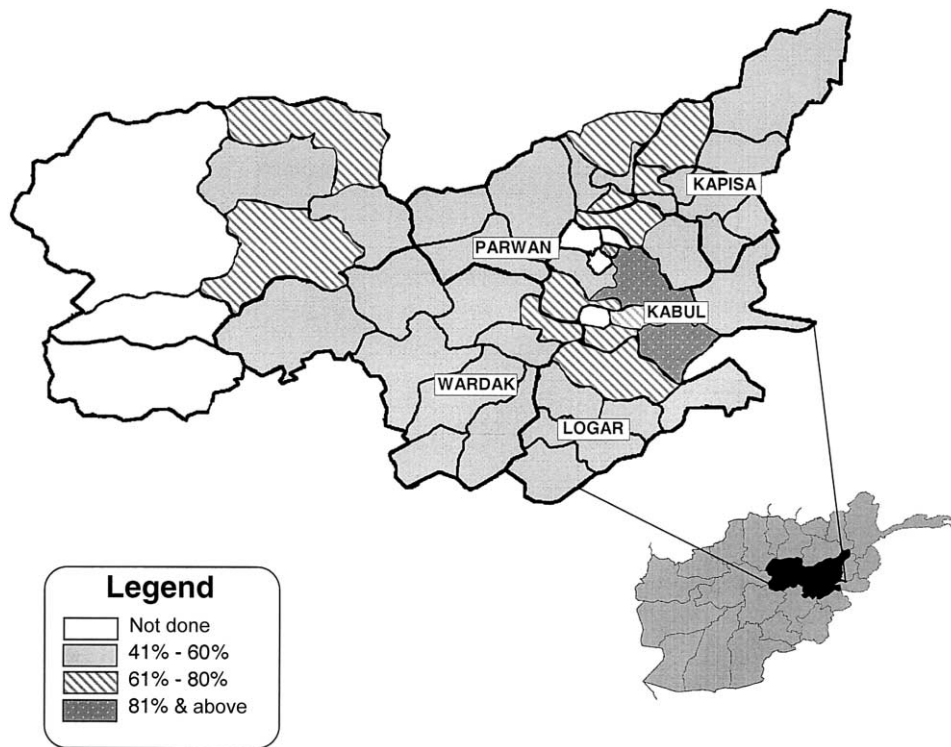
Few data are available for measles deaths in Afghanistan. A study in Kohistan District (northeast Afghanistan) [6] found that of 108 reported deaths from 26 November 2000 to 4 April 2001, 16% were attributed to measles and 3 occurred in children aged 5–9 years. In a joint planning document, WHO and the United Nations Children's Fund (UNICEF) estimated that given routine measles vaccine coverage of 40%, a vaccine efficacy of 85%, and a case-fatality ratio of 5%, 35,000 deaths due to measles would be expected among children  $<5$  years old in Afghanistan each year (WHO Afghanistan, Kabul). This figure may underestimate the

Campaign funding: governments of Italy, Germany, Japan, Poland, and USA.

Reprints or correspondence: Dr. Muireann Brennan, International Emergency and Refugee Health Branch, Centers for Disease Control and Prevention, 1600 Clifton Rd. NE, Mailstop F-48, Atlanta, GA 30333 (mbrennan@cdc.gov).

**The Journal of Infectious Diseases** 2003;187(Suppl 1):S186–90

© World Health Organization 2003. All rights reserved. The World Health Organization has granted the Publisher permission for the reproduction of this article. 0022-1899/2003/18710S-0029



**Figure 1.** Reported measles coverage for central region of Afghanistan, December 2001–May 2002

real burden of measles deaths in Afghanistan where access to treatment for complications of measles is poor and children >5 years old may also be at risk for measles deaths.

Concerns about a widespread measles outbreak against a background of low routine measles coverage, poor access to health care, and crowding among displaced persons, prompted UNICEF, WHO, and nongovernmental organization (NGO) partners, with the agreement of the Taliban and the Northern Alliance political factions, to propose a mass measles vaccination campaign. The target age group chosen was 6 months to 12 years, as 95% of all reported cases were in this age range. Between June and September 2001, >1 million children were vaccinated in the most food-insecure districts. Following the fall of the Taliban in November 2001, the Ministry of Public Health (MoPH) of the Interim Administration of Afghanistan (IAA) decided to relaunch the campaign, which had been interrupted by the war, and to extend it to the entire country. This report describes the first phase of the new campaign, which was implemented in the central region of Afghanistan between December 2001 and May 2002.

## MEASLES CAMPAIGN

**Background.** Data from the July 2001 polio national immunization days (NIDs) [7] estimated the total population of the central region at 5,122,993, consisting of Kabul city (pop-

ulation 2,713,705), its 16 surrounding districts, and the provinces of Parwan, Kapisa, Logar, and Wardak (figure 1). In this area, health facilities were destroyed or were not functioning because of lack of trained staff or supplies. This region has an estimated 0.13 primary health care units per 10,000 population versus 0.25 in the east and 0.03 in the south.

UNICEF supports an expanded program on immunization (EPI) at all levels through incentives to MoPH EPI staff and by provision of vaccines, syringes, and cold chain equipment. Reported routine EPI coverage among age-eligible children (0–11 months in 2001) was 46% for measles vaccine (range, 18% in Parwan to 77% in Logar) and 47% for diphtheria-tetanus toxins–pertussis coverage (UNICEF Afghanistan Office).

One EPI success was the polio eradication initiative, which funded much of the existing cold chain capacity in Afghanistan. Despite ongoing conflict, the spring 2001 NIDs reached 872,627 (88%) of 996,253 targeted children aged 0–59 months (table 1). In addition, 83% of children aged 6–59 months received a supplemental dose of vitamin A.

**Measles campaign planning.** The campaign was planned and implemented by the MoPH with support of UNICEF, WHO, national and international NGOs (listed after the text), and other UN partners. All children aged 6 months to 12 years were targeted to receive one dose of measles vaccine regardless of prior immunization status or history of measles disease. The

**Table 1. Target population and measles vaccination campaign results in central Afghanistan, December 2001 to May 2002.**

Province	Target measles population <sup>a</sup> (6 months–12 years)	Vaccinated during measles campaign						All ages (%)	Vaccinated NIDs aged 6–59 months <sup>b</sup>
		6–59 months			5–12 years				
		Girls	Boys	Total	Girls	Boys	Total		
Kabul (city)	858,886	154,735	154,070	308,805	115,457	111,266	226,723	535,528 (62)	371,309
Kabul (districts)	198,562	44,785	46,143	90,928	25,299	26,352	51,651	142,579 (72)	141,620
Parwan	241,155	59,370	59,472	118,842	39,337	44,065	83,402	202,244 (84)	124,177
Kapisa	198,648	55,627	55,744	111,371	35,802	36,050	71,852	183,253 (92)	100,441
Logar	137,718	31,729	32,655	64,384	23,539	25,261	48,800	113,184 (82)	74,576
Wardak	113,860	29,355	29,960	59,315	21,321	22,497	43,818	103,133 (91)	60,504
Total	1,748,829	375,601	378,044	753,645	260,755	265,491	526,246	1,279,891 (73)	872,627

<sup>a</sup> Children in the target age group in all districts where the campaign was conducted. Data are based on spring 2001 National Immunization Day (NID) results.

<sup>b</sup> Estimated proportion of children vaccinated aged 6–59 months, during 2002 spring NIDs.

upper age limit of 12 years was chosen in part because of the perceived difficulty in reaching children 12–15 years old who might be working or refuse vaccination. Other concerns that arose during planning were that younger children might be missed owing to the logistical difficulty of targeting an extended age range, that girls might be harder to reach than boys for cultural reasons, and possible shortages of human resources if teams were assigned to vaccinate too many children, which would result in poor quality implementation.

The NIDs planning framework was used for the measles campaign. Plans were prepared at the provincial level for each district by joint MoPH, UN, and NGO teams. The district population from the July 2001 NIDs was divided by five to estimate one birth cohort and multiplied by 12.5, the number of cohorts to be vaccinated. Based on these figures, estimates were made for vaccine, cold chain needs, number of teams needed, and funding. Population data were modified during training at the local level to reflect reports of population movements.

The campaign was planned in phases, rather than for all districts simultaneously, because few trainers and higher level supervisors were available (and these persons had to be deployed in several districts and in other regions), some districts were insecure, and some of the same personnel were also engaged in the NIDs. The initial campaign duration was set as 10 days for each location but could be extended. Returning refugees were vaccinated with the assistance of UNHCR and the International Organization for Migration, which managed the repatriation of refugees from Pakistan and Iran. Refugees returning to the central region were transported to an encashment center near Kabul and were vaccinated against measles on arrival.

**Selection and training of vaccinators.** To augment the small pool of trained vaccinators, additional persons were sought for training, especially women. These included doctors,

private pharmacists, and NGO workers. A cadre of 24 experienced health professionals or “master trainers” from all agencies was identified. These persons trained district coordinators in the provincial capitals, who in turn trained teams and supervisors at several sites throughout a district.

**Vaccination teams, sites, record keeping.** Each team had 5 members: 2 vaccinators, 1 health educator, 1 social mobilizer, and 1 registrar. Sometimes a community member held each child in the correct position for vaccination, which proved an effective way to save time. Recording was done on tally sheets: Boys and girls were tallied separately by age group. Reported coverage by district was estimated by dividing the number of children vaccinated according to compiled tally sheets divided by the estimated target population.

The campaign was conducted from mosque to mosque. In Afghanistan most families identify with a mosque and each mosque serves about 200 families. Mosques are traditionally used for important community activities such as meetings or teaching and no mosque refused use as an immunization site. Mosques are ideal locations for social mobilization as many have loudspeakers and people are accustomed to being called there for important activities.

**Injection safety and waste management.** Joint WHO-UNICEF guidelines for the campaign recommended that a maximum of 200 children be vaccinated per team per day to ensure safe vaccination practice. Only auto-disable (AD) syringes were used and safety boxes were provided for disposal. The cold chain was maintained in remote areas through the use of local sources of ice, provision of sufficient sealed cold boxes, and fuel for commercial freezing.

**Coverage surveys.** A two-stage cluster survey with sampling proportionate to population size was conducted in Kabul. In the first stage, clusters were randomly selected from a list of all city districts with their estimated populations. Large districts were subdivided into sections of equal population size

and one was chosen randomly. A list of all households was then constructed, and the first house was chosen randomly. Thereafter the next nearest household with a child in the target age group was identified. The head of household was asked how many children in the household were aged 6–59 months and 5–12 years and how many in each group were vaccinated. In the Panjshir Valley, Action Contre la Faim (ACF) conducted a cluster survey by standard EPI methodology of households with a child in the 6- to 59-month age group. Data were analyzed with Epi Info software, version 6.04b (CDC, Atlanta).

## RESULTS

By May 2002, 767 teams, 162 supervisors, and 44 external monitors had implemented the campaign in 48 of 59 central region districts. The campaign took 14 days to complete in Kabul and an average of 10–12 days in other districts. Each team visited an average of one mosque or fewer per day in cities and three mosques per day in rural areas. NGOs assisted, especially with implementation and external monitoring of the campaign.

Adequate injection safety was observed during monitoring and evaluation of teams and may have been related to guidelines that limited the number of children targeted per team per day. However, there was no systematic monitoring of adverse events following vaccination. There was a 1-week interruption in the supply of safety boxes owing to miscalculation and teams in some districts did not have safety boxes. Used syringes were placed in plastic bags and taken to an incineration site. Although safety boxes were to be destroyed immediately after the vaccination session, in practice filled safety boxes were destroyed at health facility incineration sites.

Of an estimated 1,748,829 eligible children in the target districts, 1,339,236 (77%) were vaccinated (table 1). Of the five central region provinces, two reported coverage of >90% and two >80%. Coverage was lowest in Kabul city (62%). However, since many families fled Kabul with the Taliban, the 2001 NIDs population may have overestimated the remaining target population.

Despite extending the duration of the campaign in Kabul by 7 days and sending external monitors to search door-to-door for missed children, reported coverage was still low. Thus, a population-based survey was conducted. Results showed that of 890 households with 3537 children aged 6 months to 12 years, 91% (95% confidence interval [CI], 0.85–0.91) of children aged 6 months to 5 years and 88% (95% CI, 0.87–0.95) of children aged 5–12 years were vaccinated during the campaign. An ACF survey in the Panjshir Valley that included four districts in Kapisa and two in Parwan provinces found 85% measles vaccine coverage among children aged 9–59 months.

Fewer children aged 6–59 months were vaccinated against

measles (86%) than were reached in the April 2002 NIDs (table 1). The number of children vaccinated against measles in this age group was higher than among children aged 5–12 years, which should contain more age cohorts. In both the 6–59 month and the 5–12 year age groups, there was little difference between numbers of boys and girls vaccinated (<2%), although the numbers were statistically significant.

No estimate for the total cost of the central region campaign is available. However, campaign costs (excluding supplies and including training, transport, and implementation) were \$54,000 (10.0 cents per child in Kabul city) and \$17,700 (17.0 cents per child) in Wardak (a rural province).

## DISCUSSION

This campaign demonstrated the possibility of successfully implementing an extended age-range measles vaccination campaign in a country with enormous complexities. The results highlighted the commitment and bravery of Afghans working within the MoPH, UN, and NGO community who planned and implemented the campaign and showed the enthusiasm of the population for immunization services. The campaign is ongoing. As of September 2002, 8 million of the estimated target population of 9–11 million children had been vaccinated against measles.

In complex emergencies, the recommended age group for measles vaccination has ranged from 6 months to 5 years [8] to more recent recommendations of 6 months to 12 or 12–15 years of age [9, 10]. Case-fatality ratios from measles in such situations have been 10%–21%: Lack of access to health care, malnutrition, low vaccination coverage, vitamin A deficiency, and crowding contribute to the high rates [11]. Deaths have also been reported among older children. A study in Gode, Ethiopia, reported that of 47 reported measles deaths, 12 (26%) were among children aged 5–14 years [12].

Several factors were considered when determining the target age group in Afghanistan. Surveillance data showed a high proportion of measles cases in older children. In addition to individual protection, vaccinating these older children might decrease the probability that these children could infect younger cohorts of non-immunized children. Lack of health care access, crowding (especially among returning refugee and displaced populations), and low routine measles coverage were risk factors for increased measles death rates in Afghanistan. Before the campaign there were reports of high levels of acute malnutrition in some areas, but these were not substantiated by subsequent nutrition surveys.

Some concerns raised prior to the campaign do not appear to have been realized. The campaign reached almost as many younger children as the NIDs (86%), even given the increased complexity of the measles campaign. Two coverage surveys also

reported high coverage among younger children. Nearly equal numbers of girls and boys were reached in both younger and older age groups. However, the campaign reached fewer children aged 5–12 years than expected. High levels of stunting might partially explain this. Consistent misclassification of children as younger than their true age would inflate the number of children aged 6–59 months vaccinated and decrease the number in the 5- to 12-year age group. However, anecdotal evidence from the field suggests that older children were missed. Older children were reported to have been working in the fields when the vaccination team arrived or to have run away due to fear of injection. Older children also did not see themselves as children requiring vaccination.

Despite many constraints, the measles campaign appears to have been successful, perhaps because it built on groundwork laid by the NIDs. The measles campaign used the same process to identify supplies, personnel, and transport needs and the training plan was modeled on that used for NIDs. The measles campaign used NIDs population maps as a starting point, and previously identified difficult-to-access populations were given special attention for measles. The measles campaign in turn benefited the NIDs. The extended time frame of the campaign allowed observers to spend more time in remote isolated areas. Previously unrecognized problems were identified. In districts covered by the measles campaign prior to the NIDs, updated population information was available from the measles campaign.

This experience in the Afghanistan central region suggests that an extended age-range measles campaign can be successful in a complex emergency country and that polio and measles campaigns can be implemented to the mutual benefit of both. In complex emergency countries, where epidemiologic data demonstrate a high proportion of cases among children >5 years old, measles campaigns should target an extended age range. However, measles campaigns should not be forced into the short time frame of NIDs.

## **PARTICIPANT NGOS IN CENTRAL AFGHANISTAN MEASLES CAMPAIGN**

ACF, ACTED, Aide Medicale Internationale, Afghan Red Crescent Society, FOCUS, CAFÉ, CDI, CDA, Coordination for Humanitarian Assistance, Concern, German Agro Action, GOAL, Halo Trust, Health Net, International Medical Corps, International Committee of the Red Cross, International Relief, International Federation of the Red Cross and Red Crescent,

IBISSINA, International Rescue Committee, Islamic Society Relief Association, International Islamic Relief Organization, JDA, Medecines Du Monde, Medecines Sans Frontiers Belgium, France, and Holland, Mercy Corps, Merlin, MERU, North-West Medical Team, OMAR, Peace Wind Japan, People In Need Foundation, Relief International, Swedish Committee for Afghanistan, Save the Children UK and USA, Solidarites, TDF, TSE, World Association of Muslim Youth, and ZOA.

## **Acknowledgments**

WHO master trainers included M. Mubarak, G. Farooq, A. Ali, I. Hanna, N. Attai, H. Stanekzai, G. Ayoub, and A. Matin. I. Hana was the WHO focal point for the central region. UNICEF Afghanistan country office staff included N. Attai and H. Stanakzai. Regional and provincial EPI management team staff included N. Khawari, G. Ayoub, and A. Matin. We thank Mary McCauley, National Immunization Program, CDC, for editorial review of the manuscript.

## **References**

1. United Nations Children's Fund. State of the world's children. New York: Oxford University Press, 2001.
2. United Nations Children's Fund. Statistical data by country. 2002. Available at: <http://www.unicef.org/statis/country.html>. Accessed 24 September 2002.
3. Central Intelligence Agency. World fact book. Available at: <http://www.cia.gov/cia/publications/factbook/>. Accessed 14 September 2002.
4. Relief web. Afghanistan facts about the country and its refugee crisis. Available at: <http://www.reliefweb.int/w/rwb.nsf/s/AE14BFF66395E3B085256C02004F3F80>. Accessed 24 September 2002.
5. United Nations High Commissioner for Refugees. Return to Afghanistan. Available at: <http://www.unhcr.ch>.
6. Assefa F, Jabarkhil MZ, Salama P, Spiegel P. Malnutrition and mortality in Kohistan District, Afghanistan, April 2001. *JAMA* 2001; 286:2723–8.
7. CDC. Progress toward poliomyelitis eradication—Pakistan and Afghanistan, January 2000–April 2002. *MMWR Morb Mortal Wkly Rep* 2002; 51:521–4.
8. CDC. Famine-affected, refugee, and displaced populations: recommendations for public health issues. *MMWR Morb Mortal Wkly Rep* 1992; 41(RR-13):1–76.
9. Medecins Sans Frontieres. Refugee health: an approach to emergency situations. London: Macmillan Education, 1997:56–7. Available at: [http://www.msf.org/source/refbooks/MSF\\_Docs/En/Refugee\\_Health/RH1.pdf](http://www.msf.org/source/refbooks/MSF_Docs/En/Refugee_Health/RH1.pdf).
10. Sphere Project. Health services. The minimum standards. Measles control. Available at: <http://www.sphereproject.org/handbook/health.htm>. Accessed 24 September 2002.
11. Toole MJ, Steketee RW, Waldman RJ, Nieburg P. Measles prevention and control in emergency settings. *Bull World Health Organ* 1989; 67: 381–8.
12. Salama P, Assefa F, Taley L, Spiegel P, van der Veen A, Gotway CA. Malnutrition, measles, mortality, and the humanitarian response during a famine in Ethiopia. *JAMA* 2001; 286:563–71.