
A Mass Immunization Campaign in Rural Ghana

Factors Affecting Participation

THE MAJOR CAUSE OF DEATH among Ghanaian children is preventable, communicable disease. Although effective vaccines are available and major operational advances have been made (1), immunization rates are low in Ghana. In the Danfa district, BCG immunization scars were seen in 15 percent of the school-age children, and the percentage in preschool children was even lower (2). Part of the problem stems from a continuing reliance by health planners on the clinic-based approach to providing immunization, even though health facilities are scarce and relatively inaccessible.

In November 1974, a 4-day mass immunization campaign in the Danfa district in southern Ghana was aimed at vaccinating 80 percent of the preschool children against measles, pertussis, tetanus, diphtheria, and poliomyelitis. The campaign was one of the public health measures of the Danfa Comprehensive Rural Health and Family Planning Project (supported in part by the Government of Ghana and the USAID Grant AID/CM/afr-IDA-73-14), a joint research project of the University of Ghana Medical School, Ghana's Ministry of Health, and the School of Public Health, University of California at Los Angeles. The campaign's effectiveness is of interest because it is being used by the Ministry of Health as a prototype for planning a national immunization campaign.

To evaluate the results of the campaign, a household interview survey was conducted immediately after the campaign was completed. Interview questions included reasons for participating in the campaign, reasons for nonattendance, opinions about the program, and recommendations for future campaigns. The survey included 676 households having children aged 14 years or younger. The aims of the study were to (a) determine attendance rates for various population groups and attempt to identify factors affecting participation, (b) determine if any groups were at risk of being underimmunized, and (c) identify prob-

lems in pre-campaign communication and campaign operation that could be solved in subsequent immunization campaigns.

Description of Danfa District

The Danfa district is located on the Accra plains 10 to 20 miles north of the capital. In 1974 it contained 61 villages with 15,931 residents (annual project census) in an area of 154 square kilometers—a population density of 103 persons per square kilometer—which is heavily populated compared to much of rural Ghana. Most adults are subsistence farmers who raise corn, cassava, and some vegetables. The population is young: 48 percent are under age 15, and the median age is 17 years. Preschool children (0-4 years) constitute 18 percent of the total population.

This young population has a predictable disease pattern for Africa—malnutrition, malaria, measles, respiratory infections, tuberculosis, diarrhea, poliomyelitis, typhoid fever, and intestinal parasites are major problems. Recently, the seriousness of poliomyelitis was demonstrated when post-poliomyelitis paralysis was detected in 7 of every 1,000 school-age children (3).

In the Danfa district, the health center and its three satellite clinics charge no service fees. Eighty-five percent of the district population live within 4 miles of one of these clinics. Although intermittent transportation service is costly, access is fairly good compared to most of rural Ghana.

The 1974 Immunization Campaign

Despite accessibility to clinics, the level of preschool immunization in the Danfa district before the 1974 mass campaign was less than 10 percent (2). Immunization had been offered only intermittently at district clinics. (A previous study (4) in the district showed that although ill patients will travel several miles for curative care, few will travel more than 1 mile for preventive programs.) Although the cam-

campaign's main objective was to reach 80 percent of the preschool children, older age groups were also asked to attend for immunization against tetanus, typhoid fever, and tuberculosis.

District health educators met with traditional village leaders to discuss immunization benefits and dates when the vaccination team would visit the villages. The campaign was conducted at 16 sites so that all villages were within 3 miles of a site. One week before the campaign, resident volunteers were trained to motivate the people in their communities to attend the program. They discussed the severity of measles and other childhood diseases, the value of vaccines to prevent such diseases, and the vaccination schedule.

The coverage achieved by the campaign was evaluated from information obtained by the six project interviewers trained for this study. The interviewers asked parents or household adults to show them each child's vaccination card and examined each available preschool child for a fresh BCG or smallpox scar.

Methods

Sample selection. All Danfa district households having 1 or more children under 15 years old were used for the sample frame. A 50 percent sample of households containing such children was randomly generated by computer from the Danfa project's population file.

Survey procedures. From December 1974 to January 1975, 1 to 2 months after the immunization campaign, a followup household interview survey was conducted. This study was part of the annual household enumeration survey, which obtains data about births and deaths from every household in the district. Each interviewer was given an assigned household listing and instructed to make up to three revisits if necessary to complete the interview. Households were located from project maps and lists of village house addresses. To be eligible for the study,

household members had to be present in the community on the day when the campaign was conducted. Household members absent at that time were excluded from the sample. Completed interview schedules were obtained from about 90 percent of the assigned sample. No replacement households were used when sample households were not available. The final interview sample contained 676 households.

Interviewers. Six full-time Danfa project field interviewers were trained to administer the interview schedules. The interviewers had an ordinary level (12th grade) education, were fluent in at least two of the three local languages, and had extensive previous field interview experience with census and attitudinal surveys. They were given 4 days of training that included background information about the campaign's operation, how to use the interview form, and how to recognize vaccination scars in children. During the actual survey, completed forms were edited by the interviewers and the field supervisor at the end of each day of interviewing.

Questionnaire. A precoded schedule was based on information from previous survey experience with a KAP (knowledge, attitudes, and practices) study. After listing all household members who were in the

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Village volunteers supervise school children lining up for immunization with their cards.

village during the campaign, the interviewers asked about the mother's age, education, occupation, parity, and household size. When applicable, mothers were asked why their children 0-4 years had not attended and their opinions of their children's pre-campaign health status. Mothers were also asked their opinions about the campaign, their intent to attend similar programs in the future, if the children had had side effects from the vaccination, and if they had any recommendations to improve the campaign. Each interview required about 20 minutes.

To improve the quality of information, special efforts were made to interview the mothers of the 0-4 year olds rather than other relatives. In about one-third of the households, a father or close relative supplied the information. After completing the questionnaire, the interviewer asked to examine the children for evidence of recent vaccination scars and to see their vaccination cards to corroborate reported attendance.

Analysis. Cross tabulations were made to determine if maternal characteristics, household size, and distance from the vaccination site were related to attendance rates. Chi-square tests were used to measure the significance of relationships.

Findings

Attendance. Efforts to motivate people to attend a mass immunization campaign, like any preventive program, start by creating an awareness and interest in the program among potential clients. Studies of other mass campaigns have shown that lack of information is a major barrier to participation (5). Program communications in this campaign were quite successful. Of the 446 mothers interviewed, 411 or 92 percent knew in advance about the campaign, and 55 percent had received information from two or more sources. The sources of information were as follows:

Source	Mothers	
	Number	Percent
Village gong-gong, bells	340	76.2
Neighbors	90	20.2
Relatives	47	10.5
Health educators	64	14.3
Clinic staff	49	11.0
Schools	34	7.6
Other sources	13	2.9
Did not know	35	7.8

Table 1. Sex- and age-specific immunization rates in 1974 campaign, Danfa project, Ghana

Age	Males			Females			Both		
	Total	Immunized		Total	Immunized		Total	Immunized	
		Number	Percent		Number	Percent		Number	Percent
0	75	51	68.0	76	60	78.9	151	111	73.5
1	77	60	77.9	67	49	73.1	144	109	75.7
2	77	66	85.7	79	58	84.0	146	124	84.9
3	79	68	86.0	93	78	83.8	172	146	84.9
4	85	68	80.0	89	75	84.2	174	143	82.2
5-9	441	383	86.8	442	378	85.5	883	761	86.2
10-14	450	395	87.8	384	336	87.5	834	731	87.6
15-19	273	226	82.8	226	171	75.7	499	397	79.6
20-24	100	58	58.0	162	111	68.5	262	169	64.5
25-29	65	39	60.0	126	92	73.0	191	131	68.6
30-34	73	36	49.3	111	83	74.8	184	119	64.7
35-39	79	34	43.0	102	72	70.6	181	106	58.6
40-44	69	41	59.4	106	74	69.8	175	115	65.7
45-49	62	42	67.7	87	64	73.6	149	106	71.1
50 and over	253	147	58.1	238	163	68.5	491	310	63.1
Total	2,258	1,714	75.9	2,378	1,864	78.4	4,636	3,578	77.2

Traditional village alarm systems—sounding the gong-gong or ringing bells—were the major source of information, followed by informal channels—neighbors and relatives. Less frequent sources were the more formal educational channels such as health education, clinic, and school personnel.

For infants and 1 year olds, a group at special risk from measles and poliomyelitis, the campaign failed to achieve its objective of reaching at least 80 percent of the 0-4 year olds. Satisfactory vaccination coverage was attained in children aged 2-14 years. Among persons aged 20 or older, 70.7 percent of the women and 56.6 percent of the men were immunized (table 1).

The immunization rates shown in table 1 are based on individual attendance reported by household respondents. In an attempt to validate these reports, the interviewers asked families of children 0-4 years to show their children's vaccination cards and recent immunization scars. The results are shown in table 2.

Vaccination cards were shown for 75 percent of the allegedly immunized children aged 0-4 years. For 19 percent of these children, the cards were claimed to have been lost or they could not be produced during the interview because they were locked in a storage chest or room. These explanations were subsequently confirmed for 88 percent of the children by the presence of an immunization scar. About one-

tenth of the children with vaccination cards did not develop scars, and this figure was used to adjust the number who had visible scars. Therefore, about 90 percent of the allegedly vaccinated children could be validated.

Factors associated with campaign attendance. Maternal attributes and the size of the household were not associated with significant variables in attendance rates for the children aged 0-4 years, as shown

Table 2. Alleged immunization status compared with presence of vaccination card or scar, or both, for children aged 0-4 years

Vaccination card or scar, or both	Reported immunization status			
	Immunized		Not immunized	
	Number	Percent	Number	Percent
Vaccination card (N=787):				
Yes	475	75.0	0	0
No	35	5.5	154	100.0
Lost or unavailable	123	19.4	0	0
Vaccination scar (N=714):¹				
Present	548	88.4	0	0
Absent	72	11.6	94	100.0

¹ 73 children not examined for scars.

in table 3. This finding supports that of earlier studies of attendance at a malaria chemoprophylaxis program in which the mother's educational level was unrelated to either beginning or continuing to bring children to the program (6). In the immunization campaign, we had surmised that mothers who were not currently married, those who were engaged in trading or other occupations requiring time away from the household, and those who thought their children's health was satisfactory might be less available or less motivated to bring their children to the immunization site. No such pattern was found in this study.

The reasons given by mothers for the nonattendance of 154 children aged 0-4 years were as follows:

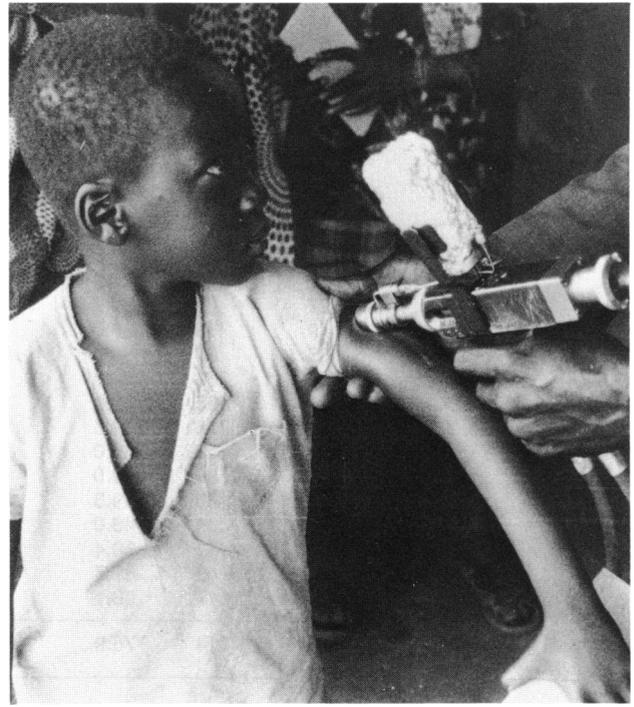
Reason	Number	Percent
Related to mother:		
No information	54	35.1
Forgot	6	3.9
Arrived late	16	10.4
No one to take child	9	5.8
At work, traveling	48	31.2
Against mother's belief	1	0.6
Mother afraid	4	2.6
Raining	2	1.3
Related to child:		
Child was sick	2	1.3
Child too young	5	3.2
Unknown reason	7	4.5

The importance of lack of information or competing maternal responsibilities and the mothers' attitudes toward the campaign constituted 91 percent of the reasons offered for the nonattendance. The condition of the child (such as illness, too young) was a far less important factor in nonattendance; this finding was also reported in an earlier U.S. study (7).

Another major barrier toward obtaining health services generally is the distance from the residence to the facility. The following table shows a significant reduction in attendance for children 0-4 years living just outside the community where the vaccination site was located, although a marked reduction occurred only after 3 or more miles.

Distance from residence (miles)	Number of children	Number vaccinated	Percent vaccinated
0	575	513	89.2
less than 1	76	55	72.4
1	86	58	67.4
2	10	7	70.0
3 or more	40	0	0.0
Total	787	633	80.4

Satisfaction with the campaign. Of the 676 households interviewed, 633 respondents or 94 percent claimed that they would attend the following year's



Measles vaccine being administered by jet gun to a trusting boy

Table 3. Attendance by children 0-4 years old in a mass immunization campaign related to maternal characteristics and household size

Maternal characteristics	Total number of children	Participating 0-4 year old children	
		Number	Percent
Total	787	633	80.4
Education:			
None	486	378	77.8
Primary	143	121	84.6
Middle or higher	158	134	84.8
Marital status:			
Married	728	580	79.7
Single, divorced, or widowed ..	59	53	89.8
Occupation:			
Housewife or farmer	411	318	77.4
Trading or other occupations ...	376	315	83.8
Mother's assessment of child's health status:			
Acceptable	684	548	80.1
Unsatisfactory	103	85	82.5
Number of persons in household:			
1-4	168	127	75.6
5-9	423	350	82.7
10-14	156	127	81.4
15 or more	40	29	72.5

Table 4. Recommendations to improve subsequent immunization campaigns by 426 household members¹

Recommendation	Household members	
	Number	Percent
Pre-campaign communications	116	27.2
Improve message about diseases and vaccination schedule covered	70	16.4
Ask mothers to tell others	40	9.4
Repeat message on day before vaccination date	4	0.9
Use all local languages	2	0.5
Operation at vaccination site	287	67.4
Have team stay longer	89	20.9
Use more vaccination sites	28	6.6
Provide additional medications	91	21.4
Use vaccine which has fewer side effects	49	11.5
Train vaccinators to be more considerate	30	7.0
Followup: return to give therapy for side effects	23	5.4
Total	426	100.0

¹ 250 offered no recommendations.

campaign. Since adverse opinions about the program may have been underreported, we were particularly interested in the reasons given by 38 household members who did not plan to attend future campaigns. Of those dissatisfied or unwilling, 58 percent said that the vaccination caused too much swelling and pain, 32 percent thought the distance to the vaccination site was too far, 5 percent believed that a single vaccination was sufficient for protection, and 5 percent had religious beliefs that made immunization unacceptable.

Suggestions for future campaigns. We asked mothers for recommendations to improve future programs, and about two-thirds offered specific suggestions. In table 4, the recommendations are arbitrarily grouped under categories of pre-campaign communications, program operation, and followup activities. Although most mothers knew about the programs, some said that they were not told which diseases could be prevented by immunization and that they ought to be stated clearly in future campaigns. They also requested that the number of hours a team would remain at the site be stated, so that they would not arrive too late. Several mothers said they were not clear about the age groups being covered, but felt that their infants were too small.

These points need to be clarified in future program communications.

Several mothers also asked that the immunization message be repeated on the day before the vaccination date, since they sometimes forgot. These women recommended a greater use of village volunteers who would make a special effort to remind other villagers just before the immunization date. A few mothers requested that general announcements be made in several languages, since they were recent immigrants who did not know the local language.

Two-thirds of all recommendations concerned the team's time schedule and the services provided (table 4). Many mothers asked if the team could remain half a day or longer, so that they could first trade or farm and attend afterwards. Others requested that each village in the district be visited. Perhaps these queries could have been answered by more complete pre-campaign discussion of the size of the population to be covered and the limited amount of time available.

Two types of recommendations were made about the vaccination procedure. First, a number of mothers asked if a less "strong" vaccine could be used, so that less pain and swelling would occur. Second, mothers said that frightened children needed sympathy and asked that vaccinators be trained to treat such children with more compassion. Finally, a number of mothers recommended that the scope of services provided at the immunization site be increased. They suggested that medications be distributed for curative purposes and that arrangements be made for the team to return to their village for several days following vaccination so that symptomatic persons could be given treatment. These service requests have been made before during preventive programs in the Danfa district (6) and reveal the need to communicate more clearly the purposes and capabilities of an immunization campaign and some of the transient side effects caused by immunization.

Discussion

Before participating in a program, prospective users weigh the potential benefits against the costs (8). In the Danfa district, several attitudes are favorable to participation in a mass immunization campaign. First, families prefer to take their sick children to clinics for care rather than to drug sellers or traditional practitioners (9). There is a widespread enthusiasm for injections in treatment. For example, a large number of mothers in this study told interviewers that immunization injections cured current symptoms in their children and also prevented future

illness. Second, childhood illnesses, particularly measles and whooping cough, are well-recognized diseases. These conditions have specific local names and are perceived to be common in young children. Therefore, a preventive program for these diseases is considered to be fending off an imminent illness, rather than some low-risk possibility in the distant future. Third, the expressed reactions to the 1974 campaign were overwhelmingly favorable. The benefits described by the respondents will be incorporated in future campaign propaganda.

Against these benefits a number of costs must be considered. These costs include distance, work loss, and side effects of immunization. As in earlier Danfa project studies (4), distance to the immunization site was an important barrier to attendance by children aged 0-4 years. It is impossible to offer immunization at the doorstep in rural Ghana, but immunization sites serving a 3- to 4-mile distant population are feasible. By using all available communication channels and stressing not only the value of healthier children but the saving of future time needed to obtain medical care for preventable disease, program planners should be able to overcome much of the distance barrier. It will be important to schedule mass immunization campaigns during the dry, off-farming season, to avoid conflict with adults' agricultural activities. In southern Ghana, 70-80 percent of the rural household's income is derived from crops harvested between June and October (10). Road conditions are also more favorable during the dry season when farming activities are reduced.

We have identified several communication problems in this study. There was a lack of clarity about the childhood diseases being covered. For some mothers there was uncertainty about the age groups to be immunized, and the desired immunization level of infants and 1 year olds was not achieved. Because of inadequate information about the number of hours the immunization team could remain in a village, some families arrived too late.

Based on this study's information about attendance rates for 0-4 year olds, we recommend several procedures for the national immunization campaign.

1. The use of village volunteers to motivate and recruit family participation in campaigns should be stressed. In addition to pre-campaign communications efforts and helping at the immunization collecting point, such volunteers could be valuable in providing subsequent first-aid care for minor postvaccination side effects.

2. Volunteers and traditional community leaders

should reiterate the campaign information 1 day in advance of the immunization date.

3. Pre-campaign propaganda should stress measles and whooping cough prevention (these are well-recognized conditions) and the need for infants and 1 year olds to be protected against these diseases.

This evaluation of the 1974 immunization campaign provided Danfa project planners with helpful guidelines for improving campaign information and mobilizing community support and encouragement for mothers of infants and 1 year olds. It also demonstrates how the existing rural health system can be integrated with a categorical program, the immunization services provided by a regional medical field unit. Since rural health center staff know the village leaders and health committees in their district, they should develop pre-campaign contacts and plans for immunization campaigns. After a suitable time schedule has been devised with the assistance of the target communities, the regional medical field unit can be mobilized to provide the technical expertise needed for efficient mass immunization.

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