Improving vaccination coverage in urban areas through a health communication campaign: the 1990 Philippine experience

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From March to September 1990 the Philippine Department of Health, with the assistance of the HEALTHCOM Project, carried out a national mass-media communication campaign to support routine vaccination services. The essential elements of the campaign strategy were as follows: focusing on measles as a way to get mothers to bring their children to the health centre; emphasizing logistic knowledge in the mass-media messages, in particular popularizing a single day of the week as "vaccination day" and giving clear information about the age for measles vaccination; and focusing on urban areas, which had lower vaccination rates than rural areas.

Evaluation of the effects of the campaign indicates an increase in vaccination coverage and a substantial increase in the timeliness of vaccination that can be attributed to improvement in carers' knowledge about vaccination. Furthermore, most of the observed increase in knowledge was related to exposure to the mass-media campaign. There was no evidence of any programmatic change that could account for the increase in vaccination or evidence that increased health education efforts at health centres could account for the change in knowledge.

These results indicate that when countries meet certain conditions — a high level of access to the media, sufficient expertise and funds available to develop and produce high-quality radio and television advertisements, and a routine system that is able to serve the increased demand — a mass communication campaign can significantly improve vaccination coverage.

Introduction

Since the institution of the WHO Expanded Programme on Immunization (EPI) in 1974, levels of vaccination coverage have increased considerably worldwide. Among the factors identified as important in achieving and maintaining high coverage are the following: an adequate supply of vaccine (*1, 2*); accessibility of vaccination sites and convenient hours for vaccination (*3–5*); short waiting times (*2, 6, 7*); and low rates of missed opportunities for vaccination (*2, 5, 8–10*).

However, even when vaccines are readily available and service delivery is good, coverage rates may still be low, owing to problems arising from knowledge, attitudes and perceptions about vaccination (*5, 6, 11, 12*). These can include more general knowledge and attitudes about the utility of vaccination, such as a less scientific, more fatalistic notion of disease and a generally lower use of preventive services (*11*), lack of knowledge about what diseases vaccination prevents (*5, 11, 12*), or a belief that EPI diseases are not serious (*12*), as well as lack of "logistic knowledge" about the time and place vaccination is available (*3*) or about the appropriate age or interval at which to bring the child for vaccination (*5, 6, 10, 12*).

One response to identification of these deficiencies is to provide the necessary information through the mass media. However, provision of information is usually only one of many components of programme improvement (and frequently is barely mentioned in descriptions of mass campaigns — see,

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e.g., *7, 14–16*); thus it has been difficult to evaluate its effect. The question is important, since the mass media are not an inevitable element of immunization programmes. Continued use of the mass media does require evidence that such use contributes to the success of programmes.

The 1990 national communications campaign to support the Philippine immunization programme provided an opportunity to assess the effectiveness of using the mass media. The immunization programme was managed by the Philippine Department of Health's Maternal and Child Health Services in collaboration with the Public Information Health Education Service, with technical assistance from the Communication for Child Survival project (HEALTHCOM) in developing, implementing, and monitoring the communication elements of the programme.

Because the campaign focused on urban areas, physical access to health facilities was not an issue. Moreover, the Philippines generally has good levels of health service provision, which did not change greatly during the campaign. Thus it provided an opportunity to examine the effect of dissemination of information about vaccination through the mass media, which could be analysed independently of other major changes in health services. The analysis demonstrates that improvement in coverage can be linked to an increase in knowledge about vaccination which in turn was related to exposure to the communication elements of the campaign.

Materials and methods

The communication campaign

The vaccination communication campaign in the Philippines was carried out in two major phases: a pilot phase in Manila in 1988, which led to a nationwide campaign in 1990. The present article focuses on the nationwide campaign, which used the programme strategies piloted in the successful measles immunization communication campaign in Manila.[a] Three essential elements of the strategy were: focusing on measles as a way to get mothers to bring their children to the health centre; emphasizing logistic knowledge in the mass media messages, in particular popularizing a single day of the week as "vaccination day", and giving clear information about the age for measles vaccination; and focusing on urban areas, which had lower vaccination rates than rural areas.

Measles vaccination was selected for promotion because measles was the commonest childhood communicable disease recognized by mothers and because it was the third largest killer of infants and children in the country. Also, since measles vaccination is the final one in the series, its promotion could draw children who had not received earlier vaccinations, particularly diphtheria–pertussis–tetanus (DPT) and oral poliomyelitis vaccine (OPV), and ensure they received these as well. The selection of a single day of the week as vaccination day meant that mothers knew a time when they could be sure that vaccinations would be given at any health centre. After consultations with the regional immunization officers, Wednesday was selected as the vaccination day.

Because of the large number of cities to be covered by the campaign, a number of pre-campaign activities with city and health personnel had to be conducted in different parts of the country. In July and August 1989, area planning conferences were held with regional immunization officers, provincial health officers, city health officers, municipal health officers, and city/municipal EPI coordinators to give them an overview of the campaign and their roles in the activities and to address their concerns. In September 1989, meetings were held with the mayors of the campaign cities (who control the city health centres) to obtain their support and cooperation in campaign activities.

The orientation of clinic personnel to the campaign began in February 1990. There were three master "sales conferences", one-day meetings with regional health staff, who were informed about the campaign and encouraged to convene similar meetings in their own areas. These meetings were held to reinforce Department of Health policies about vaccinations, to prepare clinics for the increased demand and the focus on the Wednesday vaccination day, and to stimulate the involvement of the clinic personnel in the campaign.

The mass-media element of the campaign was carried out between 16 March and 22 September 1990. Four television and four radio advertisements were broadcast, and advertisements were printed in newspapers reminding people that Wednesdays were free vaccination days at the health centres. Other promotional materials included posters, bunting, and welcome streamers for health centres to display, as well as stickers for *jeepneys* (shared taxi rides) and tricycles, and T-shirts for health centre staff.

The communication materials focused on the danger of measles and its complications, and recommended that children aged 9–12 months be taken to the health centre for vaccination. The materials emphasized that the vaccinations were free and that

[a] Details about the Manila campaign can be found in: **Verzosa C et al.** *Managing a communication program on immunization.* Manila, Academy for Educational Development, December 1989.

they would be available on Wednesdays at health centres. The campaign slogan, included in all communication materials, was "*Iligtas si baby sa tigdas*" ("Protect your baby from measles").

Evaluation

The evaluation presented here is based on data obtained from two sources: two surveys of the carers of children aged <2 years in Manila, Luzon, Mindanao and Visayas; and a pre–post study of 60 health centres in the same geographical areas.

Surveys. The first survey was carried out in July and August 1989, before the campaign; and the second, in August 1990, 5 months after the start of the media campaign. Using a structured questionnaire in the relevant local language, interviewers obtained information about the family's socioeconomic status, the child's vaccination status, use of the health care system, the experience the last time the child was taken to be vaccinated, knowledge about vaccination, exposure to the mass media, and specific recall of any advertisements about vaccination. The same questionnaire was used for both surveys.

A woman was eligible to be a respondent if she was the mother or permanent carer of a child aged less than 2 years. The sample of women interviewed was obtained using a multistage cluster sampling strategy, with a cluster size of 10 (sampling stages are summarized in Table 1). Weighted analyses were used to adjust for geographical representation and to standardize the 1990 sample to the distribution of the 1989 sample for socioeconomic factors, since differences were noted in some characteristics of the respondents interviewed in the two surveys (Table 2). Unless noted otherwise, all estimates reported in this article are weighted, and cluster effects were taken into consideration in calculating statistics for testing significance (*17, 18*), except for regression analyses. Furthermore, all coverage estimates reported here are based on carers' reports as well as vaccination cards. As reported previously in the Sudan (*13*), examination of the Philippine data indicated that coverage can be substantially underestimated if card evidence alone is used; cards are often lost and vaccinations may not be recorded. The magnitude of underestimation that would occur if undocumented vaccinations were discounted is much larger than the overestimation inherent in accepting them as valid (see Annex).

It is important to note that the absolute level of coverage reported here cannot be compared directly with estimates based on other procedures. The sample of mothers surveyed was restricted to relatively less well-off people, those who were considered to be in the "D" and "E" categories of the five-category "ABCDE" scale used by market researchers. Thus it might differ from other estimates, for example, those based on distributed vaccines, on card-verified data only, or with different samples; rural as well as urban people, other social classes as well as "D" and "E", or with other provinces included. This evaluation seeks to establish the effects of the campaign and the process through which it occurred. In view of the cost constraints that limited the sample, it cannot be said to represent the absolute level of vaccination in the Philippines.

Health centre study. A simultaneous health centre study provided parallel evidence about what was happening at the facilities that were to meet the demand stimulated by the communication campaign.

Table 1: **Summary of the sampling procedures used in the study**

Stage		
1	Allocation of interviews to:	
	A. Manila (400 interviews)	B. Cities outside Manila (800 interviews)
2	—	Probability proportionate to size sample of: 3 cities in Luzon 4 cities in Visayas 3 cities in Mindanao
3	Round 1: Random sample of voting districts with substantially D and E populations[a] Round 2: Next (previously unselected) voting district on geographically ordered list	
4	Random selection of cluster start	
5	Interviews with 10 mothers/carers of children <2 years living in adjacent or nearest houses in a randomly determined direction from the cluster start	

[a] "D" and "E" are the lowest categories of the five-category "ABCDE" scale used by market researchers. Approximately 90% of the urban population in the Philippines belongs to categories "D" and "E".

Table 2: **Differences between the respondents interviewed in 1989 and 1990 (weighted to account for area representation only)**

Characteristic	1989 survey	1990 survey
% born in a small city	6.9 (1 200)[a]	17.7 (1 198)
% who speak English with children	19.9 (1 200)	6.0 (1 200)
% with electricity	90.3 (1 200)	94.8 (1 200)
% with a radio	71.5 (1 200)	77.8 (1 200)
% whose last child was born at home	37.3 (1 200)	30.9 (1 200)
Average income category (1–10)	4.5 (1 116)	5.5 (1 153)
Average length of schooling of respondent (years)	9.6 (1 199)	10.1 (1 198)

[a] Figures in parentheses are the number of respondents.

This study included three components: structured interviews with the staff of 60 health centres; observations of 10 children who attended the health centre on a day when vaccinations were given in a subset of 20 centres; and exit interviews with the adults accompanying the observed children as they left these 20 health centres. All the health centres were visited from August to October 1989 and from July to September 1990.

The structured interviews with health centre staff covered general information about the particular clinic and its customary practices with regard to vaccination, supplies, and record-keeping. Observations centred on the interaction between the health centre clients and the staff providing vaccinations; and the interview with the client outside the health centre, which took less than 5 minutes, included questions about clinic accessibility, waiting time, knowledge about vaccination, and examination of the child's card to determine missed opportunities that day.

Most of the 60 health centres included in the study were selected because the majority of carers in an individual cluster (60 of the 120 clusters in the first survey) had named the centre concerned, either as the one they attended, if they used the public health system, or as the nearest health centre to where they lived, if they did not use the public health system. For a few clusters, either no health centre was named by a majority of individuals or the one that was named was unavailable for the study; in these cases another nearby health centre was substituted.

Results

Effect of the campaign

Between the surveys conducted in 1989 and 1990 the proportion of fully vaccinated children aged 12–23 months increased from 54% to 65%, and the average number of vaccinations for all children less than 2

Table 3: **Improvement in vaccination coverage between the 1989 and 1990 surveys, according to various measures**

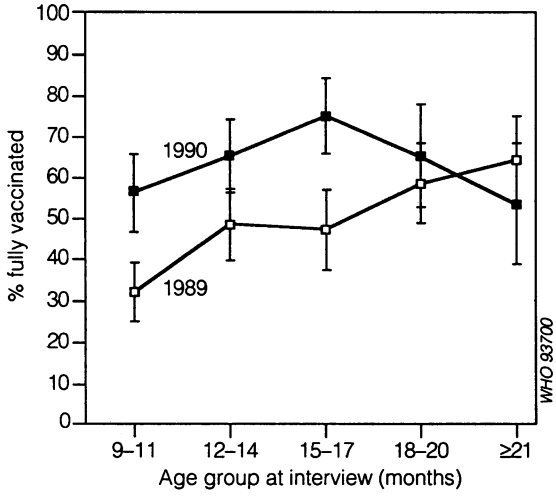
Measure	1989 survey (%)	1990 survey (%)	Rate difference
12–23 month coverage (proportion of children aged 12–23 months who had all 8 vaccinations)	53.6 *446*[a]	64.5 *461*	10.9 (2.8–19.0)[b]
Starting on time (proportion of children <4 months of age who had at least one vaccination)	43.3 *255*	55.6 *196*	12.3 (1.5–23.1)
Finished on time (proportion of children aged 9–11 months who had all 8 vaccinations)	32.2 *184*	56.2 *193*	24.0 (12.2–35.8)
Appropriate early vaccinations (proportion of children aged 2–8 months with at least 4 vaccinations)	47.7 *441*	56.2 *442*	8.5 (0–17.1)
Mean number of vaccinations	4.32 *1 200*	5.10 *1 195*	0.8 (0.4–1.1)

[a] Figures in italics are the denominators.
[b] Figures in parentheses are the 95% confidence limits of the rate difference based on the *t*-test statistic corrected for the design effect associated with the cluster sample procedures (ref. *17, 18*).

years of age increased from 4.32 to 5.10 (Table 3). Although vaccination levels in the Philippines had been increasing even before the campaign began, the rate of increase was too gradual to explain the extent of the observed change.[b]

The most striking change was the improvement in the proportion of children finishing "on time", estimated as the proportion of children between 9 months of age and their first birthday who had received all eight vaccinations. This apparently greater increase in timely vaccination than in overall coverage is an artifact of the timing of the evaluation. A comparison of the age-specific proportions of fully vaccinated children in 1989 and 1990 (Fig. 1) indicates that improvement occurred for children who were less than 1 year of age at the start of the campaign (i.e., <18 months of age at the time of the follow-up survey); children who were older at the start of the campaign showed no improvement. Had the "after" measure been delayed until the children who were 12 months old at the time of the 1990 survey reached their second birthday, the apparent increase in 12–23-month coverage would have been larger.

Fig. 1. **Age-specific proportions of children who were fully vaccinated (all eight vaccinations) at the time of the surveys completed in 1989 (before the mass-media campaign) and in August 1990 (5 months after the start of the campaign).** The 95% confidence limits (bars) are corrected for the design effect associated with the cluster sampling procedures (ref. *17, 18*).



Mechanism of the effect

There is substantial evidence that the programme increased knowledge about vaccination among the carers of young children. There were large increases in knowledge about vaccination between 1989 and 1990, and the increases, which were associated with the improvement in vaccination practice, were also related to exposure to the mass-media campaign. There is no evidence of any changes in other programme factors that could account for the increase in vaccination coverage, e.g., increased vaccine supplies, increased outreach efforts, or reorganization of clinic services to reduce waiting times. Moreover, the findings on the interaction between health workers and those coming for vaccination suggest that greater health education efforts at the health centres cannot account for the change in knowledge.

Knowledge about vaccinations. The surveys conducted in 1989 and 1990 included measurements of 22 items of knowledge about vaccination: eight measurements specifically about measles vaccination and 14 measurements concerning other vaccinations and vaccination in general. People knew more about measles vaccination after the campaign than before. For every question there was a statistically significant improvement between 1989 and 1990 (Table 4). When the baseline correct knowledge was over 80%, the improvements were small, but when the baseline knowledge was lower, the improvements were often more than twenty percentage points.

Knowledge about other vaccinations also improved between the two surveys, although not so sharply (Table 5). The increase in the average proportion of correct answers to these questions (4.8%) was only about a third of that for the eight questions about measles (15.2%). Such an overall comparison of the changes in knowledge about measles and about the other vaccinations can only be tentative, since not all the questions were identical. However, comparison of similar questions[c] shows that in every case a greater improvement occurred with respect to knowledge about measles vaccination than about other vaccinations. Moreover, the lack of change in knowledge about other vaccinations (questions 7, 8, 9 in Table 5), particularly about the number of doses of OPV necessary, suggests that the experience of actually obtaining the vaccinations is not the chief means of acquiring knowledge about them. The greater change in knowledge about measles suggests

[b] The secular trend was estimated from the time plot of measles vaccination by 12 months of age among 12–23-month-old children determined in 51 city and provincial level EPI surveys undertaken by the Philippine Department of Health with assistance from the Resources for Child Health (REACH) project between February 1988 and March 1990.

[c] Question 2 in Table 4 with questions 1–3 in Table 5; question 3 in Table 4 with questions 4–6 in Table 5; and question 7 in Table 4 with question 13 in Table 5.

Table 4: **Changes in knowledge about measles vaccination among respondents between the 1989 and 1990 surveys**

Measles knowledge question	% correct answers: 1989 (n = 1 200)	% correct answers: 1990 (n = 1 195)	Rate difference (%)
1. *Open ended:* "Some children get measles and others do not. Is there any way to protect a child from getting measles?" *If says yes:* "What can one do to protect a child from getting measles?" (*Mentions vaccination*)	53.2	73.2	20.0 (14.9–25.3)[a]
2. "Here is a list of diseases: please tell me against which of these diseases a child can be protected by vaccination?" (*Mentions measles*)	87.8	94.5	6.8 (4.0–9.4)
3. "When (child's name) has all the vaccinations he/she needs will he/she still be likely to become sick from measles?" (*Says no*)	48.0	65.4	17.4 (11.5–23.2)
4. "Would you say that measles is a serious or not so serious disease?" (*Says it is serious*)	81.1	86.6	5.5 (1.6–9.3)
5. "Would you say that measles can lead to complications or not?" (*Says it can lead to complications*)	81.0	95.9	14.9 (11.6–18.2)
6. "Mothers should never take measles for granted" (*Agrees*)	80.7	91.2	10.5 (6.0–15.0)
7. "As far as you know, at what age should a child get vaccination for measles?" (*Gives answer between 38–52 weeks)*	45.1	66.1	21.0 (15.7–26.5)
8. "The best age for a child to get measles vaccination is 3–5 months old" (*Disagrees*)	32.6	57.9	25.3 (19.3–31.4)
Average % correct	63.7	78.9	15.2

[a] See footnote *b*, Table 3.

the importance of the communication efforts, in view of the emphasis placed on that antigen during the mass-media campaign.

Vaccination coverage and knowledge. A series of regression analyses using survey year and knowledge variables to predict the number of vaccinations indicated that a subset of four of these 22 knowledge items was particularly important in explaining the influence of the campaign on vaccination practice. These four items were chosen because they were the only ones that had independent effects on the relation between survey year and vaccination performance. They included three questions about measles (questions 2, 7 and 8 in Table 4) and one about all vaccinations (question 13 in Table 5); three out of the four were about the timing of vaccinations.

Evidence that the campaign worked by increasing knowledge can be seen clearly from Fig. 2, which shows for both surveys the relationship between practice and a knowledge score (range, 0–4), obtained by summing responses to the four critical knowledge items, with respondents receiving one point for each correct answer. Strikingly, the plots are almost identical, indicating that the relationship between knowledge and practice was about the same for both 1989 and 1990. However, respondents scored higher in 1990 for knowledge, averaging 2.97 correct responses, compared with 1989, when the average score was 2.3, a difference of 0.67 (95% confidence interval (CI): 0.55–0.78).

In 1989, before the campaign, surveyed children had an average of 4.32 vaccinations; in 1990 they had 5.10, an increase of almost 20%. If this difference was largely due to the effects of the campaign on knowledge, controlling for knowledge should essentially remove the effect. The results of a series of multiple regression analyses (summarized in Table 6) demonstrate the expected pattern. The original gap in vaccination levels between the 1989 and 1990 samples is essentially explained by knowledge differences between them. Once knowledge was controlled for, no significant difference in vaccination practice between the two years remained.

Knowledge and campaign exposure. There is good evidence that the changes in knowledge were related to exposure to the mass-media campaign. The public communication campaign was readily recalled by the survey respondents (Table 7), including a particular-

Table 5: **Changes in knowledge about other vaccinations among respondents between the 1989 and 1990 surveys**

Vaccination knowledge question	% correct answers: 1989 (n = 1 200)	% correct answers: 1990 (n = 1 195)	Rate difference (%)
1. "Here is a list of diseases: please tell me against which of these diseases a child can be protected by vaccination?": Whooping cough (*Mentions*)	63.7	69.4	5.7 (0.7–10.7)[a]
2. Tuberculosis (*Mentions*)	77.0	81.9	4.9 (0.8–9.2)
3. Poliomyelitis (*Mentions*)	90.3	91.6	1.3 (–1.9 to 4.4)
4. "When (child's name) has all the vaccinations he/she needs will he/she still be likely to become sick from: Whooping cough?" (*Says no*)	39.4	48.1	8.7 (2.7–14.7)
5. "...tuberculosis?" (*Says no*)	61.0	70.9	9.9 (4.4–15.4)
6. "...poliomyelitis?" (*Says no*)	64.2	74.3	10.1 (4.8–15.3)
7. "There is no vaccination to protect a newborn baby from tetanus" (*Disagrees*)	66.2	62.5	–3.7 (–9.0 to 1.6)
8. "For a child to be fully protected against poliomyelitis, only one dose of vaccine is necessary" (*Disagrees*)	62.9	61.4	–1.5 (–7.5 to 4.5)
9. "BCG vaccination protects children from getting whooping cough" (*Disagrees*)	18.4	18.7	0.3 (–4.7 to 5.2)
10. "Poliomyelitis vaccination is given by drops in the mouth" (*Agrees*)	80.8	85.8	5.0 (1.1–9.0)
11. "Even if a child has a cold and a low fever a child should still be given vaccination" (*Agrees*)	18.2	25.1	6.9 (1.8–12.0)
12. "As far as you known, by what age should a child begin getting vaccination?" (*Answer is 4 weeks or less*)	50.7	58.8	8.1 (3.0–13.7)
13. "As far as you know, by what age should a child have all the vaccinations he/she needs" (*Answer is 38–52 weeks*)	65.0	78.1	13.1 (8.8–17.5)
14. "It's best for a child to finish getting all vaccinations by his first birthday" (*Agrees*)	91.9	90.6	–1.3 (–3.8 to 1.2)
Average % correct	60.7	65.5	4.8

[a] See footnote *b*, Table 3.

ly high proportion who could complete the campaign slogan "*Iligtas si baby sa tigdas*". The low number of correct responses given to the same questions in the 1989 survey indicates that the 1990 answers were not random correct guesses. Some of the 1989 respondents gave replies suggesting they had been exposed to mass-media information about measles. Most of these respondents were in Manila and had been exposed to the roughly similar pilot campaign mounted in 1988. This permitted them to recall the catch phrase of the campaign and know that the advertisements emphasized that vaccines were available without cost. However, the 1988 campaign featured Friday as the "vaccination day", which explains why virtually no one answered that question correctly in 1989.

A second type of supporting evidence for the effects of the mass media on knowledge was the response to the general question "Can you tell me where/from whom you learned about vaccination? Anyone else/any other place?" The broad tendency was for responses to this question to focus on health system components: clinic staff or private physicians. This did not change between 1989 and 1990. However, there was a striking increase in the number of times the mass media were mentioned in the two surveys. In 1989 about 11% and in 1990 about 35% of the respondents mentioned radio or television among their sources of such knowledge (difference = 24%; 95% CI: 19–30%). While this is not evidence about the source of any specific knowledge, it does indicate that, in general, people viewed the mass media as a much more significant source for information about vaccination than they had before the campaign.

The third type of evidence is the most direct. A measure of recall of campaign messages was constructed from respondent's replies to the items listed in

Fig. 2. **Mean number of vaccinations for all children aged 0–23 months, by vaccination knowledge scores, in 1989 and 1990.**

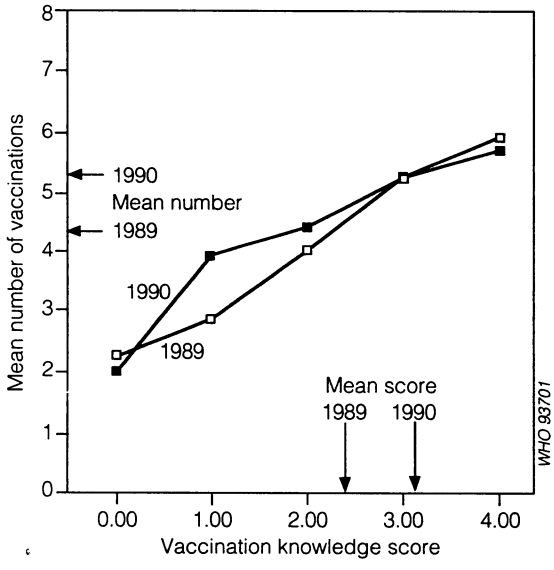


Table 7. A carer could receive from 0 to 4 points depending on how many of the items were answered in a way consistent with exposure to the media campaign ($\alpha = 0.85$). Comparison of this recall score with the level of knowledge both before and after the campaign shows the importance of the exposure in achieving greater knowledge about vaccination (Fig. 3). The exposure measure was unrelated to knowledge in 1989, as expected, but was strongly related to knowledge in 1990.

The most convincing evidence that exposure to the mass-media campaign had an important influence on knowledge is obtained from an analysis of the difference in the level of knowledge before and after the campaign (Table 8). The difference between the knowledge scores of respondents in 1989 (2.3) and 1990 (2.97) is 0.67, of which almost two-thirds is accounted for by the effects of the campaign exposure variables. Once they were controlled for, the remaining gap was 0.24, less than one-third of the original. The remaining difference was not explained by any of the other variables that were measured, including area of the country, carers' education level or wealth, recency of visiting the health centre, or number of vaccinations the child had received. Overall, while exposure does not account for all of the gain in knowledge, it had a substantial influence

Improvements in other programme factors. The increase in the average level and timeliness of vaccination cannot be explained by improvements in other programme components. Available evidence indicates that most programme factors were relatively stable.

Missed opportunities

One of the most important aspects of health worker practice that affects vaccination coverage is the level of missed opportunities — whether children receive fewer than all the vaccinations for which they are eligible at the time of each contact with the health system. Information from both the health centre study and the surveys indicates that a decrease in missed opportunities did not contribute to campaign results. During each of the 20 health centre visits, the cards of 10 children were examined to determine whether they had received all the vaccinations for which they were eligible that day. Considering all four antigens (with little difference among them), approximately 16% of the children were not given all the appropriate vaccines in 1989. In 1990 there was a small but not statistically significant increase in the proportion of such children to 21%.

While the presence of observers at the health centres may have decreased the likelihood of missed

Table 6: **Effect of respondents' knowledge on the 1989–1990 vaccination differences**[a]

	Absolute difference	% explained	Significance of difference
1989–1990 difference in vaccination coverage	0.77	—	$P<0.0001$
Amount of that difference accounted for by four knowledge items	0.54	70	
Remaining difference not explained by knowledge	0.23	30	NS[b]

[a] This analysis summarizes the results of a multiple regression analysis. These are the unstandardized coefficients for a variable representing the time a survey was completed, estimated with and without the knowledge items in the equation. Expressed alternatively, the simple bivariate correlation between survey year and vaccination level is 0.122 ($P<0.0001$); and the partial correlation, controlling for the knowledge variables is 0.04, a non-significant coefficient ($P = 0.07$).

[b] NS = not significant.

Table 7: **Exposure of respondents to the mass-media campaign**

	1989 survey (n = 1 200)	1990 survey (n = 1 195)	Rate difference (%)
Heard or saw an advertisement (%)	31.1	83.9	52.9 (48.2–57.6)[a]
Could complete last word of campaign rhyme (%)	12.6	72.0	59.3 (54.9–63.7)
Of those who recalled the advertisement:	(n = 372)	(n = 1 003)	
Agreed that it said that vaccinations were free (%)	68.2	93.7	25.5 (18.6–32.4)
Mentioned that it said that Wednesday was vaccination day (%)	6.5	74.0	67.5 (62.6–72.4)
Average score on four-point campaign recall scale (all respondents)	0.71	3.03	2.32 (2.19–2.46)

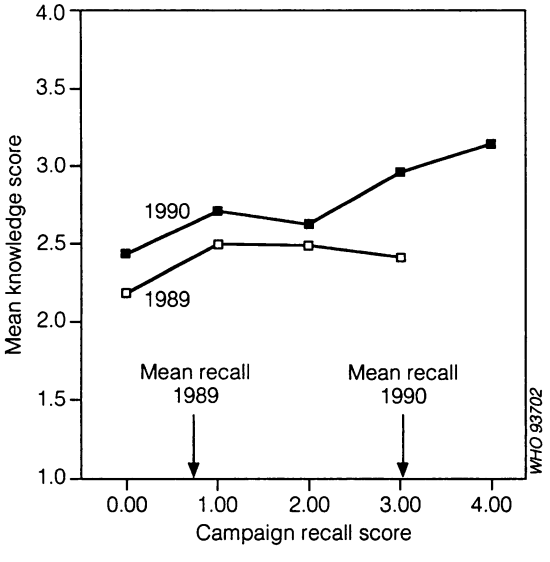
[a] See footnote *b*, Table 3.

opportunities, the results were corroborated by analysis of the vaccination data recorded during the surveys. From these data a lower limit estimate of missed opportunities can be calculated, since no information was recorded about visits to health centres when no vaccinations were received. Children did not receive all appropriate vaccinations at 24.6% of sessions during the campaign, a rate not statistically different from that during sessions in 1988 and 1989 (22.4%).

Vaccine supply

Vaccination coverage can be inhibited by a shortage of vaccine and vaccination supplies, and hence planning for the campaign included provision for an increase in supplies. Interviews with providers during the health centre study indicated that needles, syringes, and measles vaccine were all in shorter supply in 1990 than in 1989, both on the day of the interviews and over the previous 3 months. Other vaccines were all adequately supplied. Vaccination cards were in short supply in both years, with only a slight tendency for supplies to be worse in 1990 than in 1989. These shortages suggest that demand for vaccination was greater than anticipated. However, evidence from the carer's surveys suggests that supplies very nearly met the increased demand. In the 1989 survey, 2% of carers who visited the clinics in the previous year claimed to have been turned away at least once because of shortages; that proportion was only slightly, although not significantly, greater in 1990 (4%). Overall, these data suggest that the improvement in vaccination coverage occurred despite any shortfall in vaccination supplies.

Fig. 3. **Mean knowledge scores in 1989 and 1990, by level of recall of the mass-media campaign**. Each point displayed represents at least 50 respondents.



Accessibility

Few people (about 1%) claimed to have visited health centres to find them closed in either year. Waiting times for vaccination at clinics averaged about 1 hour, and they seem to have declined only slightly, by about 8 minutes (95% CI: 2.5–13.5), according to the carers' surveys.

Increases in knowledge and health centre practice. One possible explanation for the observed improvements in knowledge is that care learned about vaccination during visits to health centres. However, evidence that health clinic personnel changed their way of interacting with their clients is less convincing than that for the mass-media exposure effects. Data for this conclusion come from two sources: the carer surveys and the exit interviews in the health centre study. In both cases there was little change in the

Table 8: **Effect of campaign exposure on 1989–1990 knowledge differences (n = 2 395)**

	Absolute difference	% explained	Significance of difference
1989–1990 difference in vaccination knowledge	0.67		$P<0.01$
Amount of that difference accounted for by four campaign recall items	0.43	64	
Remaining difference not explained by campaign recall items	0.24	36	$P<0.01$

reported character of the interaction or in the level of accurate knowledge that carers took away from their health centre visit.

The interviews with carers in their homes indicated very little change in what happened at health centres. About 36% of respondents in both years said that someone at the clinic knew them by name, and about 74% said that someone had told them about the side-effects of vaccination at the last visit. There was a small increase in the proportion who reported being told against which diseases the vaccine protected (51.9% in 1989 and 59.0% in 1990; difference: 7.1%; 95% CI: 0.6–13.4), and no change in the proportion who said that someone had reminded them about vaccination over the previous 3 months (14.4% in 1989; 18.1% in 1990; difference: 3.7%; 95% CI: –0.8 to 8.4). Differences in these factors do not explain the observed improvements in vaccination levels.

The carers interviewed as they left the health centres reported roughly similar experiences in 1989 and 1990. The time they spent with the clinic personnel was about 10 minutes in both years, and almost all (85% in 1989 and 89% in 1990) were told when to bring the child back or that the child had received all the vaccinations needed. In both years 38% said that someone had told them about possible side-effects of vaccination, and in both years about the same proportion could tell the interviewer accurately what vaccinations their child had received (63% in 1989; 72% in 1990: difference not significant). One exception to this pattern of little change was a sharply increased proportion of exit interviewees saying that "someone explained about vaccination": 18.4% in 1989, but 75.5% in 1990. However, this result is difficult to interpret, since no parallel change was observed in responses to more specific questions, whether of exit interviewees or of carers.

If an essentially unobserved change in health centre practice affected knowledge, then we could expect that better knowledge would be associated with frequency of contact with the health centre. However, in 1990 the average knowledge scores of carers who reported 0, 1–3 and ≥4 visits to the health centre over the past year were almost exactly identical (on average, 2.97, 2.97, and 2.92 resp.). In summary, there is little evidence that changes in the way vaccination sessions were conducted at the clinics were responsible for the increase in knowledge among the carers that would account for most of the increased vaccination levels.

Discussion

The evidence suggests that the mass-media information campaign was largely responsible for the improvement in vaccination coverage. Health centre practice was essentially the same during the campaign as previously. The rate of missed opportunities for vaccinating children was slightly worse, as were vaccine supply shortages, and only small changes in the interaction of health workers with vaccination clients was noted. In contrast, changes in knowledge about measles vaccination, in particular about the appropriate age for vaccination, were substantial.

There were three essential elements in the campaign strategy: the concentration on urban areas; the focus on measles, and the emphasis on knowledge of the details of the time, place, and age. The decision to focus on urban areas was prompted by their lower vaccination rates. While the urban areas are at an undoubted disadvantage because of higher rates of disease transmission, this is somewhat offset by easier access to services. In contrast to rural areas, the physical access of the urban population to health facilities and of health centre staff to supply sites is not a constraint; moreover, dissemination of information is likely to be greater.

In this programme, the focus on measles and logistical knowledge — the age for vaccination and the times and places vaccinations would be available — translated directly into the messages disseminated in the television and radio advertisements and mentioned on posters. The designation of a particular day for vaccination could help keep costs down, since this

reduces wastage and improves efficiency (*19*). The change in knowledge about the appropriate age for vaccination relates directly to the major effect of the campaign on the timeliness of vaccination. This effect can be important as the Philippines moves into a later stage of measles control (*20*), since a one-dose vaccination strategy for young children may be more effective than a two-dose strategy that achieves the same coverage (*21*).

The effect of the campaign was not limited to measles vaccination. This "spillover" is most probably due to a heightening of awareness about vaccination generally, rather than the concurrent administration of other needed vaccinations when children came for measles vaccine. Improvements in vaccination levels increased well before the children reached 8.5 months of age, when they become eligible for measles vaccination (see Table 3). If the spillover was only the result of other vaccinations given when children came for measles vaccine, the improvement in coverage would have been restricted to children eligible for measles vaccination.

It is important to point out that the Philippine campaign differed from classical mass campaigns (*7, 22*) in a number of important respects. Most importantly, it was a communications campaign in support of routine vaccination services. There was a long planning period, so that vaccine supplies were reasonably adequate for the demand created; health service staff were alerted through the "sales conferences" and their local meetings; the campaign was centralized, in that there was a unique policy and universal provision of vaccination on Wednesdays, usually in addition to other days selected by local staff. The quality of services provided did not appear to suffer; there was no increase in waiting times or decrease in the proportion of clients told when to come back, a situation that constrasts markedly with that reported for some mass campaigns (*7*).

A number of factors contributed to the success of the campaign. First, the urban sample was drawn from a population with good access to the mass media. More than 60% claimed to own televisions and 73% claimed to own radios, while more than 50% owned both. In the 1990 survey, most of those who did not own such equipment claimed to be listeners and watchers, with only 2% describing themselves as neither watchers nor listeners. The intensive mass-media-based promotion campaign therefore clearly found the channels to reach its audience. Second, the high level of public access to the mass media was reflected in the expertise available to the Department of Health to develop and produce high-quality radio and television spots. Finally, and most importantly, the campaign supported a routine system that was ready to serve the increased demand that it generated.

Even with the successful media campaign, on-time vaccination coverage did not exceed 65% and the 18-month coverage was just below 80%. If measles is to be controlled and transmission interrupted in urban areas, vaccination coverage of 95% or more may be needed (J. Clements, personal communication, 1992). Achieving a high level of control will depend on using all available tools and strategies, of which mass-media-based information campaigns should certainly be one.

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Résumé

Amélioration de la couverture vaccinale en milieu urbain grâce à une campagne de communication: l'expérience des Philippines

De mars à septembre 1990, le Ministère de la Santé des Philippines a mené, avec l'aide du projet HEALTHCOM, une campagne nationale de communication dans les médias pour faire connaître ses programmes réguliers de vaccination. La stratégie adoptée lors de cette campagne comportait trois éléments essentiels: focalisation sur la rougeole pour inciter les mères à présenter leurs

enfants dans les centres de santé; publicité dans les médias, avec notamment l'annonce d'une journée hebdomadaire de vaccination et des informations claires sur l'âge de la vaccination antirougeoleuse ; focalisation sur les zones urbaines où les taux de vaccination étaient plus faibles qu'en milieu rural.

Les effets de la campagne ont été évalués à partir de deux sources de données : deux enquêtes menées auprès des mères d'enfants de moins de deux ans et une étude effectuée avant et après la campagne dans 60 centres de santé. On a pu constater une amélioration tant en ce qui concerne la couverture vaccinale que le respect du calendrier de vaccination, notamment pour les enfants âgés de moins d'un an au début de la campagne: la proportion des enfants âgés de 12 à 23 mois ayant reçu les huit vaccinations est passée de 53,6% en 1989 à 64,5% en 1990, alors que pour les enfants âgés de 9 à 11 mois, cette proportion est passée de 32,2% à 56,2%. Pour l'ensemble des enfants, le nombre moyen de vaccinations a été de 5,10 en 1990 contre 4,32 en 1989.

On a également noté une amélioration considérable des connaissances sur la vaccination. La proportion des réponses correctes à huit questions concernant la vaccination antirougeoleuse est passée de 63,7% en 1989 à 78,9% en 1990. D'autre part, 14 questions ont été posées sur les autres vaccinations et la vaccination en général; la proportion de réponses correctes à ces questions a été de 60,7% en 1989 et 65,5% en 1990. Un indice de connaissance a été calculé à partir des réponses aux quatres questions les plus importantes, identifiées grâce à une série d'équations de régression. Cet indice est passé de 2,30 en 1989 à 2,97 en 1990. L'analyse de régression a montré que l'amélioration des connaissances sur ces quatre points expliquait en grande partie la différence observée dans le nombre moyen de vaccinations entre 1989 et 1990.

Un lien a pu être établi entre l'amélioration des connaissances et le degré d'exposition à la campagne dans les médias. Le degré d'exposition a été mesuré en demandant aux gens s'ils avaient entendu ou vu une annonce concernant la vaccination antirougeoleuse et s'ils se souvenaient de trois éléments spécifiques de ces messages. On a ainsi obtenu un indice d'exposition de 0,71 en 1989 et de 3,03 en 1990. Une analyse de régression a montré que l'amélioration des connaissances de 1989 à 1990 pouvait s'expliquer en grande partie par les effets de la campagne.

Il ressort des enquêtes et de l'étude menée dans les centres de santé qu'aucun changement lié aux activités du programme, comme une réduction du nombre d'occasions manquées de vaccinations ou un meilleur approvisionnement en vaccins, ne pouvait expliquer l'augmentation du taux de vaccination. D'autre part, il ne semble pas que l'amélioration des connaissances soit due à une intensification des efforts d'éducation dans les centres de santé.

Ces résultats montrent que lorsque certaines conditions sont satisfaites — facilité d'accès aux médias, ressources techniques et financières suffisantes pour concevoir et produire des programmes de radio et de télévision de qualité et existence d'un système de santé capable de répondre à l'augmentation de la demande — une campagne de communication de masse peut améliorer nettement la couverture vaccinale.

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Annex

Validity of reported vaccinations with no card evidence

Information about their children's vaccination status was obtained by asking carers for their child's vaccination card. If no card was available, or if a specific vaccination was not recorded, the carer was asked whether the child had received that vaccination, and on what date.

In 1989, prior to the campaign, undocumented vaccinations reported by carers accounted for 15–31% (median, 17.5%) of the coverage levels of different vaccinations among children aged less than 1 year, and, as expected, higher proportions (33–40%; median, 35%) among older children, who were less likely to have cards (Table A1). It is clear that excluding undocumented reports would decrease the estimated coverage to levels that are probably too

Table A1: **Total coverage rates for specific antigens and the proportion of coverage based on undocumented carers' reports**

		1989 survey		1990 survey	
Vaccine[a]	Age (months)	Coverage rate	% undocumented	Coverage rate	% undocumented
Age-appropriate coverage in the first year of life:					
BCG	0–11	64.0	25	76.5	27
DPT1	2–11	70.0	18	78.6	21
OPV1		69.7	19	79.1	22
DPT2	3–11	56.9	16	69.2	21
OPV2		55.8	16	67.3	20
DPT3	4–11	45.1	17	57.0	23
OPV3		43.9	15	55.7	23
Measles	9–11	35.1	31	61.1	43
Coverage among 12–23-month-olds:					
BCG		84.9	40	89.4	39
DPT1		84.0	37	87.1	37
OPV1		83.8	37	85.6	38
DPT2		76.1	35	83.4	38
OPV2		75.2	35	82.8	38
DPT3		66.3	33	74.2	38
OPV3		66.2	34	73.2	37
Measles		61.2	33	71.7	42

[a] DPT = diphtheria–pertussis–tetanus; OPV = oral poliomyelitis vaccine.

low. Moreover, some verification of these reports is available from BCG scar ascertainment: in 1989 scars were observed in 88.6% of children with card evidence of vaccination and in 82.0% of those without such evidence, suggesting that most of the reports were valid. In view of the high proportion of undocumented vaccinations, if many carers were claiming vaccinations that their children had not actually received, the difference in scar ascertainment would be greater and other distortions of basic patterns would be evident. This was generally not the case; for example, coverage levels decreased for successive vaccinations, as expected.

The proportion of undocumented vaccinations was fairly constant for the different vaccinations, except for BCG and measles. Higher proportions of undocumented BCG vaccinations were apparent for both 0–11- and 12–23-month-old children. This is not surprising, since BCG vaccine is frequently given at the place where a child is born, and may not always be recorded on the vaccination card, which is obtained at a health centre.

For measles, the proportion of undocumented reports was higher than for other vaccinations among children aged less than 1 year but not among those aged 12–23 months. This could have arisen because of the practice of some physicians of giving two doses of measles vaccine — one soon after the child reached 6 months of age, and the second after the first birthday (M.T. Bagaso, personal communication, 1992). When this is done the usual practice is not to record the first dose on the vaccination card given to the mother, which has space for only one entry for measles. Thus, young children might have had a vaccination that was not recorded; in contrast, older children would probably have received the second of the two-dose series, which was recorded.

In 1990, the proportions of reported vaccinations that were undocumented increased slightly, the proportion undocumented being consistent for all vaccinations except measles. For measles, although the possibility of some overreporting stimulated by the campaign could not be ruled out, we judged that the likelihood of underestimating coverage by discounting claimed vaccinations was probably greater than that of overestimating coverage by accepting them. However, to reduce the impact of any overreporting of measles on the analysis of the effect of the campaign, the total number of vaccinations was used as the outcome measure for the analyses we have presented here.