

Evaluation of a poliomyelitis immunization campaign in Madras city*

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A city-wide oral polio vaccine (OPV) immunization campaign, aimed at the 3-36-month age group, was carried out in Madras city during the first 3 months of 1985 as a joint effort by government and voluntary agencies. Wide publicity was given to the campaign. An evaluation of the results was conducted using the 30-cluster sample survey method. The campaign succeeded in rapidly increasing the vaccine coverage to 94%, 88% and 72% for, respectively, the first, second, and third doses of OPV. Although a variety of publicity methods were used, nearly half the parents were reached through word-of-mouth information. It is proposed that similar campaigns for immunization should be carried out every year till the health care system develops the capability of attaining a high level of population coverage.

As immunization coverage by the health care system is relatively low in most parts of India (1), the incidence of preventable diseases like paralytic poliomyelitis remains high (2). In such a situation the strategy of 'annual pulse immunization', in which governmental and voluntary agencies together conduct annual immunization campaigns in geographically defined units of the population (using a broad range of the target age group of eligible children), has been recommended for disease control until the primary health care system becomes capable of achieving near-universal immunization coverage (3).

This strategy to control poliomyelitis was adopted by the city of Madras in the State of Tamil Nadu. A pilot project for the campaign was conducted in two areas of the city on a population of more than 20 000 and was evaluated by the 30-cluster sample survey method (4). A city-wide campaign using oral polio vaccine was planned and conducted by a committee (composed of representatives from the city corporation and state health department, the Integrated Child Development Scheme,^a voluntary organizations, and private companies) under the guidance of Impact India Foundation.^b

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^a The ICDS is a national programme of nutrition supplementation and immunization of selected population groups, e.g., city slum dwellers and the rural poor.

^b Impact is an international initiative against avoidable disablement and is jointly sponsored by the UNDP, WHO and UNICEF. Impact India Foundation was inaugurated in October 1983 and is a registered public trust.

Wide publicity was given to the campaign through the mass media (television, radio, newspapers) for several days. In addition, in many areas the city corporation's health workers, 'balwadi ayahs' (women workers in day-care centres for pre-school children), and volunteers visited households and informed parents by word of mouth. Wall posters, descriptive handbills, and slides in cinemas were also used to disseminate information. In many areas announcements were made through mobile loudspeakers. The target age group for immunization was 3 to 36 months.

The centrally stored oral polio vaccine (OPV) was moved to 450 immunization booths via two distribution centres early in the morning on the days of the campaign (i.e., on 4 days each in January, February and March 1985). The cold chain remained intact until the vaccine was taken out of the boxes immediately before administration by health workers and volunteers. A total of 240 100 doses of OPV were utilized in the campaign. Immunization cards were distributed in many but not all booths.

After the campaign was over, an independent evaluation was conducted and the results are reported here.

EVALUATION METHODOLOGY

The objectives of the evaluation were to determine the vaccine coverage, the relative success of various publicity methods, and the reasons for non-response. A WHO-recommended cluster-sample technique was used to choose 30 among the total of 150 administrative divisions of Madras city (4). In every chosen

Table 1. Oral poliovirus vaccine (OPV) coverage according to the age of children and number of doses

Age in months	No. of respondents	No. of children who received OPV:						
		1 dose	2 doses	3 doses	4 doses	5 doses	6 doses	7 doses
6-12	308	281(91.2) ^a	256(83.1)	200(64.9)	54(17.5)	27(8.8)	1(0.3)	0
13-24	301	291(96.7)	267(88.7)	226(75.1)	97(32.2)	58(19.3)	11(3.7)	2(0.66)
25-36	308	287(93.2)	280(90.9)	238(77.3)	103(33.4)	62(20.1)	18(5.8)	3(0.97)
Total	917	859(93.7)	803(87.6)	664(72.4)	254(27.7)	147(16.0)	30(3.3)	5(0.5)

^a Figures in parentheses are percentages.

division, a sample survey was conducted until 10 children each from the age groups of 6-12 months, 13-24 months, and 25-36 months were identified, following the procedures recommended by Henderson & Sundaresan (4), and their parents interviewed. The information obtained at the interview included how they came to hear about the campaign, history of previous OPV administration, receipt of OPV or the reasons for not receiving one or more doses of OPV at the campaign, and whether an immunization card was issued. The survey was conducted by 5 trained interviewers in April 1985, over a period of 5 days; a supervisor checked and verified a 10% random sample of the answers.

Seven samples of OPV were drawn from the cold storage and transported in ice to the virology laboratory in Vellore where their potency was assayed by infectivity titration in primary monkey kidney cell culture. Serial tenfold dilutions of the samples were inoculated in 6 tubes of cell culture, cytopathic changes were observed till the seventh day, and the vaccine virus titres were then calculated using standard formulae and expressed as the median tissue culture infectious dose (TCID₅₀).

RESULTS

A total of 917 children were identified in the 30-cluster samples in the three age groups and their parents were interviewed. The vaccine coverage according to the age of the children is summarized in Table 1. The levels of coverage were generally higher in the older age groups than among infants. The Table also shows the decline in coverage as the number of doses increased; the gradual decline from the first to the third dose became steep thereafter (Fig. 1).

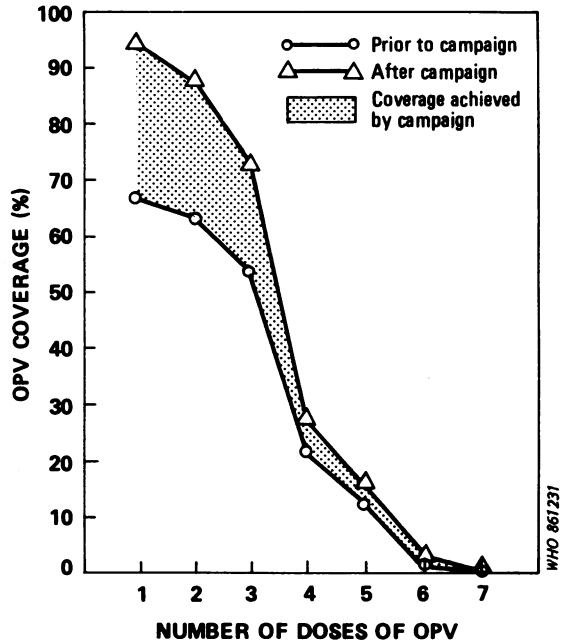


Fig. 1. Percentage immunization coverage according to the number of doses of oral polio vaccine (OPV) received before and during the Madras campaign in 1985.

The campaign accounted for 27% of all the oral polio vaccines the children had ever received. In children aged 6-12, 13-24 and 25-36 months the campaign delivered 19.4%, 31.4% and 24.6%, respectively, of all the OPV received prior to the evaluation; among the parents of children in these age groups, 13.9%, 11.5% and 9.8% respectively had

Table 2. Percentage frequency of various channels by which the parents came to know about the immunization campaign

Word of mouth: from health workers or volunteers	30.8
Word of mouth: from 'balwadi ayahs' or others	16.6
Television	10.2
Radio	7.3
Newspapers	4.0
Mobile loudspeakers	2.1
Handbills, posters or slides in cinemas	1.0
No information received	28.0

retained their immunization cards.

Based on the immunization data, the estimated child population, and a vaccine wastage of up to 10%, the total number of doses of OPV used during the campaign was calculated to be between 197 722 and 241 659 (95% confidence interval). As the campaign workers had distributed 240 100 doses of OPV (including wastage), there is close agreement with the information collected through the 30-cluster sample survey.

Table 2 indicates the responses given by the parents of 874 children regarding how they came to hear about the campaign. Health workers, volunteers, the 'balwadi ayahs', neighbours and relatives were the source of word-of-mouth information for 47.4% of the parents while 28% denied receiving any infor-

mation; the mass media all together had reached only 24.6% of the parents.

The reasons given by the parents of 789 children who did not attend one or more of the three immunization sessions are presented in Table 3. As many as 38% did not know about the campaign at all, or about any one of the immunization sessions; another 22% reported that their children had already received 3 doses of OPV from various sources prior to the campaign, and believed that no further doses were required. About 11% could give no definite reasons. The remaining 29% gave a variety of reasons.

Of the 7 samples of OPV tested for potency, 6 had infectivity titres of $10^{5.74}$ to $10^{6.06}$ (satisfactory range) and one had a titre of $10^{5.60}$ (marginally low) TCID₅₀ per dose.

DISCUSSION

The population of Madras city (area, 174 km²) was estimated to be 3 698 377, based on the 1981 census and the annual growth rate between 1971 and 1981. Although many institutions and practitioners offer immunization either free of charge or on payment, there is no system available for assessing the coverage or for locating unimmunized infants. As the paediatric hospitals in the city have not registered any decline in the numbers of children with acute paralytic poliomyelitis in recent years, it would appear that polio immunization coverage is inadequate (5). The annual pulse immunization strategy is designed to rapidly increase vaccine coverage and thereby reduce the incidence of disease (6). In Madras city, in the first application of this strategy, only oral polio vaccine was used; in subsequent years immunization against other diseases will be included until all vaccines in the Expanded Programme on Immunization (EPI) are offered during the annual pulse campaigns. The use of a single vaccine is justified in the first year so that health staff, volunteers and the community could get used to the concept. Oral polio vaccine was found to be ideal on account of the simplicity of its administration and the need to combat the high incidence of poliomyelitis.

Our results show that the Madras campaign was successful because it raised the immunization coverage very rapidly, from pre-campaign rates for the first, second and third doses of OPV of 66%, 62% and 52%, respectively, to 94%, 88% and 72%. Vaccine coverages for the fourth and subsequent doses were very low. This was because some of the campaign organizers and the parents of 22% of the children had understood that 3 doses of OPV were sufficient for every child. The Indian Academy of

Table 3. Percentage distribution of respondents according to the reasons given for not taking their children to one or more sessions of the immunization campaign

No information received, or received too late	38.1
Considered that 3 doses of vaccine given before the campaign were adequate	22.2
Not in the city at the time of the campaign	7.7
Child was sick and could not be taken for immunization	7.4
Preferred to be immunized by private practitioners	4.6
Was not informed about all 3 sessions of the campaign	3.4
Was informed by health workers that 3 doses of vaccine given before the campaign were adequate	1.4
Expected the immunization would take place at home	1.3
Immunization booth was located too far away	0.9
Various reasons: advised against immunization, forgot, or did not like the mass campaign	0.9
Immunization booth was not open on the scheduled day	0.5
Afraid to immunize the child	0.4
Could give no definite reason	11.2

Pediatrics recommends 5 doses, WHO recommends 4 doses, and the Indian EPI recommends 3 doses of OPV for primary immunization plus one or two more doses for reinforcement (7-9). The immunogenic efficacy of 3 doses of OPV in India is in the range of only 75-80% while that of 5 doses is in the range of 90-95% (10). Thus, in poliomyelitis-endemic countries, children should receive 5-7 doses of OPV. Fortunately, this vaccine costs less than US\$ 0.03 per dose. We therefore recommend a liberal policy in pulse campaigns, offering 3 doses of OPV to all children of the target age group, regardless of the number of doses that may have been given previously. Recently in Brazil annual nationwide pulse immunizations were carried out, 2 doses of OPV being offered to all children below 5 years, irrespective of the number of previous doses (11); in this country, 3 doses for primary immunization plus 2 doses annually for 5 years could add up to 13 doses per child (C. de Quadros, personal communication, 1985).

The success of immunization campaigns depends largely on three factors: information announcing the campaign reaching the parent, their compliance, and an effective vaccine delivery system. In the Madras campaign, OPV was efficiently delivered through the

immunization booths and the vaccine's potency was safeguarded by proper cold storage and handling. However, 28% of parents did not hear about the campaign at all, and another 10% had not heard about one or two sessions despite the use of a variety of publicity channels. As nearly half of all the parents came to know about the campaign by word of mouth, this appears to be the most effective channel of communication. The mass media were not as effective as the messages from person to person although it is possible that some persons may have obtained their information through the mass media.

Any immunization programme that is to continue will have to be based on accurate census data and periodic updates on new births and on the immunization status of infants; in addition, the programme should keep parents informed about facilities and the need for immunizing their children, thereby gaining their compliance, and should maintain an efficient vaccine delivery system. Until these requirements can be met, immunization campaigns, like the one described here, offer an alternative strategy so that high immunization coverage and reduced disease incidence can be achieved.

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RÉSUMÉ

ÉVALUATION D'UNE CAMPAGNE DE VACCINATION CONTRE LA POLIOMYÉLITE À MADRAS

Une campagne de vaccination contre la poliomyélite par administration de trois doses de vaccin buccal a été entreprise à Madras (population estimée: 3 698 377 habitants) en janvier, février et mars 1985. Cette campagne, qui avait été précédée par une étude pilote, était organisée par un comité représentant divers organismes gouvernementaux et bénévoles sous la direction de l'Impact India Foundation. Elle avait pour cible les enfants âgés de 3 à 36 mois. Le présent rapport résume les résultats d'une évaluation de la campagne selon la méthode de sondage par 30 grappes recommandée par l'OMS. La couverture vaccinale, qui était de 66%, 62% et 52% pour les première, deuxième et

troisième doses de vaccin avant la campagne, est passée à 94%, 88% et 72% respectivement après celle-ci. Vingt-sept pour cent de toutes les doses de vaccin buccal reçues par les enfants depuis leur naissance ont été administrées dans le cadre de la campagne au cours de laquelle 241 000 doses ont été effectivement utilisées, alors que les résultats de l'évaluation donnent un chiffre compris entre 197 722 et 241 659 doses (intervalle de confiance à 95%). Parmi les parents, 47% ont déclaré qu'ils avaient été informés verbalement de la campagne, 25% ont appris son existence par les médias et 28% n'ont reçu aucune information. Parmi les parents qui n'ont pas amené leurs enfants à une ou plusieurs

des séances de vaccination, 38% n'avaient pas été suffisamment informés et 22% croyaient que leurs enfants n'avaient plus besoin d'être vaccinés puisqu'ils avaient déjà reçu 3 doses précédemment. Notre évaluation montre qu'une campagne de vaccination bien conduite peut accroître rapidement la couverture de la population; les ressources de plusieurs organismes peuvent être mises en commun avec profit et l'information verbale est le moyen le plus efficace d'annoncer la campagne. En attendant que l'infrastructure

des services de santé permette d'entreprendre un programme permanent et efficace d'immunisation, des campagnes annuelles contribueront à atteindre un niveau élevé de couverture, à condition que 3 doses de vaccin buccal soient offertes au groupe cible, indépendamment du nombre de doses reçues précédemment. En temps utile, ces campagnes pourraient également comprendre d'autres vaccinations, jusqu'à ce que soient incluses les six maladies visées par le programme élargi de vaccination.

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