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EFFECT OF THE 1988 METRO MANILA VACCINATION CAMPAIGN: EVIDENCE FROM AN OBSERVATIONAL STUDY AT HEALTH CENTERS

by

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This report summarizes the results of a two-round study of health centers carried out as part of the summative evaluation of the Metro Manila vaccination campaign. The health center study complemented a series of large-scale surveys of mothers' knowledge, attitudes, and practices concerning vaccination. It provided additional information about health center activities, important because conditions at the point of vaccination (such as how long people have to wait, and whether vaccination supplies are available) and staff practices (such as making appointments for the next set of vaccinations and giving all vaccinations the child is eligible for at the same time) can affect the success of a vaccination campaign, either independently or through interaction with the communications component of the campaign.

An earlier study carried out by the Demographic Research and Development Foundation (DRDF) (DRDF 1986) indicated that a child's illness on the day of vaccination was the most important single reason for partial and non-vaccination, with a widespread "misconception of fever less than 38.5°C as a contraindication to immunization". Fear of side reactions and the child's being too old for vaccination -- also reasons susceptible to changes in health center practice -- were other important reasons that parents gave for their children's being incompletely vaccinated.

The DRDF study also indicated supply problems, both of vaccine and of needles and syringes, sufficiently bad that 75% of the health centers studied in Metro Manila said that they had had to interrupt immunization activity because of lack of vaccine. Overall, 30% of the centers checked were not using separate needles for each child, possibly as a response to the shortage, although the link was not investigated by DRDF.

The health center study extended these observations, indicating that missed opportunities occurred not only when a child was perceived to be sick, but also when a child was eligible for more than one vaccination. The Metro Manila vaccination campaign had no effect on opportunities missed because of sickness, but substantially reduced the number of missed opportunities for measles vaccination of eligible, healthy children. This study documents these effects.

CAMPAIGN

The Metro Manila vaccination campaign has been described in detail elsewhere (Cabanero-Verzosa et al., 1989; Zimicki et al., 1990)[1]. A major component of the campaign that distinguished it from other vaccination efforts was a mass media effort that focussed on measles. Radio and television advertisements emphasized that complications of measles could be serious but that vaccination, which was available free (as usual) every Friday at clinics, could protect children from the disease. The media portion was launched February 12 and continued until May 13. Fridays were designated vaccination days, when health centers would remain open until 8 pm and all vaccinations were to be available free. A special effort was made to ensure the availability of adequate supplies of vaccination in all health centers.

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[1] HEALTHCOM (the Communication for Child Survival Program, undertaken by the Academy for Educational Development) provided technical assistance to the Department of Health. The health center study reported here was a part of the summative evaluation of that program; it was carried out by Kabalikat ng Pamilyang Pilipino, a private research group in Manila, with technical advice from the Center for International, Health, and Development Communication at the University of Pennsylvania, a HEALTHCOM subcontractor). We would like to thank Kabalikat staff for their dedication and hard work, and acknowledge with gratitude the help of all the Department of Health personnel, health facilities staff, and health facilities clients who gave freely of their time. Particular thanks are due to Undersecretary Mario Taguiwalo, the Metro Manila NCR staff and Mayette Bernaje of PIHES; and Jose Rafael Hernandez, HEALTHCOM Resident Advisor, Elenora de Guzman, HEALTHCOM PI Associate Director, and Cecilia Cabanero-Verzosa, HEALTHCOM Senior Program Officer at AED.

"Sales conferences" were organized by Department of Health (DOH)/National Capitol Region (NCR) staff and HEALTHCOM in mid-January to acquaint health center personnel with the content and goals of the Metro Manila campaign. Eight sales conferences were held in different areas of Metro Manila. Physicians and midwives from all health centers were invited to attend. One important component of each sales conference was the answering of questions about vaccination by senior DOH/NCR staff. Health center staff were reminded that sick children should be vaccinated, unless they were sick enough to be hospitalized. The age of measles vaccination was discussed and staff were told that children could be vaccinated before age nine months in cases of measles epidemics, but that these children needed to be vaccinated again at nine months.

METHOD

The methodology for the study was developed during a series of visits to health centers[2]. The choice of which aspects of health center practice would be the focus of the study was finalized based on observations made during these visits, interviews with DOH personnel, particularly those responsible for Metro Manila, and on the results of the DRDF study. The method comprised three components: 1) an interview with the head of the health center; 2) observations of at least ten children who attended the health center while vaccinations were given, with observations of at least five who were actually vaccinated[3]; and 3) interviews with the adults accompanying the observed children as they left the health center.

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[2]Staff from DOH accompanied us on the initial visits to health centers, and all visits were made with the approval of and in coordination with DOH.

[3]Children were selected for observation because they appeared to be the appropriate age; at the time of selection the observer did not know whether the child would be vaccinated or not. If five children among the first ten observed did not receive vaccinations, additional children were observed. Thus the sample of children was fairly representative of the mix who attended health centers on vaccination days.

The interview with the head of the health center was open-ended but structured by a series of guide questions that concerned general information about vaccination at the particular clinic -- population served, vaccination schedule and load, staff involved in vaccination and patient flow on vaccination days, supplies for vaccination, circumstances in which vaccinations were refused, use of growth cards, and perceptions about client's attitudes toward vaccination. The interviewer also asked to look at the records concerning vaccination; she noted if the records were up-to-date and easy to use , and whether they indicated a pattern of defaulting.

The observation component centered on the interaction between the health center clients and the staff person giving vaccinations. Particular aspects of interest were whether the staff member explained what was being given to the child, said anything about side effects, told the client when to return for the next vaccination, and recorded the vaccination date, and whether the client asked questions or not.

The interview with the client outside the health center took less than five minutes. It included questions to determine if the person was a regular user of health center services, how long it took to get to the clinic and by what means of transport, and questions about knowledge concerning vaccination -- for adults accompanying children who had been vaccinated that day, what the child had received and whether side effects were anticipated, and for all clients, whether the child needed more vaccinations and when s/he planned to come again, and what the child would be protected against when all vaccinations had been received. For children who were not vaccinated that day but who were eligible for vaccination, the client was asked why no vaccination was given, and who (client or health center staff member) made the decision.

Eight health centers were visited, selected randomly from lists of health centers provided by the Department of Health for the four most and four least dense cities of Metro Manila. One drawback of the design of the health center study was that in order to observe interactions during vaccination it was necessary to visit health centers on vaccination days. During the first round of

the study it was occasionally difficult to determine when these occurred, as the centers were not at that time under the direct supervision of DOH, and their schedules were not known. When the Kabalikat team visited a center and found that it was not a vaccination day, they ascertained the schedule and returned on the appropriate day.

First-round visits were made in October and November 1987, before the beginning of the Metro Manila vaccination campaign. In early November, a preliminary report based on visits to six health centers was presented to members of the group at DOH concerned with vaccination in the National Capitol Region. The random selection of the centers was emphasized, as was the aggregate nature of the information presented. The DOH/NCR group expressed interest in the reported findings, and incorporated the information in its planning for the campaign.

The follow-up round of health center visits started May 6, 1988; all health centers were visited before June 16. The method was the same as that used during the first round, except that guide questions for the interviews with the senior clinic staff member were amended to include specific questions about the perceived impact of the campaign.

RESULTS

Appropriate vaccinations

During October-November 1987, 81 child--adult[4] pairs were observed and interviewed at the eight health centers; during May-June 1988, 75 child--adult pairs were observed and interviewed at the same health centers. In both years most had come to the health centers specifically for vaccination. This is unsurprising, since during both rounds observations were carried out on vaccination days. Seventy-three percent of the children in October-November

[4]In most cases the accompanying adult was the child's mother although children were also brought by their fathers and other relatives.

1987 and seventy-eight percent of those observed in May-June 1988 received at least one vaccination, with those who came specifically for vaccination much more likely to receive it than those who came for other reasons. During both periods most of those who were brought for vaccination were vaccinated, while none of those brought for sickness received any vaccinations (Table 1).

Table 1

Reason for health center visit and proportion in each category receiving vaccination

	1987		1988	
Reason for visit:	N	% Vaccinated	N	% Vaccinated
Vaccination	62	90	59	97
Sickness	13	0	11	0
Other	6	50	5	40
Total	81	73	75	78

Whether or not the child's vaccination card had been brought was also significantly related to the reason for the visit: in both years more than 90% who brought the child for vaccination brought the child's vaccination card, but only 37% of those coming for other reasons brought the child's card. Thus card information (from which eligibility for vaccination is determined) was available for only 63 children each year. We cannot know if the children who came without cards were eligible for vaccination or not. It seems likely that at least some were, since at least 10% of them each year received vaccinations that day. Review of health center records indicated that in several health centers the staff would also find it difficult to tell whether or not a child without a card was eligible for vaccination, since records of vaccination status were arranged by serial number of the vaccination card and it was difficult to look up the child without the serial number. In the absence of knowledge of the vaccination

status of children without cards, the following discussion of the appropriateness of vaccination is limited to the children who had cards.

For these children, the most striking change observed was the increase in the proportion who were appropriately vaccinated on the day of the visit, that is, received all the vaccinations for which they were eligible, and only those vaccinations. Eligibility for vaccinations was determined on the basis of evidence from the child's vaccination card, taking into account the dates of the vaccinations the child had received and the child's age on the observation day. Children were considered eligible at any age for BCG, age six weeks for the first DPT and OPV vaccinations, and age 34 weeks for measles; they were considered eligible for the second and third DPT and OPV vaccinations after an interval of at least 28 days since the previous DPT or OPV vaccinations. Thus an eight-week-old child who had already received BCG was considered eligible for DPT and OPV; a 35-week-old child who had recorded dates for BCG and the first and second DPT and OPV vaccinations, with the second doses at age 20 weeks, was considered eligible for the third DPT and OPV vaccinations and for measles.

During both rounds more than 90% of the children eligible for any vaccination received at least one. However, children were appropriately vaccinated -- they received all the vaccinations they were eligible for, and only those vaccinations -- about 20% more frequently in May-June 1988 than in October-November 1987 (Table 2). This difference reflects the decrease in the proportions partially missed; no difference was seen in the proportion completely missed (mostly due to sickness) or the small proportions who were given a vaccination for which they were ineligible (usually measles before age 34 weeks) or for whom an inappropriate vaccination was substituted for a needed one.

Table 2

Proportions of children who were appropriately or inappropriately vaccinated[1]

	1987	1988	Significance [2]
Appropriately vaccinated	54.0	73.0	$p<.001$
Missed completely	6.3	6.3	
Missed partially	33.3	17.5	$p<.05$
Given vaccination ineligible for	3.2	1.6	
Missed partially and given vaccination ineligible for	3.2	1.6	
Number of children:	63	63	

[1]Data for children who brought cards; a child eligible for no vaccinations who received none was considered appropriately vaccinated that day

[2]Significance tested using the chi-square statistic with Yates' correction.

Table 3 summarizes the missed opportunities observed by type of vaccination, controlling for the number of vaccinations for which the child was eligible that day. There were very few children eligible for only one vaccination in 1987 but in 1988 nine of the 63 children needed only measles. This shift reflects an overall increase in age-appropriate vaccination since children can (and should) receive the third DPT and OPV vaccinations well before they become eligible for the measles vaccination.

Among children eligible for two or more vaccinations that day, the proportions of those needing BCG, DPT, or OPV who were not given these vaccinations were substantially the same both years. The proportion of children who missed getting a needed measles vaccination declined significantly although it was still very high in 1988.

Table 3

Percent of children eligible for a vaccination on the team visit day who were not given that vaccination (numbers in parentheses indicate number of children eligible for that vaccination)

	1 vaccination		2 or more vaccinations	
	1987	1988	1987	1988
BCG	0 (1)	0 (2)	31.6 (19)	40.0 (10)
OPV	0 (1)		9.6 (52)	12.8 (47)
DPT	0 (2)		13.5 (52)	16.7 (48)
MEAS	0 (1)	11.1 (9)	82.6 (23)	45.4 (11)[1]

[1] Difference significant at $p = .003$ (X^2 test).

It is thus clear that one strong effect of the campaign was to reduce the proportion of missed opportunities for giving children measles vaccination.

Frequency of attendance

A second important effect of the campaign was to increase the frequency of attendance at the health center. In 1987 about half (47%) of the clients said they came to the center about once a month, 21% came more often, 21% less often, and 11% said that it was the first time they had come. In 1988 the proportion who said they came about once a month had increased to 67%, while fewer reported coming less than once a month (Table 4). This significant increase of 13% in the proportion of children coming at least once a month is consistent with an improvement in efforts by parents to bring their children for vaccination in a timely way. Frequency of visits was not related to the number of young children in the family.

Table 4

Reported frequency of health center visits: proportion of children coming after varying intervals

	1987	1988	Significance [1]
Once a month	47	60	$p<.001$
Less than once a month	21	8	$p<.05$
More than once a month	21	21	
First time	11	11	

[1]Significance was tested using the chi-square statistic with Yates' correction

In response to a question about how they knew it was time to come to the health center, more than 70% of the clients interviewed in both rounds of the study said they had been told by health center staff at the health center, and 3% by health center staff visiting them at home. The rest were told by neighbors, their spouses, or other sources. The source of information was unrelated to the reason for the visit.

Most of the adults accompanying children (76% in 1987, 79% in 1988) reported coming that day specifically to get the child vaccinated, but about 15% had come because the child was sick, and the rest had come for other reasons (to get the child weighed, for example). One worry expressed by DOH staff before the campaign was that the focus on vaccination on Fridays would draw staff time and attention away from other activities; the lack of change in the proportion coming for reasons other than vaccination indicates that this did not happen (although the fact that the observations were done only on vaccination days may limit generalizability of this result).

Client characteristics

One factor that might account for some of the improvement in vaccination and attendance at the health center would be a change in the population coming to the health center. This possibility can be ruled out. The

basic characteristics of the children were the same during both rounds of the study, indicating that there was no shift in the population served by the health system. During both rounds the children came from families with an average of two children less than five years old; with about 45% having one, 35% two, and 20% three or four children. Most of the children observed during both rounds (88% in 1987 and 93% in 1988) were less than 18 months old, with about 50% less than six months old. There were slightly more children between the ages of six and twelve months observed in 1988 (36%) than in 1987 (29%), but the overall age distribution of the children observed was not significantly different in the two rounds (Kolmogorov-Smirnov 2-sample test, $p = .951$).

Most clients observed during both rounds had come only a short distance to the health center. The average travel time was about ten minutes (10.4 minutes in 1987 and 9.5 minutes in 1988); and only 31% in 1987 and 25% in 1988 reported travelling more than 15 minutes to reach the health center. More than 80% walked or took a tricycle cab (used for short distances) to get there, while most of the rest (slightly more than 10%) took a bus.

One significant difference observed in the client populations was an increase in the average number of vaccinations children (with cards) had (including those received the day of the visit): 4.5 in 1987 and 5.4 in 1988 (t-test, $p = .009$). This clearly reflects the effect of the campaign in increasing the overall level of coverage.

Client--staff interaction

The observation of the vaccination process indicated a moderate amount of interaction between staff and clients in both years. In 1987 something specific about vaccination was explained to 39% of the clients and side effects were discussed with an additional 12%. In 1988 specific explanations about vaccination were given to 24% of the clients, and side effects discussed with an additional 14%. Vaccination dates were recorded on cards more than 95% of the time and most clients were given specific instructions about when to come back to the health center - 93% of those in 1987 and 89% in 1988 who

had children who needed to come back for more vaccinations were told when to come back.

Overall, few clients (only 19% in 1987 and 10% in 1988) asked any questions, and those who came more frequently were less likely to ask any (Table 5). This tendency was more pronounced in 1988 than in 1987.

Table 5

Relationship between question-asking and frequency of visits to the health center

Frequency of visit	Percent asking questions 1987		1988	
	%	N	%	N
Once a month or more	16	(43)	6	(47)
Less than once a month	29	(7)	20	(5)
First time visitor	33	(9)	33	(6)
All observed	19	(59)	10	(58)

We had anticipated that adults with children who fussed might ask fewer questions (because they were busy with the child or wanted to end the session as quickly as possible). Most of the children (71% in 1987 and 74% in 1988) fussed at least a little, and we found no relationship between fussing and interaction between the staff member and the client[5].

On average, the adults accompanying children who received vaccination during the visits in 1987 reported waiting for 44 minutes at the health center before they were seen. Individual waiting time ranged from no time at all to three hours, and 30% waited more than 30 minutes. Waiting time in 1988 was significantly shorter (t-test, $p = .038$), averaging 26 minutes, with times ranging from one minute to three hours, and only 23% waiting more than 30 minutes. Once the vaccination process started, it took little time in 1987: on average 4.3 minutes, with individual times ranging from 1 to 15 minutes. In 1988 the

[5] This may have been because we did not distinguish between simple crying and more severe fussing.

average time was 7.4 minutes (range from 2 to 35), significantly longer than in 1987 (t-test, $p<.001$).

Knowledge about vaccination

a) Knowledge about vaccinations received that day

Clients whose children had been vaccinated that day were asked what diseases the vaccinations were for, whether they anticipated the child's having any side effects of the vaccination, and what, if anything, they could do for the side effects. Clients' knowledge about what vaccinations the child had received that day was generally good and about the same level in October--November 1987 as in May--June 1988 (Table 6)[6]. About 70% of those whose children had received BCG, OPV or measles vaccinations that day were able to report that they had received them, while only about 35-40% of those whose child had received DPT were able to report it. In both rounds, over-reporting of vaccinations that had not been received was most severe for OPV. For BCG, OPV and DPT over-reporting was less in the second round than it had been in the first, though the decrease was statistically significant only for BCG.

Table 6

Proportions of clients reporting that child received a particular vaccination

A. When child received that vaccination (according to card)

	1987	1988
BCG	69.2	66.7
OPV	68.8	70.0
DPT	42.6	33.3
MEAS	62.5	75.0

B. When child did not receive that vaccination

	1987	1988
BCG	18.6	2.1*
OPV	25.0	11.8
DPT	22.2	5.6
MEAS	10.4	9.8

* Difference significant, X^2test, $p=.02$

[6]Mothers were asked what the vaccinations their child had received were for; responses of 'BCG', 'TB', 'tuberculosis' and 'anti-tb' were considered correct for BCG; 'polio', 'anti-polio' and 'opv' for OPV; 'diphtheria', 'pertussis', 'tetanus', 'anti-tetanus' and 'dpt for DPT; and 'measles' and 'anti-measles' for measles.

Clients' correct knowledge of which vaccinations their child had received that day was unrelated to whether any explanation about specifics of vaccination had been given that day.

b) Anticipation of side effects and knowledge about what to do for them

In October-November 1987 about 75% of the adults with children who were vaccinated expected side effects; in May-June 1988 about 59% expected side effects. Of those who expected any, fever was the one most frequently mentioned (90% in October-November and 94% in May-June). Not surprisingly, there is a correlation between expecting side effects and having discussed side effects with health center staff. This does not necessarily indicate that clients expected side effects because a health center staff member told them to; the issue may have been discussed because s/he was already concerned. Whether or not a client expected side effects was not related to any particular vaccination that s/he said the child had received that day, or the vaccinations that the vaccination card indicated the child had received that day.

c) Knowledge about child's vaccination status

Client's knowledge of the child's vaccination status was assessed first by asking whether or not the child was completely vaccinated: and if the response was no, asking further how many more injections (BCG, DPT, and measles are given by injection) were needed and how many more doses of drops (OPV is given in drops) were needed. This knowledge was moderately good and did not change as a result of the campaign. A comparison of the client's knowledge with the child's status indicated by the vaccination card showed that most (94% in 1987 and 86% in 1988) knew accurately whether the child had completed vaccination or not. Knowledge about the number of injections needed and doses of drops needed was less good (Table 7). Clients knew the correct number of injections the child still needed about half the time in both years. Those who did not have correct knowledge tended to underestimate the number of remaining injections. For doses of drops, in 1987 nearly equal

proportions overestimated as underestimated the number of doses the child still needed. However, in 1988 there was a significant decrease in the proportion of clients overestimating the number of doses, with a concomitant increase in the proportion who knew the correct number.

Table 7

Correctness of client's knowledge of how many more injections/doses were needed

	Underestimated		Correct		Overestimated	
	1987	1988	1987	1988	1987	1988
Injections	44.0	37.7	44.0	50.9	12.0	11.3
Doses	28.3	29.8	45.7	61.7	26.1	8.5*

* Overall difference significant (X^2test, $p = .07$)

d) Knowledge about the protective effect of vaccinations

All clients were asked what diseases the child would be protected against once all vaccinations had been received. The diseases most often correctly identified in both rounds were polio and measles. Tuberculosis was named by about a quarter of the adults, and no more than 20% named any other single disease. Significantly more named whooping cough in 1988 than in 1987, but even the higher proportion is very low. Interestingly, chicken pox, for which there is no available vaccine, was mentioned by 6% of the clients each time. The generally low knowledge of the specific benefits of vaccination is indicated by the proportions of adults who said that vaccination protected against cough, fever and diarrhea (Table 8).

Table 8

Proportion of clients naming disease as one that vaccination protects against

	1987	1988
Tuberculosis	30.8	24.0
Polio	54.3	52.0
Whooping cough	4.9	14.6*
Diphtheria	13.6	20.0
Measles	58.0	53.3
Tetanus	11.0	10.7
Chicken pox	6.2	6.7
Cough	28.4	18.7
Fever	14.8	16.0
Diarrhea	8.6	12.0

*Significant, t-test $p = .04$

Overall, 76% of the clients in 1987 and 64% in 1988 were able to name at least one of the childhood diseases against which vaccination protects; 43% in 1987 and 33% in 1988 gave at least one nonspecific or incorrect response. Specific knowledge of the protective effect of vaccination was unrelated to whether or not a staff member had explained anything about vaccination during that session.

DISCUSSION

The results of the health center study indicate a significant increase in the proportion of clients coming once a month and a significant decrease in the number of missed measles vaccinations. It seems likely that these two factors account for a substantial portion of the observed improvement in the vaccination status (average number of vaccinations) of children coming to the health center.

Interviews with health center staff indicate that the vaccination campaign affected both these factors. Staff at most of the health centers reported their perception that because of the media component of the campaign

it was easier to motivate mothers to get their children vaccinated -- a contrast with the situation in 1987 when staff often reported that mothers were reluctant to have children vaccinated. The emphasis of the media component on measles focussed health center staff's attention on this antigen; measles was the only vaccine for which the proportion of missed opportunities declined.

The proportions of missed opportunities for other BCG, OPV and DPT snow slight, though nonsignificant, increases between the 1987 and 1988 rounds. The proportion of children with completely missed opportunities -- not given any vaccination that day -- remained constant. Thus there is still an opportunity for improving coverage through reducing missed opportunities.

Interviews with health center staff clarify some of the reasons underlying missed opportunities. In 1987 there was a perceived risk of not having enough vaccine, and wastage allowances were reported to be less than 20%[7]. The reported response of health center staff was reluctance to open vials of vaccine if only a few children were present. They said that they might ask clients to wait until enough children had come, or ask them to bring children back on another day.

Another strategy reported was to ask older children to wait until all younger children had received vaccine. Children from areas outside the health center catchment area could be refused vaccination and told to obtain it in their "home" health center. Another reported practice that may be related to worry about shortage is that of not giving children measles vaccination if their mothers said that the child had the disease.

In the 1988 interviews it was clear that fear about not having enough vaccine was a much less important factor in refusing vaccinations, though some health center staff said they would ask children to return the following week if,

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[7]A wastage allowance is the amount of vaccine that is discarded in any month. Vaccine comes in 10- or 20-dose vials, and any vaccine that is not used within a short time must be discarded. Thus if a 10-dose vial is opened and two children are vaccinated, eight doses must be discarded. If this happened every time a vial was opened, the wastage rate would be 80%.

say, only two were eligible for measles. Staff at most health centers said that children from "outside" would be vaccinated, and no one mentioned the child's having had measles as a reason for not giving the vaccination.

In 1987, interviews with staff revealed a fear that vaccinations given to sick children would not stimulate immunity or would cause side effects. They reported asking clients with sick children -- even mildly sick -- to return for vaccination another time when the child had recovered. Refusals were linked with the type of illness: children with diarrhea or other gastrointestinal disease might not be given OPV; those with skin problems might be refused BCG; and fever was considered an indication to refuse almost all vaccinations.

When staff were asked about whether illness was a contraindication to vaccination in 1988, most reported that it was not, showing that they knew of DOH recommendations. However, results of the observational part of the study show that no child coming to the health center for sickness in 1987 or 1988 was vaccinated. Much of the reason for this may be that vaccination status was most easily checked using the vaccination cards, and few clients who brought sick children also brought their vaccination cards. Missed opportunities could be reduced by having all mothers bring vaccination cards for every visit to the health center and having staff check the cards to see if child is eligible for vaccination. Not just checking cards, but giving <u>every</u> vaccination for which a child is eligible is the only way to reduce missed opportunities.

Staff interviews also clarified reasons underlying the observations of measles vaccination given before the appropriate age (according to the EPI guidelines). The norm in private practice seems to be to give two doses of measles vaccine, one at around six months and one at nine months or a year of age. At the sales conferences, health center staff were told that this pattern was also appropriate for government health centers during measles epidemics. As Metro Manila is a large, densely populated group of cities, it is likely that

there will be at least one measles outbreak each spring for at least the next few years[8]. Perhaps reflecting this, and with the rationale that some cases of measles occur in children as young as six months, health center interviews in both 1987 and 1988 revealed a distinct tendency to give measles vaccine before 9 months. Although center staff were asked at the sales conferences to record only the second dose (given after nine months) in the space for measles on the vaccination card, vaccinations were being recorded when they were given, no matter what the age of the child. This could preclude the child's receiving the second dose, for a cursory examination of the card shows the box for measles filled in. An optimal solution would be for the vaccination card to be modified, with two spaces left for measles vaccination.

There was no significant overall change in clients' knowledge about whether or not the child needed more vaccinations (which was high before the campaign), or ability to specify either the vaccinations received that day or specific diseases that vaccinations protect against (which was moderate). Whether or not health center staff spent time explaining vaccination that day was unrelated to specific knowledge, although time spent discussing side effects was somewhat related to the client's expecting that the child would have them. Knowledge about the number of vaccinations and doses of OPV the child still needed was only moderately good in 1987; in 1988 fewer clients overestimated the number of doses of OPV needed, while there was no change in the proportions underestimating the doses of OPV or under or overestimating the number of injections needed.

CONCLUSION

Given that knowledge did not change while vaccination status improved between 1987 and 1988, it seems likely that children's regular attendance at the clinic and the health center staff's taking advantage of opportunities for measles vaccination are more important in explaining the success of the Metro Manila campaign. Further improvement in coverage levels can be anticipated if

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[8]Classic models of measles transmission indicate that regular epidemics should cease once a certain threshold proportion of children is vaccinated; experience in Congo (Dabis et al, 1988) has shown that regular epidemics can persist even at higher levels.

visiting levels and levels of supplies are sustained and if health center staff continue to reduce the numbers of completely and partially missed opportunities.

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