

IMMUNIZATION COVERAGE AND MISSED IMMUNIZATIONS AMONG 1-5 YEAR OLD PATIENTS SEEN AT CHONG HUA HOSPITAL

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ABSTRACT

Background: The Expanded Program on Immunization has been adopted worldwide. In spite of this, many children fail to be completely immunized thus increasing the risk for contracting a particular infectious disease and also increasing the number of susceptible individuals.

Objective: To determine the immunization coverage and reasons for missed immunizations among 1-5 year old patients at Chong Hua Hospital.

Study design: Descriptive, cross-sectional survey

Setting: The study was done at the Chong Hua Hospital Emergency Room and in the rooms of the admitted subjects.

Methodology: Questionnaires were distributed to primary care takers who have brought with them the patient's immunization record.

Results: The study showed that of the 216 subjects involved in the study, only 50% were fully immunized. Most commonly missed vaccines were Mumps-Measles-Rubella, H. influenzae b and Hepatitis B vaccines. Subjects who live in rural areas, those with larger number of families, those with primary care takers other than their patients, and who have lower educational attainment and unstable sources of income were more likely to have missed immunizations. The most commonly cited reasons for missed immunizations were: unavailability of vaccines, forgetting an immunization schedule and lack of time in visiting the vaccine providers.

Conclusion: Only half of the subjects were fully immunized, and MMR vaccine was the most commonly missed vaccine. There were certain subject and primary care taker profiles which may contribute to missed immunizations, and the reasons for missed immunizations vary among subjects, but the health sector can help formulate strategies to overcome these barriers.

INTRODUCTION:

Thus, presented with such discouraging data on immunization coverage, it was the aim of the researcher to find out the immunization coverage and

reasons for missed immunizations so that strategies may be developed to improve the delivery of health care.

In 1995, the Centers for Disease Control and Prevention identified three barriers to childhood immunization: cost, missed opportunities and lack of parental knowledge⁹, while the American Academy of Pediatrics in the same year cited insufficient education and limited health insurance coverage as barriers.¹⁰ Nace, et al in 1999¹¹ noted the top three barriers as wasting time at the clinic, ill child and no insurance coverage. Similar barriers were cited by Talani, et al, whose study in Congo pointed out child illness, misinformation and unavailability of vaccines as main reason for under immunization¹².

Deshpande, et al¹³ in 2001 noted 15.3% prevalence of missed immunization for measles immunization in a rural Indian town, while Perry, et al¹⁴ in 1998 on a household survey on childhood immunization coverage in Bangladesh noted only 51% of subjects were fully immunized and identified maternal education, family size and employment status as factors that affect immunization coverage. A study by Abbotts and Osborn¹⁵ on immunization delay noted a decreasing percentage of subjects receiving their immunization as they grew older from 79% for DPT₁ at 4 months old, to a low of 27% for DPT₃ by 8 months old, and pointed out child illness, inconvenience and financial reasons for delay in immunization. In a study on measles immunization among sea gypsies in Mindanao, Majid, et al¹⁶ in 1995 noted that up to 85% of their subjects were unaware of the existence of measles immunization.

Immunization protects individuals from infectious diseases. However, some children failed to be completely immunized, leading to under immunization. As a result, this increases the risk for contracting a particular infectious disease, of which immunization could have provided protection. Likewise, missing an immunization will increase the number of susceptible individuals to a particular disease in the society.

This study hoped to determine the immunization coverage of the subjects and reasons which brought about missed immunizations so that

Keywords: Immunization coverage, missed immunizations.
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individuals in the health sector and the government can focus and minimize, if not eradicate these factors. This study may also serve as a stepping stone for future studies for the welfare of the Filipino children.

METHODOLOGY

Study Design:

This is a cross-sectional descriptive study.

Study setting:

The study was conducted primarily at the Chong Hua Hospital-Emergency Room (CHH-ER). Chong Hua Hospital is a tertiary hospital in Cebu City with a 450 bed capacity, and caters mostly to patients from the Visayas and Mindanao regions. It has both ward and private room accommodations. Its Emergency room has a 12 bed capacity and accepts patients for admission during office hours, and sees patients both for consult and for admission after office hours.

Study Population:

The subjects for the study included all patients between 1-5 years old seen at Chong Hua Emergency Room wherein verbal consent was obtained. Admitted patients whose primary care taker was not around or those without immunization record at the time of admission were interviewed in their rooms once they have their immunization record with them. Patients who were not born or do not live in the Philippines and those with chronic illnesses were excluded from the study.

DEFINITION OF TERMS:

1. Missed immunization - refers to an immunization which a subject did not receive more than a month of being age-eligible at the time of interview.
2. Under immunization - refers to a state or condition when subjects whose immunizations received are less than what is expected for his age. This results from missed immunization using the American Academy of Pediatrics Immunization schedule except for BCG.
3. Appropriately-vaccinated for age subjects - refers to subjects who have received all the vaccines within one month of becoming age-eligible at the time of interview.
4. Catch-up subjects - refers to subjects who have received all the vaccines expected for his age at the time of interview even if some of the vaccines have been received later than the cut-off age.
5. Up-to-date vaccinated subjects - refers to the sum of those who were appropriately-vaccinated for age

- and those who were classified as catch up subjects.
6. Primary care taker - refers to an individual who is responsible for bringing the subjects to their primary vaccine provider.
7. Fully vaccinated subjects - refers to subjects who were able to receive the following vaccines: BCG, DPT₃/OPV₃, Measles, Hepatitis B₃, H. influenzae b₃ and MMR vaccines at the time interview.
8. Chronic illnesses - conditions which may brought about admissions at least three times in a twelve month period.

DATA COLLECTION:

A pre-tested questionnaire was used in the study. It contained two parts, the general information part followed by a second part consisting of questions on immunization, and was written in both English and Visayan dialect.

The study was explained to a respondent and a verbal consent was obtained. It was made sure that the respondent was also the primary care taker or guardian. A questionnaire was handed to the respondent who filled up the profile section of the questionnaire, and this was returned immediately to the interviewer, who proceeded to fill up the table of vaccines received, and inquired for reasons for delay or missed immunizations. Filled-up questionnaires were kept in a file, and all the answered questionnaires were analyzed at the end of the study period.

DATA ANALYSIS

To determine the timing of immunization, the dates for all the immunizations were recorded, and the age at which immunization was received was calculated. The timeliness of immunization was calculated using the number of subjects who had received that immunization by a cut-off age, divided by the total number of subjects who should have received that immunization. The cut-off age for timing immunization as shown on Table 1 was arbitrarily set at 2 months for BCG; 3 months, 5 months and 7 months for DPT₁/OPV₁, DPT₂/OPV₂, and DPT₃/OPV₃, respectively; Hepatitis B and Hib immunizations used the same cut-off age for the DPT/OPV series; 10 months for Measles vaccine and 16 months for MMR. The above schedule followed the one recommended by the American Academy of Pediatrics, except for that of BCG, and allowed a one month grace period for receipt of each vaccine as was applied in the study by Gindler, et al¹⁷.

Table 1. Cut-off age for timing of immunization

Vaccine	Cut-off age for immunization
BCG	2 months
DPT ₁ /OPV ₁ , Hep B ₁ , HIB ₁	3 months
DPT ₂ /OPV ₂ , Hep B ₂ , HIB ₂	5 months
DPT ₃ /OPV ₃ , Hep B ₃ , HIB ₃	7 months
Measles vaccine	10 months
MMR	16 months

The number of catch-up subjects was determined by adding the number of subjects who were able to receive a particular vaccine more than a month of being age-eligible at the time of interview. The number of subjects with missed immunizations was determined by getting the number of subjects who failed to receive a certain vaccine more than a month of being age-eligible. To determine the immunization coverage of the subjects according to various subject and respondent-related profiles, the number of subjects who were fully immunized per profile were added. The different reasons for missed immunizations were presented in a tabulated form.

RESULTS AND DISCUSSION

Study Subjects

There were 1612 patients seen at the Chong Hua Hospital Emergency Room under the pediatric service within the four month study period, of which 783 patients were within the 1-5 year age group. However, eight of these were not included in the study due to their area of residence which is outside of the Philippines, while 556 patients did not present their immunization records. Another 3 patients were also excluded due to chronic illnesses.

Only 216 of these 1-5 year old patients were able to satisfy the inclusion criteria with an average age of 31 months old, of which 99 (45.8%) were males. As shown in Table 2, 79 subjects (36.6%) ranked third in birth rank, while up to 35 subjects (16.2%) were born eldest. majority of the subjects (91.2%) were born institutionally, while 19 of them (8.8%) were born non-institutionally. As to area of residence, most of the subjects (57%) were from Cebu City, 39 subjects (18%) were from towns within Cebu province, 33 subjects (15%) from the neighboring city of Mandaue and mactan Island, and 21 subjects (10%) were from other provinces.

Up to 80% of the respondents were mothers

of the subjects, while 20 (9%) of them were fathers of the subjects (Table 3). The remaining respondents (4.6%) were close relatives or guardians of the subjects who acted as the primary care takers. Most of those interviewed (88.9%) have reached at least college level (including post graduate studies), while 19 (8.8%) of them reached high school only. Five (2.3%) of them claimed to have reached elementary level only.

The respondents of 92 subjects (43.0%)

Table 2. Distribution of the subjects according to age group, birth rank, place of birth and residence (N=216 subjects).

Profile	Number of Subjects	Percentage (%)
1. Age group (months)		
12-24	70	32.4
25-36	96	44.4
37-48	37	17.1
49-60	13	6.0
2. Birth rank		
1	35	16.2
2	66	30.6
3	79	36.6
>4	36	16.6
3. Place of birth		
Institutional (Hospital, lying-in clinic)	197	91.2
Non-institutional (Home)	19	8.8
4. Residence		
Cebu City	123	56.9
Mandaue City and Mactan Is.	39	18.1
Other cities/town in Cebu province	33	15.3
Other provinces	21	9.7

claimed that both parents are employed mostly in white collar jobs, with an average combined monthly income of P26,000,00 while another 35 subjects have mothers as full time housewives. Twelve subjects (5.6%) have parents who do not have fixed sources of income. The remaining 76 respondents (35.2%) did not disclose their average monthly income nor employment status.

There wer 122 subjects (56.4%) who obtained their immunizations from private physicians, 63 subjects (29.2%) from health centers, and another 31 subjects (14.4%) from hospital out-patient departments (OPD).

Table 3. Distribution of the primary care takers according to their relationship with the subjects, educational attainment and employment status.

Profile	Number of Respondents	Percentage of Respondents(%)
Relationship with subjects		
Father	20	9.3
Mother	186	86.1
Others	10	4.6
Educational attainment		
Postgraduate	4	1.9
College Level	188	87.0
High School Level	19	8.8
Elementary Level	5	2.3
No educational background	0	0
Employment status		
Both parents employed	93	43.0
One parent employed	35	16.2
No fix job	12	5.6
Did not disclose	76	35.2

Immunization Coverage and Missed Immunizations

Of the 216 subjects, only 108 (50.0%) were able to receive all the vaccines. Subjects with private physicians comprise the bulk of fully-immunized subjects (Fig. 1), while there were only 2 each for the health center and OPD subjects who were fully-immunized.

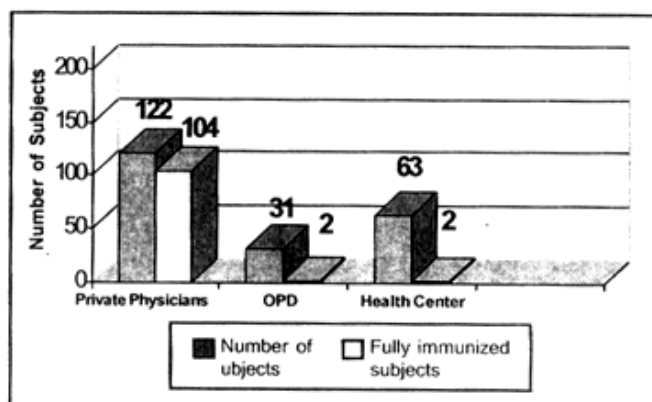


Figure 1. Distribution of fully immunized subjects with their corresponding vaccine provider.

As shown on Table 4, up to 99% of the subjects were given BCG, but only 90% completed the OPV series, and 84.7% completed the DPT series. A low of 62.5% and 52.8% completed the Hepatitis B and Hib series, respectively. Up to 84.7% of the subjects received Measles vaccine, but a further low of 51% received the MMR vaccine.

Table 4. Number of immunized subjects per vaccine (N=216 subjects)

Vaccine	Number of immunized subjects	Percentage(%)
BCG	214	99.0
DPT ₁	209	96.8
DPT ₂	206	95.4
DPT ₃	183	84.7
OPV ₁	212	98.1
OPV ₂	210	97.2
OPV ₃	196	90.7
Measles	183	84.7
HepaB ₁	183	84.7
HepaB ₂	156	72.2
HepaB ₃	135	62.5
Hib ₁	130	60.2
Hib ₂	122	56.5
Hib ₃	114	52.8
MMR	111	51.5

There were only 37 subjects (17.1%) who were appropriately-vaccinated for age, with another 71 subjects (32.9%) who were able to catch-up (Table 5). These two sub-groups added up to 108 (50%) subjects who were considered as up-to-date. An equal number of subjects had missed immunizations, regardless of the number of vaccines missed.

Table 5. Immunization coverage of subjects

Immunization coverage	Number of subjects	Percentage (%)
1. Up-to-date immunized subjects	108	50.0
A. Appropriately-vaccinated for age	37	17.1
B. Catch-up subjects	71	32.9
2. Missed immunized subjects	108	50.0
TOTAL	216	100.0

Data presented on Table 6 showed the number of fully immunized subjects against the various demographic profiles of the subjects. It showed that of the 108 fully immunized subjects, those who belonged to the older age group were more likely to have been fully immunized. With regards to birth rank, those who were born eldest or second in rank had a higher percentage of fully immunized subjects than those who were born later in rank. Although majority of the subjects were delivered institutionally, the percentage of fully immunized subjects compared to those who were delivered non-institutionally were similar with around half of the subjects of each group being fully immunized. Subjects who live in Cebu City and in the neighboring cities of Mandaue and Lapu-lapu were also more likely to be vaccinated.

Table 6. Distribution of fully immunized subjects (N=108 subjects) according to age, birth rank, place of birth and residence

Profile	Fully immunized subjects/Number of subjects for a particular profile	Percentage (%)
1. Age group (months)		
12-24	31/70	44.3
25-36	37/96	28.5
37-48	28/37	75.7
49-60	12/13	92.3
2. Birth rank		
1	20/35	57.1
2	46/66	69.6
3	32/79	40.5
≥4	10/36	27.7
3. Place of birth		
Institutional (Hospital, lying-in clinic)	99/197	50.2
Non-institutional (Home)	9/19	47.3
4. Residence		
Cebu City	67/123	54.5
Mandaue City and Mactan Is.	22/39	56.4
Other cities/towns in Cebu province	12/33	36.3
Other provinces	7/21	33.3

The figures in Table 7 showed the number of fully immunized subjects based on the various demographic profiles of the primary care takers. It showed that those with parents as the primary care taker had a higher percentage of being fully immunized. Primary care takers with higher educational level, and those subjects who have both or one parent employed with a stable source of income were also more likely to be fully immunized than those who have educational level less than college or those whose parents had no stable jobs.

Table 7. Distribution of fully immunized subjects (N=108 subjects) according to the relationship of the primary care takers with the subjects, their educational attainment and employment status.

Profile	Fully immunized subjects/Number of subjects for a particular profile	Percentage (%)
1. Primary care taker		
Father	9/20	45.0
Mother	99/186	53.2
Others	3/10	30.0
2. Educational attainment		
>College	102/192	52.0
>High School	6/19	31.6
>Elementary	0/5	0
3. Employment status		
Both parents employed	49/93	52.7
One parent employed	17/35	48.6
No fixed job	4/12	33.3
Did not disclose	38/76	50.0

Figure 2 showed the number of subjects who were appropriately-vaccinated and who were able to catch-up per vaccine. It also showed that among the vaccine series requiring three (3) successive doses, the number of subjects who received the third dose on time were less as compared to the first dose. This held true for the four (4) vaccine series included in the study (OPV, DPT, Hepa B and Hib vaccines).

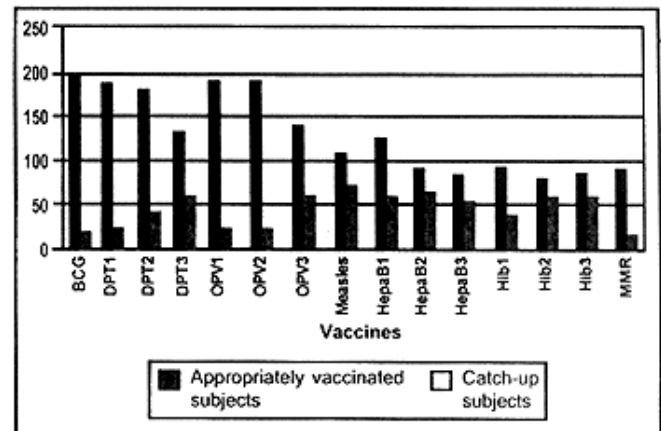


Figure 2. Appropriately-vaccinated and catch-up subjects per vaccine

The subjects were able to have missed immunizations in all of the vaccines involved in the study. As shown in Table 8, the most commonly missed vaccine was MMR where 105 subjects were not able to receive it. This was followed by the Hib series with 102 missed immunizations, then by Hepatitis B vaccine series with 81 missed immunizations.

Table 8. Missed immunizations of the subjects

Immunization	Number of missed immunizations	Percentage (%)
BCG	2	0.3
DPT ₁	7	1.0
DPT ₂	10	1.5
DPT ₃	33	4.9
OPV ₁	4	0.6
OPV ₂	6	0.9
OPV ₃	20	3.0
Measles	33	4.9
HepaB ₁	33	4.9
HepaB ₂	60	8.8
HepaB ₃	81	12.0
Hib ₁	86	12.7
Hib ₂	94	13.9
Hib ₃	102	15.1
MMR	105	15.5

Many subjects had missed immunizations with Hepatitis B and Hib vaccines. This was because of the unavailability of the vaccines, lack of time and forgetfulness in bringing the subjects to the vaccine providers as these were the reasons most commonly provided by the respondents whose subjects had missed immunizations with these vaccines. Certain vaccines such as Hepatitis B and Hib vaccines are not available in hospital out-patient departments. Thus, subjects whose primary vaccine providers are from hospital OPD were more likely not to have received these vaccines, leading to a increased number of missed immunizations. Almost a third of the subjects who had missed immunizations with the MMR attributed it to forgetfulness as a reason for the delay. The study showed that as the subjects increase in age vaccines that they were supposed to have received were usually missed due to forgetfulness. Money as a consideration among subjects whose primary vaccine providers were private practitioners and hospital OPD because of the government subsidized vaccines for the health centers thereby minimizing expenditures for vaccination for health center subjects. Although hospitals get some of their vaccines from the government, a fee is being charged by the hospitals for the services rendered to the subjects.

SUMMARY AND CONCLUSION:

The study on immunization coverage and reasons for missed immunization was done to help determine flaws in the health care system and to improve delivery of vaccines to the members of the society who would benefit from them.

The study showed that only 50% of the subjects were able to receive the vaccines expected of them during the time of interview, and majority of these were those with private practitioners as health care providers. Up to 99% of the subjects may have received BCG, but the number of subjects who were able to receive subsequent vaccines decreased with age. This was clearly shown on the number of subjects who were able to receive vaccines that were given in a series of three

successive doses such as (DPT, OPV, Hep B and Hib vaccines) where the number of recipients decreased as they progressed through the series. MMR, Hib, and Hepatitis B vaccines were not commonly missed.

Similar to studies cited²⁰⁻²², the study also showed that birth rank, area of residence, primary care taker, educational attainment and employment of the primary care takers affect immunization coverage. The unavailability of a vaccine, forgetting an immunization schedule and lack of time to visit the vaccine provider were the most common reasons for missed immunizations. These may have been eliminated with the proper resources and through proper communication with the care takers.

RECOMMENDATIONS:

Based on the results of the study, the researcher was able to come up with the following recommendations.

1. Maintain a constant supply of vaccines in the local government in order to increase immunization rates as lack of vaccine was the most commonly cited reason for missed immunizations.
2. Health care givers must be more cautious in reminding parents and guardian of patients who are likely to have missed immunizations as cited in the study such as many siblings, living in smaller towns and rural areas, primary care takers with low educational attainment and no stable jobs.
3. Health care givers must be vigilant in keeping track of children with history of poor immunization follow-up and in reminding primary care takers of any upcoming vaccination schedule.
4. Conduct lectures and information dissemination campaign in schools and barangay halls to heighten the awareness and the importance of vaccination among the parents.
5. Conduct a multi-center study where the number of subjects and study period may be increased.
6. Determine the prevalence of giving vaccines not included in the EPI.

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Discussion

Of the subjects who were included in the study, only 108 (50% of them were fully-immunized, with some subjects failing to receive only one vaccine, while others failed to receive several vaccines. Only four of the fully-immunized subjects had health center and OPD as sources of vaccine provider. The higher number of fully-immunized subjects from those with private physicians may be due to the unavailability of some vaccines from the other vaccine providers, as the four fully-immunized subjects from OPD and health center bought vaccines such as Hepatitis B and Hib vaccines from another source and had them given by their vaccine providers.

The immunization coverage for BCG, DPT, OPV and Measles was high for the up-to-date vaccinated subjects ranging from 84% to 99% as shown in table 4. There is however, a different picture for Hepatitis B, Hib and MMR vaccines where immunization coverage ranged between 51% to 62%. The appropriately vaccinated subjects were even less, with only 43% of the subjects having received the MMR, 40% for the Hib series, and an even lower 36% of the subjects having completed the Hepatitis B series on time. These findings were comparable to that of Farizo, et al¹⁸ who studies the vaccination levels in a public pediatric clinic and noted that there was also a decrease in the coverage of vaccines appropriate for age from 67% at 3 months to 25% at 19 months. Similarly, Holt, et al¹⁹ noted in their study that missed opportunities occurred in up to 75% of their subjects at 24 months of age, and only 55% were up to date.

A survey of immunization coverage by Herceg, et al²⁰ found that doses of vaccine due at older ages were more likely to be given late or not at all. In this study, a similar trend was also noted as there was an increasing delay in the giving of vaccines as the subjects increased in age. The delay for the subjects to catch up with the DPT₁ was 2.4 months, and increased to 5.8 months for DPT₃. For Hep B₁, the delay was 4.2 months, and likewise increased to 4.8 months for Hep B₃. Similar findings were found in the study made by Gindler, et al¹⁸ in Puerto Rico where there was a delay of 0.3 months for DPT₁ and OPV₁ to approximately 3 months for DPT₃ and OPV₃. Vaccines that are required to be given in three successive doses (DPT, OPV, HepaB, Hib vaccines) were more likely to be missed upon reaching the third dose, as shown by the number of subjects who failed to receive the last dose among the vaccine series as reflected on Table 8. Although 108 subjects (50%) were up-to-date, only 37 subjects were appropriately-

vaccinated, while the remaining 71 subjects were catch-up subjects, where the delay in months to catch-up varied among the vaccines. The delay in the receipt of vaccines may not only be due to the unavailability of the vaccines, but also due to forgetfulness, distance, and lack of time in visiting their primary care takers as these were the most commonly cited reasons for missed immunizations among the respondents.

Subjects in the older age group (49-60 months old) were more likely to have been fully immunized. This could be explained by the fact that they may have more chances of immunization by virtue of having more opportunities for encounters with their primary care takers. Although subjects in the older age group were more likely to be fully immunized, most of them were catch-up subjects, with the gap in delay in receipt of vaccines increasing with age. Subjects with fewer siblings were also more likely to be fully immunized as up to 57% of subjects without siblings were fully immunized as compared to 27.7% for subjects with four or more siblings. This was similar to the study made by Herceg et al²⁰ where having more than one child in the family was noted to be a factor in incomplete immunization. This may be because of the allocation of resources where parents with one or two children can spend more time and more financially capable of spending for the immunization of their children than for parents with many children. Access to health care is of utmost importance as shown in the study where subjects from Urban areas had a higher percentage (>50%) of being fully immunized as compared to subjects from smaller towns (35%). With parents as primary care takers, immunizations were also more likely to have been given as compared to guardians where only 30% were fully immunized. Primary care takers with higher educational attainment was shown to be more likely to lead to full immunization as compared to those with lower educational attainment. Literacy of parents was also cited by a study in India²¹ as an important factor that would affect immunization. Having a stable source of income was also associated with higher percentage of being fully immunized as shown in this study. Employment and literacy were also cited by Fassin, et al²² as factors that affect immunization among children in Senegal.

Missed immunizations due to the lack of vaccine maybe because of the failure of the government to secure vaccines such as DPT and OPV in 2001. By maintaining a constant supply of vaccines, more subjects could have been immunized.

Many subjects had missed immunizations with Hepatitis B and Hib vaccines. This was because of the unavailability of the vaccines, lack of time and forgetfulness in bringing the subjects to the vaccine providers as these were the reasons most commonly provided by the respondents whose subjects had missed immunizations with these vaccines. Certain vaccines such as Hepatitis B and Hib vaccines are not available in hospital out-patient departments. Thus, subjects whose primary vaccine providers are from hospital OPD were more likely not to have received these vaccines, leading to a increased number of missed immunizations. Almost a third of the subjects who had missed immunizations with the MMR attributed it to forgetfulness as a reason for the delay. The study showed that as the subjects increase in age vaccines that they were supposed to have received were usually missed due to forgetfulness. Money as a consideration among subjects whose primary vaccine providers were private practitioners and hospital OPD because of the government subsidized vaccines for the health centers thereby minimizing expenditures for vaccination for health center subjects. Although hospitals get some of their vaccines from the government, a fee is being charged by the hospitals for the services rendered to the subjects.

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