

CAUSES OF VACCINE DEFAULT AMONG CHILDREN LESS THAN 12 MONTHS IN
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ABSTRACT

Background: childhood vaccination represents one of the most cost-effective public health interventions for reducing morbidity and mortality among children. **Aim:** To find the causes of vaccine default in children less than 12 months in Mosul city. **Methods:** A descriptive cross sectional design was used to achieve the objectives of this study. The study was conducted in Mosul city in a family Medicine and primary health care centers and A convenient sample of 600 caretaker accompany the vaccine dropout infant for vaccination who visit the PHCCs for vaccination were enrolled after verbal agreement for participation in the study. The number of infants obtained from each center in Mosul city was estimated according to the proportion of the annual number of attendants of the center to the total attendants of the 13 centers. The study was carried out over a four months period from the beginning of April 2022 to the end of July 2022. Data for this study were collected through direct interview with the infant's mothers/ caretaker using a specially designed questionnaire sheet, the immunization card was used to verify each infant's for compliance with the vaccine schedule, then only the infants with incomplete vaccination was taken. Data were entered and analyzed using statistical package for social science (SPSS) version 25 and excel sheet. **Results:** Regarding general characteristics of the infants show Both parents father and mother take immediate care of the infant found among 540 (90%), followed by mother 58 (9.7%). Regarding general characteristics of the infants reveals that, most of the dropout infants aged 12 months was 160 (26.67%) followed by 10-11 months 116 (19.33%), also this study showed that 266 (44.33%) dropout infants had ≥ 3 brother followed by 2 brothers 210 (35%). Regarding causes of vaccine dropout this study revealed that most causes related to the take care 337 (56%). In relation to causes belong to the vaccine itself, commonest cause related to vaccine was fear of vaccine side effect 146 (24.3%). **Conclusion:** Most of the dropout infants aged 12 months 160 (26.67%) The common cause of dropout was causes related to the take care (56%) The commonest cause related to vaccine was fear of vaccine side effect (24.3%) Commonest vaccine dropout by infants was at 6 months (OPV, Rota, Penta, Pneumococcal) (28.8%).

1.1. Overview

Childhood vaccination represents one of the most cost-effective public health measures for lowering the morbidity and mortality among children.^[1]

WHO, defined children as fully vaccinated when they have received a vaccines against tuberculosis (BCG), three doses of pentavalent vaccine DPT-HePB-Hib and Polio vaccines, and Measles vaccination by the age of 12 months. children who miss at least one dose of the eight vaccines before 12 months are considered

incompletely vaccinated.^[2]

In Iraq, despite significant improvements in the immunization system and vaccination coverage among children under 2 years of age, some children still miss their scheduled vaccines.^[3] According to the Iraqi Ministry of Health report in 2020, an estimated coverage of BCG vaccine was 97%, oral polio 1st, 2nd, 3rd, dose was 93%, 83.76% respectively and Measles vaccine 75%, children still require administration of all vaccines included in the immunization schedule.^[4] The

immunization program is influenced by various factors and barriers, including those related to the child and the family. Other influences involve healthcare provider aspects, such as waiting time, staff attitudes, responses to side effects, as well as environmental factors include logistic barriers, limited access to health care, community information dissemination and inter-sectoral collaboration. Children who are not fully immunized are at far greater risk of contracting serious vaccine-preventable diseases. Studies showed that children who have not received the measles vaccine were 35 times more likely to develop the disease.^[5] The dropout rate is used to assess program continuity and follow up. The dropout between the first and third doses of DPT-HepB-Hib vaccine serves as a key indicator, since this vaccine is usually not administered during campaigns.^[8] The dropout rate, defined as the difference between the first and last vaccine doses during the first year of life, is used to evaluate the health systems capacity to complete the immunization schedule. The maximum acceptable dropout rate is 10%.^[7]

Causes Of Vaccination Dropout

A study done in Gindhir District found that the marital status, sex, and possessing of children card were other contributing factors of dropout rates.^[43] Powelson J, et al. found that there are five main patterns of barriers leading to dropouts was observed.^[9]

- 1) Social norms and limited family support shift responsibility of immunization primarily onto mothers.
- 2) Low-quality healthcare reduces caregivers trust in vaccination programs.
- 3) Worries about side effects lead to vaccine hesitancy.
- 4) Overburdened caregivers hesitated to seek or advocate for vaccination due to poor interaction and lack of support from health workers.
- 5) COVID-19 created additional barriers related to social distancing, mask requirements, supply chain challenges and disrupted outreach services; compounding barriers greatly increases the likelihood of dropout; and absence of immunization facilitators.^[9]

Dropout Rate In Iraq

In 2016, the Global routine immunization coverage report indicated that among the 19.5 million children worldwide who did not receive DPT3 doses during the first year of life, 11.8 million of them (61%) were lived in just 10 countries: India (16%), Pakistan (7%), Indonesia (6%), Iraq (3%), Angola (2%), Brazil (1%), and South Africa (1%), the Democratic Republic of the Congo (3%), Nigeria (18%), Ethiopia (4%).⁽¹⁰⁾ Maki Z T et al in Basrah 2017.

AIM OF THE STUDY

Identifying the causes of vaccine default in children less than 12 months in Mosul city.

OBJECTIVES

1. To find which demographic and socio-economic factors are present with Immunization dropout
2. To determine the immunization dropout for Penta vaccine in children aged 0-12 months.

Patients & Methods Ethical & Administrative Considerations

This study received ethical approval from the Arabic council of health specializations in family medicine. Also considered by Iraqi Ministry of Health/ Nineveh Health Department.

Informed consent was taken from infant's parents included in the study.

Study Setting

This study was done in Mosul city in a family Medicine primary health care centers (in both sides). Right side sector (six PHCCs AL Rabeea Health Center, AL Mansur for family medicine center, Al- Yarmouk for family medicine center, Tamuz for family medicine center, Al-Hadbaa for family medicine center, Al-Zanjeli primary Health care Center) and left side sector (seven PHCCS AL-Quds for family medicine center, Al- Aqsa for family medicine center, Al Arabi for family medicine center) and the following primary health care centers: AL-Karama, AL-Sharqy, and AL-Qahira. which cover most quarters of Mosul city.

Study Period

This study was conducted over a four-month period from early April 2022 to late July 2022, with sample of this study was collected in four days per week.

Study Design

A descriptive cross-sectional study design was employed to achieve the objectives of this research.

Study Sample

Convenient samples of 600 caretakers accompany the vaccine dropout infant for vaccination who visits the PHCCs for vaccinations were enrolled after verbal agreement for participation in the study. The number of infants obtained from each center in both sides of Mosul city was estimated according to the proportion of the annual number of attendants of the center to the total attendants of the 13 centers.

Percent of infant in each center = $\frac{\text{annual no. of attendant to the center}}{\text{total attendance to the 1ry health care centers}} * 100$.

Data were collected through direct interviews with the infant's mothers/ caretaker using a specially designed questionnaire sheet, The immunization card was used to verify each infant's compliance with the vaccination schedule, then only the infants with incomplete vaccination was taken. The questionnaire contains information regarding.

- i. Socio-demographic characteristics include: age of caretaker, education, residence, and working.
- ii. Information's regarding the infant included; age, sex, number of brothers, birth order, and place of delivery.
- iii. Information regarding the reason of vaccination dropout; fear of vaccine side effect, lake awareness of important of the vaccine, postpone of the vaccine due to fear from COVID pandemic, thoughts of that vaccine causes more disease than prevention, fear of the vaccine source, time of immunization unknown, and believe that the given vaccine is COVID vaccine.
- iv. Questions regarding reasons related to the caretakers; (I am busy with the work), Family problem, sickness of the child or the caretaker, Neglected of the mother, problem of transportation, health care center away from the house, and cause related to traveling difficulties.

Operational Definitions^[7]

- Children are considered fully vaccinated when they have received all recommended vaccines, including the vaccine against tuberculosis (BCG), three doses each of the Penta, PCV and polio vaccines and measles& mumps and rubella (MMR) vaccination by the age of 12 months.
- Infants who are partially vaccinated are those who have not received one or more doses of the vaccines specified in the full immunization schedule.
- Unvaccinated- infants are those who have not received any of the recommended vaccines.
- Dropout infant according to MOH-Iraq is any infant that has been more than a month past the due date of the vaccination dose.

Inclusion Criteria

All caretakers accompany the dropout infant aged (0-12 months), that accept for enrollment in the study in the centers or by calling them.

Exclusion Criteria

1. Aged > 12 months.
2. Refuse enrollment in the study.
3. Not have the immunization card at the time of the interview.

Table 3.3: The reasons of infant's incomplete vaccination related to the vaccine.

Causes Of Vaccine Drop Out Related To The Vaccine	No.	% Denominator
Fear Of The Side Effect	146	24.3
Lake Awareness Of Important Of The Vaccine	96	16
Postpone Of the Vaccine Due To Fear From COVID Pandemic	40	6.7
Vaccine Causes More Disease Than Prevention	18	3
Fear Of The Vaccine Source	14	2.3
Time Of Immunization Unknown	12	2
Believe That The Given Vaccine Is COVID Vaccine	12	2
There Is Crowding On The Vaccine Unit	12	2
Vaccine Do Nothing To The Child	8	1.3
Vaccine Not Available	4	0.67

RESULTS

Analysis of the 600 infant those dropout from vaccination which taken from 11 family medicine & primary health care centers in the right and left side of Mosul city.

General Characteristics of the Infant's Parents

Both parent's father and mother take immediate care of The infant found among 540 (90%), followed by mother 58(9.7%) While age of the take care personnel was reveal that most of them aged ≥30 years 330(55%), 548(91.3%) was married followed by 38 (6.3%) divorced and 14 (2.3%) was widow., this Study found that 554 (92.3%) of caretaker personnel had no work and that all of the caretaker live in urban area.

The General Characteristics of the Infants

Most of the dropout infants aged 12 month was 160 (26.67%) followed by 10-11 months 116(19.33%).

Causes of vaccine Dropout

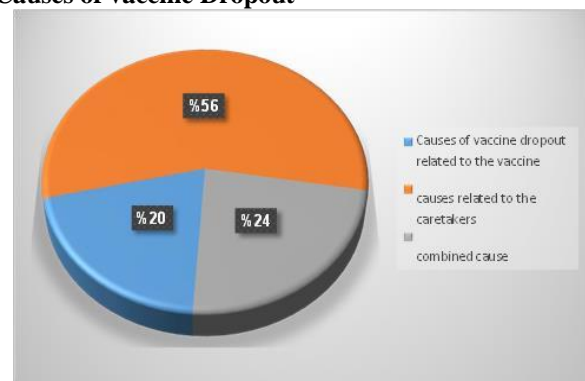


Figure 3.1: The distribution of infants according to causes of dropout.

Causes of vaccine dropout related to vaccine

The commonest cause related to vaccine was fear of vaccine side effect 146(24.3%) followed by lake awareness of important of the vaccine 96(16%), postpone of the vaccine due to fear from COVID pandemic 40(6.7%) thoughts of that vaccine causes more disease than prevention 18(3%), fear of the vaccine source 14(2.3%), time of immunization unknown 12(2%).

Causes of vaccine dropout related to caretakers

According to causes related to the caretakers. the reasons of infant's incomplete vaccination related to the caretakers was commonly related to (I am busy with the

work) 146 (24.3%), Family problem 82(13.7%), sickness of the child or the caretaker 78(13%), Neglected of the mother 52(8.7%), problem of transportation 40(6.7%).

Types of vaccines dropout according to age of infants

Type of vaccine dropout	No=600	%
2 months (PENTA 1(DPT, cellular P, Hib, HepB), ROTA1, PREV13-1 +OPV1)	109	18.2
4 months (PENTA 2 + IPV 1, PREV13-2 + OPV2 + ROTA 2)	157	26.2
6 months (PENTA 3+ IPV 2, PREV13-3 + OPV3)	173	28.8

DISCUSSION

Prevention of vaccine-preventable diseases through immunization benefits everyone, producing positive health, economic and social outcomes. at global, national and community levels. Immunization is a cost effective, life-saving intervention, that prevents unnecessary diseases, disabilities and deaths. Immunization and associated interventions contribute significantly to achieving the Millennium Development Goals (MDGs) either directly by reducing childhood deaths or indirectly by reducing the infectious diseases incidence, and ultimately , by improving the health of the population and thus contributing to poverty reduction.^[13]

In this study Both parents father and mother take immediate care of the infant found among 540 (90%), followed by mother 58 (9.7%), while non-reported father take care of the infant.

Most of mothers aged ≥ 30 years 330 (55%). This goes with Chanie MG 2021^[18] in Ethiopia which found that most of caregiver was mothers aged 25-34 years (46.3%).^[19]

Regarding marital status was married among 548(91.3%) followed by divorced 38(6.3%) and widow 14 (2.3%). This goes with Yehualashet SS et al 2019.(7)which found that 316 (73.1%) of the mothers/caregivers was married Most of the caretakers personnel had secondary school, followed by primary school 242(40.3%), high education found among 62(10.3%), and illiterate found among 30(5%). This goes with previous studies done by Zenbaba D et al 2021 in Southeastern Ethiopia^[10] found that the children with uneducated primary caregivers were 2.6 times more likely to default vaccination than those who attend college and above (AOR=2.61, 95% CI: 1.19, 5.67) (an adjusted odds ratio that controls for other predictor variables in a model.

Alshammari TM, et al 2018 in Saudi Arabia found that it is well established that a mother's educational status have a significant role in the utilization of health services. Higher educational levels may positively influence the acceptance of full childhood vaccination.^[13] this may be explained by the fact that educated mothers generally have greater knowledge and decision making ability regarding various child health service issues, including the importance of child vaccination compared to mothers with no formal education. This finding is

conducted in Kenya and Bangladesh.^[12]

Regarding the sex of the infants, most of dropout infants were male 340(56.67%) compared by 260 (43.33%) which was female. This goes with previous study in Iraq done by Abbas LM et al 2016(14) found the proportions of incomplete vaccination is higher in males (55.7%) than females (44.3%). Gualu T et al 2017 in Ethiopia^[15] found that male sex had OR of 2.66 (1.02–6.91) for complete immunization and this mean that male sex had 2.66 times of risk of vaccination dropout.^[57]

On the other hand, this research found that the commonest cause related to vaccine dropout was fear of vaccine side effect 146(24.3%) followed by lack awareness of important of the vaccine 96(16%), postpone of the vaccine due to fear from COVID pandemic 40(6.7%) thoughts of that vaccine causes more disease than prevention 18(3%), fear of the vaccine source 14(2.3%), time of immunization unknown 12(2%), and believe that the given vaccine is COVID vaccine 12(2%).

A Study conducted in Iraq by Abbas LM et al 2016^[14] found that both direct and indirect factors contributed to incomplete vaccination, the main direct factors included Social events and busy family schedule (63.4%), change in place of residence; internal and external displacement (35.5%), and child illness (24.6%). Indirect factors included low level of parental education, and large family size.

The commonest vaccine dropout by infants was at 6 months (OPV, Rota, Penta, Pneumococcal) 173(28.8%) followed by 4th month schedule (OPV, Rota, Penta, Pneumococcal)157(26.2%), 2nd month (OPV, Rota, Penta, Pneumococcal)109(18.2%), and measles 104(17.3%), the Pneumococcal vaccine was absent from the 1ry health care centers 600(100%) dropout Regarding the Reasons of partial immunization, Essam M et al in 2017 in Basrah found that 29% of participants reported experiencing obstacles. These obstacles included mother being too busy16(27.6%), long distance to immunization site3(5.3%), child illness5(8.6), long waiting times2(3.4%), family problems including maternal illness2(3.4%), unavailability of vaccines1(1.7%).

CONCLUSIONS

1. Most of the dropout infants aged 12 month 160

- (26.67%) followed by 10- 11 months 116(19.33%), 6-7 months 116(19.33%), and 8-9 month 112 (18.67%).
- The common cause of dropout was causes related to the take care 337(56%) followed by combined cause 141(24%), and causes of vaccine drop out related to the vaccine 122(20%).
 - The commonest cause related to vaccine was fear of vaccine side effect 146(24.3%) followed by lack awareness of importance of the vaccine 96(16%), postpone of the vaccine due to fear from COVID pandemic 40(6.7%) thoughts of that vaccine causes more disease than prevention 18(3%), fear of the vaccine source 14(2.3%), time of immunization unknown 12(2%), and believe that the given vaccine is COVID vaccine 12(2%).
 - The reasons of infant's incomplete vaccination related to the caretakers was commonly related to (I am busy with the work) 146 (24.3%), Family problem 82(13.7%)

Recommendations

- good educational programs implemented to educate those groups about importance of vaccination through home visits programs and use of social media to reach these groups
- The implementation of an SMS reminder system on days before the scheduled vaccination
- Improving communication between parents and immunization can enhance engagement in decision-making, clarifying the importance of immunization and highlight its value.

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