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Missed Opportunity for Vaccination among Children Under-five years of age: A Cross-Sectional Study at Mwananyamala Regional Hospital, Dar es Salaam, Tanzania

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Abstract

Background

Immunization is among the most important public health interventions against common childhood diseases. However, a missed opportunity for vaccination (MOV), may hamper the progress made in reducing childhood illness through vaccination. Knowing the magnitude and contributing factors for MOV, is essential for planning and executing preventive measures; however, these factors are not well elucidated in the Tanzania context.

Broad Objective

To determine the magnitude and factors for MOV among children under five-years old admitted at Mwananyamala hospital.

Methodology

We conducted a hospital-based, cross-sectional descriptive study among children under-five year old who were admitted at Mwananyamala hospital and their respective care givers from October to November 2018. An interview-guided questionnaire was used to collect data from the caregivers. The childhood immunization history was obtained from the immunization cards. Data were analyzed using Statistical Package for Social Sciences (SPSS version 20).

Results

A total of 209 caretakers and their respective children were enrolled in the study. Thirty-eight (18.2%) had MOV, and among the missed vaccines, the second dose of measles and rubella was the most missed vaccine (45.5%). Identified factors for MOV were unavailability of the vaccine on the day of vaccination 12 (31.3%), the child being sick on the day of vaccination 10(26.3%), due date forgotten 8 (20.8%), not informed on when to return for vaccination 7(18.1%), and no money for transport to vaccination center 1 (2.7%).

Conclusion and recommendation

The magnitude of missed opportunity for vaccination is still high among hospital admitted children. Vaccine procurement and distribution as well as improved communication among caretakers and health personnel should be more strengthened to reduce the number of children who are missing vaccines.

Keywords: *Missed opportunity for vaccination, Children, Under-five, Dar es Salaam.*

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Introduction

Immunization is among the most important public health interventions against infectious diseases. It reduces childhood mortality, and morbidity; ensures normal growth and development by preventing recurrent common childhood infections such as pneumonia and diarrhea diseases which have detrimental effects on children's wellbeing and survival (1,2). Except for water, sanitation, and hygiene (WASH), immunization is the second most cost-effective life-saving intervention against infectious diseases (3,4). In 2013, The World Health Organization (WHO) estimated that immunization prevented six million deaths from vaccine-preventable diseases such as pneumonia, measles, diphtheria and diarrhea, especially from low and middle-income countries (5).

Despite the benefits of vaccination, some children miss timely administration of the vaccines. WHO defines missed opportunity for vaccination (MOV) as any contact with the health services by an individual who is eligible for vaccination but does not receive one or more of the vaccine doses for which he or she is eligible. Some of the identified factors for MOV are lack of knowledge regarding the benefits of vaccination, inadequate number of health care workers, and stock out of vaccines and other vaccine-related materials. (6,7). Other factors include lack of coordination between vaccination and curative service providers, as well as invalid contraindication for vaccination (8). However, there is a paucity of local data regarding the magnitude and contributing factors of missed opportunities for vaccination in Tanzania. If not well investigated and mitigated, may hinder the progress towards the reduction of childhood morbidity and mortality due to vaccine preventable diseases.

This study aimed to determine the magnitude and contributing factors for MOV among children under-five years old admitted at Mwananyamala hospital in Dar es Salaam—Tanzania. This is essential for mitigation strategies against MOV and improvement in immunization coverage.

Methodology

A cross-sectional descriptive study was conducted at Mwananyamala regional referral hospital in Dar es salaam, Tanzania from October to November 2018. Children under-five years of age who were admitted at Mwananyamala Hospital in the pediatric ward and their respective caretakers were considered for the study.

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Sample size determination

The minimum sample size of the study participants was calculated using Kish and Leslie formula for determination of proportion in cross-sectional studies as below:

$N=Z^2p(1-p)/d2$

Where *N*=estimated sample size, *Z*=z score at 95% confidence interval (1.96), *d*=marginal error (5%) and *p*= prevalence of missed opportunity for vaccination in previous related studies. We used the prevalence of 16.2% from a study conducted by Ojwang in Kenya (9). By using the above formula, the calculated minimum sample size was 209.

Sampling procedure

A concurrent recruitment method was used to select study participants whereby each day of recruitment, parents/caretakers with children below 5 years of age who were admitted were approached and asked to participate in the study. Those who met the criteria were recruited serially until the targeted minimum sample size was reached. Those who did not have the vaccination cards, who did not consent for the study, or with children above 5 years of age were excluded from the study.

Data collection and analysis

Demographic data were collected using an interview guided pre-structured questionnaire while the vaccination status was recorded from the children's immunization cards. Descriptive data analysis was performed using Statistical Package for Social Sciences (SPSS Version 20.0, SPSS Inc., Chicago, USA). Sampling, data collection and analysis were conducted by the authors.

Ethical clearance and considerations

Ethical clearance for the study was obtained from the ethical review committee of the Hubert Kairuki Memorial University with reference number HK/MD/14/1055. The approval to recruit participants was obtained from Mwananyamala hospital administration. Informed consent was sought from the caretakers before they were enrolled in the study. Those who objected were not included. Those who had missed vaccines and still eligible were referred to the Reproductive and Child Health clinic for vaccination before they were discharged. Furthermore, health education regarding the importance of timely vaccination was conducted among caretakers whose children had missed vaccines.

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Results

A total of 209 caretakers and their respective children less than 5 years who were admitted at Mwananyamala referral hospital were recruited in the study. The mean age for caretakers was 29.04±6.5years. The majority (95.7%) were biological mothers and 169 (81%) were married. More than half of the caregivers (56.5%) had primary education while only 4 (1.9%) had post-secondary education (Table 1).

Table 1: Demographic characteristics of caretakers who were enrolled in the study at Mwananyamala hospital

Variable	Frequency (N=209)	Percent (%)
Mean age of the caregivers 29 years		
Relationship of caregiver to child		
Mother	200	95.7
Aunt/uncle	2	1.0
Grandparent	7	3.3
Marital status		
Married	171	81
Single	32	15.3
Divorced	3	1.4
Widow/widower	3	1.4
Level of education		
No formal education	12	5.7
Incomplete primary education	1	0.5
Completed primary education	118	56.5
Secondary education drop out	42	20.1
Completed secondary education	32	15.3
Higher level education	4	1.9
Occupational status		
Unemployed	98	46.9
Self employed	79	37.8
Formal Employment	29	13.9
Formal work	3	1.4

Among 209 children who were enrolled, 55 (26.3%) were aged between 2 to 5 years. The majority of children (97.6%) were delivered at the health facility (Table 2).

Table 2: Demographic characteristics of children under five years who were enrolled in the study at Mwananyamala Hospital

Variable	Frequency (N=209)	Percent (%)
Age of the child		
0-6months	41	19.6
6-12months	38	18.2
12-18months	43	20.6
18-24months	32	15.3
24-60months	55	26.3
Gender		
Male	116	55.5
Female	93	44.5
Place of birth		
Home	5	2.4
Health facility	204	97.6

Thirty-eight children (18%) had missed the opportunity for vaccination. The most missed vaccine was the second dose of measles and rubella whereby 10 (4.8%) missed the vaccine and 11 (5.4%) missed the second dose of vitamin A (Table 3). Children who missed the second dose of Measles and Rubella vaccine was 45.5% of all children who had missed the opportunity for vaccination (Figure 1).

Among children who missed the vaccines, 12 (32%) of the caretakers reported the reason to be unavailability of vaccines at the due dates, 8 (20.8%) forgot the dates for immunization while 1 (3%) reported not having money for transport to vaccination site (Figure 1).

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Table 3: Missed opportunity for vaccination per vaccine as indicated in the vaccination cards issues by Tanzania Immunization and Vaccine Development (IVD) program

Missed Vaccine	Frequency (N=209)	Percentage
No Vaccine missed as per age	171	81.8
BCG	2	1.0
ORAL POLIO VACCINE 0	2	1.0
ORAL POLIO VACCINE 1	2	1.0
PENTAVALENT 1	2	1.0
PENTAVALENT 3	1	0.5
Measles and Rubella1	3	1.4
Measles and Rubella 2	10	4.8
Vitamin A first dose	5	2.4
Vitamin A second dose	11	5.3

Note: Vaccines not shown in the table were not missed

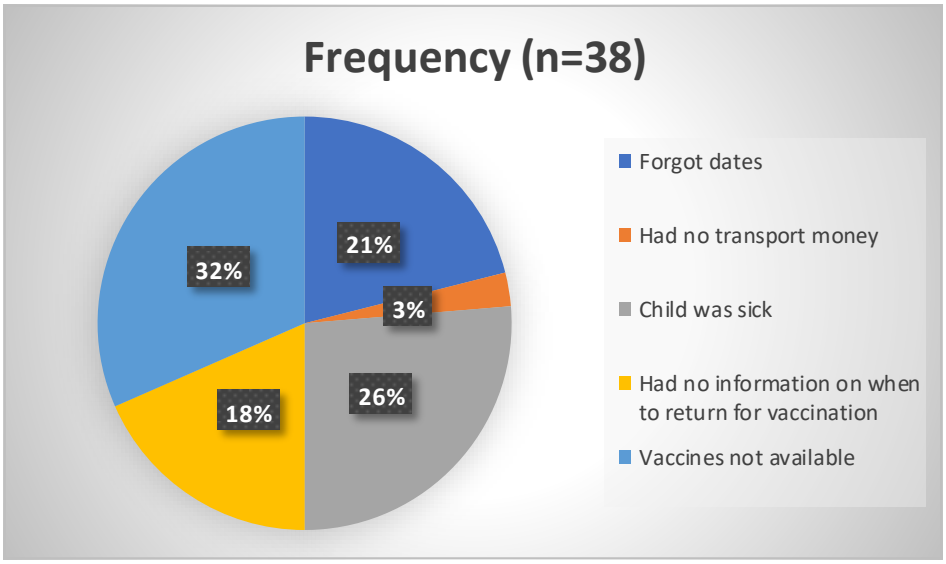

Figure 1: Factors for missed vaccination among children under-five admitted at Mwananyamala hospital

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Discussion

In this study, found that 18% of children had MOV and the most missed vaccine was the second dose of rubella and measles (4.8%). The magnitude was relatively low compared to other studies conducted in Sub-Sahara African countries such as Chad (51%), Malawi (66%) (8), and 30% among pastoralist communities in Kenya (10) . The most missed vaccine in our study was the second dose of measles and rubella (MR2) which is usually administered in children at 18 months of age. The magnitude is much lower compared to another study conducted in Mtwara District Council whereby children who were eligible for MR2 but were not vaccinated at the time of the study was 55.8% (11). This difference might be due to the differences in study setting. Our study was hospital based in the metropolitan city, while the other one was a community based and was conducted in Mtwara District council, which is a rural area where vaccination centers are not easily accessible. In addition, our study was conducted among the admitted patients, therefore they were subjected to selection bias as they could be having different behavior and attitude. Being admitted may also reflect recurrent illness, which may affect their vaccination status. However, both studies indicate that MR2 was the most missed vaccine. In 2017, World Health Organization also reported MR2 to be the leading missed vaccine whereby 36% of eligible children did not receive the vaccine.

In this study, unavailability of vaccines at the vaccination center (stock-out) was the most mentioned reason for missed vaccination. This factor was also frequently mentioned in the study conducted in Mtwara, Tanzania (11) and in other studies conducted in low and middle income countries (6,12). Some studies have attributed this setback to challenges in financial resources for vaccine purchase and immunization program support; logistic and supply chain management, poor infrastructure, and global vaccine markets (13,14). Child being sick during the vaccinated date was also among the mentioned reasons for missing vaccines. We could not find out the nature of illness during the day of the planned vaccines, but mild illnesses are generally not reasons to defer vaccination. It can be postponed only if the child has moderate to severe symptoms (15). This has also been identified in other studies, mentioning lack of knowledge on the valid contraindication of vaccination among care takers and health care providers as the main culprit (6,8).

We also found that, some children did not receive the intended vaccines as parents forgot the due dates for vaccination. In routine vaccination services in Tanzania, the next dates for vaccination are usually indicated after receiving the services. It is usually the responsibility of

the caretakers to check the dates regularly and take the child for the subsequent vaccination on the indicated dates. This factor has also been identified in other studies, but it was also associated by the parents not being sure of the age of their children as the result of low education (11,16). Not having clear information on when to take the child for subsequent vaccination was also mentioned among the respondents. This could be the result of not receiving clear instructions from health care workers. Even if the dates for the subsequent visits are indicated on the vaccination card, it is crucial for health care workers to make sure that caretakers understand the exact dates for subsequent vaccinations. Another mentioned reason was lack of money for transport to the vaccination center on the day of vaccination. This could be attributed to lack of source of income as up to 46.9% of caretakers who participated in the study were not involved in any reliable and regular income generating activities. This factor has also been identified in other studies in Sub-Sahara Africa, pinning extreme poverty as the main source (16,17).

Conclusion

In conclusion, despite the success achieved by the Immunization and Vaccine Development program in Tanzania in maximizing immunization coverage, there are children who are still missing routine vaccines. Vaccine procurement and distribution chain management; educating care givers and health care personnel on valid contraindication for vaccination; appropriate communication with care givers regarding when to return the child for subsequent vaccination, and community outreach services should be more improved to reduce the proportion of children who are missing opportunity for vaccination.

Competing interest

The authors declare no competing interests

Authors' contributions

FSH designed the study, planned and collected data, analyzed the data, prepared the report and the manuscript. FSK was responsible for study design and manuscript writing.

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