

ORIGINAL ARTICLE

MISSED IMMUNIZATION OPPORTUNITIES AMONG CHILDREN UNDER 5 YEARS OF AGE DWELLING IN KARACHI CITY

Asif Khaliq, Sayeeda Amber Sayed*, Syed Abdullah Hussaini**, Kiran Azam***, Mehak Qamar***

Department of Paediatrics and Child Health, The Aga Khan University Hospital, Karachi, *Alberta Health Services, Calgary-Zone-Canada, **Ziauddin Medical University, Karachi, ***Department of Health and Hospital Management, Institute of Business Management, Karachi-Pakistan

Background: Immunization is the safest and effective measure for preventing and eradicating various communicable diseases. A glaring immunization gap exists between developing and industrialized countries towards immunization, because the developing countries including Pakistan are still striving to provide basic immunization to their children. The purpose of this study was to access the prevalence and factors of missing immunization among under 5-year children of Karachi. **Methods:** A cross sectional study was conducted from June 2015 to October 2015 among different outpatient clinics of Karachi. Parents who had child less than 5 year of age were approached by non-probability purposive sampling. Data was analysed by using Statistical Package of Social Sciences. **Results:** There were around 59.09% (n=156) and 64.43% (n=165) parents who have correctly responded regarding the number of essential immunization visit during the first and second year of their child life respectively. About 28.12% (n=108) parents responded that they do not know about the name and number of missed doses of vaccines. 31.78% (n=122) parents responded that their children have missed either one or more than one doses of routine immunization vaccines. Of which 34.42% (n=42) children have missed more than one vaccine. Lack of knowledge regarding immunization schedule 28.68% (n=34), concern about vaccine side effects 21.31%, (n=26), child sickness 17.21% (n=21), and lack of trust about government 10.65%, (n=13) were the major barriers identified by parents for missed immunization opportunities. **Conclusion:** Parents have inadequate knowledge regarding routine immunization visits, immunization schedule and vaccine doses. The practices of parents for routine childhood immunization are also poor. Parents refuse to immunize their child because of lack of immunization visit knowledge and also because of their doubts regarding vaccine potency and side effects. A proper system of immunization promotion, advocacy and reminder systems with proper follow-up mechanism need to be developed by all healthcare centres.

Keywords: Child; Immunization; Health System; Healthcare Providers; Karachi

J Ayub Med Coll Abbottabad 2017;29(4):645-9

INTRODUCTION

The high morbidity, complications and treatment cost of diseases has transformed the focus of healthcare providers from disease treatment to disease prevention¹. Immunization is one of the effective and acceptable methods of disease prevention.^{1,2} The global immunization campaign has successfully eradicated Small pox from the world in 1980³ and almost wipe-off Polio from the whole world.

Every year immunization saves the life of more than 2 million children from many communicable diseases, such as diphtheria, pertussis, tetanus, tuberculosis, polio and measles etc.^{2,4} Despite of intensive immunization, throughout the world, around 20% of world children fail to receive complete immunization doses aimed at their 1st year of life.^{4,5}

Pakistan is among the South Asian countries, where the infant mortality rate has decline from 78 to 66 per 1000 live births,⁶ but still Pakistan ranks 8th among countries with high new-born mortality rate.^{6,7} The infant mortality rate is a basic indicator for nation's health status. The health related MDGs (Millennium Development Goals) were not achieve by Pakistan in 2015.⁸ All of these facts reflect that Pakistan has abysmally poor healthcare system.

Pakistan is still striving to provide basic vaccination to their children, where the immunization coverage of Pakistan according to PDHS (Pakistan Demographic and Health Survey) report of 2012-2013 is 57.8%⁹. This means Pakistan has not reached the target of optimal routine immunization coverage of 80% or more¹⁰. A myriad of factors such as: low literacy level of parents, poverty, female gender, religion, and household expenditure has deprived the children of Pakistan from complete immunization.^{11,12}

Moreover, low immunization coverage, lack of interest of health providers and lack of innovation are also seemed as major hurdle for effective immunization program.

Paediatric vaccination on time offers multiple benefits. It prevents the children from vaccine-preventable diseases, reduces the mortality rate and provides herd immunity to unvaccinated or medically contraindicated children⁵. A glaring immunization practice gap exists between the developed and developing nations like Pakistan. In areas where immunization coverage is reported high, the proportion of fully immunized child is not up to mark as well.

Therefore, the basic purpose of this study was to investigate the frequency and underlying reasons of missed vaccines dose among the children of Karachi. However, the secondary objective of this study was to identify the role of healthcare providers and healthcare institution in the successful implementation of vaccination program.

MATERIAL AND METHODS

This cross-sectional study was conducted in Outpatient setting of 3 healthcare centres from June to October 2015. These healthcare centres were selected because they granted permission to conduct the study in their Outpatient waiting area. Moreover, these healthcare centres provide basic healthcare facilities to mother and child health, like antenatal care, postnatal care, maternal, neonate and child immunization services.

In this study, parents of children under 5 years were approached by non-probability purposive sampling technique. Parents who have visited the selected healthcare centres with a child age 5 year or less were included. Likewise, those parents living in Karachi since last 2 years and those who were able to communicate in local language were also included. Whereas, grandparents, uncle/aunts, neighbours, siblings were excluded. The sample size of this study was 384 and this was derived from OpenEPI calculator, keeping $\pm 5\%$ margin of error, 95% confidence interval and 50% population distribution.¹³

The data in this study was collected by 3 authorized researchers and a structured questionnaire that was constructed by reading different literatures was used for data collection. The questionnaire after construction was developed in Urdu language, so that participants can easily comprehend and answer. The questionnaire was then sent to 2 public health specialists for content validity. Moreover, the face validity of the questionnaire was also checked on

10% (n=38) respondents and the reliability of the questionnaires was done by test-retest method and R value of 0.714 was obtained for reliability analysis. The data of this study was analysed by using SPSS 19.0 version.

RESULTS

In this study there were 77.86% (n=299) were mother and 22.14% (n=185) were father of children under 5 years of age. Majority of the respondents (32.03%, n=123) were Urdu speaking, following by Sindhi speaking (20.83%, n=80), Pashtoon (17.96%, n=69), and rest of them were Punjabi, Baloch & others (29.18%, n=111).

The education level of 40.88% (n=157) parents were graduate followed by Matric & Intermediate (33.84%, n=130), and rest of the 25% (n=96) parents who were either illiterate or have no any formal education. The table 2 reveals that on an average each family has 3.3 ± 1.7 children, but the average number of under-5-year children in a family was 2.2 ± 0.8 . Around 70% parents claimed that they know about number of visits in Healthcare centre during first and second year of their child life for vaccination, but unfortunately among these parents only 59–60% parents actually know about the immunization visits.

There were 28.12% (n=108) parents who refused to answer about the vaccines schedule because of lack of their knowledge and illiteracy. Only 71.88% (n=276) parents responded about the vaccine preventable diseases immunization schedule. 65.88% (n=253) parents responded correctly about tuberculosis vaccination, that it is given at the time of birth. The knowledge of parents regarding the vaccines for Hepatitis-A, Chicken pox, MMR and Diarrhoea vaccine (Rotarix) was comparatively low, i.e., 8.07%, 10.93%, 12.7% and 8.85% respectively.

The statistics in table-3 is indicating that 31.78% (n=122) children have missed either one or more than one doses of their routine immunization. Around 34.42% (n=42) children have missed more than one vaccine. There were 38.52% (n=47) parents don't know the name of vaccine which has been missed, but they know that their children have not receive vaccine. The different vaccines doses which were missed by children were of Measles 8.19% (n=10), *Pneumococcal* 7.37% (n=9), MMR 6.55% (n=8), and other like OPV, BCG & pentavalent 5.71% (n=7).

The major reasons identified for missing vaccination were lack of knowledge regarding immunization schedule 28.68%, (n=34), concern about vaccine side effects 21.31%, (n=26), child sickness 17.21% (n=21), and lack of trust about government 10.65%, (n=13). Most of the parents

believed that the lack of education 30.2% (n=116) and lack of awareness 34.37% (n=132) act as barrier for child immunization program. 95.83% (n=368) parents were in favour of immunization and they responded there is need to promote immunization by means of community education 46.09% (n=177), educating mothers 22.91% (n=88), mass media campaign 17.96% (n=69) and 13.02% (n=50) parents have suggested to improve the existing facilities of the immunization centres.

Table-1: Socio-demographic profile of respondents

	Categories	Percentages (Frequencies)
Parents	Mother	77.86 (n=299)
	Father	22.14 (n=185)
Education	No formal education	7 (n=27)
	Education less than 10 year (including illiterate)	17.96 (n=69)
	Matric	23.95 (n=92)
	Inter	9.89 (n=38)
	Graduate (including Master)	40.88 (n=157)
Mother Tongue	Urdu	32.03 (n=123)
	Sindhi	20.83 (n= 80)
	Punjabi	13.02 (n=50)
	Balochi	5.98 (n=23)
	Pashtoon	17.96 (n=69)
	Other (Bengali, Memoni, Katchi, Sraiki, Kashmiri, Hinko)	9.89 (n=38)

Table-2: Parents knowledge regarding immunization visits & vaccines preventable diseases

Responses	Percentage (Frequencies)	
Mean Number of Children	3.3±1.7	
Under 5 children	2.2±0.8	
Knowledge of Parents regarding 1st year Immunization Visits		
Parents claim about knowledge	68.75 (n=264)	
Correct Responses*	59.09 (n=156)	
Knowledge of Parents regarding 2nd year Immunization Visits		
Parents claim about knowledge	71.09 (n=273)	
Correct Responses*	60.43 (n=165)	
Parents knowledge about the vaccine preventable diseases & its schedule**		
Vaccine Name	Recommended Doses***	Correct Answers
Polio	4-6 doses	36.97 (n=142)
Tuberculosis	1 dose at birth	65.88 (n=253)
DPT	3 doses	20.83 (n=80)
Pentavalent	3 doses	48.95 (n=188)
Tetanus	3 doses	22.91 (n=88)
Hepatitis B	3 doses	47.91 (n=184)
Measles	2 doses	33.85 (n=130)
Pneumonia	3 doses	21.87 (n=84)
MMR	1 dose	12.7 (n=49)
Hepatitis A	2 doses	8.07 (n=31)
Chicken pox	1 dose	10.93 (n=42)
Diarrhoea	2 doses	8.85 (n=34)
Don't know	Not able to answer	28.12 (n=108)

The Asterisk sign indicates as: *parents need to visit immunization centre 5 times, according to EPI (Expanded program of Immunization)- Pakistan child immunization protocols for child vaccination during first year of their child-birth. **Parents need to visit immunization centre at least once, according to EPI (Expanded program of Immunization)- Pakistan child immunization protocols for child vaccination during second year of their child-birth. ***is indicating the correct recommended doses of each vaccine

Table-3: Parents response regarding immunization status of their children

Responses	Percentages (Frequency)
Immunization status of children	
Child has been Immunized Completely	68.22 (n=262)
Vaccine Missed (one or more than one dose is missed)	31.78 (n=122)
Vaccine missed[∞]	
Polio	2.45 (n=3)
BCG	1.63 (n=2)
Pentavalent	1.63 (n=2)
Measles	8.19 (n=10)
MMR	6.55 (n=8)
Pneumococcal	7.37 (n=9)
More than one vaccine	34.42 (n=42)
Don't know	38.52 (n=47)
Reason for missed dose[∞]	
Side effects of vaccines	21.31 (n=26)
Non-availability of vaccines in centres	4.09 (n=5)
Don't know about vaccine schedule	28.68 (n=35)
Financial reasons	2.45 (n=3)
Lack of trust on Government	10.65 (n=13)
Doctor advise not to give this vaccine	4.91 (n=6)
Child was very sick	17.21 (n=21)
Don't know about vaccination centre	3.27 (n=4)
Migration	4.91 (n=6)
Don't know	2.45 (n=3)

∞ indicate those parents who have missed either one or more doses of vaccines

Table-4: Parents response regarding immunization barriers & awareness

Responses	Percentages (Frequency)
Barriers to Child Immunization	
Illiteracy	30.2 (n=116)
Lack of Resources & facilities	14.06 (n=54)
Lack of awareness	34.37 (n=132)
Rumours and fear	13.02 (n=50)
Don't know	8.33 (n=32)
Need to promote immunization	
Yes	95.83 (n=368)
No	4.17 (n=16)
Effective method for immunization promotion	
Community Education	46.09 (n=177)
Mother Education	22.91 (n=88)
Mass Media Awareness	17.96 (n=69)
Improve facilities	13.02 (n=50)

DISCUSSION

Immunization is an effective means for preventing illness and reducing the burden of various communicable diseases¹⁴. Incomplete or partial immunizations pose a serious threat to the health of children. In Pakistan, the proportion of partially immunized children range from 37–58%, and that is the major contributor for measles and polio epidemics.¹⁵ The result of this study shows that more than 30% parents responded that their child has not received complete immunization against the vaccine preventable diseases. Similarly, a study conducted in Peshawar also depicts that the percentage of partially immunized children is around 30%.¹⁶

In this study, the parents have presented different reasons for the incomplete immunization status of their children and these were lack of knowledge regarding immunization schedule and vaccination centres 31.96% (n=39) followed by fear of vaccines side effects 21.31% (n=26), child sickness 17.21% (n=21), non-availability of vaccines in vaccination centre 4.09% (n=5). In 2016, Wain *et al.* in their study also mention that the knowledge of parents regarding immunization is scarce and that act as a major barrier for successful child immunization.¹⁴ In addition, a study conducted in Cameron, Africa in 2015 also reflect similar types of reason for partial immunization like lack of parent's education, negative attitude of parents regarding immunization, and long distance of vaccination centres from the community.¹⁷

A myriad of barriers against effective immunization coverage were highlighted by the respondents and these were lack of education (30.2%, i.e., n=116), lack of resources (14.06%, i.e., n=54), lack of awareness regarding immunization schedule (34.37%, i.e., n=132) and rumours & fears (13.02%, i.e., n=50). A qualitative study conducted in rural parts of Sindh province also reveals that lack of awareness regarding immunization schedule and fear of vaccine side effects are the major constraints for effective immunization campaign.¹⁸ Al-Lela *et al.*, (2014) and Ali *et al.*, in their studies also depict similar reasons like lack of knowledge, vaccine side effects and poor performance of the healthcare centres are associated with immunization barriers.^{19,20}

There were 95.83% (n=368) parents who have shown positive concern regarding immunization advocacy and promotion. Similarly, in a mixed method study carried out in public health clinics of Iraq 93.9% parents responded positively for immunization promotion and advocacy.¹⁹ There were 87% parents believed that the educational and awareness campaign can aid in improving the immunization status and immunization coverage. They suggested education to community specifically to mothers and mass media campaign would be effective tool for improving the vaccination coverage. Whereas 13.01% (n=50) parents believe that improving the existing facilities in the vaccination centres aid in improving the immunization coverage. Different studies also have suggested similar types of interventions for improving the immunization coverage and child vaccination and these were parent's education, mass media education, strengthening of vaccination centres facilities and better communication between the healthcare staff and community.^{17,21,22}

The results of this study are just representing the responses of parents of selected areas of Karachi,

because only 3 healthcare institutes grant permission for data collection. Moreover, the data in this study was collected purposively from the parents who have visited the selected healthcare institutes and because of this reason it can't represent the actual characteristics of the population. No any parents were asked to confirm their defaulter status via immunization card or immunization centre record. Scaling-up of such types of studies in which parents are targeted for assessing the immunization status of their children with approved funding, community participation and with continuous follow-up would not only help in identifying the actual gaps in the immunization coverage and proportion of fully immunized child, but it will also assist in knowing about the activities of different CBOs, NGOs and other healthcare institution working in any community. In this way, this study would be beneficial for the healthcare providers, decision makers and different healthcare organizations working in community for effective decision making, policy formulation and immunization program success.

CONCLUSION

The immunization is among the most effective and safest methods for the prevention of vaccine preventable diseases. It is a basic tool that reduces the disease morbidity and mortality specifically among children. In developing countries, like Pakistan where at one hand immunization coverage is low, whereas on other hand partial immunization of children serve as serious threats for the epidemics of polio, measles and other vaccine preventable diseases. The result of this study reflects that the knowledge of parents regarding routine immunization visit, immunization schedule and vaccine doses are inadequate. The inadequacy in the knowledge of parents upshots poor immunization practices of parents and this ultimately intensify the chances of missing immunization among their children. Parents refuse to immunize their child because of lack of immunization visit knowledge and also because of their doubts regarding vaccine potency and side effects. A proper system of immunization promotion, advocacy and reminder systems with proper follow-up mechanism need to be developed by all healthcare centres in order to mitigate this situation.

AUTHORS' CONTRIBUTION

AK has worked on writing the introduction, methodology and discussion, SAS has worked on overall project supervision, questionnaire designing and validation and manuscript review, SAH has worked on analysis, KA and MQ worked on literature

search and also assisted AK in methodology designing.

Disclaimer: Not applicable

Acknowledgment: We would like to acknowledge all the healthcare institutes especially management of Saima General Hospital & Aziza Hussaini Hospital Karachi for granting permission for data collection.

Financial Disclosure: Not applicable

Conflict of Interest: The author declares no any conflict of interest

REFERENCES

1. Qidwai W, Ali SS, Ayub S. Knowledge, attitude and practice regarding immunization among family practice patients. *J Dow Univ Health Sci* 2007;1(1):15-9.
2. Asim M, Tanwir F, Hussain S, Shahzad AR, Shawar D. An Assessment of Adoption Level of Mothers Regarding Immunization of their Children among Minorities in Rural Areas of District Faisalabad. *Pak J Life Soc Sci* 2010;8(2):106-10.
3. WHO. Emergency Preparedness, Response: Small Pox. [Internet]. [cited 2017 Jan 1]. Available from: <http://www.who.int/csr/disease/smallpox/en/>
4. Maurice JM, Davey S. State of the world's vaccines and immunization. 3rd ed. Geneva: World Health Organization; 2009. p.169.
5. Restrepo-Méndez MC, Barros AJ, Wong KL, Johnson HL, Pariyo G, Wehrmeister FC, *et al.* Missed opportunities in full immunization coverage: findings from low-and lower-middle-income countries. *Global Health Action* 2016;9(1):30963.
6. The World Bank. Mortality rate, infant (per 1,000 live births) | Data [Internet]. [cited 2017 Jan 1]. Available from: https://data.worldbank.org/indicator/SP.DYN.IMRT.IN?name_desc=false
7. Afzal U, Yusuf A. The state of health in Pakistan: An overview. *Lahore J Econ* 2013;18.
8. Khowaja AR, Zaman U, Feroze A, Rizvi A, Zaidi AK. Routine EPI Coverage Subdistrict Inequalities and Reasons for Immunization Failure in a Rural Setting in Pakistan. *Asia Pac J Public Health* 2015;27(2):NP1050-9.
9. Immunisation coverage: Pakistan losing immunity to health disasters - The Express Tribune [Internet]. [cited 2017 Jan 1]. Available from: <https://tribune.com.pk/story/596647/immunisation-coverage-pakistan-losing-immunity-to-health-disasters/>
10. WHO. Suboptimal routine immunization coverage causing measles outbreaks, 2 January 2013. [Internet]. [cited 2017 Jan 1]. Available from: <http://www.emro.who.int/pak/pakistan-news/suboptimal-routine-immunization-coverage-causing-measles-outbreaks.html>
11. Lakew Y, Bekele A, Biadgilign S. Factors influencing full immunization coverage among 12-23 months of age children in Ethiopia: evidence from the national demographic and health survey in 2011. *BMC Public Health* 2015;15:728.
12. Zaidi AK, Awasthi S, deSilva HJ. Burden of infectious diseases in South Asia. *children* 2004;328(7443):811-5.
13. OpenEPI. Sample Size for a Proportion or Descriptive Study. [Internet]. [cited 2017 Jun 30]. Available from: <http://www.openepi.com/SampleSize/SSPropor.htm>
14. Wain ZN, Masood RA, Ali RW, Bashir I. An overview of immunization practices in Pakistan. *Int Curr Pharm J* 2016;5(11):94-6.
15. Bugvi AS, Rahat R, Zakar R, Zakar MZ, Fischer F, Nasrullah M, *et al.* Factors associated with non-utilization of child immunization in Pakistan: evidence from the Demographic and Health Survey 2006-07. *BMC Public Health* 2014;14:232.
16. Jan M, Khan MS, Raheel A, Iqbal S, Arif BA. Social Marketing and Awareness about Routine Immunization among the Parents of Children under 5 Years Coming to a Private Hospital in Khyber Pakhtunkhwa. *J Med Stud* 2015;1(1):1-9.
17. Russo G, Miglietta A, Pezzotti P, Biguioh RM, Boutiang Mayaka G, Sobze MS, *et al.* Vaccine coverage and determinants of incomplete vaccination in children aged 12-23 months in Dschang, West Region, Cameroon: a cross-sectional survey during a polio outbreak. *BMC Public Health* 2015;15(1):630.
18. Memon Z, Zaidi S, Riaz A. Residual Barriers for Utilization of Maternal and Child Health Services: Community Perceptions From Rural Pakistan. *Glob J Health Sci* 2015;8(7):47-57.
19. Qutaiba B Al-lela O, Bahari MB, Al-Qazaz HK, Salih MR, Jamshed SQ, Elkalmi RM. Are parents' knowledge and practice regarding immunization related to pediatrics' immunization compliance? a mixed method study. *BMC Pediatr* 2014;14(1):20.
20. Ali Z, Pongpanich S, Kumar R, Gaffar A, Murred S, Safdar RM. Routine immunization status among children under 5 years of age living in rural district of Pakistan. *Int J Health Res Innov* 2015;3(2):13-20.
21. Harvey H, Reissland N, Mason J. Parental reminder, recall and educational interventions to improve early childhood immunisation uptake: a systematic review and meta-analysis. *Vaccine* 2015;33(25):2862-80.
22. Than SL, Mongkolcharti A, Laosee O. Determinants of incomplete immunization among hill tribe children aged under two years in Myanmar. *J Public Health Dev* 2016;14(2):17-31.

Received: 5 March, 2017

Revised: 25 June, 2017

Accepted: 15 October, 2017

Address for Correspondence:

Asif Khaliq, Department of Paediatrics and Child Health, Aga Khan University Hospital, Karachi-Pakistan

Cell: +92 332 824 5582

Email: asifkhaliq7@gmail.com