

RESEARCH PAPER

## Factors influencing compliance with immunization regimen among mothers in Basrah, Iraq

Jhood A.S. Molan<sup>1</sup>

1. MBChB, FICMS Family Medicine, High Health Institute, Basrah, Iraq.

Received: 05.02.2020

Accepted: 03.04.2020

### Abstract

**Introduction:** Immunization is a proven tool for controlling and eliminating the life-threatening infectious diseases among children. In most developed countries, immunization programs have had dramatic success in reducing morbidity and mortality rate significantly. Although the children received immunization free of charge, the immunization status in developing countries did not achieve the immunization targets of the WHO. The factors and barriers that influence the immunization program include child demographic factors, family factors and other factors.

**Purpose:** It was to evaluate immunization completeness among children younger than 2 years, demographic characteristics and familial data associated with immunization rates and the reasons of immunization incompleteness as reported by the mothers attending PHC centers in Basrah.

**Methods:** A cross-sectional study was conducted in four PHC centers in Basrah during a period of February to April 2019; two hundred twenty five mothers with children aged below 2 years were interviewed.

**Results:** About one third of children were incompletely immunized. The study found significant association of immunization completeness with child's age ( $P < 0.05$ ). Other demographic factors (child's gender, birth weight, mother's education, occupation and family income) were insignificantly associated with immunization completeness ( $P > 0.05$ ). The most reported reasons for incomplete immunization were: remoteness of PHC centers and transportation problems, fear, negligence and forgetfulness, vaccine unavailability and child's illness.

**Conclusion:** Incomplete immunization was observed in (29.8%) of the children, which represent an alarming percentage.

**Keywords:** Immunization; Compliance; Basrah; Child and Maternal Factors

---

\*Correspondence: Molan, Jhood Abdul Samad\*, MBChB, FICMS Family Medicine, High Health Institute, Basrah, Iraq.

✉ Email : [jhoodasm@yahoo.com](mailto:jhoodasm@yahoo.com)

### INTRODUCTION

Infectious diseases are a major cause of morbidity and mortality across age groups worldwide and continue to be major challenges to human survival.<sup>1</sup> Immunization is a proven

tool for controlling and eliminating the life-threatening infectious diseases among children.<sup>2</sup> Globally, the estimated number of all deaths in children under 5 year was 6.9 million and 1.5 million of these deaths was from vaccine preventable diseases in the year 2011.<sup>3</sup> In most developed countries, immunization programs have had dramatic success in reducing morbidity and mortality rate significantly. Such programs have helped in the eradication of diphtheria, measles, neonatal tetanus, pertussis and poliomyelitis since 1993.<sup>4</sup> In 1974, the World

Health Organization (WHO) established the Expanded Program on immunization (EPI); this program provides free vaccines in many developing countries. After 1974, the global immunization coverage for six EPI vaccines increased from 5% to 80%. Although the children received immunization free of charge, the immunization status in developing countries did not achieve the immunization targets of the WHO.<sup>5</sup> There is a substantial gap between immunization requirement and actual compliance even though it is known that vaccination compliance is a fundamental aspect of preventive health care.<sup>6</sup> Delay in vaccination is variable throughout nations. For example, a study conducted in the United States in 2005 used a survey on 14,810 children, aged 24 to 35 months, and found around 75% of these children had delays in one or more vaccinations.<sup>7</sup> In India, a study carried out in 2014 reported a 94.2% vaccination coverage rate among 224 children aged 12-23 months of age, although only 32% of the children were vaccinated on time.<sup>8</sup> Likewise in Riyadh, Saudi Arabia, out of the 238 parents attended a pediatric outpatient clinic department, 34% confirmed that at least one of their children had considered delay in vaccination.<sup>9</sup> In Iraq, although the immunization system has significantly improved the vaccination rate in children younger than 2 years of age, some Iraqi children still do not receive their scheduled vaccinations.<sup>10</sup> According to the Iraqi Ministry of Health report in 2008, an estimated 1,065,216 children still need to be vaccinated with all of the vaccines listed in the immunization schedule.<sup>11,12</sup> The factors and barriers that influence the immunization program include child demographic factors and family factors.<sup>13</sup> Other factors include provider factors like

waiting time, attitude of service providers, reaction to side effects in addition to environmental factors like logistic barriers, limited accessibility to health care, information dissemination among the community and inter-sectoral collaboration.<sup>14</sup> In Basrah, little is known about these factors and how they affect immunization coverage rates. These information will be important in improving vaccination timeliness and consequently, the well-being of the children in the future. The main aims of the study were:

- To evaluate immunization completeness among children younger than 2 years in Basrah.
- To determine associations of immunization rate with demographic characteristics and familial data.
- To find out reasons of immunization incompleteness as reported by the mothers attending PHC centers.

## METHODS

**The study design:** This is a descriptive cross-sectional study carried out during a period of 2 months extending from the 1<sup>st</sup> of February 2019 to the 1<sup>st</sup> of April 2019.

**Ethical consideration:** Agreement of the Basrah Directorate of Health to carry out the study was obtained before starting the study

**The sample size and sampling method:** A total of 225 mothers (with children aged below 2 years) attending 4 primary health care centers in Basrah were included in the present study. A list of the primary health care centers in Basrah was obtained from the Department of Primary Health Care (a total of 134 primary health care centers). The health centers were divided into urban and rural then 4 primary health care centers were randomly selected with a lottery method, two

centers were chosen to represent urban areas (HaiAlqaim, 14 Tamooz ) and two centers were chosen from rural areas ( Khor Al-Zubair, Al-Hweer). These PHC centers operate five immunization days per week (Sunday, Monday, Tuesday, Wednesday, Thursday), from 9.00 am. to 2.00 pm. The first 15-20 mothers fulfilling the criteria of inclusion in the study were included. Accordingly, from each of the 4 centers, 50-60 mothers were included in the study.

**The questionnaire and data collection:** The data were collected through direct interview of the mothers by the investigators. Each child had an immunization card for recording details of the immunizations received. The data from the immunization cards and from mothers was retrospectively extracted to obtain the immunization history of each child.

The questionnaire included 4 parts: (1) Characteristics of the children (age, gender, birth weight, place of delivery, birth order), (2) familial data (family type: nuclear, extended, zone of residence: urban, rural, mother's education, mother's occupation and family income) and (3) immunization status of the children which was classified into two groups depending on immunization completeness:

- Fully immunized (when a child received all immunization doses without any missed dose)
  - Not fully immunized (when a child missed at least one immunization dose)
- (4) Reported reasons for vaccinations incompleteness: as mentioned by the mothers.

**Data analysis:** The data were analyzed by the statistical package for social sciences (SPSS) version 23. Descriptive statistics like the socio-demographic characteristics were presented as frequencies, and percentages. The relationship

between two categorical variables was analyzed using Chi square test. A P-value of  $\leq 0.05$  was the criterion of statistical significance.<sup>15</sup>

## RESULTS

(Table-1), presents child and maternal socioeconomic characteristics. The study included 225 children aged below 2 years. In total (64%) of the children were below 1 year, while (36%) of them were from 1 to 2 years old. The number of male and female children was approximately equal. About three quarters of children (75.6%) their birth weights were equal to 2500 g or above, the remaining (24.4%) were below 2500g. More than three quarters of children (78.2%) were born in hospital; the remaining (21.8%) were born at home. The distribution of children according to their birth order was as the following: about (25.3%, 24.9%, 49.8%) for first born, second born, third born or more respectively. About two third of the children's families (62.2%) were nuclear, the remaining (37.8%) of the families were extended. About half of the families (55.1%) were rural; the others (44.9%) were urban. Nearly half of the mothers (52%) have  $\leq 6$  years of schooling, while (30.2%) of them have 7-12 years of education. Only (17.8%) of the mothers with 13 years and above. The majority of mothers (84%) were housewives, only (6.2%) were governmental employees and (3.6%) were self-employed. More than half of the families (58.2%) had a family income of less than 500.000 IQD, about one third (35.1%) of the families had an income between 500.000 and 1000.000 IQD. Only (5.8%) of the families had an income between 1000.000 and 2000.000 IQD.

**Table 1. Child and maternal characteristics**

Variable	No.	%
<b>Child's age (years)</b>		
< 1	144	64
≥ 1 – 2	81	36
<b>Gender of child</b>		
Male	110	48.9
Female	115	51.1
<b>Birth weight</b>		
≥ 2500 g	170	75.6
< 2500 g	55	24.4
<b>Place of delivery</b>		
Hospital	176	78.2
Home	55	21.8
<b>Birth order</b>		
First	57	25.3
Second	56	24.9
Third or more	112	49.8
<b>Family type</b>		
Nuclear	140	62.2
Extended	85	37.8
<b>Zone of residence</b>		
Urban	101	44.9
Rural	124	55.1
<b>Mother's education (years)</b>		
≤6	117	52
7-12	68	30.2
≥13	40	17.8
<b>Mother's occupation</b>		
House wife	189	84
Governmental employee	14	6.2
Self-employed	8	3.6
Others	14	6.2
<b>Family income (IQD)</b>		
Less than 500.000	131	58.2
Between 500.000-1000.000	79	35.1
Between 1000.000-2000.000	13	5.8
More than 2000.000	2	0.9

Overall, incomplete immunization were observed in (29.8%) of the children, while one hundred and fifty- eight children (70.2%) were fully immunized according to routine immunization. (Table-2).

**Table 2. Immunization completeness and compliance**

Immunization completeness	No.	%
Fully immunized	158	70.2
Not fully immunized	67	29.8
<b>Total</b>	225	100

The present study found a highly significant association between child's age and immunization completeness ( $P < 0.05$ ). No significant association were found between the immunization completeness and child's gender, birth weight, mother's education, occupation or family income ( $P > 0.05$ ). (Table-3).

**Table 3. Association of immunization completeness with child and maternal socioeconomic characteristics**

Variable Child's age (years)	Immunization completeness				Total	
	Fully immunized		Not fully immunized		No.	%
	No.	%	No.	%		
<1	110	76.4	34	23.6	144	100
≥ 1-2	48	59.3	33	40.7	81	100
$X^2= 7.27$				$P = 0.007$		
<b>Gender of child</b>						
Male	75	68.2	35	31.8	110	100
Female	83	72.2	32	27.8	115	100
$X^2= 0.428$				$p=0.531$		
<b>Birth weight</b>						
≥ 2500	117	68.8	53	31.2	170	100
< 2500	41	74.5	14	25.5	55	100
$X^2= 0.65$				$P = 0.42$		
<b>Mother's education ( years)</b>						
≤ 6	77	65.8	40	34.2	117	100
7-12	49	72.1	19	27.9	68	100
≥ 13	32	80	8	20	40	100
$X^2 = 3.027$				$P = 0.22$		
<b>Mother's occupation</b>						
House wife	133	70.4	56	29.6	189	100
Governmental Employee	7	50	7	50	14	100
Self-employed	5	62.5	3	37.5	8	100
Others	13	92.9	1	7.1	14	100
$X^2 = 6.398$				$P=0.094$		
<b>Family income (IQD)</b>						
Less than 500.000	91	69.5	40	30.5	131	100
Between 500.000-1000.000	56	70.9	23	29.1	79	100
Between 1000.000 – 2000.000	9	69.2	4	30.8	13	100
More than 2000.000	2	100	0	0.0	2	100
$X^2 = 0.907$				$P = 0.824$		

Among 67 mothers with incomplete immunization, 31 mothers (46.3%) reported that PHC centers they are far from home and they had transportation problems. Twenty seven mothers (40.3%) reported fear, negligence and forgetfulness as reasons for incomplete immunization. Vaccine unavailability was mentioned by 21 mothers (31.3%) as a reason, (16.4%) of the mothers blamed children's illness for their incomplete immunization. Poor

knowledge about seriousness of the disease was reported by 10 mothers (15%) while parenteral jobs were mentioned by 17 mothers (25.4%). Other reasons like lost cards, moving to a new home, health workers' behavior, number of visits and long waiting time were mentioned by (9%,9%,6%,6%,4.5%) of the mothers respectively. (Table-4).

**Table 4. Reported reasons for vaccinations incompleteness**

Factors	No.	%
Vaccination centers are far from home & transportation problems	31	46.3
Fear , negligence, forgetfulness	27	40.3
The vaccine is not available	21	31.3
Child been ill	11	16.4
Poor knowledge about the seriousness of the disease	10	15
Mother's work	9	13.4
Father's work	8	12
Lost cards	6	9
Moving to a new home	6	9
Health workers' behavior discourage mothers	4	6
Lengthy contact period ( number of visits)	4	6
Time spent too long	3	4.5
Other factors	5	7.5

## Discussion

The study was carried out to examine factors influencing compliance with immunization regimen among mothers attending four PHC centers in Basrah, Iraq.

### *Immunization incompleteness:*

The immunization incompleteness rate observed in this study was (29.8%) which is comparable to the rate observed in Jeddah, Saudi Arabia (24.2%)<sup>16</sup> while a study conducted in Mosul-Iraq revealed that the percentage of children with partial immunization was (54.2%) in 2017.<sup>17</sup> A study done in India on children below the age of 5 revealed that over 50% of them were delayed.<sup>18</sup> In a rural community of Bangladesh the rate of complete immunization was (90.87%),<sup>19</sup> however, comparisons of immunization coverage between different countries are difficult due to differences in health service systems, vaccine series and immunization schedules.

### *Factors influencing compliance with immunization regimen:*

In this study, the only factor that was significantly in relation to incomplete immunization was child's age which means that mothers complied with immunization regimen below 1 year.

No significant association was found between gender and immunization completeness, as in different countries,<sup>20-22</sup> thus it appears that there was no gender discrimination in immunization. The current study results are consistent with those of Saudi Arabia and another study in Mosul,<sup>16,17</sup> in which birth weight did not influence immunization status. As shown in many studies,<sup>14,16</sup> our study found insignificant association between mother's education level and the immunization rate of the children, which might have been due to the homogeneity of the populations in our study (have little variation in their educational level). In contrast, previous studies,<sup>17,22,23</sup> showed that the duration of mothers' education had positive effects on the vaccination of children. The occupation of mothers has no significant association with immunization completeness in our study and findings obtained from Nepal,<sup>23</sup> this in contrast to the results obtained from Nigeria in which compliance depends on occupations of mothers.<sup>24</sup> Furthermore, it is worth noting that the family income had no significant effect on immunization status. This could be because this sample was collected from PHC centers which offer vaccination for free (in Iraq) which is consistent with the findings in Saudi Arabia.<sup>16</sup> These findings are opposite to what was found in other studies done in Mosul, Ethiopia, Istanbul and Pakistan, where an increase in income led to an increase in coverage rate.<sup>17,20,22,25</sup> This study found that remoteness of PHC centers and transportation problems are the most common

reason used to justify immunization incompleteness followed by fear, negligence and forgetfulness. In Jeddah travelling at the time of vaccination was the most reported reason for delay,<sup>16</sup> while studies done in Bangladesh, Karachi and Burkina Faso revealed that the most common reason for delay is lack of time or knowledge among parents.<sup>19,26,27</sup> A study in India showed that the main two reasons for 'missed' vaccination were prior reminder not given and mother's forgetfulness.<sup>28</sup> It was also found that unavailability of some vaccines was a major reason for incomplete immunization in our sample, which is consistent with other studies conducted in Saudi Arabia, Gambia, Greece, and China.<sup>16,29-31</sup>

## Conclusion

The most obvious finding to emerge from this study is incomplete immunization was observed in (29.8%) of the children, which represent an alarming percentage.

## Recommendations:

There is need to encourage mothers to comply fully with the regimen through continuous immunization awareness/ campaigns workshops and seminars on benefit of immunization and remind them for the next vaccination visit by recall notices or mobile SMS in all PHC centers in Basrah.

## References

1. Morens DM, Folkers GK, Fauci AS. The challenges of emerging and re-emerging infectious diseases. *Nature*. 2010; 463:122-122.
2. WHO/UNICEF. Global immunization vision and strategy (GIVS) 2006-2015. October 2005. Available from: URL: [http://www.who.int/vaccinedocuments/DocsPDF05/GIVS\\_Final\\_EN.pdf](http://www.who.int/vaccinedocuments/DocsPDF05/GIVS_Final_EN.pdf) (accessed on February 5, 2019)

3. World Health Organization [WHO]. Data and statistics, global health observatory. Geneva: WHO; 2012. Available from: URL: <http://www.who.int> (accessed on February 7, 2019)
4. World Health Organization (2005). An Evaluation of Infant Immunization in Africa a Transformation in Progress 6.Vol. (85) 421-500.Geneva.
5. Casey RM, Dumolard L, Danovaro-Holliday MC, Gacic-Dobo M, Diallo MS, Hampton LM, et al. Global routine vaccination coverage,2015 . *MMWR*.2016; 65(45):1270-1273.
6. Bundt T. National examination of compliance predictors and the immunization status of children: precursor to a developmental model for health systems. *Mil Med*. 2004; 169: 795-802.
7. LumanET, Baker LE, Shaw KM, McCauley MM, Buehler JW, Pickering LK. Timeliness of childhood vaccinations in the United States: days undervaccinated and number of vaccines delayed. *JAMA*.2005; 293:1204-1211.
8. Sood RK, Sood A, Bharti OK, Ramachandran V. High immunization coverage but delayed immunization reflects gap in health management information system (HMIS) in district Kangra, Himachal Pradesh, India- an immunization evaluation. *World J Vaccine*.2015; 5: 69-78.
9. Al-Saeed G, Rizk T, Mudawi K, Al-Ramadina BA, Al-Saeed I. Vaccine hesitancy prevalence and correlates in

- Riyadh, Saudi Arabia. *ACTA SCIENTIFIC PAEDIATRICALS*. 2018; 1 (1):5-10.
10. Al-Iela O, Bahari M, Alabbassi M, Basher A. Right immunization doses received by pediatrics younger than 2 years. *Value Health*. 2011; 14(3):A120-A.
  11. World Health Organization. Immunization profile-Iraq, 2009. Available from: on [http://app.who.int/immunization\\_monitoring/en/globalsummary/countryprofile/result.cfm?C='irq](http://app.who.int/immunization_monitoring/en/globalsummary/countryprofile/result.cfm?C='irq). (accessed on February 18, 2019).
  12. Ministry of Health- Republic of Iraq. Immunization profile report 2008. Available from: <http://moh.gov.iq/arabic/>. (accessed on February 22, 2019)
  13. Burns I, Zimmerman R. Immunization barriers and solutions. *J Family Practice*. 2005; 54(1): 58-62.
  14. Shamsul AS, Nirmal K, Nazarudin S, Rohaizat H, Azimatun NA, Rozita H. Factors influencing childhood immunization defaulters in Sabah, Malaysia. *IMJM*. 2012; 11(1):17-22.
  15. Daniel W W. Biostatistics basic concepts and methodology for the health sciences. 9<sup>th</sup> ed. Asia: Wiley; 2010.594-629p.
  16. Banjari M, Alamri A, Algarni A, Abualjadayel MH, Alshardi YS, Alahmadi TS. How often do children receive their vaccinations late, and why?. *Saudi Med J*. 2018; 39(4):347-353.
  17. Al-Iela O, Bahari M, Baderden S, Basher A, Hamoodi H. Factors Affecting on Immunization Compliance: Iraq. *Journal of Pharmacy Practice and Community Medicine*. 2017; 3 (4): 246-253.
  18. Yadav K, Srivastava R, Kumar R, Chinnakal P, Rai SK, Krishnan A. Significant vaccination delay can occur even in a community with very high vaccination coverage : Evidence from Ballgarh, India. *J Trop Pediatr*. 2012; 58:133-138.
  19. Salam M, Uddin S, Khan F, Mazumdar PK, Huq E, Yousuf R, et al. Maternal awareness on under-5 child immunization in a rural community of Bangladesh. *International medical journal*. 2013; 20(6):681-684.
  20. 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; 15:728-736.
  21. Odusanya O, Alufohai E, Meurice F, Ahonkhani V. Determinants of vaccination coverage in rural Nigeria. *Bio Med Central Public Health*. 2008; 8(1):381-388.
  22. Torun SD, Bakrc N. Vaccination coverage and reasons for non-vaccination in a district of Istanbul. *Bio Med Central Public Health*. 2006; 6(1):125-132.
  23. Shrestha T, Sermsri S, Sillabutra J. Factors affecting utilization of immunization services among mothers with children aged 12-23 months in the rural areas of Lalitpur district, Nepal. *J Health Res*. 2013; 27(5): 287- 293.
  24. Rahji F, Ndikom C. Factors influencing compliance with immunization regimen among mothers in Ibadan, Nigeria. *J NursHealth Sci*. 2013; 2(2):1-9.
  25. 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; 14:232-239.
26. Sheikh A, Iqbal B, Ehtamam A, Rahim M, Shaikh HA, Usmani HA, et al. Reasons for non- vaccination in pediatrics patients visiting tertiary care centers in a polio-prone country. *Arch Public Heal* .2013; 71:19-27.
27. Sanou A, Simboro S, Kouyaté B, Dugas M, Graham J, Bibeau G. Assessment of factors associated with complete immunization coverage in children aged 12-23 months: a cross-sectional study in Nouna district, Burkina Faso. *BMC Int Health Hum Rights*. 2009; 9: S10-25.
28. Patel TA, Pandit NB. Why infants missed vaccination during routine immunization sessions? Study in a rural area of Anand district, Gujarat. *Indian J Public Health*.2011; 55:321-323.
29. Odutola A, Afolabi MO, Ogundare EO, Lowe- Jallow YN, Worwui A, Okebe J, et al. Risk factors for delay in age appropriate vaccinations among Gambian children. *BMC Health Serv*. 2015;15: 346-355.
30. Pavlopoulou ID, Michail KA, Samoli E, Tsiftis G, Tsoumakas K. Immunization coverage and predictive factors for complete and age-appropriate vaccination among preschoolers in Athens, Greece: a cross-sectional study. *BMC Public Health*.2013; 3:908-918.
31. Hu Y, Chen Y, Guo J, Tang X, Shan L. Completeness and timeliness of vaccination and determinants for low and late uptake among young children in eastern China. *Hum VaccinImmunother*. 2014; 10:1408-1415.

### العوامل المؤثرة على التزام الأمهات ببرنامج التحصين في البصرة, العراق

*المقدمة:* التحصين هو اداة مؤكدة للسيطرة و القضاء على الامراض المعدية التي تمدد حياة الاطفال. في معظم البلدان المتقدمة حققت برامج التحصين نجاح دراماتيكي في الحد من نسبة أنتشار الامراض والوفيات بشكل ملحوظ. على الرغم من ان الاطفال في البلدان النامية يستلمون اللقاحات بشكل مجاني لم يحقق وضع التحصين اهداف منظمة الصحة العالمية. العوامل والحواجز التي تؤثر على برنامج التحصين تشمل عوامل ديموغرافية, عوامل أسرية وعوامل أخرى. *الغرض:* كان لتقييم اكمال التحصين بين الاطفال الاصغر سنا من 2 سنوات, العوامل الديموغرافية والعوامل الأسرية المرتبطة بأكمال اللقاحات والاسباب التي ادت الى عدم اكمال جدول اللقاحات حسب ما ذكرت الامهات المرتدات لمراكز الرعاية الصحية الأولية في البصرة. *المنهجية:* أجريت دراسة مقطعية في أربعة مراكز رعاية صحية اولية في البصرة خلال الفترة من شباط الى نيسان من سنة 2019. وتم اخذ العينات ل 225 من الامهات الذين لديهم اطفال دون عمر السنتين. *النتائج:* حوالي ثلث الاطفال كانوا غير مكتملي التحصين كما وجدت الدراسة ارتباط بين عمر الطفل واكتمال التحصين ( $p < 0.05$ ). العوامل الديموغرافية الاخرى (جنس الطفل، الوزن عند الولادة، تعليم الام، مهنة الأم ودخل الاسرة) لم تكن مرتبطة باكتمال اللقاحات ( $p > 0.05$ ). اغلب اسباب عدم اكتمال التحصين كانت: بعد مراكز الرعاية الصحية الأولية، مشاكل النقل والمواصلات، الخوف، الابهمال والنسيان، عدم توفر اللقاح ومرضى الطفل. *الاستنتاجات:* لوحظ عدم اكتمال التحصين حوالي (29.8%) من الاطفال والتي تمثل نسبة مثيره للقلق.