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Original Research Article

RISK FACTORS OF NON-VACCINATION IN A HOSPITAL SAMPLE OF IRAQI CHILDREN

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Abstract

Background: Inadequate vaccination against childhood diseases is a significant public health problem. The reasons for incomplete vaccination are variable.

Aim: The study aimed at finding out the factors correlating with non-vaccination in children less than six years of age.

Subjects and Methods: Mothers of children, aged 1 month to 72 months (N = 545) were interviewed for vaccination status and causes of non-vaccination if present in a cross sectional study over period of seven months from 1st April 2014 to 30th October 2014, in the Central Child Teaching Hospital/ Baghdad. The health card was utilized to check for completeness of vaccination up to age according to the national schedule. Children were divided into two groups; group A was the group of vaccinated children, group B was the non or incompletely vaccinated children.

Results: out of 545 children studied; 374 (68.7%) had completed their vaccination up to date and 171(31.3%) were either incompletely vaccinated, or non-vaccinated. In comparison of the vaccinated group and the unvaccinated group; the unvaccinated group had no sex predilection with high rural residence (P = 0.000), the majority of children were below 9 month (P = 0.000), significant father's illiteracy (P = 0.006) and self employment (P = 0.000). While the mothers of children were young (P = 0.012), and illiterate (P = 0.000).

In the unvaccinated group; there was a highly significant number in fathers aged 30 to <40 yr age group, who had secondary school level, and self employed (P=0.000). While mothers were in highly significant number in 20 - <30 yr age group, had primary school level, and were unemployed (P=0.000).

Acute illness and chronic illness of children less than 9 mo, and 9 mo to <18mo, were the commonest causes of none or incomplete vaccination. While acute illness and family trend of non vaccination in children aged 18 month to 72 month were the commonest causes.

Conclusion: The immunization status needs to be improved increasing awareness, and counseling of parents through primary health care centers, public media education about immunizations, its side effects, and the associated misconceptions.
Taking measures to prevent and treat acute and chronic illnesses, especially during the 1st nine months of life, through improving general socioeconomic, educational status of families.
Improving security situation in the country through political settlements and banning of military conflicts, would have positive direct impact on family economic stability and minimizing early marriages before completion of parental education.

Key words: vaccination, Expanded Programme on Immunization, incomplete vaccination, family education

Background: Immunization is a successful and very cost-effective means of preventing infectious diseases and is one of the essential achievements of public health and pediatrics. [1, 2]
The Expanded Programme on Immunization (EPI) was established in 1974. Vaccines currently recommended by the Expanded Programme on Immunization (EPI) of the world health organization (WHO) for routine use in the developing world are against seven diseases including; BCG, OPV, DTP, measles, and hepatitis B vaccines for children and toxoid of tetanus for pregnant women. [1, 3] Other vaccines are used regionally, depending on the disease epidemiology and available resources. The EPI was introduced in Iraq since 1985, and by 1987 immunization coverage in Iraq had reached 94 %.[1] Then as a result of conflict and sanctions this coverage rate declined. A survey in 1996–1997 reported 74% vaccine coverage in 1995.[3] Since the change of regime in 2003, and in spite of the relative improvement in the security situation, poor infrastructure, substandard primary health care centers, left 197 000 infants not completely immunized by the life-saving diphtheria, tetanus, pertussis vaccine during 2010. [1] The reasons for none or incomplete vaccination are variable. [2]
Aim: The study aimed at finding out the factors correlating with non-vaccination in children less than six years of age.

Subjects and Methods: In this cross sectional study, mothers of children, aged 1 month to 72 months were interviewed in a cross sectional study over period of seven months from 1st April 2014 to 30th October 2014, in the Central Child Teaching Hospital/ Baghdad. We used structured questionnaire to collect the data on socio-demographic characteristics of the family (including; child's age and sex, family residence, father's and mother's age, education, and job), extent of immunization status of children (vaccination not done, incomplete, or completed vaccination) and causes of non vaccination (including; acute illness, chronic illness, think it harmful, security hazard, economic reasons, not available, family trend, previous bad experience, doctor's advice, and premature baby) according to the national schedule health card which was utilized to check for completeness of vaccination up to age according to the Iraqi routine national vaccination schedule which was implicated in current study. [4]
Children were divided into two groups; group A was the group of vaccinated children up to date, group B was none or incompletely vaccinated children up to date. The EPI info program of biostatistics was used in this study. The P value of <0.05 is considered significant, <0.01 is considered highly significant.

Results

Results had shown that out of 545 children studied; 374 (68.7%) had completed their vaccination up to date. While 141 (25.8%) were incompletely vaccinated, and 30 (5.5%) were non-vaccinated up to date. (Table 1)

Table 1: State of vaccination

Group	State of vaccination (No.545)	No.	Total
A	Complete	374 (68.7%)	374 (68.7%)
B	Incomplete	141(25.8%)	171(31.3%)
	Not done	30(5.5%)	

Study had shown sex indifference in group A and B, while residence in rural area had significant negative impact on vaccination status in group B. (Table 2)

Table 2: Sex and residence distribution in vaccinated or non- vaccinated group

		Group A (No. 374)	Group B (No. 171)	
Gender (No.545)	Male(304)	204(67.1%)	100(32.9%)	P = 0.391
	Female(241)	170(70.5%)	71(29.5%)	χ^2 = 0.74
Residence (No.545)	Urban(473)	345(72.9%)	128(27.1%)	P = 0.000
	Rural(72)	29(40%)	43(60%)	χ^2 = 30.96

There was a significant difference (P = 0. 000) of age sub-groups of children in between group A and B. The majority of vaccinated children (group A) were in age group (18 month - 72 month), while the majority of unvaccinated children (group B) were in age group (< 9 month), as shown in table 3.

Table 3: Comparison of age groups in group A and B.

Sub-groups (Total No. 545)	Group A	Group B	
< 9 month (No. 158)	78(20%)	80(46%)	P = 0. 000
9 month - <18 month (No. 77)	53(15%)	24(15%)	χ^2 = 40.94
18 month - 72 month (No. 310)	243(65%)	67(39%)	
Total	374	171	

Father's illiteracy and being self employed had significant correlation with non-vaccination. Young mother of < 20 years and illiteracy had significant correlation with non- vaccination.

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Table 4: Parental parameters in relation to vaccination status.

Father's parameters (No.)		Group A	Group B	Group B/Total	
Age (year)	<30 (191)	121	68	(35%)	P = 0.239 χ^2 = 2.86
	30 - <40 (247)	176	71	(28%)	
	40 and above (109)	77	32	(29%)	
Education	Illiterate (46)	25	21	(45%)	P = 0.006 χ^2 = 12.49
	Primary school (207)	146	61	(29%)	
	Secondary school (161)	101	60	(37%)	
	High education (institute or college) (131)	102	29	(22%)	
Job	Unemployed (135)	109	26	(19%)	P = 0.000 χ^2 = 22.41
	Self employed (198)	113	85	(43%)	
	Employed (212)	152	60	(28%)	
Mother's parameters (No.)		Group A	Group B	Group B/Total	
Age (year)	< 20 (43)	21	22	(51%)	P = 0.012 χ^2 = 10.88
	20 - <30 (267)	180	87	(32%)	
	30 - <40 (193)	141	52	(27%)	
	40 and above (42)	32	10	(23%)	
Education	Illiterate (71)	35	36	(50%)	P = 0.000 χ^2 = 19.33
	Primary school (283)	192	91	(32%)	
	Secondary school (114)	85	29	(25%)	
	High education (institute or college)(77)	62	15	(19%)	
Job	Unemployed (494)	334	160	(32%)	P = 0.113 χ^2 = 2.51
	Employed (51)	40	11	(21%)	

Acute illness, chronic illness and family trend are the commonest causes of none or incomplete vaccination as shown in figure 1

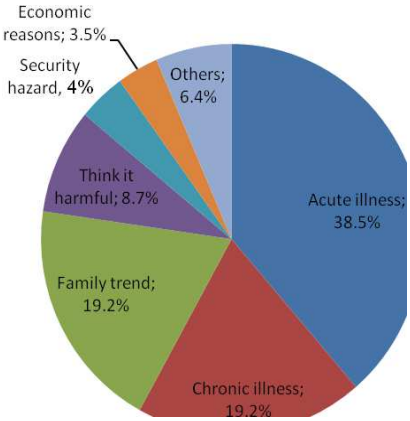

Figure 1, Percentage of causes of none or incomplete vaccination
*Others (Not available previous bad experience, Doctor Advice, Premature baby)

Acute illness of children, family trend, and chronic illness of children are the most common causes of none or incomplete vaccination in rural and urban area, as seen in Table 5.

Table 5: Causes of none or incomplete vaccination in relation to residence.

Causes of non or incomplete vaccination	Total	Rural	Urban
Acute illness	66	16(37%)	50(39%)
Chronic illness	33	6(13%)	27(21%)
Family trend	33	8(18%)	25(19%)
Think it harmful	15	5(11%)	10(7%)
Security hazard	7	3(7%)	4(3%)
Economic reasons	6	1(2%)	5(4%)
Not available	6	3(7%)	3(2%)
Previous bad experience	3	0	3(2%)
Doctor advice	1	1(2%)	0
Premature baby	1	0	1(0.01%)
Total	171	43	128

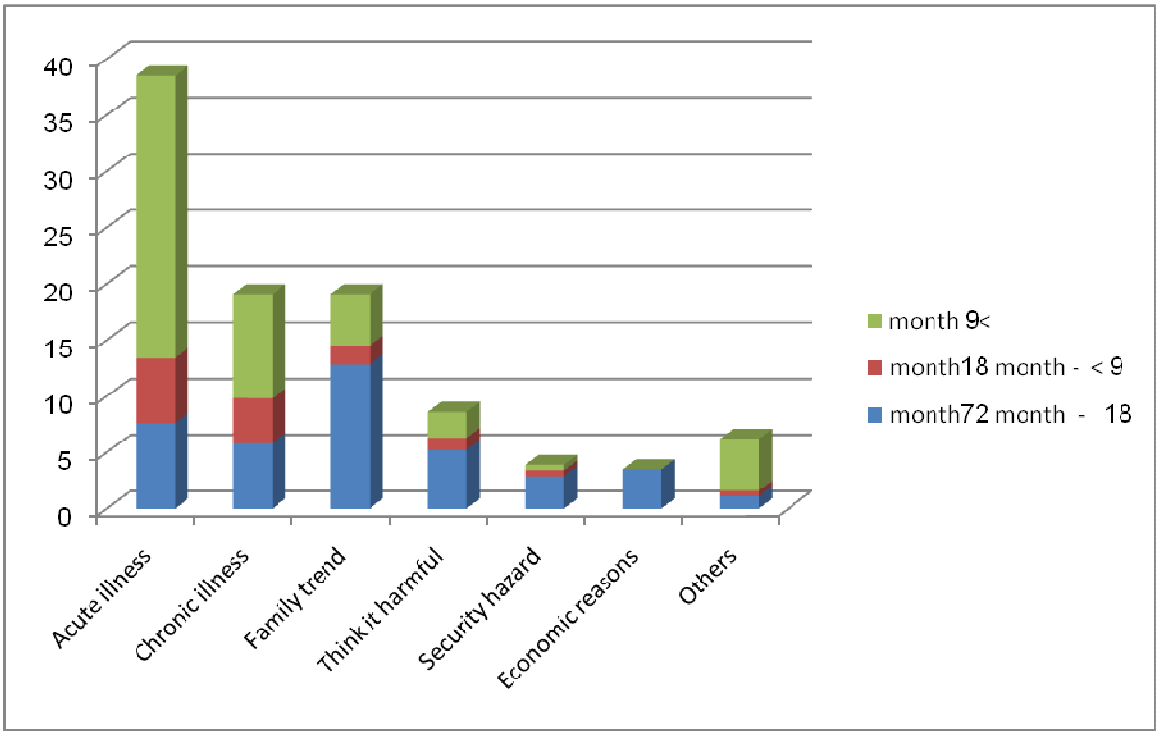

Figure 2. Frequency of causes of none or incomplete vaccination according to children age groups
*Others (Not available previous bad experience, Doctor Advice, Premature baby)

Acute illness and chronic illness of children less than 9 mo and 9 mo - <18mo, were the commonest causes of none or incomplete vaccination. While acute illness and family trend in children aged 18 month-72 month were the commonest causes.

Regarding parental variables in none or incompletely vaccinated children; there was a highly significant difference in between paternal and maternal age groups. As fathers tend to be 30 - <40 yr old, had secondary school level, and self employed, while mothers were in 20 - <30 yr age group, had primary school level, and were unemployed, a as shown in table 7.

Table 6: None or incomplete vaccination according to parental variables.

None or incomplete vaccinated group according to parental age groups					
	< 20 yr	20 - <30 yr	30 - <40 yr	40 yr and above	P value
Father	3	65	71	32	P = 0.000
Mother	22	87	52	10	χ^2 = 32.08
None or incomplete vaccinated group according to parental educational groups					
	Illiterate	Read and write	Primary school	Secondary school	High education	P value
Father	21	13	48	60	29	P = 0.000
Mother	36	21	70	29	15	χ^2 = 24.39
None or incomplete vaccinated group according to parental job					
	Unemployed		Self employed	Employed	P value
Father	26		85	60	P = 0.000
Mother	160		4	7	χ^2 = 212.18

Discussion

The immunization status of 545 children was reviewed. Numbers of fully vaccinated children, incompletely vaccinated, and non-vaccinated children up to date were (68.7%, 25.8%, and 5.5% respectively), which is close to finding of Najdat in a study done in Al- Batool teaching hospital /Baquba city on 2011(70%, 24% and 6 % respectively).[5]. Bbaale E study revealed that slightly over 50% of children in Uganda were fully immunized, a finding reflects the multifactor of non-vaccination in Uganda.[6] While Kumar D in a similar study Delhi, India found low vaccination rate, (17.84%) were completely immunized, (48%) were partially immunized, and (34.15%) were non-immunized. So the vaccination rates are variable according to country and reasons for the low coverage vary from logistic ones to those dependent on human behavior. [7]

There was no sex subordination in the vaccination status of children in group A and B (P = 0.391). Masand R found that sex of the child had no impact on vaccination status. [8] while unvaccinated children were more likely to be male than female in Smith PJ study.[9] Rural residence had negative impact on vaccination status (P = 0.000), with similar findings in; Nasseri K found the higher coverage in urban area is attributed to the generally higher social, economic, and educational status[10]. Brugha R in a study in Ghana found a positive association of vaccination with the town of residence of the child (P < 0.005). [11] Balraj V in a study in India found large and peri-urban areas had significantly better coverage than small and more rural areas. [12]

There was a significant difference (P = 0. 000) of age sub-groups of children in between group A and B. Children of age

group (18 month - 72 month) had significantly completed their vaccination, while children in age group (< 9 month) did not completed their vaccination. A finding may be related to the concurrent country security circumstances, peaking of illnesses and seasonal infections which form a contraindication of vaccination at time of sample collection. [13] Multiple vaccines given over the first nine months of life in contrary to the period over 9 months of life which makes the chance of non-vaccination or postponed vaccination more in presence of variable conditions.

As the sampling in this study was hospital based children and siblings, and because of the disrupted public health services after wars (e.g., vaccination services, vector borne disease control, and the Tuberculosis Directly Observed Therapy program) [14], probably may have resulted in increasing frequency of acute illness (38.5%), and chronic illness (19.2%) in the non-vaccinated group, as vaccines in Iraq are available only through the national system of primary health-care centers. [15]. Yet others studies documented different causes of non vaccination as in Ategbo S study in Libreville (Gabon), who found the principle reasons for non-immunization were lack of financial resources (28.3%), forgetfulness (21.7%), neglect (11.3%). [16] Falagas ME found sick child influence compliance to vaccinations. [17] A study in Mozambique revealed family has to spend an average of 2.5% of the average annual salary per child and spent longer than 60 minutes to reach the nearest health facility had a strong negative influence in immunization uptake. [18]

Some families had the trend of refusing vaccination (19.3%), especially in 18-72 months old children, and others think it harmful (8.8%) as influenced by occasional side effects of vaccination. A finding represents at least in part increasing public ignorance after years of good vaccination coverage. [1] The spreading of illiteracy is an inevitable outcome after decades of successive wars, sanctions, and insecurity with deterioration of general educational level and poor public campaigns and exposure to media regarding the importance of vaccination. [13, 15]

Security hazard (4.1%), economic reasons(3.5%), unavailability of vaccines(3.5%), represent clear cumulative impact of aftermath of the war in Iraq, as there was widespread looting and intended ruining of government facilities resulted in the interruption of public health services. Thus the core public health services including vaccination were disrupted. [13, 15]

Freeman PA studied the social factors in the acceptance of childhood immunization in urban settlements in Papua New Guinea. He found that the provision of information to mothers on immunization schedule and was key factor in determining immunization status. [19] Bosu WK et al in a study of factors influencing attendance to immunization sessions for children in a rural district of Ghana found, poor knowledge about immunization, lack of suitable venues and furniture, financial difficulties, long waiting times, transport difficulties, and weak intersectoral collaboration. [20, 21]

Father's illiteracy had significant correlation with non-vaccination (P = 0.006), similar to finding of Najdat study (p= 0.001) [5]. Self employed father had also significant correlation with non-vaccination (P = 0.000), which reflects the family income instability in presence of insecure environment, making vaccination a secondary family priority.

Young mother of < 20 years and illiteracy had significant correlation with non-vaccination (P = 0.012, P = 0.000 respectively), which is attributed to the impact of successive wars and security crisis, with increasing number of widows of

militants and warriors, thus encouraging early marriage, multiple marriages, in this age group and consequently a diminished teaching opportunities. Freeman PA found maternal education was positively associated with knowledge of immunization, but was not significantly associated with actual immunization practice.[19] Also a study in Uganda by Bbaale E revealed children whose mothers had post-secondary school education were twice as likely to be fully immunized as compared to their peers whose mothers had only primary education ($p < 0.01$). [6]. Freeman PA, found maternal education was found to be positively associated with knowledge of immunization, but was not significantly associated with actual immunization practice.[19] Da Silva AA found health education activities are one of the suggested strategies to increase vaccination coverage.[20]

Falagas ME in a study about suboptimal compliance to vaccinations in children in developed countries found low parental education, younger maternal age, late birth order, lack of knowledge about disease and vaccination, negative beliefs/attitudes towards immunization, fear of side-effects/risks/contraindications, were statistically significantly associated with suboptimal compliance,[17] findings were similar to ours. Smith PJ found that unvaccinated children tended to be to have a mother who was married and had a college degree, to live in a household with parents who expressed concerns regarding the safety of vaccines. [9]

Illiteracy makes parents under-estimating the importance of vaccination and proper health care, so encourage chances of early marriage, which deprives young mothers from completing their education. Najdat study [5] revealed low maternal education was a significant association with non-vaccination ($P = 0.000$), and Jagrati V Jani et al study had same finding ($P = 0.001$). [18]

While Robert E study in Belgium revealed no association between vaccination coverage and mother's level of education and the main reason for not complying with the vaccination schedule was mainly carelessness on either parent's or physician's side. Findings reflect the impact of proper health education of Belgium population in spite of parental educational levels.[23] Sackou KJ, et al. found of reasons for non-vaccination in a periurban area of Abidjan is the significance of parents education, knowledge of the immunization schedule and the marital status of mothers, in fully immunized children. [24]

The role of a health education campaigns and peer spiritual leaders in improving vaccination coverage rates in Akre district in Kurdistan region/ Iraq was well studied in Abdul Rahman MA et al study,[25] and the rates of missed vaccines was significantly decreased and the vaccination in villages where spiritual leaders were involved, improved significantly more than other villages.

Regarding parental variables in none or incompletely vaccinated children; fathers were 10 years age group older than mothers, which matches the social taboos of marriage in Iraq. It also showed fathers had minimal high education and most mothers had Primary school level, which reflects the educational status in the community.

Conclusion

* The immunization status needs to be improved by increasing awareness, and counseling of parents through primary health care centers, public media education about immunizations, its side effects, and the associated misconceptions.
* Taking measures to prevent and treat acute and chronic illnesses that interfere with vaccination, especially during the 1st nine months of life, through improving general socioeconomic,

educational status of families, and vaccination coverage.

* Improving security situation in the country through political settlements and banning military conflicts, has positive direct impact on family economic stability, prevents displacements, and minimizing early marriages before completion of parental education.

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