ORIGINAL ARTICLE

Immunization coverage among children in Al-Taizyah district, Taiz Governorate, Yemen

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Abstract

Introduction: At least 2 million people die every year from diseases preventable by vaccines recommended by the World Health Organization. **Objective:** To assess the routine immunization coverage among children aged 12-23 month and to determine the reasons for unvaccinated. **Methods:** We conducted a community-based survey in Al-Taizyah district, Taiz governorate, Yemen. Information about vaccination status and related barriers was collected for 420 children from 1st March to 31st March 2012. **Results:** 49.8% of the children had vaccination cards. About 69.5% of the children were fully vaccinated by cards and by history, 15.5% were partially vaccinated and 15% not vaccinated. As a regards to crude vaccination coverage, 82.9% of children were received BCG vaccine. OPV1 vaccine was 82.6%. Pentavalent1 was 82.6%. Measles 1 represented for 71.7% and vitamin A1 was 46.4%. 91% was valid doses for OPV1 and 93% for pentavalent1. Only 76% of measles1 dose was valid. The high scores14% of drop-out rate was recorded between BCG and Measles. The main reasons for partially vaccinated and unvaccinated of children were the lack of information 61.7%. **Conclusion:** There is low vaccination coverage among children aged 12-23 months. There is a need to raise the awareness of community about vaccination and EPI services in Al-Taizyah district.

Key Words

Immunization; Vaccination; Reasons For Unimmunized; Al-Taizyah District; Yemen

Introduction

Immunization, one of the greatest achievements in public health, greatly reducing morbidity, mortality and health care costs. Artificial active immunization has been identified as the single most important factor that determines whether a child will have any of the vaccine preventable diseases [1]. Considering that more than 130 million children are born each year worldwide and need to be immunized, over 27 million children, who live mainly in disadvantaged rural communities, are not reached by routine immunization services and significant variations in coverage exist between and within regions and countries [2]. The total numbers of children who died in 2002 from diseases preventable by vaccines currently recommended by WHO, plus diseases for which vaccines are expected soon were 2.5 million [3]. In 2010, an estimated 19.3 million infants worldwide are still not being reached by routine immunization services, 13.2 million (or 68%) live in 10 countries and more countries achieve high levels of vaccination coverage were the Americas, Europe and Western Pacific, maintained over 90% immunization coverage [4]. In 2003, the total proportion of children in the age range 12-23 months who received all eight essential vaccinations before their first birth day was 20.7% [5]. In addition, the coverage levels achieved by the expended immunization program (EPI) in Al-Taizyah district

in 2009 before the first birth was 62.6%, 91.1%, 91.1%, 72.5% and 59.4% for BCG, OPV, pentavalent, measles and vitamin A respectively [6] indicating figures that are below the acceptable level.

Aims & Objectives

The objective of the study was to assess the routine immunization coverage among children aged 12-23 months in Al-Taizyah district, Taiz governorate and to determine the reasons for unimmunized.

Material and Methods

This study was conducted in Al-Taizyah district, Taiz governorate. Al-Taizyah district consist of 20 subdistricts, all subdistricts include 155 villages [7]. Community-based survey was conducted from 1st March to 31st March 2012. A total of 420 children were admitted to the study. Households with at least one living children (boys and girls) of aged between 12-23 months on the date of interview and who were residing in the area for last six months or more were eligible for admitted to the study. A sampling frame of all villages at the different sub districts of Al-Taizyah district was used for the purpose of sampling. Multistage random sampling was used to select 420 children in Al-Taizyah district. The first stage of the sampling was selected 5 sub districts out of 20 sub districts in Al-Taizyah district by simple random sampling. In the second stage of the sampling were selected 6 villages for each selected sub districts (30 villages in total) by simple random sampling. In the third stage of the sampling were selected 14 households for each selected villages (420 household in total) by systematic random sampling and then the subsequent households were selected contiguously till the completion of the required sample size. In the fourth stage of the sampling, for each selected households had child aged 12-23 month at the date of interview was taken, if there was no child aged 12-23 months in the chosen households, the next nearest household was selected. Then the number of children selected per cluster was therefore 420/30=14. If the required 14 respondents could not be found in the selected cluster then the area adjacent to the cluster was selected for the completion. In case of two or more children the youngest child by age was selected and in case of twin both children were included. Based on WHO recommendation to determine the sample size, the required sample size for this study has been estimated using the standard method as a 30-cluster survey8. For the calculation, desired precision was (±5%), confidence level was 95%, and expected vaccination coverage was 85% 6. The sample size estimated according to this method was 420 children. With 30 clusters to be studied, the number of respondents selected per cluster was therefore 420/30 =14 child per cluster.

The data were collected by trained nursing graduated under researcher supervisor as a face to face interview with caretakers of children. Based on WHO immunization coverage cluster survey manual [8], a modified sample immunization coverage survey forms were administered. The immunization coverage survey forms were consisted of a) infant immunization cluster form (demographic characteristics and vaccination status of children), b) Reasons for vaccination failure form. Data on vaccination history was collected in two ways, based on the availability of vaccination card and caretakers verbal report.

Data were analyzed by SPSS version 16.0. The process involved double-checking for errors and cleaning of data entries where needed at completion of the data entry process. Vaccination coverage level was categorized into three groups of fully, partially and unvaccinated children. The child was considered as fully vaccinated if he/she had received eight essential vaccination that included; one dose each of BCG and measles and three doses each of pentavalent and polio (excluding Polio 0 dose) by his/her first birthday. Those who had missed any one vaccine out of the eight essential vaccination was described as “partially vaccinated” and those children who had not received any vaccine was defined as “unvaccinated”[8]. Drop-out rate is the rate difference between the initial reference vaccine (IRV) and the final reference vaccine (FRV). The drop-out rate was calculated according to the following formula: [(IRV-FRV)/IRV]x 100 [8]. Crude vaccines coverage: defined as vaccination given, evidenced by card where applicable or by history from mothers/caretakers. To determine the valid doses of vaccines of the children, the analysis was done in steps. First, the research team was calculated the coverage with each vaccine based on the presence of a card with a date when the vaccine was given. Second, for the dose to be valid the research team based one the following criteria otherwise the vaccine dose was considered as invalid; criteria: 1=satisfies requirement for minimum interval between doses, 2= satisfies requirement for minimum age and 3= satisfies for

valid previous dose. Finally, the dose had to be administered after a defined minimum age according to the standard criteria of the national EPI [5].

Ethical approval was obtained from faculty of medicine and health sciences, Sana'a University and health office in Taiz governorate. Oral informed consent was taken from caretakers.

Results

A total of 420 children age ranged from 12 to 23 months were surveyed, of whom 49.5% were boys and 50.5% were girls. The mean age and SD were 17.6±3.7 year. The result of the study regarding immunization status of children by card and by history showed that 292 (69.5%) of the children were fully immunized (168; 40%) by card and (124; 29.5%) by history, 65 (15.5%) were partially immunized (41; 9.7%) by card and (24; 5.8%) by history and 63 (15%) were unimmunized [Figure 1].

The crude vaccination coverage by antigen (card + history) for BCG was 82.9% and OPV zero dose was 82.9%. OPV1, OPV2 and OPV3 vaccines were 82.6%, 78.8% and 75.5% respectively. Pentavalent1, pentavalent2 and pentavalent3 were 82.6%, 79.5% and 75.5% respectively. The coverage of measles1 vaccine was 71.7% and vitamin A1 was 46.4% [Table 1]. Out of 214 children age ranged from 18-23 months, of whom 54(25.2%) were received measles2 by card and 85 (39.7%) by history while, 30 (14%) were received vitamin A2 by card and 63 (29.4%) by history.

The drop-out rate between BCG-measles1 vaccines was 14%, BCG-pentavalent3 was 9% and BCG-OPV3 was 9%. The drop-out rate between pentavalent1-pentavalent3 was 9% and OPV1-OPV3 was 9%. Pentavalent1-measles1 was 12% and OPV1-Measles1 was 13%.

Table 2 shows that 163 (91%) were valid doses out of 180 OPV1 doses received, 135 (78%) valid doses out of 173 OPV2 and 123(77%) valid doses out of 159 OPV3 doses received. Regarding valid vaccine doses for pentavalent, 163 (93%) valid doses out of 175 pentavalent1 doses received, 122 (70%) valid doses out of 174 pentavalent 2 and 108 (69%) valid doses out of 157 pentavalent3 doses received. Only 109 (76%) of doses were valid out of 143 measles1 vaccine received.

The main reasons for partial and unvaccinated of children were the lack of information accounted for 61.7% followed by obstacles 29.7% and lastly lack of motivation accounted for 8.6% [Table 3].

Discussion

The proportion of children with immunization cards (immunization card retention) in this survey (40%) was lower than that (69.2%) in the Yemen Demographic and Maternal and Child Health Survey [9] in 1997, lower than that in the UNICEF survey (47%) [10] and also was lower than that (66.7%) in Hadramout study in 2010 [11] . In the final YDMCHS report 1992 [12], vaccination cards were seen by interviewers for only 40.3% of children aged 12–17 months, which is similar than in this study [12]. Based on vaccination card and history, 69.5% of the children aged 12-23 month were fully immunized. It was lower than reported in Indian studies 98% and 72.23% [13,14] Hadramout study 82.4% [11], in the Ethiopian study 75.5% [15], but higher than other India study 58.6 % and 57.6% [16]. Our study was also higher than that in Ethiopia study 35.6% [17]. It is higher than the 2003 immunization coverage survey in the country which is about 30.5% of children aged 12-23 months were fully vaccinated [5]. In the present study, the immunization coverage among children aged 12-23 months was approximately similar than study conducted in in India [18] which about 69.3% of the children were fully immunized.

Crude vaccines coverage was defined as vaccination given, evidenced by card where applicable or by history from caretakers. Crude vaccines coverage is used as an indicator to show a population's levels of access to vaccination services [19]. Immunization coverage for children in the district for different vaccines ranged from 82.9% for BCG to 71.7% for measles by card and history. The study indicates access to vaccination services was acceptable for vaccines that are given within the first few months after birth at between 80.4%, and 82.9% but not for pentavalent 79.1%. On the other hand, coverage for pentavalent, OPV and measles, given towards the second month and the end of the first year was below 68.1% and 75.5% the WHO target of 80% vaccination coverage at district level as per UNEPI Standards [20]. This difference in coverage between these two sets of vaccines has also been documented in other studies in developing countries [21,22,23] and may be due to the long interval between them. The low vaccination coverage for measles is of particular public health concern given

both the specific and non-specific beneficial effects of measles vaccine on childhood morbidity and mortality documented in several studies in the developing world [24]. This coverage was lower than that in studies conducted in Uganda study [25] for all antigens. This result was lower than the 2005 immunization coverage survey in the country for OPV3, DPT3 and measles1 vaccines except for BCG vaccine3 but higher than the 2009 immunization coverage survey for BCG, and measles except for pentavalent3, OPV3 and measles [26]. These differences may be due to area in our study (rural), while EPI in Taiz governorate include urban and rural areas. The crude vaccination coverage rate in the present study was higher than reported in Uganda and in Nigeria studies [25,10].

Invalid doses that did not meet vaccination schedule criteria were noted during this study. The findings of our study showed that invalid doses accounted for 58.3% of the total doses given. The coverage with valid doses of the multidose vaccines (OPV and pentavalent) was in the range 91%–93% for the first dose. For the second dose it ranged from 70%-78%, and for the valid third dose it was 69%-77%. The result of this study was higher than the study conducted in Ethiopia [17], it was ranged from 82%–83% for the first dose but approximately same for the second dose 73% to 77%, and for the third dose 74% for OPV3 and DPT3.

The drop-out rate of vaccination is the best indicator of program continuity and follow-up of children in EPI. The proportion of drop-out rate of pentavalent1-pentavalent3 vaccines in our study was 9% compare to 13%, 10%, 5%, 5% and 5% in 2006, 2007, 2008, 2009 and 2010 respectively in the our country [26]. This result was lower than the MoPHP survey 48.9%5 According to the WHO there is a problem with the immunization programme whenever the drop-out rate exceeds 10%20. The drop-out rate of pentavalent1-measles1 in our study 12% was lower than the 2009 drop-out rate 21.4% in the country6. Overall drop-out rate for BCG-measles1 in our study was 14% comparable to study done in India by Bashir *et al*. 2004 [27] where it was 20.9%.

The main reasons for unvaccinated the child or partially vaccinated were mostly due to lack of information. This is similar with base line done by core polio group in Ethiopia [28] and study conducted by Kamanda [29] obstacles (mainly place of vaccination is too far) were the main reasons for partially vaccinated or unvaccinated, however the results of the same survey showed that, for children, the reason cited most often by mothers was the lack of information. In the study by Nirupam *et al* [30] stated that the common reasons for unvaccinated were obstacles, lack of information and lack of motivation. The findings of this study are somewhat in contrast to study conducted by Sarab [31] which suggested that about one-third of the children did not receive any vaccination because the mothers of the children were unaware of the need for immunization.

Conclusion

There is low immunization coverage among children in Al-Taizyah district, Taiz governorate in which 69.5% of children aged 12-23 months were fully vaccinated by cards and history while only 40% were fully vaccinated by cards which are below the goal of the EPI in Yemen is to achieve 80% vaccination coverage at district level. The main reasons for partial and unvaccinated of children were the lack of information. We recommended that, the EIP should work to raise the awareness of community in Al-Taizyah district regarding important of immunization.

Recommendation

We recommended that, the EIP should work to raise the awareness of community in Al-Taizyah district regarding important of immunization.

Authors Contribution

NA: Study concept, Study designing, analysis, Manuscript writing; AD: Literature search, Data collection, Manuscript writing and review; AA: Data collection, Manuscript editing and review, schedule preparation.

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Tables

TABLE 1 CRUDE VACCINATION COVERAGE BY ANTIGEN

Vaccines	Crude vaccination coverage			
	Card		Card+ history	
	n	%	n	%
BCG	180	42.9	348	82.9
OPV 0	180	42.9	348	82.9
OPV 1	180	42.9	347	82.6
OPV 2	173	41.2	331	78.8
OPV 3	159	37.9	317	75.5
Pentavalent 1	175	41.7	347	82.6
Pentavalent 2	174	41.4	334	79.5
Pentavalent 3	157	37.4	317	75.5
Measles 1	143	34.0	301	71.7
Vitamin A1	98	23.3	195	46.4

TABLE 2 VALID VACCINATION COVERAGE BY CARD

Vaccines	Valid dose criteria				Total dose
	3	1+3	1+2+3		
	n	N	n	%	n
BCG	0	0	180	100	180
Pentavalent1	0	0	163	93	175
Pentavalent2	163	145	122	70	174
Pentavalent3	120	112	108	69	157
OPV 1	0	0	163	91	180
OPV 2	163	150	135	78	173
OPV 3	143	130	123	77	159
Measles 1	0	0	109	76	143

TABLE 3 REASONS FOR PARTIAL AND UNVACCINATED OF CHILDREN

Reasons	n	%
Lack of information		
Unaware of need for vaccination	55	43
Unaware of need to return for 2nd , 3rd dose	8	6.2
Fear of side reactions	16	12.5
Lack of motivation		
No faith in vaccination	8	6.3
Rumors	3	2.3
Obstacles		
Place of vaccination too far	16	12.5
Vaccine not available/Vaccinator absent	5	3.9
Mother too busy	5	3.9
Mother/Child ill	12	9.4
Total	128	100

Figures

FIGURE 1 IMMUNIZATION STATUS OF CHILDREN BY CARD AND HISTORY