American Journal of
Epidemiology & Public Health

Research Article

Vaccination Coverage in Tarim District, Yemen, 2017

Atheba Mubark Al-Tarbi[1] and Abdulla Salem Bin Ghouth[2]*

[1]Lecturer, Hadramout University College of Medicine and Physician, MOPH&P (Hadramout, Yemen)
[2]Professor and Head of Community Medicine Department, Hadramout University College of Medicine (Hadramout, Yemen)

***Address for Correspondence:** Abdulla Salem Bin Ghouth, Department of Community Medicine, Hadramout University College of Medicine, Post box No 8892, Hadramout, Yemen, Tel: +967-713-963-030/ +967-774-954-505; ORCID ID: orcid.org/0000-0002-0884-5361; E-mail: abinghouth2007@yahoo.com

Submitted: 17 March 2020; Approved: 20 March 2020; Published: 21 March 2020

Cite this article: Mubark Al-Tarbi A, Bin Ghouth AS. Vaccination Coverage in Tarim District, Yemen, 2017. American J Epidemiol Public Health. 2020;4(1): 010-015.

ISSN: 2644-0032

ISSN: 2644-0032

ABSTRACT

Introduction: In Yemen, although vaccines for the major vaccine-preventable diseases are available free for the public under the Expanded Program on Immunization but the vaccine-preventable diseases still cause nearly one third of the total deaths among the under 5 years Yemeni children raising the question about the achievement of universal vaccination coverage at district level.

Objective: To determine immunization coverage among children (12-23 months of age) and the affecting factors in Tarim District, Hadhramout Governorate, between first June-31 August 2017.

Method: A cross-sectional community based study conducted among children aged 12-23 months in Tarim district Hadhramout governorate. A multistage cluster sampling was used to select houses. A total of 238 children of aged between 12-23 months from 238 households were selected from 10 rural and 3 urban areas. The data collectors assessed the vaccination status of the children based on vaccination cards or mother's verbal reports using a pre-tested structured designed questionnaire through house-to-house visits. SPSS was used for data entry and analyses. The results of the study were presented as appropriate by tables and graphs.

Results: Only 67.2% of children aged 12-23 months were completely (fully) vaccinated, 20.6% were partially vaccinated, and 12.2% of children were un-vaccinated. The immunization coverage for Bacillus Calmette-Guérin (BCG) was 87.4%, 71.4% for third dose of Oral Polio Vaccine (OPV), pentavalent and pneumococcal vaccines, 73.5% for Rota vaccine and 67.6% for measles rubella vaccine. The main reasons for incomplete vaccinations or un-vaccination is fear from side effects of vaccination.

Conclusions: The complete immunization coverage among children (12-23 months) in Tarim district was still below the expected national and WHO target. The reasons of incomplete or un-vaccination can be avoided by health education methods.

Keywords: Immunization coverage; Vaccination; Tarim; Hadhramout

INTRODUCTION

Limited immunization coverage still a major problem especially in developing countries which means a higher risk that child will die of vaccine-preventable diseases [1]. Several underlying factors for suboptimal vaccine uptake have been described, but are complex and present diversities among different countries, and population groups [2] while a major barrier is the underlying weakness of the health system in many developing countries as the case in Yemen.

In Yemen, although vaccines for the major Vaccine Preventable Diseases (VPDs) are available free for the public under the Expanded Program of Immunization (EPI) since its establishment in 1979, the overall complete immunization coverage for Yemeni children within the age 12-23 months was only 37.2% [3]. There was significant improvement in childhood vaccination coverage between 1997 and 2006. The coverage increased from 28% in 1997 to 38% in 2006. Since 2006, the coverage for each individual vaccination has slightly decreased, and the proportion of children who received no vaccinations increased from 12% to 16% [4]. This deterioration making VPDs cause nearly one third of the total deaths among the under 5 years Yemeni children that raising the question about the achievement of universal vaccination coverage at governorate or district level.

At governorate or district level, limited studies investigated the routine vaccination coverage among children at 12-23 months of age in Yemen. The study done in Mukalla in 2006 by Ba'ammer, et al. [5] found that 82% of children 12-23 months of age were fully vaccinated, 12% were partially vaccinated, and 5% were not vaccinated, Basaleem, et al. [6] found in Aden that 83.1% of children 12-23 months of age were complete immunization, 10.4 % were partial immunization and 6.5% were never immunized. Other community-based survey in Al-Taizyah district, Taiz governorate done in 2012 to assess the routine immunization coverage among children aged 12-23 month found that 69.5% of the children were fully vaccinated, 15.5% were partially vaccinated and 15% not vaccinated [7].

As a result of limited vaccination coverage throughout Yemen after 2015, due to political and social instability and military conflicts, sporadic outbreaks of vaccine-preventable diseases from different parts of the country were observed including Tarim district (in Hadramout at eastern Yemen). However, the reasons for the low uptake of vaccine were not studied in Tarim. The aim of this study is to determine immunization coverage among children (12-23 months of age) and the affecting factors in Tarim District, Hadhramout Governorate of Yemen during the period from first June to 31August 2017.

SUBJECTS AND METHODS

A cross-sectional community based study conducted among children aged 12-23 months in Tarim district Hadhramout governorate. A multistage cluster sampling was used to select houses. A total of 238 children of aged between 12-23 months from 238 households were selected randomly.

Tarim district was initially divided into rural and urban areas which have 150 rural and 7 urban areas then, 10 rural and 3 urban areas were selected by lottery from administrative wards, after that rural areas were considered as one cluster and done sample frame for it and the same method used for the urban areas. Proportional Probability Size (PPS) procedure was used to select a number of households that was interviewed in each rural area and urban areas. For the selection of households in each section, interviewer teams were used the modified EPI methodology to randomly pick the household that were interviewed. First the interviewers were identifying the center of the section, where they had to spin a pen to randomly select the direction to take the edge of section (periphery of section). The interviewers walk to the edge of section, from the edge of the section interviewers had

ISSN: 2644-0032

to spin a pen again aiming to randomly get direction to follow to the other extreme edge of the section when the interviewers get a new direction. The team counted all houses along the randomly selected direction and gave each household a number, and then randomly selects the first household for interview from the numbered households and selected at least one child from each household if there were more children selected smallest one. Then went to the next nearest household, to the right hand side until the number of households in that section was found. In case of absence of the caregivers or the child of the randomly selected households, an appointment was made by the study team to return back before leaving the locations.

The data collectors assessed the vaccination status of the children based on vaccination cards or mother's verbal reports using a pre-tested structured designed questionnaire through house-to-house visits.

The research team investigate the immunization card and/or asked mothers according to the recommended EPI vaccine schedule of Yemen, [8] the recommended vaccine schedule mentioned that children receive the complete schedule of vaccinations before their first birthday: the BCG vaccine should be given at birth; pentavalent, Oral Polio (OPV), and pneumococcal vaccines should be given at approximately age 2, 3, and 4 months; and measles rubella vaccine should be given at or soon after the child reaches 9 months and the second dose at 18 months of age. Rota vaccine is given at age of 2 and 4 months. Injectable Polio Vaccine (IPV) is recommended one dose at 4 month as a third dose of OPV.

Statistical Package of Social Sciences (SPSS) was used for data entry and analyses. The results of the study were presented as appropriate by tables and graphs. Frequency, percentages, mean and standard deviation were the statistical methods used. .

Operational definition of vaccination status

The following operational definitions were used in this study:

Complete (Fully) immunized: A child between 12-23 months old who received one BCG, at least three doses of pentavalent, at least three doses of pneumococcal, at least three doses of OPV, two doses Rota virus vaccine and one dose MR (Measles Rubella) vaccine [9].

Incomplete immunized: A child is considered incompletely vaccinated at 1 year if he has not received all the routine EPI vaccines before his/her first birthday [10].

Partially immunized: A child who missed at least one dose of the thirteen doses of recommended vaccines.

- **Unvaccinated:** A child who does not receive any dose of the thirteen doses of recommended vaccines.
- **Vaccinated:** A child who took at least one dose of the thirteen doses of recommended vaccines.

RESULTS

A total of 120 out of 238 studied children were males (50.4%) and 118 (49.6) were females, the mean age of children was 17.5 months (± 3.8), regarding residency the majority of these children (152 children, 63.9%) were from an urban area while 86 children (36.1%) were from rural area.

Regarding the Socio-demographic characteristics of the mothers, the mean age of them was 28 year (± 6.2). About 18.5% of mothers were illiterate (44 mothers) and 41.2% read and write (98 mothers) while 78 mothers (32.8%) had primary education and only 4 women (1.7 %) had university degree. The Majority of the mothers (98.3%) were housewives (Table 1).

The immunization coverage regardless to the type of vaccine showed that 209 children aged 12-23 months (87.8%) were vaccinated at the time of data collection while 29 children (12.2%) were unvaccinated (Figure 1). This coverage was further classified in this study into complete/incomplete and fully, partial vaccinated or unvaccinated. The results showed that 160 children (67.2%) out of 238 children had received all recommended doses of the recommended routine EPI vaccines in Yemen and considered as completely (fully) vaccinated while 78 children (32.8%) were incompletely vaccinated including 49 children (20.6%) were partially vaccinated that had missed at least one dose of the recommended routine EPI vaccines and 29 children (12.2%) were not vaccinated at all at the time of data collection. Among those who were partially or fully vaccinated 195 (93.3%) had EPI immunization card (Table 2).

Table 1: Socio-demographic characteristics of the studied children 12-23 months and their mothers, Tarim district, Hadhramout Governorate, 2017.

Characteristics	No. of children	%
Gender of the child:		
Male	120	50.4
Female	118	49.6
Total	238	100
Residency:		
Urban	152	63.9
Rural	86	36.1
Total	238	100
Mother's educational status:		
Illiterate	44	18.5
Read and write	98	41.2
Primary education	78	32.8
Secondary education	14	5.9
University and above	4	1.7
Total	238	100
Mothers occupation:		
Employed	4	1.7
House wife	234	98.3
Total	238	100
Child age in months:		
Mean	17.5	
SD	3.8	
Range	12-23	
Mothers age in years:		
Mean	28.3	
SD	6.2	
Range	18-45	

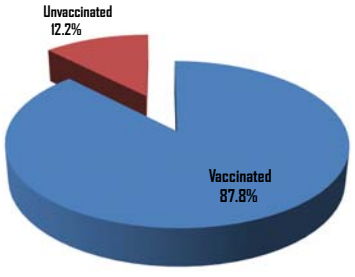

Figure 1: Immunization coverage in general.

ISSN: 2644-0032

Specifically, the coverage for each vaccine was investigated. BCG Vaccine coverage was 87.4% while MR vaccination coverage (first dose) was 67.6%. Oral Polio Vaccine (OPV), pentavalent and pneumococcal vaccines were given at the same time for the recommended three doses; the coverage were 71.4% for the third dose (complete vaccination) while 5 children had only two doses (2.1%) and 18 children (7.6%) had received only one dose of each vaccine. According to the new EPI strategy; one dose IPV is now recommended, IPV coverage in Tarim district was 67.6%. Rota vaccine coverage was 73.5% (second dose), and only 7.6% of children had received only one dose of Rota vaccine. The unvaccinated children with Rota vaccine was 18.9% (Table 3).

Reason behind incomplete and or un-vaccination

The study showed that the main reason for incomplete and or unvaccinated children was fear from side effects of vaccine (38%) followed by mother's misbelieves toward importance of child vaccination (28%) then father refuse due to religion belief (24%). The least reason was inaccessibility due to the health facility was far away (2%). The same reasons were reported regarding incomplete or partial vaccination (Figure 2).

DISCUSSION

The complete immunization coverage among children in Tarim district (12-23 months) was 67.2%; this coverage was still below the national and WHO target of 80% coverage at district level [11] and was low compared with immunization coverage in other areas in Yemen like Aden (83.1%), [6] Mukalla (82.4%) [5] but it was similar to the coverage in Taiz (65.4 %) [7] and Shabwah (55%) [1]. Also it was very higher than the coverage reported by Yemen National Health and Demographic Survey (YNHDS, 2013) [4] in which the reported coverage was 42.6%. The same variations were found in different developing countries, the coverage in this study was similar to the complete immunization coverage in Zimbabwe 65.4% [12] and in Atakumosa-west district Osun State Nigeria (74.4%) [13] while it was higher than the complete immunization coverage in Nigeria (22%), [14] in East Pokot, Kenya (23%), [15] in Somaliland (25.8%), [16] in Ethiopia (35.4%), [17] in Owerri, Nigeria (35.6%) [18] and in Kacheliba Division, PokotCounty, Kenya (40.3%) [19], but it is lower than the coverage in Cameroon (85.9%) [20].

The unvaccinated children are very important group for EPI programs especially in developing countries, accumulation of unvaccinated groups over time increase the risk of epidemics [21]. The percentage of non vaccinated children in this study was 12.2%, it was higher than the percentage of non vaccinated children in other areas in Yemen like Aden (6.5%), [6] Mukalla (5.2%) [5] while it was similar to percentage found by different national surveys like Yemen Multiple Indicator Cluster Survey (YMICS) 2006(12%), [4] YNHDS, 2013 (16%), [4] it is also similar to study done in Taiz (15%) [7] but lower than the percentage of non vaccinated children in other studies as in Shabwa (20%) [1] and in Ethiopia (23.7%) [17].

In this study the coverage of BCG was accepted (87.4%) and it was similar to BCG coverage in other areas of Yemen like Aden

Table 2: Immunization coverage of children aged 12-23 months, Tarim district, Hadhramout Governorate, 2017.

Coverage	No. of children	%
Immunization coverage by completeness of doses:		
Complete	160	67.2
Incomplete	78	32.8
Total	238	100
Immunization coverage by completeness of doses in detail:		
Complete	160	67.2
Partial	49	20.6
Unvaccinated	29	12.2
Total	238	100
Have Childs Immunization card (*n* = 209):		
Mothers have Childs immunization card	195	93.3
Mothers did not have Childs immunization card	14	6.7
Total	209	100

Table 3: Immunization coverage by type of vaccine among children aged 12-23month, Tarim district, Hadramout Governorate, 2017.

Vaccines	No. of children	Coverage %
BCG vaccine:		
Childs had received BCG	208	87.4
Childs had not received BCG	30	12.6
Total	238	100
OPV vaccine:		
Childs had received three OPV doses	170	71.4
Childs had received two OPV doses	5	2.1
Childs had received one OPV dose	18	7.6
Childs had not received OPV	45	18.9
Total	238	100
IPV vaccine:		
Childs had received IPV	161	67.6
Childs had not received IPV	77	32.4
Total	238	100
Pentavalent vaccine:		
Childs had received three Pentavalent doses	170	71.4
Childs had received two Pentavalent doses	5	2.1
Childs had received one Pentavalent doses	18	7.6
Childs had not received Pentavalent	45	18.9
Total	238	100
Pneumococcal vaccine:		
Childs had received three Pneumococcal doses	170	71.4
Childs had received two Pneumococcal doses Childs had received one Pneumococcal doses	5 18	2.1 7.6
Childs had not received Pneumococcal	45	18.9
Total	238	100
Rota vaccine:		
Childs had received two Rota doses	175	73.5
Childs had received one Rota doses	18	7.6
Childs had not received Rota	45	18.9
Total	238	100
Measles Rubella vaccine MR:		
Childs had received one MR doses	161	67.6
Childs had not received MR	77	32.4
Total	238	100

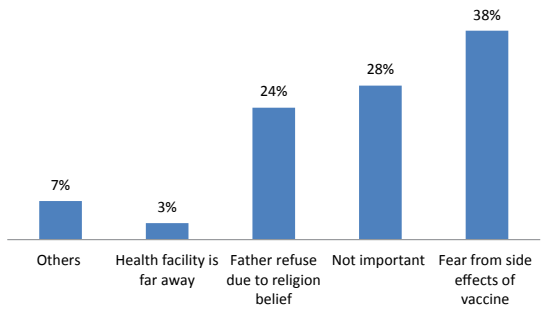

Figure 2: Reason for unvaccinated children 12-23 months of age, Tareem district, 2017.

(92.9%), [6] Mukalla (88.1%) [5] and Taiz (82.9%), [7] it was also similar to other developing countries as Zimbabwe (88%), [12] East Pokot Kenya (82%) [15] in Kacheliba Division, PokotCounty, Kenya (90.3%) [19] and in Atakumosa-west district Osun State Nigeria 91.6% [13]. In this study BCG vaccination coverage was higher than what were reported by YNHDS, 2013 (68%), [4] and in Ethiopia (71.1%) [17]. The local authority in Tarim district considers the vaccination card is a prerequisite for getting birth certificate for neonates, this approach raised the BCG coverage in Tarim district.

The coverage of the third dose of OPV, pentavalent and pneumococcal vaccines was 71. 4%, it was similar to the coverage in Taiz (75.5%) [7] but it was higher than the national figure reported in YNHDS 2013 (60%) [4]. While it was lower than the coverage in Aden [6] and Mukalla [5]. In comparing with the coverage in other developing countries; it was similar to coverage in Zimbabwe (75%) [12] but it was higher than the coverage in India, East Pokot Kenya [15] in Kacheliba Division, PokotCounty Kenya, [19] in Somaliland [16] and Mozambique [16] while it was lower than the coverage in Cameroon, [20] in Atakumosa-west district Osun State Nigeria [13].

Measles and Rubella Vaccine (MR) was investigated in this study based on the first dose which was giving in the 9th month of age of the child. In this study the coverage of first dose of MR was 67.6%, it was similar to the coverage in Taiz (71.7%), [7] and the coverage that reported by the YNHDS 2013 (63 %) [4]. It was higher than the coverage in East Pokot Kenya [15] in Kacheliba Division, PokotCounty Kenya, [19] Zimbabwe, [12] in Somaliland, [16] and Mozambique [22] but it was lower than the coverage in Cameroon [20] and in Atakumosa-west district Osun State Nigeria [13].

Because the Rota vaccine recently introduced in EPI program in Yemen (at the end of 2012) there was no evidence presented for local or national comparison. Globally; after 10 years since its introduction in 2006, the implementation of rota vaccine is still unacceptably low [23]. In USA 71% of children were fully vaccinated for rotavirus but Lower socioeconomic status increased the likelihood of being unvaccinated for rotavirus [24]. In Norway; the national coverage for rotavirus vaccine achieved a year after the introduction was 89% for one dose and 82% for two doses, respectively [25].

About the main reasons for incomplete immunization either partial or unvaccinated children were fear from side effects of vaccine in this study followed by father refuse due to religion belief then followed by negligence and mother's misbelieves toward importance of child vaccination, similar reasons for incomplete vaccination for children were found from other developing countries like study done by Abdulraheem, et al. [26] and Negussie, et al. [27].

CONCLUSION

The complete immunization coverage among children (12-23 months) in Tarim district was still below the expected national and WHO target. The percentage of incomplete or unvaccinated children of significant concern especially the reasons of incomplete or un-vaccination can be avoided by health education theses reasons like fear from side effects of vaccine, father refuse due to religion belief and mother's misbelieves toward importance of child vaccination.

ACKNOWLEDGEMENT

We thank all who facilitated our research works especially manager of office of the ministry of public health and population-Hadhramout wadi and EPI program in Syoun, great thanks to all women who respond to the questionnaire and open their houses during the field work for data collection.

STATEMENT OF ETHICS

The work described in this article has been carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans and uniform requirements for manuscripts submitted to biomedical journals.

The proposal was approved by the Research Ethics Committee of Hadramout University College of Medicine (HUCOM). Facilitator correspondences were obtained from HUCOM to the health and population affairs office-Hadhramout Wadi to facilitate data collection. Written consent was obtained from the manager office of the ministry of public health and population-Hadhramout wadi. A simple and clear explanation of the research aims and procedure were provided to participants involved in the study. Verbal consents were obtained from all participants involved in the study. Participants' privacy and confidentiality were assured.

AUTHOR CONTRIBUTIONS

Conception, design: Both authors. Data collection: Atheba Al-Tarbi. Data analysis both authors. Writing, revision: Bothl authors. Final approval: Both authors.

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