

Nomadic and Rural Population of Balochistan: Exploring the Pockets of Poor Childhood Immunization in the Most Under-Vaccinated Province of Pakistan

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Abstract: *Objective:* To assess the immunization coverage of children less than 2 years of age in rural and nomadic population of Balochistan. To assess the knowledge of parents about EPI immunization and find reasons of poor vaccination. *Material and methods:* The cross-sectional survey was conducted in rural population and nomadic tribes located in suburbs of district Zhob, Balochistan. One hundred families of rural areas and 100 families of nomadic tribes were interviewed. Information regarding the vaccination status of children, parents' knowledge of EPI vaccination and reasons of not vaccinating children or skipping vaccines were asked and noted. Education status of parents and socioeconomic status was also noted. *Results:* There were 295 children under 2 year age in the study population with 146 (49.5%) males and 149 (50.5%) females. Among rural population, 25 (16.4%) children were completely vaccinated, 106 (69.7%) children were partially vaccinated and 21 (13.8%) children never received any vaccination. In nomadic population, 10 (7%) children were completely vaccinated, 88 (61.5%) were partially vaccinated and 45 (31.5%) were unvaccinated. There was significant difference between vaccination status of families belonging to rural population versus those of nomadic population ($P=0.002$). Most common reason of skipping one or more vaccines was lack of knowledge and awareness in 28.8% cases. There was significant association between education status of fathers and mothers with vaccination status of families. *Conclusion:* Routine immunization of children in rural and nomadic population of Balochistan is dismal. Main culprits are lack of knowledge and awareness, compounded by illiteracy and poor education status of parents.

Keywords: Immunization, Vaccination, Nomadic Population, Polio, Measles

1. Introduction

Vaccine preventable diseases are an important cause of death among children in developing countries, attributing to one million deaths per annum [1]. Coverage of childhood vaccination remains low in many developing countries [2]. In South-East Asia, vaccination coverage and accessibility gradually increased from 5% in 1970s to approximately 70% at present [3]. However our country is still struggling to cope up with immunization coverage and vaccine preventable diseases.

That is why, the preventable diseases that have vanished in developed countries with help of vaccinations/immunization are still prevalent in our country [4]. Vaccination coverage of children still remains unsatisfactory in Pakistan. Pakistan is currently ranking third in most under-vaccinated children in world [5]. Expanded Program of Immunization was initiated by government of Pakistan in 1978 to save children from these disabling and deadly vaccine preventable diseases including diphtheria, pertussis, tetanus, polio, tuberculosis, meningitis, pneumonia etc [2]. Vaccination efforts here have faced and still

facings many challenges. Main reasons held responsible are poor awareness, hesitancy, false beliefs, poor coverage and religious refusals in other studies of Pakistan with varying immunization coverage rates [2, 6]. Great variations in childhood vaccination coverage exist among provinces and also in rural and urban population [7]. Pakistan has poor cumulative vaccination coverage of children reported 66% recently, which is much lower than desired rate [8]. Vaccination coverage of children is highest in Punjab (80%), followed by Azad Jammu and Kashmir (75%) and lowest in FATA (Federally administered Tribal areas) (30%) and Balochistan (29%) [8]. Balochistan has shown improvement of childhood immunization coverage from 16% in 2012-2013 to 29% at present that is still alarming [8]. The obstacles causing poor immunization uptake in such areas of poor vaccination areas need to be explored in more depth keeping in view the peculiarities of subject areas in order to form strategies to overcome these barriers.

Although cumulative vaccination coverage in our country and especially Balochistan is very feeble compared to international standards but rural rate is much poorer needing prompt attention of policy makers and implementers. Balochistan is the poorest, least populous and most under-vaccinated province of Pakistan with more than 90% population living in rural areas [6]. However, Balochistan constitutes 43% of country's area. Rural population demography varies tremendously from other provinces as rural population lives in scattered scarce areas with accessibility issues. Rural population follows two styles of accommodation; settled and nomads. Majority reside in scattered but settled accommodation. Nomadic tribes live in temporary tentages that are uprooted for their seasonal migration twice a year (from colder areas to hotter ones and vice versa) [6]. There was a strong need to study and research the far flung areas of Balochistan, especially this nomadic population to find immunization status and the hurdles to poor immunization uptake in this specific group.

We have surveyed rural and nomadic areas in suburbs of District Zhob and assessed the immunization coverage of children of this far flung district in Balochistan.

2. Materials and Methods

The cross-sectional study was carried out in nomadic and rural populations located in district Zhob. Two rural areas and two nomadic tribes were identified and selected for the subject study. Rural areas were Killi Hasan Zai and Killi Mandazai. Two nomadic tribes (Called Kochis in native language) located in western suburbs of Zhob city (along Zhob river) were selected. One hundred families were chosen from the nomadic population; 50 from each of the two nomadic camps. Similarly, 100 families; 50 from each of the two rural areas (villages) were selected. The respondents who were issue-less (without children) or who refused to consent for interview were excluded. The selection was through convenience sampling technique and only those parents were interviewed who had children under 2 years age (vaccination age range of EPI). The survey team comprised of a doctor, two paramedical staff and two lady health visitors (LHV) of

District Headquarter (DHQ) Hospital Zhob. Paramedical staff and LHV spoke and interviewed the respondents (study population) in their local language. Ethical permission was obtained prior to the start of the subject study from the Ethical Review Committee of DHQ hospital.

The information acquired through direct interviews was recorded on pre-designed questionnaires. The questions were close-ended, direct and asked in the local language. The questionnaire was prepared beforehand after a thorough study of literature. Information regarding the number of children under 2 years of age and children vaccinated, confirmed by vaccination records (vaccination card), was noted. Parents' knowledge of EPI vaccines was assessed by asking whether they knew about EPI vaccines, including names of all vaccines, vaccination age, and vaccination schedule. They were enquired whether vaccination is beneficial, useless or harmful for children. Reasons of not vaccinating children or skipping vaccines were asked and noted. Respondents were asked to choose from various reasons including lack of knowledge of vaccination, lack of knowledge of vaccination facility, transportation issue, had no time for vaccination, long waiting time at vaccination centre, unavailability of staff or vaccines at vaccination facility, parent or child sick on vaccination day, forgot to vaccinate children, fear of syringes, vaccine has side-effects or had complication or side-effect of previous vaccination, religious reason (haram), peer or friends pressure, vaccination is useless or harmful, migrated from somewhere else etc. Questions were asked from both parents (if present at home) or either of the available parents (father or mother). BCG scar was examined of all the children present at home at the time of survey. Parents were categorized in uneducated, primary qualified (having completed primary level of education), matriculate (having completed matric level of education) and graduates (having completed graduation). Socioeconomic status was categorized into poor, lower middle class, upper middle class and rich. Family with monthly income less than 20 thousand rupees was declared poor, family with 20 thousand to 50 thousand rupees income per month were declared lower middle class, families with monthly income > 50 thousand rupees and less than 1 lac rupees were declared upper middle class and those with monthly income > one lac rupees were declared rich.

The data included gender, number of children, vaccinations cards, vaccination status of children, knowledge and perception of parents about childhood vaccination/immunization, BCG scar mark, education of parents (both), socioeconomic status, and reasons for non-vaccination etc. The children were categorized into three categories; completely vaccinated, partially vaccinated and unvaccinated. The data was entered and analyzed with the Statistical package for social sciences 21 (SPSS). Chi-square was used for qualitative variables and an independent T test was used for quantitative variables. P value < 0.05 was considered significant.

3. Results

There were 295 children under 2 year age in the study population with 146 (49.5%) males and 149 (50.5%) females.

In rural area, there were 152 children [77 (50.7%) males and 75 (49.3%) females] and in nomadic population 143 children [69 (48.3%) males and 74 (51.7%) females] in target age group were identified. Out of these, 35 (11.9%) children were completely vaccinated, 194 (65.8%) were partially vaccinated and 66 (22.4%) children were unvaccinated. The vaccination status of children is shown in Table 1. Among rural population, 25 (16.4%) children were completely vaccinated, 106 (69.7%) children were partially vaccinated and 21 (13.8%) children never received any vaccination. In nomadic population, 10 (7%) children were completely vaccinated, 88 (61.5%) were partially vaccinated and 45 (31.5%) were unvaccinated. There was significant difference between vaccination status of

families belonging to rural population versus those of nomadic population (P=0.002) (Table 1). All the nomadic participants belonged to poor class. On the other hand, among rural population 47 (47%) belonged to poor class, 33 (33%) belonged to lower middle class, 18 (18%) belonged to upper middle class and 2 (2%) were in rich class category (p<0.001). In rural population, 65 (65%) fathers were uneducated, 23 (23%) were primary qualified and 12 (12%) were matriculate. Among nomads, 94 (94%) fathers were uneducated while 6% were primary qualified. In rural population, 73 (73%) mothers were uneducated, 18% were primary qualified and 9% were matriculates. In nomads, all mothers were uneducated.

Table 1. Vaccination Status and demographic profile.

S/No	Vaccination Status	Rural population	Nomadic population	Total	P value	
1	Vaccination Status of children	Vaccinated	25 (16.4%)	10 (7%)	35 (11.9%)	P = 0.658
		Partially vaccinated	106 (69.7%)	88 (61.5%)	194 (65.7%)	
		Unvaccinated	21 (13.8%)	45 (31.5%)	66 (22.4%)	
		Total	152 (51.5%)	143 (48.5%)	295 (100%)	
2	Vaccination status of families	Vaccinated	16 (16%)	6 (6%)	22 (11%)	P = 0.002
		Partially vaccinated	70 (70%)	62 (62%)	132 (66%)	
		Unvaccinated	14 (14%)	32 (32%)	46 (23%)	
		Total	100	100	200 (100%)	
3	Socioeconomic status	Poor	47 (47%)	100 (100%)	147 (73.5%)	P < 0.001
		Lower middle class	33 (33%)	0	33 (16.5%)	
		Higher middle class	18 (18%)	0	18 (9%)	
		Rich	2 (2%)	0	2 (1%)	
4	Education father	Total	100	100	200 (100%)	P < 0.001
		Uneducated	65 (65%)	94 (94%)	159 (79.5%)	
		Primary	23 (23%)	6 (6%)	29 (14.5%)	
		Matric	12 (12%)	0	12 (6%)	
6	Education mother	Total	100 (100%)	100 (100%)	200 (100%)	P < 0.001
		Uneducated	73 (73%)	100 (100%)	173 (86.5%)	
		Primary	18 (18%)	0	18 (9%)	
		matric	9 (9%)	0	9 (4.5%)	
		Total	100 (100%)	100 (100%)	200 (100%)	

The knowledge of parents about EPI vaccination and their awareness of individual EPI vaccines have been shown in Table 2. The participants had maximum knowledge about polio vaccination; 98% of rural respondents and 56% of

nomads were aware of polio vaccination. Polio was followed by measles; 33% of rural and 13% of nomads were aware about measles vaccination (Table 2).

Table 2. Parents' awareness about EPI vaccines, age and schedule.

EPI Vaccine	Awareness about vaccine				Awareness about age of vaccination				Awareness about schedule of vaccination			
	Rural		Nomadic		Rural		Nomadic		Rural		Nomadic	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
BCG	21 (21%)	79 (79%)	8 (8%)	92 (92%)	14 (14%)	86 (86%)	5 (5%)	95 (95%)	29 (29%)	71 (71%)	10 (10%)	90 (90%)
	P value = 0.009				P value = 0.0330				P value = 0.001			
Polio	98 (98%)	2 (2%)	56 (56%)	44 (44%)	77 (77%)	23 (23%)	13 (13%)	87 (87%)	71 (71%)	29 (29%)	17 (17%)	87 (87%)
	P value = 0.000				P value = 0.000				P value = 0.000			
Hep B	17 (17%)	83 (83%)	7 (7%)	93 (93%)	13 (13%)	87 (87%)	3 (3%)	97 (97%)	13 (13%)	87 (87%)	2 (2%)	98 (98%)
	P value = 0.030				P value = 0.009				P value = 0.003			
Pentavalent	15 (15%)	85 (85%)	3 (3%)	97 (97%)	11 (11%)	89 (89%)	2 (2%)	98 (98%)	10 (10%)	90 (90%)	2 (2%)	98 (98%)
	P value = 0.003				P value = 0.010				P value = 0.17			
Pneumococcal	11 (11%)	89 (89%)	2 (2%)	98 (98%)	11 (11%)	89 (89%)	3 (3%)	97 (97%)	7 (7%)	93 (93%)	3 (3%)	97 (97%)
	P value = 0.010				P value = 0.027				P value = 0.192			
IPV	24 (24%)	76 (76%)	5 (5%)	95 (95%)	22 (22%)	78 (78%)	5 (5%)	95 (95%)	16 (16%)	84 (84%)	8 (8%)	92 (92%)
	P value = 0.000				P value = 0.000				P value = 0.082			
Rota virus	16 (16%)	84 (84%)	3 (3%)	97 (97%)	19 (19%)	81 (81%)	6 (6%)	94 (94%)	17 (17%)	83 (83%)	4 (4%)	96 (96%)
	P value = 0.002				P value = 0.005				P value = 0.003			
Measles	33 (33%)	67 (67%)	13 (13%)	87 (87%)	27 (27%)	73 (73%)	9 (9%)	91 (91%)	24 (24%)	76 (76%)	3 (3%)	97 (97%)
	P value = 0.001				P value = 0.001				P value = 0.000			

Reasons of not vaccinating or skipping vaccination of children have been summarized in Table 3. Most common reason attributing to non vaccination or skipping vaccination was lack of knowledge about EPI vaccination (28.8%). Eighteen parents (10.2%) of respondents thought vaccines are harmful, 17% had no knowledge about vaccination

facility, and 15% remained poorly vaccinated or skipped vaccination because of peer/friends pressure. Twelve percent (12%) of respondents (all belonging to nomadic population) attributed their migration to the poor vaccination. Other causes leading to poor vaccination have been shown in Table 3.

Table 3. Reasons of non-vaccination or skipping vaccination of children.

S/No	Reason of not vaccinating or skipping vaccine	Rural population	Nomadic population	Total
		N (83) %age	N (94) %age	
1	Lack of knowledge about vaccination (EPI)	11 (13.3%)	40 (42.6%)	51 (28.8%)
2	Lack of knowledge of vaccination facility	10 (12%)	7 (7.4%)	17 (9.6%)
3	Transport not available	6 (7.2%)	5 (5.3%)	11 (6.2%)
4	Had no time for vaccination	9 (10.8%)	2 (2.1%)	11 (6.2%)
5	Long waiting time at vaccination facility	3 (3.6%)	0	3 (1.2%)
6	Unavailability of staff at vaccination facility	2 (2.4%)	0	2 (1.1%)
7	Unavailability of vaccination	4 (4.8%)	0	4 (2.3%)
8	Forgot to vaccinate the child	7 (8.4%)	0	7 (4%)
9	Parent or child was sick, so could not go for vaccination	3 (3.6%)	2 (2.1%)	5 (2.8%)
10	Vaccines are harmful	11 (13.3%)	7 (7.4%)	18 (10.2%)
11	Vaccines are haram (religious belief)	6 (7.2%)	3 (3.2%)	9 (5.1%)
12	Peer or friends pressure	6 (7.2%)	9 (9.6%)	15 (8.5%)
13	Migrated from some other place	0	12 (12.8%)	12 (6.8%)
14	Vaccines are expensive	3 (3.6%)	6 (6.4%)	9 (5.1%)
15	Fear of syringes or injections	2 (2.4%)	1 (1.1%)	3 (1.2%)
	Total	83 (46.9%)	94 (53.1%)	177 (100%)

P value < 0.001.

There was no significant association between socioeconomic condition and vaccination status of families as shown below in Table 4 (P = 0.213).

Table 4 Association between socioeconomic and vaccination status of families.

S/No	Socioeconomic status	Vaccination Status	Rural population	Nomadic population	Total	P value
1	Poor	Vaccinated	2 (4.3%)	6 (6%)	8 (5.4%)	P = 0.213
		Partially vaccinated	36 (76.6%)	62 (62%)	98 (66.7%)	
		Unvaccinated	9 (19.1%)	32 (32%)	41 (27.9%)	
		Total	47 (32%)	100 (68%)	147 (100%)	
2	Lower middle class	Vaccinated	7 (21.2%)	0	7 (21.2%)	
		Partially vaccinated	22 (66.7%)	0	22 (66.7%)	
		Unvaccinated	4 (12.1%)	0	4 (12.1%)	
		Total	33 (100%)	0	33 (100%)	
3	Upper middle class	Vaccinated	6 (33.3%)	0	6 (33.3%)	
		Partially vaccinated	11 (61.1%)	0	11 (61.1%)	
		Unvaccinated	1 (5.6%)	0	1 (5.6%)	
		Total	18 (100%)	0	18 (100%)	

There was significant association between education status of fathers and mothers with vaccination status of families as shown in tables 5 and 6 below (p value 0.014 and 0.035 respectively).

Table 5. Education status father and vaccination of families.

S/No	Education status father	Vaccination Status	Rural population	Nomadic population	Total	P value
1	Uneducated	Vaccinated	3	2	5	P = 0.014
		Partially vaccinated	53	60	113	
		Unvaccinated	9	32	41	
		Total	65	94	159	
2	Primary	Vaccinated	6	4	10	
		Partially vaccinated	14	2	16	
		Unvaccinated	3	0	3	
		Total	23	6	29	
3	Matric	Vaccinated	7	0	7	
		Partially vaccinated	3	0	3	
		Unvaccinated	2	0	2	
		Total	12	6	12	

Table 6. Education status mother and vaccination of families.

S/No	Education status Mother	Vaccination Status	Rural population	Nomadic population	Total	P value
1	Uneducated	Vaccinated	1	6	7	P = 0.035
		Partially vaccinated	58	62	120	
		Unvaccinated	14	32	46	
		Total	73	100	173	
2	Primary	Vaccinated	8	0	8	
		Partially vaccinated	10	0	10	
		Total	18	0	18	
3	Matric	Vaccinated	7	0	7	
		Partially vaccinated	2	0	2	
		Total	9	0	9	

4. Discussion

In the present study 11.9% children under 2 year were completely vaccinated, 65.8% were partially vaccinated and 22.4% children were unvaccinated. Rural and nomadic population had poor awareness about EPI vaccines, their age and schedule except polio vaccine. Most common reason attributing to poor vaccination uptake was lack of knowledge and awareness. Significant association was seen between education status of parents and immunization uptake.

Nomadic population of Balochistan has borne the brunt of poor vaccination in recent past in the form of outbreak of measles reported in Nasirabad and Zhob [6, 9]. Pakistan remains one of the two countries in world where polio is still endemic [10]. The menace of polio and burden of vaccine preventable diseases are result of poor childhood vaccination and immunization in our country.

Saeedet al., conducted a study in Karachi to assess vaccination rate of children, found 91% of parents had skipped one or more vaccines of EPI schedule which closely resembles our finding of 89% [4]. Most frequent cause of skipping vaccination was unavailability of vaccines (19.8%) followed by long distance to vaccination facility (18.7%). However we found lack of knowledge about childhood vaccines as most common culprit (28.8%) followed by the perception that vaccines are harmful (10.2%). Similar picture was seen in a study carried out by Jamal et al., in rural Sindh [11]. Yazdani et al., surveyed peri-urban slums of Karachi and reported that 51% of children had poor vaccination (missed one or more of vaccinations) and 49% were completely vaccinated which is sharply different from our findings [7]. Karachi is the biggest city of Pakistan with easy accessibility and better resources than far flung underprivileged provinces like Balochistan, resulting in better routine immunization uptake in such cities. However, Yazdani et al., found lack of knowledge and awareness as the commonest culprit of missing vaccination (same as in our study). Murtaza et al., reported in their study that 34.8% of children in Balochistan are unvaccinated [12]. They reported lack of awareness and lack of vaccination teams' visit as the most frequent attributors. Literacy and education were significant factors listed in their study that seconds our finding. Khattak et al., carried out similar study in Bannu of KPK province. They found that nearly one third of parents

(27.9%) refused vaccination of their children [13].

Socioeconomic status of parents did not appear a significant factor for poor immunization in our study. However, Saeed et al., and Khattak et al., have reported it a significant factor in their studies [4, 13]. Lucyk et al, reviewed the literature and found 52.4% articles showing significant association between socioeconomic status and pediatric immunization, 4.5% showed negative association and 14.3% revealed no association [14].

Lack of awareness and knowledge about childhood routine immunization/vaccinations is the commonest factor of poor immunization of children that is coupled with low literacy and education of parents. Public spending in these two most important fields (health and education) is very dismal in Pakistan and among the lowest in the world [15].

Rural and especially nomadic populations of Balochistan serve as pockets of poor immunization that is alarming. Urban coverage of routine childhood immunization may be better but rural, underprivileged and nomadic populations are poorly covered. Policy makers should emphasize on better routine immunization of children in these areas. Public awareness should be enhanced about pediatric immunization, their benefits and address the negative campaigns/propaganda. Data of children in rural and especially nomadic population should be recorded with help an online app and brought on digital platform. Because of migratory nature and culture of nomadic tribes, online follow-up and record can serve the purpose. These modern tactics can help fight the menace of vaccine preventable diseases much efficiently in our country and is the need of the hour. This way routine immunization of every child can be followed and monitored online, sitting far in decision making halls of capital cities.

5. Conclusion

Pakistan is unfortunately still facing the evil of VPDs especially polio. The root reason of this menace is poor immunization coverage and uptake, especially in the far flung areas i.e rural and nomads. That is why this study is carried out in the biggest and scarcely populated province of Pakistan with scattered villages having poor access and road infrastructure. Routine immunization of children in rural and nomadic population of Balochistan is found to be dismal. Main culprits are lack of knowledge and awareness,

compounded by illiteracy and poor education status of parents. Policy makers should make earnest efforts to overcome this threat for future of the nation.

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