Original Research Article

The practices of parents regarding their child immunization in the regions of Lahore, Pakistan

ABSTRACT

Background: Childhood immunization is a key strategy of the World Health Organization (WHO) to reduce child mortality. Despite this, Pakistan continues to struggle with vaccine-preventable diseases due to a significant number of unvaccinated children. This study aims to investigate the factors influencing parents' decisions regarding childhood immunization in Pakistan, with a focus on understanding parental practices and perceptions surrounding vaccination

Method: A cross-sectional study was conducted to assess parent's practices toward vaccination of their children in Lahore, Pakistan. Validated questionnaires was used to evaluate parent's practices of childhood vaccination. The research population was 353 parents living in urban and rural areas of Lahore with children of different ages. The data collected through a questionnaire entered and analyzed by using SPSS program v21, IBM. P-values less than 0.05 were considered as statistically significant values.

Results: Out of 353 parents surveyed, majority of the study subject were mothers (56.1%) with age 25-29 years with percentage 30.0%, stating that majority of the parents have poor practice (75.4%) and good practice (24.6%). Variables like occupation, number of children, residency, living class and health care providers in respondent family shows highly significant statistical association ($p<0.001$) with patient's practice regarding their child immunization.

Conclusion: The poor practice towards child immunization indicates a concerning gap in immunization adherence. The study revealed that a significant majority of parents demonstrated poor practices highlighting critical public health issues despite awareness campaigns. Factors such as limited access to healthcare facilities, socioeconomics challenges and cultural beliefs contribute poor practice. The findings emphasize the need for improved support system and educational initiatives to bridge the gap between knowledge and practice, to enhance vaccination rates and improving public health outcomes.

KEYWORDS: Parents, Practice, Child immunization, Sociodemographic characteristics, Children, Vaccination

INTRODUCTION:

Vaccination is a proven and one of the most cost-effective child survivals interventions [1]. All countries in the world have an immunization program to deliver selected vaccines to the targeted beneficiaries, specially focusing on pregnant women, infants and children, who are at a high risk of diseases preventable by vaccines [2]. There are at least 27 causative agents against which vaccines are available and many more agents are targeted for development of vaccines [1]. The number of antigens in the immunization programs varies from country to country; however, there are a few selected antigens against diphtheria, pertussis, tetanus, poliomyelitis, measles, hepatitis B which are part of immunization programs in most of the countries in the world [2]. Though a proven cost-effective preventive intervention, the benefits of immunization is not reaching to many children who are at the maximum risk of the diseases preventable by these vaccines [1]. Majority of the children who do not receive these vaccines live in

developing countries [3]. As per the recent nation-wide survey data, of the targeted annual cohort of 26 million infants in India, only 61 per cent had received all due vaccines [1].

Vaccines help protect against many diseases that used to be much more common, such as diphtheria, mumps, measles, pertussis (whooping cough), meningitis, and polio[2]. With the advent of the COVID-19 pandemic, the rate of developing and delivering vaccines has been at a much faster pace than traditional vaccine development and delivery[3]. When developing vaccine policy and regulatory structures, whether it is during a public health emergency or non-emergency event, key considerations for vaccines include balancing safety and speed, equity and effectiveness, value and innovation[1].Vaccine enthusiasm and acceptance will vary across regions and populations, as well as the level of trust the public will have in the institution or actor delivering the public health messages about vaccines[4].

The main aim was to immunize 0–2-year-old children (and pregnant women) and achieve above 85% coverage and to integrate immunization into routine activities of all primary health care systems [4]. To reduce infant morbidity and mortality rate, immunization against preventable diseases including Tuberculosis, Poliomyelitis, Diptheria, Pertussis, Neonatal Tetanus, Measles, Yellow Fever, Hepatitis B, Haemophilusinfluenzae type Cerebro-Spinal Meningitis (CSM), Pneumococcus, Rotavirus, Human Papilloma Virus (HPV) and other vaccine-preventable diseases was given more emphasis[5].

Vaccine safety evaluation requires very high data quality standards because of the serious implications of measured associations[4]. Erroneous associations can undermine confidence in a vaccine and result in reduced vaccine acceptance and increased vaccine-preventable disease incidence[3].Up until recently, vaccination records were kept on paper in medical charts, vaccination logs, and registries but,

computerized medical records and vaccination databases are replacing these paper-based records[3]. Population-based, automated vaccination databases serve as a foundation for regional immunization registries and offer a way to maintain high vaccination coverage in the face of increasingly complicated immunization schedules[2]. The accuracy of immunization records entered into these computer-based immunization tracking systems is still being evaluated[2].

Anti-vaccination organizations are addressing a wide range of vaccine safety issues, as are other groups whose worries may be a reflection of regional traditions or of religious, political, or other convictions[1]. It is also necessary to be knowledgeable about topics that may represent particular or local ideas and attitudes while responding to media or anti-vaccination charges[3].Additionally, building media relationships by promptly and appropriately reacting to vaccine safety concerns and projecting credibility as a dependable, trustworthy communication partner will be essential to combating the anti-vaccination movement and vaccination scares[2]. Effective action also depends on knowing where to go for trustworthy, useful information and where to get assistance when looking into local occurrences[5].

Despite being a disease that can be prevented with a vaccine, tetanus nonetheless results in over 50,000 deaths annually worldwide[1]. The majority of tetanus morbidity and mortality are borne by developing nations without access to vaccination programs[5]. Less than 60 instances of tetanusincluding maternal, neonatal, and other cases—are documented in the United States each year[6].

One important part of primary health care services that helps prevent and control infectious disease epidemics is vaccination[2]. Vaccines reduce the number of children who die from infectious diseases by two to three million per year [3]. Childhood vaccination is therefore one of the WHO's strategies for lowering the rate of vaccine-preventable diseases, child mortality and morbidity, and medical

expenses associated with infectious diseases, all of which may ensure that children have a higher quality of life [1]. The Global Vaccine Action Plan, a framework established by the WHO, intends to eradicate vaccine-preventable diseases by 2020;sadly, most children worldwide, particularly in developing nations, did not meet the goal global immunization coverage of 90%[7].

In 1988, the World Health Organization (WHO) projected that at least 350,000 children worldwide contracted poliomyelitis annually[6]. Even though there has been impressive progress in the previous ten years toward the global elimination of polio, no nation can be considered safe until the last case has disappeared[7]. Three nations—Pakistan, Afghanistan, and Nigeria—kept receiving confirmed cases of polio (isolation of wild poliovirus from stool samples) and were classified as endemic until September 2015, when Nigeria's advancements caused the WHO to remove Nigeria from the list[8].

The World Health Organization (WHO) launched a global immunization campaign in contrast to its national immunization program, which covered six vaccine-preventable diseases, because of the smallpox elimination, which was one of the historical achievements that alerted and induced a prompt Disease Early Warning System extensive and indiscriminate field response against the vaccine-preventable infectious diseases[6]. In May 1974, the World Health Organization (WHO) launched the Expanded Programme on Immunization (EPI) globally, with the goal of impeding six vaccine-preventable diseases by the year 2000[9].

Global Polio Eradication Initiative was established in 1988 through a relationship between the united Nations Children’s Fund (UNICEF), Rotary International and World Health Organization (WHO)[9]. In comparison with 1988, incidence of polio had decreases by >99% in 2012[4]. It stands out as one of the largest, internationally coordinated health project with the aim to end the transmission of polioviruses and also to end its cases[10].

Vaccination acceptance is an outcome behavior resulting from a complex decision-making process that may be influenced by many factors[8].

In the "3 Cs" model, confidence is defined as trust in the effectiveness and safety of vaccines, the system that delivers them, including the reliability and competence of the health services and health professionals and the motivations of policymakers who decide on the needed vaccines[10].

Cost effectiveness is becoming an important factor for stakeholders who have to decide to add vaccine into national immunization programs versus alternative use of resources[11]. For evaluation of cost effectiveness, relevant economic, epidemiological and biological factors require use of a model. Analyst should be more transparent with each other to improve communication about cost effective vaccination program[12], [13].The present study aimed to access the factors influencing parents' decisions regarding childhood immunization in Pakistan, with a focus on understanding parental practices and perceptions surrounding vaccinations.

METHODOLOGY:

Study Design & Study Subjects

A multi-centered, cross sectional observational study was conducted to evaluate thepractice of the parents regarding their child immunizationinLahore,Pakistan. Quantitativeresearchmethodologyinvolving validated questionnaires and research tools were utilized in order to evaluate theknowledge of the parents regarding their child immunization.

Thedataforthisresearchprojectwascollectedfromparentsfrom Lahore,Punjab. Study population was 353 parents belongs to urban and rural areas of Lahore having children of different ages.

A questionnaire in native language was provided to partcipants, and data wascollected after consent to participate. The incomplete responses were excluded from the final study. Ethical approval from Institutional Ethical Review Board and Bio-Ethical Committee(BEC)ofLahore university of Biological & Applied Scienceswasattainedbefore enrolling patients for the current study.

Inclusion & exclusion criteria

The inclusion criteria for this research included parents or guardians from different rural and urban areas of Lahore that are healthcare and non-healthcare providers who willingly participated in the current study by signing the questionnaire.

However, the parents whose children were above 4 years and do not provide full information and do not complete the questionnaire were excluded.

Sample size,

Samplesizewascalculatedaccordingto theconvenient sampling technique.Approximately353 parentsbothmother andfather were approachedfor the datacollection. Among which, the parents who provided consent were included in the present study. Study settings of this research were the rural and urban areas of Lahore. Study duration was of 6 months approximately.(OK)

Questionnaire Development

The questionnaire was divided into different sections regarding demographic factors and knowledge of parents regarding child immunization. The demographic section involved information on age of parents and child, relationship of parents with child, gender of child, occupation of parents, number of children, living class, residency, marital status, religion and healthcare provider in family. The knowledge

section involved information about child immunization, effectiveness of vaccination, schedule of vaccination, parent's belief regarding their child immunization, benefits of EPI program, side effects of vaccination, diseases prevented by vaccination, child immunity, mortality rate and disability.

The questionnaire was designed after an extensive literature review of the published research. After developing each question was reviewed to ensure it aligned precisely with our objectives, and any questions that elicited unnecessary or sensitive information were removed. Afterwards, content validity was attained by sending it to 3 academicians who were expert, as the result of their suggestions the questionnaire was modified and face validated by checking on small number of respondents. The pilot study was conducted on small number of parents and Cronbach's alpha value of 0.76 was attained for knowledge questions. The results of pilot study were not included in the study's results. The first part of the questionnaire contained demographic information of the parents, followed by 10 Knowledge questions. The cut off points were decided on 60% scores for appropriate knowledge.

Statistical analysis

The data collected from the study subjects was analyzed and interpreted by using SPSS v21,IBM. Descriptive and inferential statistics were appliedtosummarizethe variables.Categoricalvariableswerepresentedas frequencies and percentages. To find factors regarding associations between independent variables, chisquare tests (Pearson chi square) were applied and where assumptions of chi-squareanalysis requirements were not met, Fisher exact tests were applied to calculate p-values. P-values less than 0.05 wereconsideredasstatisticallysignificantvalues.

RESULTS:

The current study recruited 353 parents from different private and government hospitals. Majority of the study subject were mothersi.e 56.1% with age 25-29 years with percentage 30.0%. Majority of the child were male i.e 51.6% with age above than 1 years (39.4%). Majority of the parents have 3-4 children with 55.5%. Majority of the parents were Non-Health Care Providers i.e 66.3% who were resident mostly in rural areas i.e 66.3% , with majority of them belongs to middle class i.e 55.5%. Most of them do not have health care providers in their family i.e 66.3%.

Table 1: Demographics Characteristics of study subjects (N=353)

No	Variables	Categories	Frequency (N)	Percentage (%)
1	Parent Age	15-19	20	5.7
		20-24	46	13.0
		25-29	106	30.0
		30-34	88	24.9
		35-39	93	26.3
2	Child Age	< 1 Month	17	4.8
		1-4 Month	47	13.3
		5-8 Month	83	23.5
		9-12 Month	67	19.0
		> 1 Year	139	39.4
3	Relationship with Child	Mother	198	56.1
		Father	152	43.1
		Guardian	3	0.8
4	Gender of Child	Male	182	51.6
		Female	171	48.4

5	Occupation	Health Care Provider	119	33.7
		Non- Health Care Provider	234	66.3
6	No of Children	1-2	111	31.4
		3-4	196	55.5
		5-6	46	13.0
7	Residency	Rural Area	234	66.3
		Urban Area	119	33.7
8	Living Class	Lower Class	46	13.0
		Middle Class	196	55.5
		Upper Class	111	31.4
9	Marital Status	Married	306	86.7
		Divorced	35	9.9
		Widow	12	3.4
10	Religion	Muslim	330	93.5
		Non-Muslim	23	6.5
11	Health Care Professional in your family	Yes	119	33.7
		No	234	66.3

The study was conducted to access the practice of parents regarding their child immunization. The respondents were asked to provide information about the time utilized for immunization. Most of the parents were had to wait for about less than 15 minsi.e 48.4% and time spent on their child immunization were less than 15 min i.e 53.8% to get their child immunized.

Table 2: Time Utilized For Immunization

Sr. No	Variables	Categories	N (%)
1	Waiting Time Before Immunization Process	< 15 mins	171 (48.4)
		15-29 mins	149 (42.2)
		30-60 mins	22 (6.2)
		>60 mins	11 (3.2)
2	Time Spent on Immunization	< 15 mins	190 (53.8)
		5-10 mins	158 (44.8)
		>10 mins	5 (1.4)

Table 3 demonstrate practice of parents regarding their child immunization stating that majority of the parents have poor practice (75.4%).

Table 3: Knowledge of parents regarding their child immunization

No.	Variables	Categories	N (%)
1.	Practice	Good practice	87 (24.6)
		Poor practice	266 (75.4)

Figure-1: Parental practices regarding their child immunization

The parent's perception that health care provider guide the parents regarding immunization is strongly disagree i.e 56.4%. The parent's perception regarding that

side effects do not appear after vaccination is strongly disagree (45.0%). The parent's practice regarding the completion of their child immunization on time is strongly disagree (44.8%) and vaccination is not a time consuming process was highly disagree (46.5%). The perception that health care providers informed the parents about type of vaccines was highly disagree. The practice of parents about managing swelling with cold compress was strongly disagree (51.3%) and the use of antipyretics after getting fever was strongly disagree (51.6%). The parent's perception about not missing a single dose of vaccine their child was disagree (52.4%) and vaccination date remainder to parents was also strongly disagree (55.5%). The parent's practice regarding vaccination procedure in our country is strongly not satisfactory (60.9%).

Table 4: Response of parents regarding practicesof immunizations: N(%)

No	**Questions**	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1	Health care providers guide the parents about immunization.	199 (56.4)	51 (14.4)	28 (7.9)	20 (5.7)	55 (15.6)
2	Side effects do not necessarily appear after vaccination.	159 (45.0)	79 (22.4)	35 (9.9)	20 (5.7)	60 (17.0)
3	Was your immunization course completed on time?	158 (44.8)	75 (21.2)	37 (10.5)	20 (5.7)	63 (17.8)
4	Vaccination is not a time-consuming process.	164 (46.5)	65 (18.4)	39 (11.0)	19 (5.4)	66 (18.7)
5	Did the healthcare provider inform you about the type of vaccine?	182 (51.6)	57 (16.1)	27 (7.6)	9 (2.5)	78 (22.1)
6	Did you manage swelling with a cold compress?	181 (51.3)	48 (13.6)	28 (7.9)	17 (4.8)	79 (22.4)
7	Did you use antipyretic/analgesic after getting	182 (51.6)	51 (14.4)	38 (10.8)	13 (3.7)	69 (19.5)

	fever?					
8	You did not miss even a single dose of vaccine.	185 (52.4)	50 (14.2)	43 (12.2)	12 (3.4)	63 (17.8)
9	Vaccination visit date reminder was not required.	196 (55.5)	49 (13.9)	40 (11.3)	14 (4.0)	54 (15.3)
10	Are you satisfied with the vaccination procedures in your country?	215 (60.9)	49 (13.9)	27 (7.6)	14 (4.0)	48 (13.6)

Figure-2: Parental response to practice items

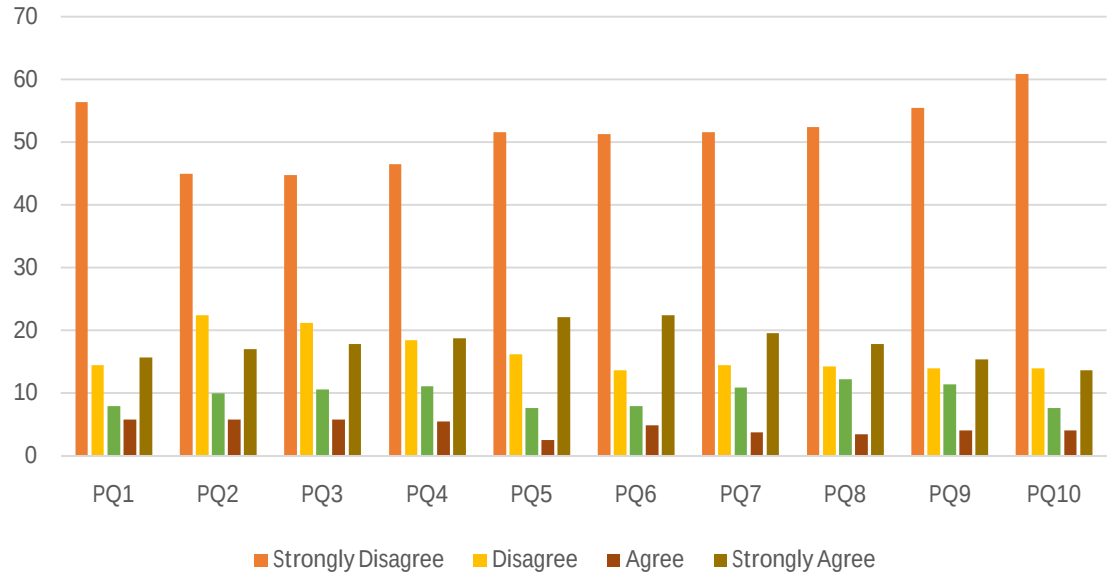

Table 5 provides the association of demographics variable with parent's practice It was observed through statistical analysis that the occupation, no of children, residency, living class and health care providers in respondent family shows highly significant statistical association ($p<0.001$) with parent's practice regarding their child immunization.

Table 5: The association of demographic variables with parent's practice

No	Variables	Categories	Practice Category	P-Value	Effect Size

			Good	Poor		
1	Parent Age	15-19	6(30.0%)	14(70.0%)	0.385	-
		20-24	15(32.6%)	31(67.4%)		
		25-29	20(18.9%)	86(81.1%)		
		30-34	24(27.3%)	64(72.7%)		
		35-39	22(23.7%)	71(76.3%)		
2	Child Age	< 1 Month	4(23.5%)	13(76.5%)	0.427	-
		1-4 Month	9(19.1%)	38(80.9%)		
		5-8 Month	22(26.5%)	61(73.5%)		
		9-12 Month	12(17.9%)	55(82.1%)		
		> 1 Year	40(28.8%)	99(71.2%)		
3	Relationship with Child	Mother	52(26.3%)	146(73.7%)	0.147	-
		Father	33(21.7%)	119(78.3%)		
		Guardian	2(66.7%)	1(33.3%)		
4	Gender of Child	Male	45(24.7%)	137(75.3%)	0.972	-
		Female	42(24.6%)	129(75.4%)		
5	Occupation	Health Care Provider	79(66.4%)	40(33.6%)	<0.001	0.691
		Non- Health Care Provider	8(3.4%)	226(96.6%)		
6	No of Children	1-2	73(65.8%)	38(34.2%)	<0.001	0.564
		3-4	12(6.1%)	184(93.9%)		
		5-6	2(4.3%)	44(95.7%)		
7	Residency	Rural Area	8(3.4%)	226(96.6%)	<0.001	0.691
		Urban Area	79(66.4%)	40(33.6%)		
8	Living Class	Lower Class	2(4.3%)	44(95.7%)	<0.001	0.564
		Middle Class	12(6.1%)	184(93.9%)		
		Upper Class	73(65.8%)	38(34.2%)		
9	Marital Status	Married	78(25.5%)	228(74.5%)	0.269	-
		Divorced	5(14.3%)	30(85.7%)		
		Widow	4(33.3%)	8(66.7%)		
10	Religion	Muslim	79(23.9%)	251(76.1%)	0.243	-
		Non-Muslim	8(34.8%)	15(65.2%)		

11	Healthcare professionalin family	Yes	79(66.4%)	40(33.6%)	<0.001	0.691
		No	8(3.4%)	226(96.6%)		

DISCUSSION:

The present study discusses the practices of child vaccination in Pakistan. Vaccination is a crucial step in achieving child immunization. Only 24.6% of the participants reported good practices, while 75.4% reported poor practices. These results highlight an important public health issue, despite awareness programs, many caregivers lack the resources, knowledge, or motivation to follow optimum immunization practices for their children.

A total of 353 parents were included in the sample size of the study from urban and rural areas of Lahore, Pakistan. The data was collected from both mothers and fathers. It is a multi-centered, cross sectional observational study. Poor vaccination practices according to this study is associated with various factors. Parents occupations were a leading factor, healthcare providers showing much better immunization practices for their children compared to non-healthcare providers. Nearly all children (99.2%) of healthcare professionals were fully immunized, while only 3.8% of children with non-healthcare parents received full immunization. Similarly, family size played a role. Parents with fewer children (1-2) had higher immunization rates (99.1%) compared to larger families (3-4) that is 7.7% and 5-6 is only 4.3% where immunized. Residency also influenced immunization practices. Children in urban areas had much higher immunization rates (99.2%) compared to those in rural areas, where only 3.8% of children were fully immunized. Socio-economic status was another important factor, with families from higher economic classes having better immunization practices.

Among upper-class families, 99.1% of children were fully immunized, while only 4.3% of lower-class children were immunized. Having a healthcare professional in the family greatly impacted immunization practice, as 99.2% of children in these families were fully immunized compared to only 3.8% in families without a healthcare professional. This highlights how medical knowledge, access, and support can improve health outcomes.A study conducted in Lebanon in 2020 revealed similar practices outcome [14]. The good practice of child vaccination was Only 32.8% which highlights poor adherence. It also showed that literate parents had better immunization practices as compared to illiterate. Education is linked with good adherence [14].

A study conducted in China from 2022 to 2023 contradicts the idea that good knowledge is associated with better practice. The survey found that most parents have good knowledge and attitudes about the influenza vaccine, but only 30.56% of parents said their children had been vaccinated against influenza in the past year [15]. The results indicated a gap between parents' preferences and their vaccination practice. The main reason for not getting a vaccine was lack of recommendation [15].

In contrast the poor adherence to vaccination was 45 % in the case of Nairobi. In terms of vaccination by the age of 12 months, about half of the children in Nairobi’s settlements did not receive all the vaccines while this proportion is less than 15 % in Ouagadougou [16].The possible explanation to this is the difference in living class. Lack of knowledge and less awareness about vaccines are the main barriers to prevent vaccination. Socio-economic factors as well as certain characteristics such as religious beliefs are considered barriers to vaccination [17].

In contrast to vaccination practices mentioned above some countries adhere better practices. A study conducted in Malaysia, published in 2018 showed 90%

adherence to vaccination practices. Mothers were having better knowledge and practice as compared to fathers [17].

Similarly, a cross sectional survey study that was carried out upon 420 parents that were randomly selected from public areas. The study revealed good practices that is 73%. The associations involved educational level, locations and family size [18].

The main reasons behind vaccine refusal are lack of faith in the quality of the vaccine, followed by fear of side effects, head of the household not allowing vaccination, video clips on social media and lack of trust. Parents are influenced by fear of vaccination, fear of vaccine side effects, and basic education. It was reported in a cross-sectional study conducted in Indonesia. A survey of parental vaccination in Ireland also reported parental concern about vaccine side effects, vaccine safety and the number of vaccines given [19].

According to the present study, the presence of healthcare professional is positively associated with the parental practices of child immunization. These results are in accordance with another study conducted in Lahore, Pakistan, which also imposes the similar results that presence of healthcare professional in immediate family significantly enhances the knowledge and practices of family members [20], [21].

Conclusion: This study highlights a concerning gap in how parents are managing their children's immunizations, with only 24.6% following proper vaccination practices and 75.4% falling short. The results point to major barriers like limited access to healthcare, lack of awareness, and misinformation, especially in rural areas. To boost immunization rates and safeguard children's health, we need targeted efforts that improve education, make healthcare more accessible, and engage communities. Tackling these challenges is essential to overcome the gap and ensuring healthier practices for children, as vaccination is an inborn right of every child.

Limitations of the study:

The study was conducted in selected areas including house to house survey therefore the chance for practice of child immunization in working mothers is missed.

RECOMMENDATIONS

The study revealed that a significant majority of parents demonstrated poor practices highlighting critical public health issues despite awareness campaigns. Factors such as limited access to healthcare facilities, socioeconomics challenges and cultural beliefs contribute poor practice. The findings emphasize the need for improved support system and educational initiatives to bridge the gap between knowledge and practice, to enhance vaccination rates and improving public health outcomes.

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