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Parental Knowledge and Misconceptions Toward Childhood Immunization in the Doluwa MOH Area, Sri Lanka

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ABSTRACT

Introduction: The Expanded Program of Immunization (EPI) has significantly reduced vaccine-preventable diseases in Sri Lanka. However, gaps in parental knowledge and misconceptions remain, posing challenges to national immunization efforts. **Objectives:** This study aimed to evaluate parental knowledge and misconceptions regarding childhood immunization and identify factors influencing parental knowledge in the Doluwa Medical Officer of Health (MOH) area. **Methods:** A community-based cross-sectional descriptive study was conducted with 176 participants attending vaccination and well-baby clinics in purposively selected Public Health Midwife (PHM) areas within the Doluwa MOH area of Kandy district. Data were collected using a structured interviewer-administered questionnaire and Child Health Development Records. **Results:** The study included 176 parents, with a mean age of 31 years. While 87.8% of parents demonstrated a basic understanding of the general benefits of vaccination, significant gaps were observed in knowledge regarding specific diseases prevented by vaccines. 72% of participants were unaware of non-EPI vaccines available in the private sector. However, 88.6% of participants preferred vaccination over allowing children to develop natural immunity through illness. Significant associations were identified between immunization knowledge and education level and ethnicity ($F = 5.003$, $p < .001$). Public Health Midwives were the primary source of vaccination information for all participants with a high level of trustworthiness (4.95/5). Misconceptions were relatively minor and infrequent. **Conclusion:** While parental knowledge about vaccination is generally good, gaps persist regarding specific disease prevention and awareness of non-EPI vaccines. Public Health Midwives, as highly trusted sources of information, are well-positioned to address these gaps through targeted educational initiatives.

Keywords: Vaccination, Expanded Program on Immunization, Vaccination knowledge, Sri Lanka

INTRODUCTION

The Expanded Program on Immunization (EPI), initiated by the World Health Organization (WHO)

in 1974, aims to ensure equitable access to essential vaccines for infants, children, and mothers. Sri Lanka adopted the EPI in 1978, resulting in a significant reduction in the incidence



of polio, measles, diphtheria, pertussis, tetanus, and rubella. These reductions underscore not only the effectiveness of vaccines but also the concerted efforts of healthcare professionals, governments, and international organizations.

Despite the success of Sri Lanka's EPI program, vaccine hesitancy continues to be a challenge. Defined as a "delay in acceptance or refusal of vaccines despite the availability of vaccination services," vaccine hesitancy undermines herd immunity, which depends on a critical portion of the population being immunized to interrupt the transmission of diseases.

Parents, as primary decision-makers regarding their children's health, play a crucial role in vaccine uptake. Their knowledge, beliefs, and perceptions about vaccines can either facilitate or challenge national immunization efforts. A lack of knowledge regarding vaccination may subject parents vulnerable to misconceptions, leading to poor adherence and expose children to vaccine-preventable diseases.

Parental knowledge is influenced by their sociodemographic factors, as well as the sources from which they acquire information about vaccination. While most studies on this topic have focused on urban areas and major hospitals, our study seeks to fill the gap by investigating parental knowledge, misconceptions, and the factors contributing to them in a rural setting.

The general objective of this study was to evaluate parental knowledge and misconceptions toward childhood immunization and identify factors influencing parental knowledge among parents having children equal to or less than five years of age in the Doluwa Medical Officer of Health (MOH) area.

METHODOLOGY

A descriptive cross-sectional study was conducted in seven Public Health Midwife (PHM) areas within the Doluwa MOH region during March 14 to April 08, 2024. The Doluwa MOH area is situated in the Kandy district, Central Province of Sri Lanka. The Doluwa MOH region consists of 18 PHM areas, and

the study was carried out at Vaccination and Well-Baby Clinics in seven selected PHM areas.

The sample size for the study was calculated based on the formula for estimating a population proportion [$n = z^2 p (1-p)/d^2$](1). A z value of 1.96 and a degree of precision of 7.5% was considered and anticipated population proportion(p) was set at 50% as the "safest option" since p is not known (1). Similar method has been used in previous studies (2). As the above formula is used for an infinite population, it was corrected to a finite population considering a estimated population size of 2000 in PHM areas. Final sample size was calculated as 173.

Inclusion and Exclusion Criteria:

Parents accompanying their biological child aged five years or younger to the MOH clinic were included in the study. If the biological parents were deceased, the legal guardian was included. Participants were excluded if they did not provide informed consent, accompanied a child older than five years. If a parent or guardian had multiple children, only the oldest child was considered. Additionally, those residing outside the Doluwa MOH area or without a Child Health Development Record were excluded.

Cluster sampling was employed, with each PHM area considered a cluster. Seven out of 18 clusters were selected to represent the study population. All eligible participants presenting to the clinic on the day of data collection were considered. 176 parents residing in the Doluwa MOH area, who accompanied their biological child aged five years or younger to the clinics, were included in the study.

Data were collected using a pre-validated, interviewer-administered questionnaire, custom developed for the Sri Lankan context based on previous studies (3)(4). Interviews were conducted by trained interviewers in the native language of parents. Vaccination compliance data were obtained from Child Health Development Records.

Data Analysis

Data were analysed using Microsoft Excel and the

Statistical Package for the Social Sciences (SPSS) version 27. Descriptive statistics, including proportions, percentages, and means with 95% confidence intervals, were utilized.

Maternal knowledge was assessed based on respondents' ability to provide correct answers to a series of questions in the questionnaire. True or false questions were scored as 0 or 1 depending on the response. The open-ended question on the purpose of vaccination was analysed through thematic analysis, with responses scored from 1 to 5 based on the range and completeness of themes covered. An overall knowledge score was calculated, yielding a value between 0 and 1. This score was then used in a linear regression model to examine associations with the sociodemographic factors of the population. One way ANOVA and turkey post hoc test was employed to assess the significance of the differences of means.

RESULTS

A total of 180 responses were collected from seven PHM areas, with four responses excluded due to incomplete data, resulting in 176 responses for the final analysis. The majority of participants were mothers (169, 96%) with a mean age of 31 years (SD $\pm$ 6 years) (Table 1).

Table 1: Demographic characteristics of the study participants

Characteristic	N (%)
Childs Sex	
Female	90 (51.1%)
Male	86 (48.9%)
Birth order of the child	
1st Child	72 (40.9%)
2nd Child	59 (33.5%)
3rd Child	40 (22.7%)
4th Child	5 (2.8%)
Relation to the child	
Mother	169 (96%)
Father	6 (3.4%)
Legal guardian	1 (0.6%)
Religion	
Buddhism	117 (66.5%)
Hindu	40 (22.7%)
Muslim	12 (6.8%)
Christian	7 (0.4%)
Ethnicity	
Sinhalese	120 (68.2%)

Muslim	11 (6.3%)
Tamil	45 (25.6%)
Education level	
Not schooled	1 (0.6%)
Primary	19 (10.8%)
Ordinary level	79 (44.9%)
Advanced level	63 (35.8%)
Graduate	13 (7.4%)
Postgraduate	1 (0.6%)
Occupation status	
Unemployed	151 (85.8%)
Employed	25 (14.2%)
Monthly income	
< 25,000 Rs	37 (21%)
25,000 – 50,000 Rs	80 (45.5%)
50,000 – 100,000 Rs	39 (22.2%)
>100,000 Rs	17 (9.7%)
Data not revealed	3 (1.7%)

The common themes regarding the primary purpose of childhood vaccination are tabulated in Table 2. Most parents (87.8%) demonstrated a basic understanding of the purpose of vaccination. However, a subset (8%) lacked knowledge, and few parents (4.3%) held misconceptions. Notably, these misconceptions included beliefs such as "vaccines provide children with vitamins and nutrition," "vaccines aid in brain development," and "vaccines prevent diseases emerging seasonally."

Table 2: Thematic analysis of the primary purpose of immunization

Themes	Count	Percent (%)
Disease prevention and maintaining good health	138	73.4
Building up or increasing immunity	27	14.4
Misconceptions	8	4.3
Lack of knowledge	15	8.0
Total	188	100.0

Participants were also asked to name three diseases prevented by vaccines given in the EPI (Table 3). Among the 176 participants, 37 (21%) correctly identified one disease, 32 (18.2%) named two, and 42 (23.9%) accurately named three. Notably, 18.2% of respondents provided incorrect answers, while 23.3% did not respond. Additional questions assessing knowledge are summarized in Table 4.

Table 3: Types of answers given for naming EPI vaccines

True answers	Count	Percent (%)
One true answer	37	21.0
Two true answers	32	18.2
Three true answers	42	23.9
Don't know	41	23.3
False answers	32	18.2

Table 4: Other questions for knowledge assessment

Question	Answer	Count	Percent (%)
Do you think the effects of vaccination given to children equal to or under five years of age protect them during adulthood?	Don't know	12	6.8%
	No	15	8.5%
	Yes	149	84.7%
Do you have any understanding of additional vaccines that are offered by the private sector?	No	127	72.2%
	Yes	49	27.8%
Do you think it is better for your child to develop natural immunity by getting sick rather than receiving a vaccination?	Don't know	3	1.7%
	No	156	88.6%
	Yes	17	9.7%

The primary source of vaccination information for all 176 respondents was the PHM, who received a mean trustworthiness rating of 4.95 (SD = 0.235) (Table 5).

Statistically significant associations have been found between immunization knowledge and both education level and ethnicity ($F = 5.003$, $p < .001$). However, no significant associations were found with the sex of the child, child's age, parent's age, birth order, religion, occupation status, or income. (Table 6).

Table 5: Sources of information about vaccination

Source of information			Trust			
Data sources	Count	Percent (%)	Mean	Minimum	Maximum	SD
PHM	176	100.0	4.95	3	5	0.235
Internet - Webpages	17	9.7	2.53	1	4	0.874
Friends	15	8.5	3.47	1	5	1.187
Internet - Social media	12	6.8	2.83	1	4	0.937
Other parents	5	2.8	4.20	3	5	0.837
Neighbours	4	2.3	3.50	3	4	0.577
Primary healthcare providers	1	0.6	5.00	5	5	

Table 6: Linear regression full model: Factors associated with vaccination knowledge

Factor	Standard Error	t-Value	P-value	95% CI Lower	95% CI Upper
Sex of the Child	0.0206	0.1494	0.8814	-0.0376	0.0437
Child Age in months	0.0007	-1.1890	0.2361	-0.0021	0.0005
Birth order	0.0142	-0.3717	0.7106	-0.0334	0.0228
Age of the Parent	0.0021	1.1273	0.2612	-0.0018	0.0065
Religion	0.0227	0.0536	0.9573	-0.0437	0.0461
Ethnicity	0.0296	-2.2630	0.0249	-0.1255	-0.0086
Education level	0.0152	2.6879	0.0079	0.0108	0.0707
Occupation status	0.0308	-0.1223	0.9028	-0.0647	0.0571
Monthly income	0.0130	0.8671	0.3871	-0.0144	0.0371

A positive association was observed between education level and immunization knowledge, with higher educational attainment correlating with increased knowledge scores. The mean knowledge scores were highest among the Graduate group (0.6308), followed by the Advanced Level (A/L) group (0.5708), Ordinary Level (O/L) group (0.5013), and the Primary education group (0.4316). A detailed post-hoc analysis of immunization knowledge across different education levels is presented in Table 7.

Table 7: Tukey HSD Post Hoc Tests for education level

Education level (I)	Education level (J)	Mean Difference (I-J)	Standard Error	P - value	95% CI Lower	95% CI Upper
Primary	O/L	-0.0697	0.0357	0.2109	-0.1624	0.023
	A/L	-0.1392	0.0366	0.0011	-0.2341	-0.0443
	Graduate	-0.1992	0.0503	0.0006	-0.3297	-0.0686
O/L	Primary	0.0697	0.0357	0.2109	-0.023	0.1624
	A/L	-0.0695	0.0236	0.0191	-0.1308	-0.0083
	Graduate	-0.1295	0.0418	0.0122	-0.2381	-0.0209
A/L	Primary	0.1392	0.0366	0.0011	0.0443	0.2341
	O/L	0.0695	0.0236	0.0191	0.0083	0.1308
	Graduate	-0.06	0.0426	0.4958	-0.1705	0.0505
Graduate	Primary	0.1992	0.0503	0.0006	0.0686	0.3297
	O/L	0.1295	0.0418	0.0122	0.0209	0.2381
	A/L	0.06	0.0426	0.4958	-0.0505	0.1705

Ethnicity was also significantly associated with immunization knowledge. The mean knowledge score was highest among Sinhalese participants (0.5670), while Tamil (0.4420) and Muslim (0.4464) participants had nearly identical scores. Table 8 presents the post-hoc analysis of immunization knowledge across different ethnic groups.

Table 8: Tukey HSD post hoc tests for ethnic groups

Ethnicity (I)	Ethnicity (J)	Mean Difference (I-J)	Standard Error	P - value	95% CI Lower	95% CI Upper
Sinhalese	Tamil	0.1250	0.0239	0.0000	0.0684	0.1816
	Muslim	0.1206	0.0431	0.0160	0.0187	0.2226
Tamil	Sinhalese	-0.1250	0.0239	0.0000	-0.1816	-0.0684
	Muslim	-0.0044	0.0460	0.9950	-0.1132	0.1045
Muslim	Sinhalese	-0.1206	0.0431	0.0160	-0.2226	-0.0187
	Tamil	0.0044	0.0460	0.9950	-0.1045	0.1132

DISCUSSION

Childhood immunization has been the most important public health intervention in reducing child morbidity and mortality. Accurate parental knowledge about vaccinations is crucial for informed decision-making. In our study, while most participants had basic understanding of the general

benefits of vaccination, less than a quarter (23.9%) could correctly name three diseases prevented by vaccines. This gap in knowledge mirrors findings from similar studies done in Colombo and Southern Sri Lanka, where specific knowledge about the EPI vaccines and the diseases it prevents was limited (5)(2).

The lack of awareness about specific vaccines highlights the need for targeted educational efforts, particularly during antenatal and well-baby clinics. It is possible that parents may not recall the names of the vaccines due to infrequent discussions or reminders about them. Consistent education about vaccines and the diseases they prevent could address this knowledge gap.

Additionally, the study revealed that 72% of participants were unaware of vaccines available in the private sector, indicating a communication gap about non-EPI vaccines. Meanwhile, 88.6% of participants preferred vaccination over allowing children to develop natural immunity through illness. This positive attitude aligns with the similar study conducted at the National Hospital Peradeniya (6). This finding emphasizes the importance of the need to continuing to educate and reassure parents about the safety and efficacy of vaccines compared to natural immunity

Association of immunization knowledge and education level have been demonstrated in past local and international studies (6)(7)(8)(9)(10).

Further analysis with one-way ANOVA showed a statistically significant difference between educational levels ($F = 8.286$ $p < 0.001$). (Table 7). Participants with graduate-level education scored significantly higher than those with Ordinary Level ($P = 0.012$) or Primary Level ($P = 0.001$) education. Similarly, Advanced Level-educated participants scored higher than those with Ordinary Level ($P = 0.019$) or Primary Level ($P = 0.001$) education. Sri Lanka's high literacy rate, exceeding 90%, likely contributes to the high vaccination acceptance and coverage observed nationally.

Ethnicity was also significantly associated with immunization knowledge ($F = 15.706$ $p < 0.001$). Sinhalese participants had significantly higher knowledge scores compared to Tamils ($P < 0.001$) and Muslims ($P = 0.016$). This finding has not been reported in previous Sri Lankan studies (6). The discrepancy could be attributed to the demographic composition of our sample, where Sinhalese participants constituted 68%, with Tamils (6%) and Muslims (25%) representing minorities.

Several misconceptions about primary purpose of vaccination were observed among parents. These misconceptions, while relatively minor and not widespread, are due to a lack of clear knowledge about the functions of vaccines. This suggests that existing public health communication strategies, particularly those led by PHMs, are effective in disseminating accurate vaccination information and countering misinformation.

PHMs were identified as the primary source of vaccination information by all participants (100%), with a high level of trustworthiness (4.95/5). Parents also cited other sources, including social media, friends, and healthcare providers. The results underscore the critical role of PHMs as reliable and trusted sources of vaccination information, consistent with findings from other regions in Sri Lanka (6)(2).

This study provides valuable insights into parental knowledge and misconceptions regarding childhood immunization in a rural setting. A key strength of this study is the use of a structured, interviewer-administered questionnaire to ensure consistency in data collection. However there are several limitations. The study relied on self-

reported data, which is subject to recall bias. Additionally, the study population consisted of parents attending vaccination and well-baby clinics, introducing potential selection bias, as parents with poor knowledge and poor healthcare-seeking behavior may have been underrepresented. The use of degree of precision of 7.5% instead of the standard 5%, may limit the statistical power. Furthermore, the questionnaire was custom-developed based on previous studies and pre-tested for applicability but it had not been widely tested, which may introduce measurement bias.

CONCLUSION

This study highlights a high level of trust in government healthcare services, particularly Public Health Midwives (PHMs), among parents in the Doluwa MOH area. While parents demonstrated strong general knowledge about vaccination, notable gaps were observed in their understanding of the specific diseases that vaccines prevent. Education level and ethnicity were significantly associated with parental knowledge, while misconceptions about vaccination were relatively rare and less prevalent than in previous studies.

These findings suggest that current public health strategies have been effective in maintaining parental knowledge of immunization. However, targeted educational interventions are necessary to address specific knowledge gaps and ensure more comprehensive awareness. Strengthening immunization education efforts, particularly through PHMs, could further enhance parental understanding and support vaccine uptake.

Author declaration

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Authors' contributions:

Conceptualization and Design: RASMBR; Data Collection: RASMBR, NJG, MN, DGKBP, UMNSP; Data Entry: RASMBR, NJG, MN, DGKBP, UMNSP; Statistical Analysis: RASMBR; Preliminary Analysis: NJG, MN, DGKBP, UMNSP; Manuscript Drafting: RASMBR, MN; Manuscript Finalization: RASMBR, NJG; Supervision: BND; Final Approval: BND. All authors have reviewed and approved the final version of the manuscript and agree to the order of authorship.

Conflicts of interest:

The authors declare that there is no financial or non-financial conflict of interest.

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Ethics approval for this study was obtained from the ethical review board of the Faculty of Medicine, University of Peradeniya (Project No.-2023/EC-2/SP/08). Written permission was taken from the Director General of Health Services, Kandy. Informed consent to participate was obtained from all the respondent parents before data collection. Data were collected only from the participants who have consented.

Statement on data availability:

The data supporting the findings of this study are available upon request from the primary author, R.A.S.M.B. Ramanayake. Data are not publicly available due to ethical and privacy restrictions

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