

Knowledge, Attitudes, and Practices Toward Childhood Vaccination Among Caregivers in Buea Urban Setting: A Cross-Sectional Study

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ABSTRACT

Objectives: Understanding caregivers' knowledge, attitudes, and practices (KAP) toward childhood vaccination is crucial for improving immunization coverage and addressing vaccine hesitancy. This study utilized the World Health Organization Behavioral and Social Drivers (WHO BeSD) framework to assess KAP regarding childhood vaccination among caregivers in Buea urban setting.

Methods: A cross-sectional study was conducted among 439 caregivers with children aged 0-59 months in Buea urban area. We collected data using a structured questionnaire based on the WHO BeSD tool. We assessed KAP domains using binary categorization: good knowledge ($\geq 50\%$ positive responses to knowledge indicators), positive attitude ($\geq 75\%$ positive responses to attitude indicators), and good practice ($\geq 50\%$ positive responses to practice indicators). Chi-square tests were performed to identify factors associated with each KAP domain.

Results: Among 439 participants, 79.0% demonstrated good knowledge, 82.5% had positive attitudes, and 85.0% showed good vaccination practices. Knowledge was significantly associated with age group ($p=0.039$), sex ($p=0.027$), marital status ($p<0.001$), occupation ($p=0.013$), primary caregiver role ($p<0.001$), and housing status ($p=0.002$). Positive attitudes were associated with age group ($p=0.002$), marital status ($p=0.019$), health insurance ($p=0.039$), primary caregiver role ($p=0.042$), and number of children ($p=0.003$). Good practices were linked to marital status ($p<0.001$), education level ($p=0.007$), and health insurance ($p=0.011$).

Conclusion: While most caregivers demonstrated favorable KAP toward vaccination, targeted interventions are needed for specific demographic groups, particularly younger caregivers, males, and those with non-primary caregiver roles to further improve vaccination outcomes.

Keywords: attitudes, Cameroon, childhood vaccination, knowledge, practices

INTRODUCTION

Childhood vaccination remains one of the most cost-effective public health interventions, preventing millions of deaths annually (WHO, 2025; Ehreth, 2003). Despite global efforts to achieve universal immunization coverage, vaccine hesitancy and suboptimal vaccination practices continue to pose significant challenges to public health programs worldwide (MacDonald & SAGE Working Group on Vaccine Hesitancy, 2015; Larson et al., 2014). Understanding the behavioral and social drivers that influence vaccination decisions is crucial for developing effective interventions to improve immunization outcomes (WHO, 2014).

The World Health Organization (WHO) developed the Behavioral and Social Drivers (BeSD) framework to systematically assess factors influencing vaccination behaviors (WHO, 2022). This framework provides a comprehensive approach to understanding how knowledge, attitudes, and practices (KAP) toward vaccination interact with social and behavioral determinants to influence immunization decisions (Machingaidze et al.,

2013). The KAP model has been widely used in public health research to identify gaps in knowledge and practice, which can be addressed through targeted interventions (Kaliyaperumal, 2004; Launiala, 2009).

In sub-Saharan Africa, including Cameroon, achieving optimal vaccination coverage remains challenging due to various socioeconomic, cultural, and health system factors (Wiysonge et al., 2012; Restrepo-Méndez et al., 2016). Previous studies have shown that parental knowledge, attitudes, and practices significantly influence childhood vaccination uptake (Shrivastwa et al., 2015; Adedokun et al., 2017). However, there is limited research specifically examining these factors using the WHO BeSD framework in urban settings of Cameroon.

Buea, as an urban center in the Southwest region of Cameroon, represents a diverse population with varying educational backgrounds, socioeconomic status, and cultural beliefs that may influence vaccination behaviors (Republic of Cameroon, 2010). Understanding the KAP patterns in this setting is essential for informing local immunization strategies and improving vaccination coverage.

In this study, we aimed to assess the knowledge, attitudes, and practices toward childhood vaccination among caregivers in Buea urban setting using the WHO BeSD framework, and identify demographic factors associated with each KAP domain.

METHODS

Study Design and Setting

A cross-sectional study was conducted in Buea urban area, Southwest region of Cameroon, between February and June 2024. Buea is a cosmopolitan town with diverse ethnic groups and serves as a regional educational and administrative center.

Study Population and Sampling

The study population comprised caregivers (parents or guardians) of children aged 0-59 months residing in Buea urban area. Participants were eligible if they were primary or secondary caregivers of at least one child in the specified age range, and provided informed consent. Caregivers without children in the target age group were excluded from the analysis.

Using a convenience sampling approach, participants were recruited from various locations including health facilities, community centers, and residential areas. The final analysis included 439 caregivers with complete KAP data.

Data Collection

Data were collected using a structured questionnaire adapted from the WHO BeSD tool (WHO, 2016). The questionnaire was administered through face-to-face interviews conducted by trained research assistants. The instrument included sections on:

- **Sociodemographic characteristics:** Age, sex, marital status, education level, occupation, monthly income, religion, health insurance coverage, primary caregiver role, housing status, and number of children.
- **Knowledge assessment:** Awareness of vaccination campaigns, information-seeking behavior, confidence in recognizing vaccine-preventable diseases, and receipt of vaccination information from community leaders.
- **Attitude assessment:** Beliefs about vaccine safety and effectiveness, perceived importance of childhood immunization, trust in healthcare workers, and belief in vaccination necessity.
- **Practice assessment:** Child's vaccination status, vaccination schedule adherence, appointment attendance, and medical advice-seeking behavior.

Variable Definitions and Scoring

KAP domains were assessed using binary categorization based on composite scores. Knowledge was classified as "good" if participants scored $\geq 50\%$ positive responses on knowledge indicators (awareness, information-seeking, confidence, and community information receipt); Attitude was classified as "positive" if participants scored $\geq 75\%$ positive responses on attitude indicators (safety beliefs, importance perception, necessity beliefs, and healthcare worker trust); and Practice was classified as "good" if participants scored $\geq 50\%$ positive responses on practice indicators (vaccination completion, schedule adherence, appointment attendance, and advice-seeking).

Statistical Analysis

Data were analyzed using appropriate statistical software. Descriptive statistics were used to summarize participant characteristics and KAP distributions. Chi-square tests of independence were performed to examine associations between demographic factors and each KAP domain. Effect sizes were assessed using Cramer's V, with values of 0.1, 0.3, and 0.5 representing small, medium, and large effects, respectively (Cohen, 1988). Statistical significance was set at $p < 0.05$.

Ethical Considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki. Participants provided informed consent before data collection. Confidentiality and anonymity were maintained throughout the study process.

RESULTS

Participant Characteristics

The study included 439 caregivers with children aged 0-59 months. Table 1 presents the demographic characteristics of participants. Majority of the participants were females (87.7%), majority were aged 18-30 years (55.8%), and 49.4% were married. Majority of the participants had university education (53.8%) and 56.0% were self-employed. Most participants had no health insurance coverage (63.3%) and lived in rented accommodation (74.3%). The majority were primary caregivers (57.2%) and had one child in the target age group (56.9%).

Table 1: Demographic characteristics of participants

Variable	Category	Frequency (n=439)	Percentage
Sex	Female	385	87.7
	Male	54	12.3
Marital Status	Married	217	49.4
	Single	173	39.4
	Separated	21	4.8
	Widowed	17	3.9
	Divorced	11	2.5
Education	University	236	53.8

	Secondary	162	36.9
	Primary	29	6.6
	No Formal Education	12	2.7
Health Insurance	No, currently not covered	278	63.3
	Yes, comprehensive coverage	106	24.1
	Yes, partial coverage	55	12.5

Knowledge, Attitudes, and Practices Distribution

Figure 1 shows the distribution of KAP toward childhood vaccination. Overall, 79.0% of participants demonstrated good knowledge, 82.5% had positive attitudes, and 85.0% exhibited good vaccination practices. The highest scores were observed in the practice domain, followed by attitudes and knowledge.

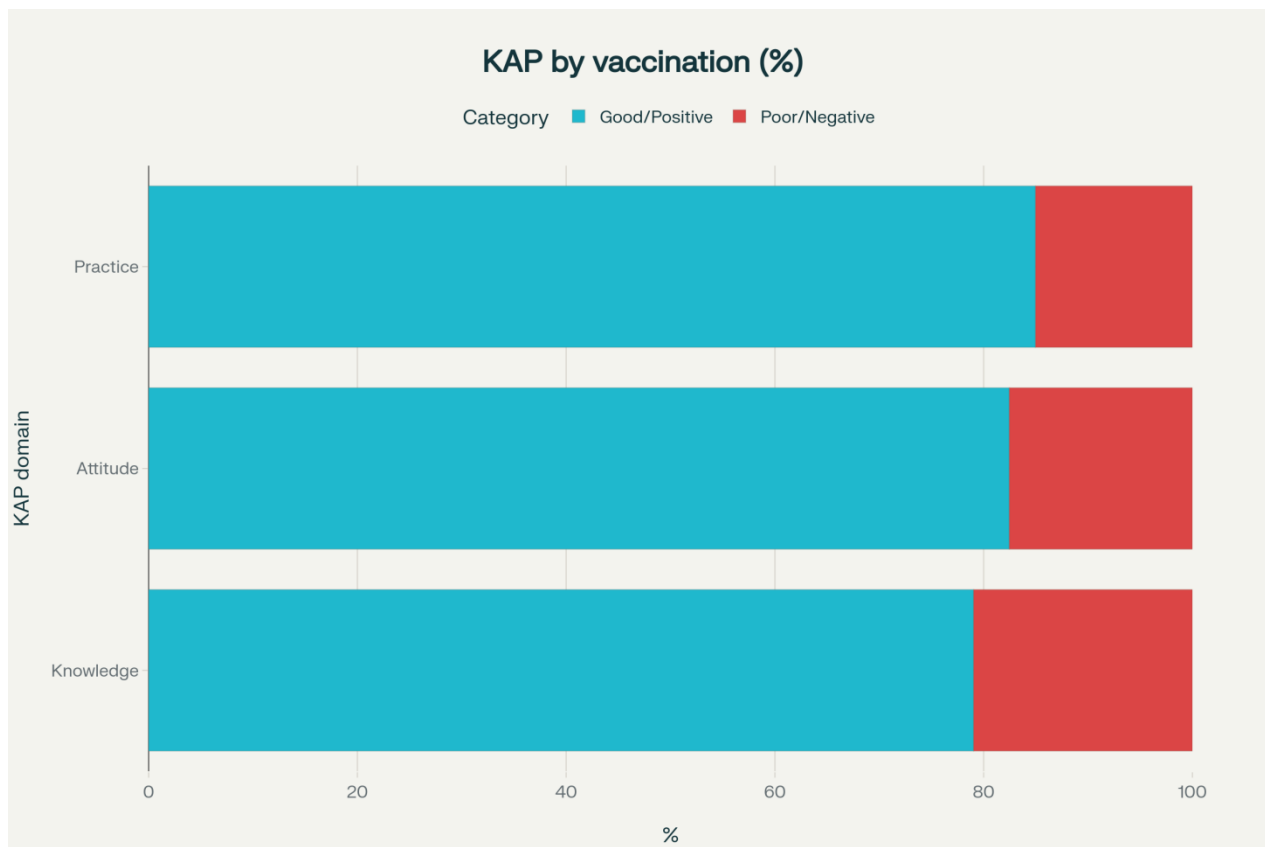


Figure 1: Distribution of KAP toward childhood vaccination.

Factors Associated with Vaccination Knowledge

Knowledge of vaccination was significantly associated with several demographic factors (Table 2). Age group showed a significant association ($p=0.039$), with higher knowledge levels among older caregivers (31-50 years: 84.7%, 51+ years: 87.5%) compared to the younger ones (18-30 years: 74.7%). Female caregivers demonstrated better knowledge than males (80.8% vs 66.7%, $p=0.027$).

Marital status was strongly associated with knowledge ($p<0.001$), with married caregivers showing the highest knowledge levels (88.0%) compared to separated (61.9%) and widowed caregivers (52.9%). Government employees had the highest knowledge scores (92.7%), while self-employed caregivers had the lowest (74.4%) ($p=0.013$).

Primary caregiver role was significantly associated with knowledge ($p < 0.001$), with those sharing caregiving responsibilities demonstrating the highest knowledge (87.3%) compared to non-primary caregivers (57.4%). Housing status also showed significant association ($p = 0.002$), with participants who lived houses they owned having better knowledge (81.4%) compared to those with other housing arrangements (51.9%).

Table 2: Factors associated with vaccination knowledge

KAP_Domain	Factor	Chi-square	p value	Cramers V
Knowledge of Vaccination	Age Group	6.49	0.039	0.12
	Sex	4.87	0.027	0.11
	Marital Status	26.13	<0.001	0.24
	Occupation	10.79	0.013	0.16
	Primary Caregiver	20.8	<0.001	0.22
	Housing Status	12.86	0.002	0.17

KAP_Domain, Knowledge, Attitudes, and Practices_Domain

Factors Associated with Vaccination Attitudes

Attitudes toward vaccination were significantly associated with age group ($p = 0.002$) (Table 3), with a notable decrease in positive attitudes among caregivers aged 51+ years (37.5%) compared to younger groups (18-30 years: 82.4%, 31-50 years: 85.2%). Marital status influenced attitudes ($p = 0.019$), with married caregivers showing more positive attitudes (86.6%) than divorced (72.7%) or widowed caregivers (58.8%).

Health insurance coverage was associated with attitudes ($p = 0.039$), with comprehensive coverage linked to more positive attitudes (90.6%) compared to partial coverage (78.2%) or no coverage (80.2%). Primary caregiver role showed significant association ($p = 0.042$), and the number of children was inversely related to positive attitudes ($p = 0.003$), with caregivers having more than two children showing less positive attitudes (68.9%) compared to those with one child (85.6%).

Table 3: Factors associated with vaccination attitudes

KAP_Domain	Factor	Chi square	p value	Cramers V
Attitudes toward Vaccination	Age Group	12.25	0.002	0.17
	Marital Status	11.78	0.019	0.16
	Health Insurance	6.48	0.039	0.12
	Primary Caregiver	6.34	0.042	0.12
	Number of Children	11.37	0.003	0.16

KAP_Domain, Knowledge, Attitudes, and Practices_Domain

Factors Associated with Vaccination Practices

Vaccination practices were significantly associated with marital status ($p < 0.001$), with married caregivers demonstrating better practices (88.9%) compared to separated (61.9%) or widowed caregivers (58.8%). Education level showed significant association ($p = 0.007$), with those having no formal education showing poorer practices (50.0%) compared to other education levels (85.6-89.7%).

Health insurance coverage was associated with practices ($p = 0.011$), with comprehensive coverage linked to better practices (90.6%) compared to partial coverage (72.7%) or no coverage (85.3%) (Table 4).

Table 4: Factors associated with vaccination practices

KAP_Domain	Factor	Chi square	p value	Cramers V
Vaccination Practices	Marital Status	20.65	<0.001	0.22
	Education Level	12.15	0.007	0.17
	Health Insurance	9.07	0.011	0.14

KAP_Domain, Knowledge, Attitudes, and Practices_Domain

Figure 2 presents a heatmap of the significant associations, showing the strength of relationships between demographic factors and KAP domains. Marital status and primary caregiver role emerged as the strongest predictors across multiple KAP domains.

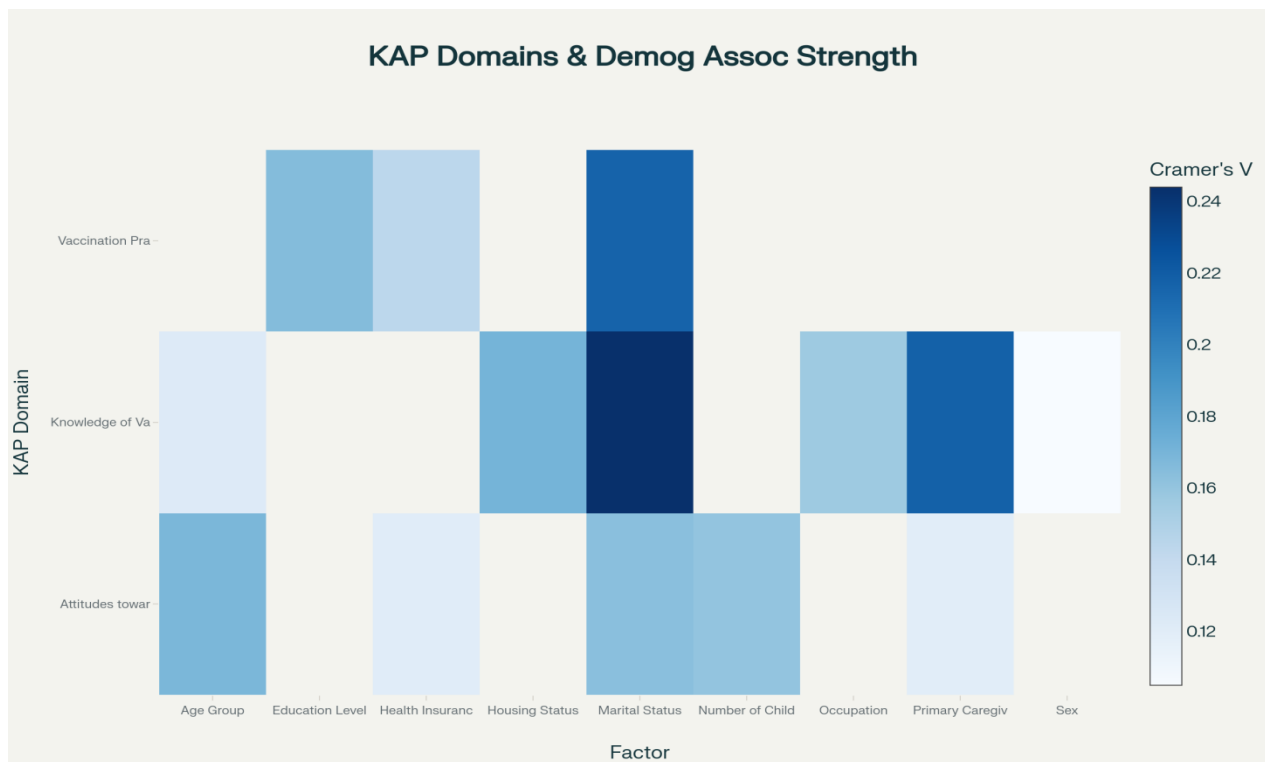


Figure 2: KAP domains and demographic association strengths

Demographic Characteristics Visualization

Figure 3 illustrates the distribution of key demographic characteristics among study participants, highlighting the predominance of female participants, diversity in marital status and education levels, and limited health insurance coverage in the study population.

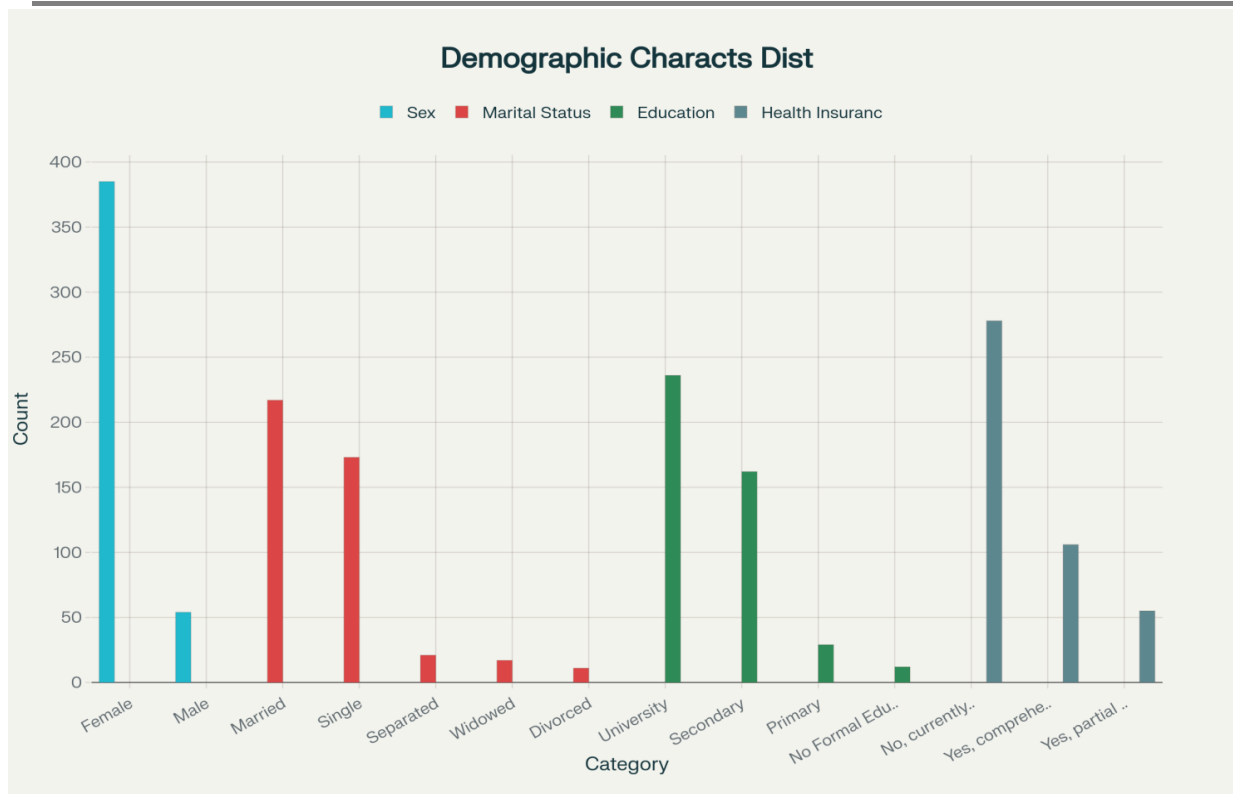


Figure 3: Demographic characteristic Distributions of Participants

DISCUSSION

The findings reveal favorable KAP levels, with practice scores being highest, followed by attitudes and knowledge. However, significant variations exist across different demographic groups, highlighting opportunities for targeted interventions.

Knowledge of Vaccination

The 79.0% prevalence of good knowledge found in this study is encouraging and reflects the educational background of the study population, with over half having university education (Taddese et al., 2018). The association between sex and knowledge, with females demonstrating better knowledge than males, aligns with previous studies showing that mothers typically have greater involvement in child health decisions (Thorpe et al., 2016; Singh & Brodish, 2015). This finding suggests the importance of including fathers and male caregivers in vaccination education programs.

The strong association between marital status and knowledge may reflect social support systems and shared decision-making processes in married couples (Story et al., 2012). The superior knowledge among government employees compared to other occupational groups may be attributed to better access to health information and formal employment benefits (Wendt et al., 2015).

The finding that primary caregiver role influences knowledge underscores the importance of targeting primary caregivers in vaccination communication strategies. However, the significant proportion of non-primary caregivers with poor knowledge (42.6%) highlights the need to extend educational efforts to all family members involved in child care decisions (Greenaway et al., 2012).

Attitudes Toward Vaccination

The 82.5% prevalence of positive attitudes is consistent with high vaccine acceptance rates reported in other African urban settings (Tadeese et al., 2009; Wado et al., 2014). The notable decline in positive attitudes among older caregivers (51+ years: 37.5%) warrants attention. This pattern may reflect generational differences in health beliefs, exposure to misinformation, or past negative healthcare experiences (Freed et al., 2010).

The association between health insurance coverage and positive attitudes suggests that healthcare access and experience with health services influence vaccination perceptions (Gidado et al., 2014). Caregivers with comprehensive coverage showed the most positive attitudes, possibly due to better healthcare provider interactions and increased confidence in the health system.

The inverse relationship between number of children and positive attitudes may reflect increased caregiver burden, competing priorities, or accumulated negative experiences with healthcare services (Antai, 2009). This finding emphasizes the need for targeted support for families with multiple children.

Vaccination Practices

The 85.0% prevalence of good vaccination practices represents the highest score among the three KAP domains, suggesting that despite the knowledge gaps and attitude challenges, most caregivers translate their understanding into appropriate vaccination behaviors. This finding is encouraging for public health efforts and vaccine confidence in the study area (Favin et al., 2012).

The strong association between marital status and practices mirrors the knowledge findings, reinforcing the importance of social support in healthcare decision-making (Bbaale, 2013). The education-practice relationship, with the lowest practices among those with no formal education, highlights education as a key determinant of health behaviors, and the need for culturally appropriate communication strategies for less educated populations (Kumar et al., 2010).

Implications for Public Health Practice

The findings suggest some key areas for intervention:

- **Targeted education programs:** Focus on younger caregivers, male caregivers, and those with limited formal education to improve knowledge levels.
- **Family-centered approaches:** Include all family members, particularly non-primary caregivers, in vaccination education and decision-making processes.
- **Health system strengthening:** Improve healthcare worker training to better address concerns of older caregivers and those with multiple children.
- **Insurance coverage expansion:** Advocate for expanded health insurance coverage to improve both access to vaccination services and attitudes toward vaccination.

The findings of this study have significant policy implications for Cameroon's immunization program and broader sub-Saharan African contexts. Health policy frameworks should prioritize community engagement strategies that leverage existing social structures, particularly religious institutions and community leadership networks, which have proven effective in vaccination promotion across similar settings (Ames et al., 2017). Given that married caregivers demonstrated superior KAP levels across all domains, policies should emphasize family-centered vaccination approaches that engage both spouses in decision-making processes. The association between health insurance coverage and positive vaccination outcomes suggests that expanding universal health coverage could serve as a dual intervention improving both healthcare access and vaccination attitudes (World Health Organization, 2022). Community engagement strategies should incorporate door-to-door social mobilization, announcements during religious services, and collaboration with trusted community leaders, as these approaches have demonstrated effectiveness in Cameroonian contexts (Ames et al., 2017). Furthermore, policy frameworks should establish systematic mechanisms for addressing the specific needs of vulnerable groups identified in this study, including younger caregivers, males, and non-primary caregivers, through targeted outreach programs that utilize culturally appropriate communication channels and trusted messengers within these demographic segments (Xie et al., 2024; Orr et al., 2022).

Theoretical Framework Application

The study findings align with key constructs of the Health Belief Model (HBM), which provides a valuable theoretical lens for understanding caregiver vaccination behaviors observed in this research (Ellithorpe et al., 2022; Chen, 2011). The high prevalence of positive attitudes (82.5%) and good practices (85.0%) suggests that most caregivers perceive significant benefits from childhood vaccination and have low perceived barriers to vaccination uptake, consistent with HBM predictions for health-promoting behaviors (Handayani et al., 2025; Bowen et al., 2025). The demographic variations observed, particularly the lower knowledge and attitudes among specific groups, can be interpreted through HBM constructs of perceived susceptibility and severity—groups with limited healthcare exposure or lower socioeconomic status may have reduced perception of disease severity or personal susceptibility (Li et al., 2021). The strong association between health insurance coverage and positive vaccination outcomes supports the HBM construct of perceived barriers, where financial and access constraints represent significant obstacles to vaccination behavior (Orr et al., 2022). Future interventions should systematically address HBM components by enhancing perceived susceptibility through targeted education about vaccine-preventable disease risks, reinforcing perceived benefits through testimonials and success stories, reducing perceived barriers through improved healthcare access and convenience, and strengthening self-efficacy through clear guidance on vaccination schedules and procedures (Orr et al., 2022; Jain et al., 2022).

Study Limitations and Strengths

This study has some limitations. First, the cross-sectional design limits causal inference, and the convenience sampling may affect generalizability. Second, the binary categorization, while useful for analysis, may mask nuanced differences in KAP levels. Third, social desirability bias may have influenced responses, particularly regarding vaccination practices.

An important limitation of this study is its exclusive reliance on quantitative methodology, which limits the depth of understanding regarding the underlying reasons for demographic variations in KAP levels. While the WHO BeSD framework provides valuable quantitative insights, qualitative research methods could offer critical complementary perspectives to explain the "why" behind the observed associations (Ashfield, 2024; Glanz et al., 2013). Future research should employ mixed-methods approaches that incorporate in-depth interviews, focus group discussions, and ethnographic observations to explore the cultural, social, and personal factors that influence vaccination decision-making among different demographic groups (Huang et al., 2024; Eberhardt et al., 2023). Qualitative exploration could provide crucial insights into the barriers faced by males, younger caregivers, and non-primary caregivers, potentially revealing specific concerns, misconceptions, or structural obstacles that quantitative measures cannot capture (Kassabekova et al., 2025). Such research could investigate how cultural beliefs, past healthcare experiences, social networks, and information sources influence vaccination attitudes across different demographic segments (Skirrow et al., 2024). Additionally, qualitative methods could explore the decision-making processes within families, understanding how primary and secondary caregivers interact in vaccination choices, and identifying optimal intervention points for family-centered approaches (Ashfield, 2024; Eberhardt et al., 2023). The integration of qualitative insights would enable the development of more nuanced, culturally sensitive, and theoretically grounded interventions that address the specific contextual factors influencing vaccination behaviors in urban Cameroonian settings, ultimately contributing to more effective and sustainable immunization strategies.

However, the study had some strengths which include the use of the standardized WHO BeSD framework, comprehensive assessment of multiple demographic factors, and focus on an urban setting with diverse populations. The binary categorization of KAP domains provides clear, actionable results for intervention planning.

In conclusion, this study reveals generally favorable knowledge, attitudes, and practices toward childhood vaccination among caregivers in Buea urban setting, with 79.0%, 82.5%, and 85.0% demonstrating good/positive levels respectively. However, significant demographic variations exist, with younger caregivers, males, those in certain marital status categories, and non-primary caregivers showing lower KAP levels. These findings provide valuable insights for designing targeted interventions to further improve vaccination outcomes in urban Cameroon settings.

The application of the WHO BeSD framework proves valuable for understanding the multifaceted nature of vaccination behaviors and identifying specific intervention points. Continued efforts to address identified gaps through targeted, evidence-based interventions will be crucial for achieving optimal vaccination coverage and protecting child health in the study population.

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Ethical Approval: This study was approved by the institutional review board, Faculty of Health Sciences, University of Buea (approval number 2359-01), and conducted in accordance with the principles of the Declaration of Helsinki.

Conflict of Interest and Data Availability: The authors declare no conflicts of interest. The datasets used in this study are available from the corresponding author upon reasonable request.