journal homepage: greenvalleyjournal.com/index.php/home
Green Valley Journal of Health and Biomedical Science
Volume 1, Issue 1, 2026

Vaccination Coverage and Associated factors among Children in Southwest Ethiopia Peoples' Region

Bezuayehu Alemayehu[1*], Derej Alemayehu[2], Haile Zewude[3]

[1] Department of Environmental Health, College of Medicine and Health sciences, Mizan Tepi University, Ethiopia

[2] Department of Public Health, College of Medicine and Health sciences, Mizan Tepi University, Ethiopia

[3] Southwestern Ethiopia Peoples' Regional Health Bureau, Tarcha, Ethiopia

[*]Corresponding author: Bezuayehu Alemayehu

Email=bezua@ymail.com

https://orcid.org/0000-0002-4126-0939

Abstract

Background: Routine childhood vaccination (BCG, pentavalent, OPV, PCV, rotavirus, and measles as per Ethiopia's EPI schedule) is highly effective in preventing vaccine-preventable diseases; in Southwest Ethiopia, coverage remains suboptimal due to health service, socio-demographic, and knowledge-related barriers.

Objective: To assess vaccination coverage and identify associated factors among children in Southwest Ethiopia.

Methods: A community-based cross-sectional design was used to conduct the study in the Bench Sheko zone from July 1–30, 2022. The multistage sampling technique was used to select 731 households' data. The data was collected on four variables and entered into Epidata version 4.0.2 and exported to SPSS version 26 for analysis on a logistic regression model. Finally, a p-value of 0.05 with a 95% confidence interval was used to determine the statistical significance of factors associated with vaccination coverage.

Results: The total vaccination coverage was 584 (79.9%) (95% CI 77.2, 82.8%). Post-natal care (PNC) service follow-up (AOR: 2.8, 95% CI: 1.2, 6.4), antenatal care (ANC) follow-up (AOR: 2.3, 95% CI: 1.3, 4.2), and knowledge about vaccination (AOR: 2.28, 95% CI: 1.49, 3.49) were factors associated with full vaccination coverage.

Conclusion: The vaccination coverage was lower than the target set by the 2030 Immunization Agenda (90%). Prenatal care follow-up, knowledge about vaccination, and postnatal care follow-up were significantly associated with vaccination coverage. Healthcare officials at all levels and policymakers are advised to focus on education to improve vaccine coverage.

keywords: Vaccination Coverage, Southwest Ethiopia.

Introduction

The burden of vaccine-preventable diseases (VPDs) remains substantial globally, despite the availability of effective vaccines. This burden encompasses the direct health consequences of such diseases as measles, polio, Diphtheria, tetanus, Influenza, Hepatitis B, pneumonia and pertussis. Vaccination coverage is defined as the proportion of children who have received all the recommended basic vaccines. Children are considered to have received all basic vaccinations if they have received a vaccination against tuberculosis (also known as BCG), three doses of the DPT-HepB-Hib (also called pentavalent) vaccine, and vaccinations against polio and measles [1]. Vaccination reaches the most people of any health or social service and is an essential component of primary health care

[2]. It is a future investment in three ways: saving lives and protecting population health, improving countries' production and resilience and enabling a safer, healthier, more prosperous world. Vaccination plays an important role in the prevention and control of numerous communicable diseases, helps children thrive, supports families and caregivers, improves community health, and protects youngsters from sickness [3]. Vaccinating children benefits community health by increasing herd immunity and limiting the spread of antibiotic resistance. In addition to these, vaccination also has economic importance. According to a global report, every dollar invested in vaccination yields a $26 return on investment [4]. Children are still impacted by vaccine-preventable diseases, despite clear advancements over many decades. Nearly one out of five children worldwide lacked complete protection against diseases that can be prevented by vaccination [5]. In West and Central Africa, nearly 1 in every 2 children in the poorest homes is under-vaccinated, compared to 1 in every 16 in the wealthiest, where seventy percent of unvaccinated children lived in middle-income countries in 2018. Every year, 20 million babies do not receive a full course of basic immunizations and over 13 million have not received any vaccination at all. The Immunization Agenda 2030 (IA2030) represents the global community's vision and strategy for ensuring that no one falls behind in vaccination during the next decade. Commitment demand, coverage equity, life course integration, outbreaks emergencies, supply sustainability, and research innovation are IA2030 strategic priorities, which are guided by people-centered, country-owned, partnership-based, and decision-making basic principles. This ambitious global initiative aims to cut in half the number of children who do not receive critical immunizations and achieve 90% coverage for critical lifesaving vaccines. If the agenda is met, it is anticipated that 50 million lives will be spared in this decade [6]. Vaccination coverage varies greatly between and within countries around the world. Studies conducted in various parts of the world found that the vaccination coverage ranges between 25.8%-90.85% [7], which is affected by multiple factors. According to 2019 Ethiopian Demographic and Health Survey (EDHS) data, 44% of Ethiopian children aged 12 to 23 months were fully vaccinated. Regionally, Addis Ababa (83%) and Afar (20%) have the greatest and lowest rates of full vaccination coverage, respectively [8]. Nonetheless, to the best of our knowledge, there is no up-to-date study measuring vaccination coverage among children aged 12 to 23 months in Ethiopia's southwestern regional state, notably in the Bench Sheko zone. Assessing vaccination coverage will offer immediate and up-to-date data on vaccination status, which will be critical for local intervention. Furthermore, it assists governments in tracking their progress toward meeting national and international goals. As a result, this study aimed to assess full vaccination coverage among children aged 12 to 23 months in Bench Sheko Zone, Southwest Ethiopia.

Methods and Materials

Study area and period

A community-based cross-sectional study was carried out in the Bench Sheko zone from July 1 to 30, 2022. Bench Sheko zone is one of the zones in the Southwest Ethiopian Peoples' Regional State. Mizan Aman town is the administrative headquarters of the Bench Sheko zone and is located at a distance of 581 kilometers from Addis Ababa, Ethiopia's capital city. According to information obtained from the Bench Sheko zone administration office, the zone has 8 woredas with a total estimated population of 625,345. Of this figure, under 1-year-olds, under 2-year-olds, reproductive-age mothers, and expected pregnant mothers account for 19947, 32392, 14570, and 21630, respectively. Regarding health facilities, Bench Sheko Zone has one teaching hospital, one primary hospital, 26 health centers, 9 medium clinics, 122 primary clinics, 35 drug stores, 128 health posts, and 5 rural clinics. Besides the EPI in Ethiopia considers a child to have received all basic vaccinations if the child has also received three doses of the pneumococcal conjugate vaccine (PCV) (at age 6, 10, and 14 weeks) and two doses of the rotavirus vaccine (at age 6 and 10 weeks), two doses of measles at (9 months and 15 months) [9].

Population

Source population: all children aged 12–23 months and their caregivers in the Bench Sheko zone. Study population: children aged 12–23 months and their caregivers, who were chosen randomly.

Eligibility criteria

Children aged 12 to 23 months, as well as their caregivers, were eligible for participation in the study. Children aged 12 to 23 months and their caregivers who did not live in the study area for at least 6 months were excluded.

https://doi.org/10.20372/gvjhbms.v1.i1.2026.005 © 2026 Green Valley Journals. All rights reserved.

Sample size determination

The sample size was determined for both the proportion of vaccine coverage and factors associated with vaccination coverage, and the largest sample size was considered. **For Objective 1**

The sample size was calculated using the single population proportion formula (n = (Z / 2)2 *pq/d2) with assumptions of 95% CI, 5% margin of error, design effect of 2 (multi-stage sampling), non-response rate (10%), and vaccination coverage (66.1%) from a study conducted in southwest Ethiopia [7]. Substituting the corresponding values in the formula, the sample size became 341. The design effect of two was considered to get a representative sample with a non-response rate of ten percent. Finally, the sample size for objective one was 750.

For objective 2

The sample size was calculated using EpiInfo and the following parameters: the prevalence of ANC attendance [10], TT vaccination [11], and birth order [12] from studies conducted in Minjar Shenkora Woreda, north Gondar, and the Afar region, respectively. Using the formula and the parameters, the sample sizes become 444, 532, and 624, respectively. The highest sample size was discovered to be the one calculated for objective one, which was 750 claimed final sample size.

Sampling Procedure

A multi-stage sampling technique was carried out using the administrative structure of the Bench Sheko Zone. The Bench Sheko Zone is divided into rural and urban areas. There are six (6) rural districts: Semen Bench, Gid Bench, Shey Bench, Sheko, South Bench, and Guraferda. There are two districts under city administration: Mizan Aman and Siz Town Administration. Two rural districts (Semen Bench and Debub Bench) and one city administration (Siz Town) were chosen by the lottery method. There were 3050, 7144, and 1496 children aged 12-23 in the Debub Bench, Semen Bench, and Siz town administrations, respectively. The entire sample size is then allocated proportionally to the population of each district. Accordingly, 196, 458, and 96 samples were taken from the Debub Bench, Semen Bench, and Siz Town administrations, respectively. Then, from each district, two kebeles (the lowest administrative unit in Ethiopia) were chosen. From Debub Bench district (Kite Kebele and Kobe Kebele), from Semen Bench (Wala Kebele and 01 Kebele), and from Siz Town administration (01 Kebele and 02 Kebele), they were selected randomly. Then, from each kebele's family folder, a list of households with children aged 12–23 months was compiled. Households with at least one child aged 12–23 months were identified, a serial order was given, and an Excel sample frame was constructed. Then, using Excel, random numbers were produced for everyone. Following that, participants were recruited using a simple random sampling technique. For residences that were closed during the data collection period, a revisit was done the following day. Finally, if they were still absent the next day, the next household with children aged 12 to 23 months was included in the study. The diagnostic procedures of patients with vaccine-preventable diseases were assessed while collecting data from families, to determine whether the child had vaccine-related diseases.

Operational Definitions

Vaccination coverage is defined as a child who has received one dose of BCG, three doses of pentavalent, three doses of pneumococcal conjugate (PCV), three doses of oral polio vaccines (OPV), two doses of rotavirus, and the first dose of measles vaccine [13]. Each vaccination is recorded as "0" for children who didn't take it and "1" for children who took the recommended doses, based on the reports of mothers and information in the child's vaccination card.

Knowledge about vaccination: Questions about when to start vaccination, when to finish vaccination, the number of rounds or sessions required for vaccination, and listing VPDs are used to assess vaccination knowledge. Individuals with a mean score of 0.5 or above on the total knowledge questions are regarded as having good knowledge, while those with a mean score of less than 0.5 are regarded as having poor knowledge.

Data collection and data quality control

The data were gathered using an interviewer-administered questionnaire modified from related studies [11], [14]. The tool is divided into four sections: socio-demographic characteristics of mothers and caregivers; reproductive and child histories; knowledge items; and immunization status items. The information was gathered by ten health extension workers who spoke the local language. Two master's degree holders in public health oversaw the data collection process. To ensure the quality of the data, supervisors and data collectors received two days of training on the significance of the study, the purpose of the study, data collection instruments, the data collection method, and the roles of data collectors and supervisors during the study period. Furthermore, before the real study, the tool

https://doi.org/10.20372/gvjhbms.v1.i1.2026.005 © 2026 Green Valley Journals. All rights reserved.

was pretested on 5% of the sample size in Mizan Aman town.

Data processing and Analysis

The data was cleaned, edited, and entered into EpiData Association (Odense, Denmark) and IBM SPSS Statistics version 26 (IBM Corp., Armonk, NY, USA) before being exported to SPSS version 26 for analysis. A binary and multivariable logistic regression analysis with the method of enter strategies was done to identify factors associated with vaccination coverage. Variables with p-values$\leq$ 0.25 were included in the multivariable logistic regression analysis. A P-value of ≤ 0.05 was used to declare factors associated with vaccination coverage in the multivariable logistic regression analysis model.

Ethical Consideration

Ethical committee approval was received from the Ethics Committee of Mizan Tepi University, College of Medicine and Health Sciences (Approval no.05/23; Date: June 21, 2022). Before data collection oral consent was sought from all participants.

Results

Socio-demographic characteristics of the study participants

Out of 750 eligible participants, the study involved 731, yielding a response rate of 97.5%. The mean age of the participants was 27.04. The majority of participants (87.3%) and (94.2%) were rural residents and married, respectively. Approximately 38.2% and 57.9% of the participants and their husbands completed primary school, respectively. Similarly, the majority (87.9%) of the participants and their husbands (89.4%) were housewives and farmers, respectively. More than half (60.9%) of the participants had less than five family members (Table 1).

TABLE 1
SOCIO-DEMOGRAPHIC CHARACTERISTICS OF MOTHERS/CAREGIVERS OF CHILDREN AGED 12–23 MONTHS IN BENCH SHEKO ZONE, SOUTHWEST ETHIOPIA, 2022 G.C

Variable	Category	Freq.	(%)
3*Age	15–24	250	34.2
	25–34	265	36.3
	35–49	216	29.5
2*Residence	Rural	638	87.3
	Urban	93	12.7
2*Marital	Married	688	94.2
	Unmarried	43	5.8
4*Mother education	No edu.	222	30.4
	Primary	279	38.2
	Secondary	98	13.4
	College+	132	18.0
4*Husband education	No edu.	121	16.5
	Primary	423	57.9
	Secondary	112	15.3
	College+	75	10.3
2*Mother occupation	Housewife	643	87.9
	Govt. employee	88	12.1
2*Father occupation	Farmer	659	89.4
	Govt. employee	72	10.6
2*Family size	$\leq$5	445	60.9
	>5	286	39.1

Reproductive and child characteristics of the study participants

More than half (55.3%) of the participants have male children; almost two-thirds (64.7%) of the participants have fewer than four living children; and 35.9% have children in the second birth order. Approximately 83 percent of the mothers had ANC follow-ups, with 76.3 percent having more than two. In terms of birthplace, the vast majority (88%) of mothers gave birth in a health facility. About 88.9% of mothers received PNC service, and 81.9% of mothers had ever gotten the TT vaccine (Table 2).

https://doi.org/10.20372/gvjhbms.v1.i1.2026.005 © 2026 Green Valley Journals. All rights reserved.

TABLE 2
REPRODUCTIVE AND CHILD HISTORY OF STUDY PARTICIPANTS IN BENCH SHEKO ZONE, SOUTHWEST ETHIOPIA, 2022 G.C

Variable	Category	Freq.	(%)
2*Child gender	Male	404	55.3
	Female	327	44.7
2*No. of children	1–3	473	64.7
	≥4	258	35.3
2*ANC service	Yes	608	83.0
	No	123	17.0
2*ANC follow-ups	1–2	144	23.7
	3–4	464	76.3
2*Place of birth	Health facility	643	88.0
	Home	88	12.0
2*PNC service	Yes	650	88.9
	No	81	11.1
2*TT vaccination	Yes	599	81.9
	No	132	18.1
4*Birth order	1st	81	11.0
	2nd	263	35.9
	3rd	185	25.4
	4th	202	27.7
2*TT doses	1–3	507	84.6
	4–5	92	15.4

Knowledge about vaccination among Mothers/Caregivers

Of the total respondents, 279 (38.2%) have good knowledge about vaccination. The majority of the participants (93.4%) and (81.7%) had never heard about vaccination and responded that vaccination is used to prevent disease, respectively. More than one quarter (26.1%) of participants responded that they knew four or more types of VPDs. Of this, the majority of the participants (94.6%) responded that they knew about diarrhea. About 68.1% and 80.8% of the participants responded that they knew the age at which vaccination was completed and began, respectively. Around 58.2% of the participants responded that they knew the total number of sessions needed for child vaccination (Table 3).

TABLE 3
KNOWLEDGE ABOUT VACCINATION AMONG MOTHERS OF STUDY PARTICIPANTS IN BENCH SHEKO ZONE, SOUTHWEST ETHIOPIA, 2022 G.C

Variable	Category	Count	(%)
2*Heard about vaccination/VPDs	Yes	683	93.4
	No	48	6.6
2*Vaccination prevents disease	Yes	597	81.7
	No	134	18.3
2*Know ≥4 VPDs	Yes	191	26.1
	No	540	73.9
5*Types of VPDs reported	Measles	186	94.6
	Polio	151	79.0
	Diarrhea	186	94.6
	Pneumonia (cough)	186	94.6
	Pertussis	35	18.3
2*Know completion age	Yes	498	68.1
	No	233	31.9
3*Completion age reported	1 year	268	36.7
	9 months	179	24.5
	2 years	52	7.1
2*Know start age	Yes	590	80.8
	No	141	19.2
2*Start age reported	At birth	255	43.2
	45 days	335	56.8
2*Know no. of sessions	Yes	429	58.7
	No	302	41.3
3*Sessions reported	3 rounds	112	26.2
	4 rounds	197	45.9
	5 rounds	120	27.9
2*Overall knowledge	Good	279	38.2
	Poor	452	61.8

Vaccination status of the child

Overall, 584 (79.9%) of children aged 12–23 months in the Bench Sheko zone were vaccinated. Of the total children assessed in the current study, 130 (17.8%) did not complete their vaccination, and 17 (2.3%) did not start vaccination at all. The highest vaccination coverage was recorded for Penta1 and Rota1 vaccines, which is 95.35%. Less than half (39.9%) of participants availed immunization cards for their child's vaccination (Table 4).

https://doi.org/10.20372/gvjhbms.v1.i1.2026.005 © 2026 Green Valley Journals. All rights reserved.

TABLE 4
VACCINATION STATUS OF CHILDREN AGED 12–23 MONTHS IN BENCH SHEKO ZONE, SOUTHWEST ETHIOPIA, 2022

Variable	Resp.	Freq.	(%)
2*Any vaccination	Yes	714	97.6
	No	17	2.4
2*BCG	Yes	631	86.32
	No	100	13.68
2*OPV0	Yes	642	87.8
	No	88	12.2
2*OPV1	Yes	695	95.08
	No	36	4.92
2*OPV2	Yes	687	93.8
	No	44	6.2
2*OPV3	Yes	672	91.9
	No	59	8.1
2*Penta 1	Yes	697	95.35
	No	34	4.65
2*Penta 2	Yes	687	93.8
	No	44	6.2
2*Penta 3	Yes	670	91.6
	No	61	8.4
2*PCV1	Yes	692	94.66
	No	39	5.34
2*PCV2	Yes	691	94.53
	No	40	5.47
2*PCV3	Yes	688	94.12
	No	43	5.88
2*Rota1	Yes	697	95.35
	No	34	4.65
2*Rota2	Yes	690	94.39
	No	41	5.61
2*Measles	Yes	675	92.34
	No	56	7.66
2*Card source	Card	292	39.95
	Other	439	60.05
2*Vaccination status	Incomplete	147	20.1
	Fully	584	79.9

Factors Associated With Vaccination Coverage

Variables with a p-value of< 0.25 during bivariate logistic regression analysis were considered for multivariable logistic regression. Finally, all of the candidate variables for multivariable logistic regression analysis (knowledge about vaccination, ANC service utilization, and PNC service utilization) were significantly associated with vaccination coverage. The odds of vaccination coverage were 1.853 times higher among children of mothers or caregivers with good knowledge than among children of mothers or caregivers with poor knowledge [AOR = 1.853, 95% CI (1.244, 2.762)]. Similarly, the odds of vaccination coverage are 2.8 times higher among children whose mothers and caregivers had PNC service follow-up compared to children whose mothers and caregivers did not receive PNC service [AOR: 2.8, 95% CI: (1.2–6.4)]. The odds of vaccination coverage were 2.3 times higher among children of mothers or caregivers who received ANC during pregnancy than among children of mothers or caregivers who did not receive ANC during pregnancy [AOR = 2.3, 95% CI (1.3–4.2)] (Table 5).

https://doi.org/10.20372/gvjhbms.v1.i1.2026.005 © 2026 Green Valley Journals. All rights reserved.

TABLE 5
MULTIVARIABLE LOGISTIC REGRESSION ANALYSIS OF FACTORS ASSOCIATED WITH VACCINATION COVERAGE AMONG 12–23-MONTH-OLD CHILDREN, BENCH SHEKO ZONE, SOUTHWEST ETHIOPIA REGION, ETHIOPIA, JULY 2022

Variable	Category	Fully Vaccinated		COR (95% CI)	AOR (95% CI)
		Yes	No		
2*Knowledge about vaccination	Good	239	40	1.85 (1.244, 2.762)	1.85 (1.24, 2.76)
	Poor	345	107	1	1
2*Place of delivery	Health facility delivery	506	139	1.70 (1.20, 3.70)	1.07 (0.27, 4.10)
	Home delivery	58	28	1	1
2*ANC service	Received ANC service	477	105	1.78 (1.04, 3.22)	2.30 (1.30, 4.20)
	Not received ANC service	107	42	1	1
2*PNC service	Received PNC service	530	120	2.20 (1.10, 4.34)	2.80 (1.20, 6.40)
	Not received PNC service	54	27	1	1

Discussion

The current study assessed vaccination coverage and associated variables among children aged 12 to 23 months in the Bench Sheko Zone of southwest Ethiopia. According to the study, 39.9% of children were fully vaccinated using only the vaccination card, while the overall vaccination coverage using caregiver information and the vaccination card was 79.9This finding is congruent with studies conducted in the Sidama region [15] and Enugu state [16] and in Turkey [17]. However, it is higher than studies done in the Minjar-Shenkora district, 75.6% [10], Southern Ethiopia, 66.1% [7], and the Somali area (41.4%) [18], Lay-armachiho district (76.2%) [10]. The variation involved in the methods of the current study could be the cause of this disagreement. Unlike the previous studies, our study had a larger sample size and included both urban and rural locations. Furthermore, the time difference between the studies could account for the discrepancy observed in the current studies. Aside from these, our study only included children aged 12 to 23 months. On the contrary, the current finding is lower than that of research conducted in Ghana (89.5% [19], Bangladesh (84%) [20], and Eritrea (83%) [21]. This could be explained by differences in health system organization and health policy priorities between the countries. Furthermore, socioeconomic and cultural disparities between countries may play a significant role. The present finding is also higher than the Ethiopian Demographic and Health Survey (EDHS-2019) report (44%) [8] as well as the Ethiopian Health Sector Transformation Plan II target of 75% [14]. This could be because EDHS addresses a wider sample size and community than our study, which is limited to a particular zone in southwest Ethiopia. Similarly, the health sector transformation plan is a comprehensive national plan that takes into account a variety of elements at the national level. This study found a significant association between maternal knowledge and complete vaccination coverage [22]. As a result, mothers who had good knowledge about vaccination were more likely to have fully vaccinated children than mothers who had poor knowledge about vaccination [23]. This is explained by the relevance of knowledge for mothers with children; it increases mothers' health awareness, encourages healthcare-seeking behavior, and lowers vaccination default rates [24]. Our finding is consistent with earlier research conducted in Ethiopia and other African countries Similarly, mothers who attended ANC at least three times had a positive influence on their children's vaccination status [25]. Health care services during pregnancy and after birth are critical for the mother's and infant's survival and well-being. In Ethiopia, standard ANC guidelines emphasize that every pregnant woman should receive ANC from a qualified physician, which involves a full physical examination, blood tests to check for infection, and a urine test [26], [27]. ANC follow-up provides mothers with the opportunity to learn about the importance of immunization and the vaccination schedule. Furthermore, it establishes links between mothers and health care institutions, as well as health experts, and reduces the likelihood of defaulters. The current finding is consistent with findings from other studies [28], [29]. Mothers who had PNC service follow-up were more than twice as likely to have vaccinated their children as mothers who did not get PNC follow-up. The study conducted in Demba Gofa District, southern Ethiopia [29], similarly supports the findings. The explanation for this could be that during PNC service, the child had opportunities to begin vaccination and

https://doi.org/10.20372/gvjhbms.v1.i1.2026.005 © 2026 Green Valley Journals. All rights reserved.

to raise the mother's understanding through counseling on child health promotion, EPI schedules, and the importance of vaccination [30].

Connotation for vaccine-preventable diseases

Low or incomplete vaccination coverage directly explains a higher incidence and prevalence of VPDs within a community [31]. In Southwest Ethiopia, this could mean a continued problem of diseases such as measles, polio, diphtheria, pertussis, tetanus, tuberculosis, and rotavirus [1]. Outbreaks of these diseases can strain already limited healthcare resources, lead to increased morbidity and mortality among children, and disrupt educational and economic activities. For instance, measles outbreaks, often associated with vaccination gaps, can result in severe complications like pneumonia, encephalitis, and even death [2], [4]–[6]. The economic burden of treating VPDs, both for families and the healthcare system, can be substantial, diverting resources that could otherwise be used for other essential health services. Vaccination coverage among children aged 12-23 months has significant implications for public health, increasing the prevalence of VPDs and highlighting disparities in healthcare access. Recent findings indicate a concerning decline in routine childhood vaccination coverage in some areas, particularly among children born during or after the COVID-19 pandemic [32]. This decline can lead to a resurgence of VPDs, posing a threat to community health and increasing the risk of outbreaks of VPDs. Moreover, the global Immunization Agenda 2030 aims to eliminate VPDs and ensure everyone benefits from vaccines, which requires sustained effort to address the identified gaps in coverage and equity [33]. Additionally, studies in similar contexts have highlighted that incomplete vaccination schedules leave children vulnerable to VPDs, which can have long-term consequences beyond physical health, potentially affecting cognitive and mental development due to repeated illness, malnutrition, and chronic inflammation [34].

Connotation for Child Mental Health Development

The link between VPDs and child mental health development is multifaceted and often indirect but significant. Repeated or severe episodes of VPDs can have profound negative impacts on a child's physical health, leading to chronic illness, malnutrition, and developmental delays. For instance, severe infections can lead to prolonged hospital stays, pain, and distress, which can contribute to anxiety, fear, and even post-traumatic stress in young children [32]. Besides, the long-term consequences of some VPDs, such as meningitis caused by Haemophilus influenzae type b (Hib) or pneumococcal disease, can include neurological damage, cognitive impairments, and developmental disabilities [35]. These physical and cognitive challenges can significantly impact a child's ability to learn, socialize, and adapt, potentially leading to increased risk of mental health issues such as depression, anxiety disorders, and behavioral problems later in life [36]. Chronic illness and disability can also affect family dynamics, leading to increased stress on caregivers and potentially impacting the child's emotional well-being. Malnutrition, often a consequence of recurrent infections, is also strongly linked to impaired cognitive development and can exacerbate mental health vulnerabilities [37]. Therefore, achieving high vaccination coverage is not only crucial for preventing physical illness but also plays a vital role in safeguarding the holistic mental and cognitive development of children [38].

Strengths and limitations of the study

In comparison to previous studies undertaken in the Bench Sheko Zone, this study is the first to measure vaccination coverage using a larger sample size in both urban and rural districts. However, contextual factors such as district/kebele-level differences, urban vs rural clustering, health facility access, and card availability were unaccounted for, which may affect estimated associations in this study. In addition, we have used the adapted questionnaires without the Cronbach's alpha test for validity to collect the data and we have included it as a limitation. We recommend geographic fixed effects or multilevel modeling for better estimation of the factors.

The diagnostic limitations of the Study

A large number of mothers and caregivers lacked a vaccination card. As a result, information about vaccination coverage has been reliant on mothers' and caregivers' information, which may have biased the current study. Additionally, the data is local and cannot be generalized. Individuals with a mean score of 0.5 or above on the total knowledge questions are regarded as having good knowledge, while those with a mean score of less than 0.5 are regarded as having poor knowledge. However, providing mean scores can more clearly reveal the participants' knowledge level.

https://doi.org/10.20372/gvjhbms.v1.i1.2026.005 © 2026 Green Valley Journals. All rights reserved.

Conlusion

Over three-quarters of the children were vaccinated, according to vaccination cards and maternal information. Full vaccination coverage was associated with maternal education level, ANC and PNC service utilization, and vaccination knowledge. Healthcare officials at all levels, programmers, and policymakers are advised to focus their efforts on maternal health services and maternal education to increase vaccine coverage beyond the existing level in the Bench Sheko zone.

Abbreviation /Acronomy

AOR: Adjusted odds ratio, **ANC:** Antenatal care, **COR:** Crude odds ratio, **BCG:** Bacillus Calmette Guerin, **PCV:** Pneumococcal conjugate vaccine, **DPT-HepB-Hib:** Diphtheria, Tetanus, Pertussis, Hepatitis B, **EDHS:** Ethiopian Demographic and Health Survey, **TT:** Tetanus Vaccination , **PNC:** Postnatal care, **VPD:** Vaccine-preventable diseases.

Declarations

Availability of Data and Materials

The data that support the findings of this study are available on request from the corresponding author.

Funding

The authors declared that this study has received no financial support.

Author's contribution

Concept – BA., HZ.; Design – BA, DA., HZ; Supervision – BA, DA.,HZ; Resources – HZ.; Materials – BA., DA., HZ; Data Collection and/or Processing – HZ.; Analysis and/or Interpretation – BA., HZ; Literature Search – HZ.; Writing – BA; Critical Review – DA.,BA.

Acknowledgments

The authors express appreciation to all the study participants for their cooperation and dedication of time during the data collection and study period.

References

[1] WHO, "Module 2: Epi vaccines department of vaccines," 2001.

[2] B. Kapuria *et al.*, "Immunization as an entry point for primary health care and beyond healthcare interventions—process and insights from an integrated approach in lebanon," 2023.

[3] S. T. Schwethelm and S. Stefanet, "Protecting from vaccine-preventable," 2020.

[4] A. Nandi and A. Shet, "Why vaccines matter: understanding the broader health, economic, and child development benefits of routine vaccination," 2020.

[5] UNICEF, "For every child, vaccination," 2023.

[6] W. H. Organization, "Immunization agenda 2030," 2022.

[7] G. Asmare, M. Madalicho, and A. Sorsa, "Disparities in full immunization coverage among urban and rural children aged 12-23 months in southwest ethiopia," 2022.

[8] E. P. H. Institute and ICF, "Ethiopia mini demographic and health survey 2019: Final report," 2021.

[9] E. P. on Immunization Report, "Expanded programme on immunization (epi)," 1998.

[10] A. G. Mekonnen, A. D. Bayleyegn, and E. T. Ayele, "Immunization coverage of 12–23 months old children and its associated factors in minjar-shenkora district, ethiopia," 2019.

[11] B. Fentie *et al.*, "Spatial distribution and determinants of tetanus toxoid immunization among pregnant women in ethiopia," 2023.

[12] S. G. Gebremichael and S. M. Fenta, "Factors associated with u5m in the afar region of ethiopia," 2020.

[13] CDC, "Communicable disease control manual chapter 2: Immunization part 1 - immunization schedules."

[14] E. M. of Health, "Health sector transformation plan ii 2020/21–2024/25," 2021.

[15] B. T. Negash, Y. Tediso, and A. Yoseph, "Predictors of timeliness of vaccination among children aged 12–23 months in boricha district, ethiopia," 2023.

[16] A. J. Ugwu *et al.*, "Determinants of full vaccination coverage among children in rural communities in enugu state," 2025.

[17] K. Yırgın, "Vaccination status in children with chronic diseases," 2023.

[18] Z. S. Yadita and L. M. Ayehubizu, "Full immunization coverage in somali region, ethiopia," 2021.

[19] A. Nambagyira *et al.*, "Routine immunization status of nomadic children in ghana," 2025.

[20] M. Khanam and N. A. Jahan, "Determinants of full vaccination coverage in bangladesh," 2024.

[21] F. Kibreab, S. Lewycka, and A. Tewelde, "Impact of mother's education on full immunization in eritrea," 2020.

[22] M. Anwar *et al.*, "Maternal literacy and child immunization in karachi," 2023.

[23] A. Gebreyesus and K. Tesfay, "Effect of maternal education on childhood vaccination in ethiopia," 2024.

[24] B. Elbert *et al.*, "Mothers' knowledge and child immunization status in indonesia," 2023.

[25] L. Martín-Manchado *et al.*, "Nutritional status and infertility study," 2024.

[26] A. M. Hussen *et al.*, "Antenatal care services in ethiopia," 2025.

[27] M. of Health, "National antenatal care guideline," 2022.

[28] M. K. Yenit, Y. A. Gelaw, and A. M. Shiferaw, "Predictors of incomplete childhood vaccination in ethiopia," 2018.

[29] WHO, "Recommendations on antenatal care for a positive pregnancy experience."

[30] W. Simegn *et al.*, "Childhood vaccination practices in debre tabor, ethiopia," 2023.

[31] G. Alliance, "The vaccine alliance report," 2023.

[32] H. A. Hill *et al.*, "Decline in vaccination coverage in the united states," 2024.

[33] A. Burton *et al.*, "Who and unicef immunization estimates computational model," 2012.

https://doi.org/10.20372/gvjhbms.v1.i1.2026.005 © 2026 Green Valley Journals. All rights reserved.

[34] A. Desalew *et al.*, "Incomplete vaccination in ethiopia: systematic review," 2020.
[35] N. Schiess, N. E. Groce, and T. Dua, "Neurological sequelae following bacterial meningitis," 2021.
[36] R. Schlack *et al.*, "Mental health problems in childhood and adulthood outcomes," 2021.
[37] B. Y. Mekuriaw *et al.*, "Psychological distress among caregivers of malnourished children," 2025.
[38] G. Musuka *et al.*, "Immunization coverage and equity among children with disabilities," 2025.

https://doi.org/10.20372/gvjhbms.v1.i1.2026.005 © 2026 Green Valley Journals. All rights reserved.