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Original Research Article

Quality assessment of immunization clinics in Bondo sub-County, western Kenya: a descriptive study

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ABSTRACT

Background: Childhood vaccine coverage remains suboptimal in the second year of life. In Kenya, the fourth dose of the RTS,S/AS01 malaria vaccine stands at 34%. Demand and supply factors influence vaccine uptake but the quality-of-service delivery- a critical supply-side factor- remains underexplored. An immunization clinic quality assessment framework was developed to evaluate services in 29 health facilities in Bondo sub-County, Kenya.
Methods: The WHO pediatric quality of care framework was adapted and used to conduct a cross-sectional survey of 29 health facilities between April and May 2025. The framework included 33 measurable indicators categorized as provision of care, experience of care and availability of child friendly resources. Immunization clinics were scored 1 or 0 per indicator, with total scores expressed as percentages and categorized into three quality levels: “below average” (0-50%), “average” (51-79%), and “above average” (80-100%). A Mann-Whitney U test compared quality scores between level 2 and levels 3/4 health facilities.
Results: Of the 29 clinics, 58.6% were level 2, 34.5% level 3, and 6.9% level 4; 89.7% were government owned. Clinic scores ranged from 70% to 91%, with 52% classified as “average” and 48% as “above average.” Levels 3 and 4 facilities performed significantly better than level 2 ($U=41.5$, $n_1=17$, $n_2=12$, $p=0.006$). Key deficiencies included vaccine stockouts and absence of child-friendly spaces.
Conclusions: Vaccine stock-outs is the key challenge to delivering quality services. Improving immunization service quality requires increased government investment that ensures uninterrupted vaccine supply and enhancing clinic environments.

Keywords: Assessment framework, Clinics, Immunization, Service quality, Vaccines

INTRODUCTION

Vaccines prevent most infectious diseases and have averted millions of deaths among under five years old children. For example, the measles vaccine averted 23 million deaths between 2010 and 2018.[1] Since 2020, the incidence of measles was reduced by 83% and 21.1 million mortality cases were prevented.[2] Despite the existence of effective vaccines, many children are still losing their lives to vaccine preventable diseases (VPDs) in the low- and middle-income countries (LMICs) due to sub-optimal coverage.[3,4] Increasing timely childhood vaccine coverage can significantly reduce morbidity and mortality cases. In Kenya, vaccine coverage for a fully immunized child for the first year of life is estimated at 80% with geographical variations across the country.[5] The Kenya’s Ministry of Health (MOH) and the World Health Organization (WHO) recommend a vaccine coverage of 80% and 90% respectively.[6] A high level of

vaccine coverage can help achieve herd immunity and hence protects an entire population from the VPDs.[7]

Challenges exist to achieving higher levels of vaccine coverage both on the demand and supply sides. On the demand side, studies have reported barriers to vaccine uptake including religious beliefs.[8] Small Christian denominations that believe in healing by faith avoid medical care and hence caregivers withhold their children from receiving vaccines.[9] Lack of awareness, low maternal education level, negative experiences with routine vaccination systems, costs of accessing vaccinating centers, conflicting activities and unfriendly vaccination environments are part of the reasons for low coverage.[10-12] Caregivers' experiences differ from one health facility to another depending on the quality of immunization services. In addition, experience with the adverse events following immunization (AEFIs), and how caregivers are prepared to manage them can influence decisions to go for the subsequent vaccines.[13] The sum of all the above challenges plus others not stated here is that in some parts of the world, 1 of 5 children are not vaccinated.[14]

Supply side factors too can either encourage or discourage vaccine uptake. Not so many research studies have been done about the supply side factors but the following are known, vaccine stock-outs, poor cold chain management/power outages, poor communication with caregivers, long waiting times, under staffing and inadequate infrastructures.[15-17] There is a need to overcome these barriers to childhood immunization uptake to achieve the vision of the Immunization Agenda 2030, "A world where everyone, everywhere, at every age, fully benefits from vaccines for good health and well-being".[1] In Kenya, there is a high coverage of over 90% for the vaccines administered during the first year of life including Bacillus Calmette-Guerin (BCG) and oral polio.[18] However, the coverage levels are inversely proportional with the children's age. The vaccines administered later including measles and 3rd and 4th doses of the malaria vaccine (RTS,S/AS01E) experience low coverage of less than 40%.[19] Improving quality of immunization services can increase uptake and help avert 51 million deaths between 2021 and 2030.[20] The quality of immunization services refers to the service delivery approach that increases the likelihood of achieving the desired outcome. The WHO asserts that quality health services should be effective, efficient, accessible, patient centered, equitable and safe.[21] While there are a few universally agreed indicators to assess quality of health services including the service availability and readiness assessment (SARA) that was developed by the WHO in collaboration with other partners, their scope is broad for a localized assessment exercise. The objective of SARA survey is to generate reliable and regular information on service delivery including availability of key human and infrastructure resources, and on the readiness of health facilities to provide basic healthcare interventions relating to family planning, child health services, basic and comprehensive obstetric care, HIV/AIDS, tuberculosis, malaria and non-communicable diseases.[22] This study's focus was limited within immunization department in a health facility and covered a small area, a sub-County. Consequently, there was a need for a simple tool that focuses on the expected services and resources within the smaller part of a health facility, immunization department.

We adapted the WHO pediatric quality of care framework to suit immunization services. The pediatric quality of care framework outlines eight domains that are critical to providing quality of care for children aged between 0 and 15 years old. The eight domains are organized into three categories namely, provision of care (1-3), experience of care (4-6) and availability of child and adolescent friendly resources (7 and 8).[23] Each of the eight domains has quality statements that are consistent with quality indicators highlighted in various policy documents including the SARA and the Kenya National Immunization Policy Guidelines.[6] The Kenya Expanded Programme for Immunization (KEPI), today known as the National Vaccines and Immunization Programme (NVIP) was established in 1980.6 Part of the NVIP's objectives is to oversee high quality, uniform and standardized immunization delivery, ensure uninterrupted availability of potent and safe vaccines, improve data quality, reporting and utilization for strategic decision making, improve knowledge, skills and competencies of immunization teams and stakeholders for effective, efficient and people-centered service delivery.[6] The national policy guideline document further states principles of immunization service delivery including, uninterrupted supply of vaccines, provision of vaccines without charges, provision of vaccines in all working day and on demand, screening children on vaccination status when joining school, storing all vaccines in specialized vaccine refrigerators, administering injectable vaccines using non-reusable injection devices, making efforts to prevent dropouts from all immunization schedules through careful counseling of caregivers about the importance of vaccines, possible side effects and how to manage them, and the consequences of not completing the schedule. On the other hand, SARA responds to questions including 1) What is the availability of basic packages of essential health services offered by public and private health facilities? 2) Is there an adequate level of qualified staff? 3) Are resources and support systems available to assure a certain quality of services? 4) How well prepared are facilities to provide high-priority services such as reproductive health services, maternal and child health services, and infectious disease diagnosis and treatment (e.g. HIV, sexually transmitted infections, tuberculosis and malaria)? 5) Are facilities ready to respond to the increasing burden of noncommunicable diseases? 6) What are the strengths and weaknesses in the delivery of key services at health-care facilities?[22]

Given that the supply side factors, particularly quality of immunization services influence uptake, we conducted a

comprehensive assessment of health facilities in Bondo sub-County, Siaya County in Kenya. Specifically, we assessed the quality-of-service inputs and service processes.[15] Our main objective was to establish capacity of the immunization clinics within the health facilities to deliver the desired quality services. This is because information on the quality of health services is necessary to help manage health systems, monitoring and evaluation.[22] Further, we aimed to identify improvement opportunities for strengthening immunization service delivery. Our findings have the potential to guide development of targeted interventions for improving quality of immunization services and thereby increase coverage of the childhood vaccines. Consequently, the increased coverage can avert many VPDs and related mortalities.

METHODS

Study design, setting and population

This is a cross-sectional descriptive study conducted between April and May 2025 in 29 health facilities of Bondo sub-County in western part of Kenya. Bondo sub-County is one of the six sub-Counties of Siaya County within the former Nyanza region. Bondo sub-County borders Lake Victoria and hence a malaria endemic zone. Projections made from the 2019 population census estimated the population of Bondo sub-County at 197,883 people of which 106,982 are males. The total number of children aged 0 to 4 years was estimated at 135,707.

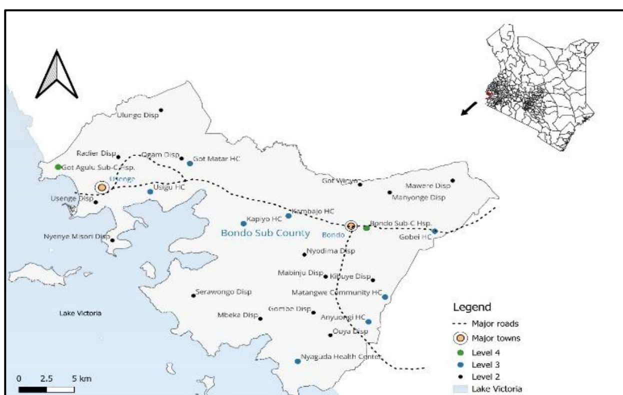

Figure 1: Map of Bondo sub-County health facilities.

There are 63 public or government owned health facilities in Bondo sub-County. The Kenyan health facilities range from levels 1 to 6 based on the level of service. The lowest level, which are also referred to as community health units provide preventive and promotive care and consist of the services offered by the community health promoters (CHPs) at the community level. Levels 2, 3 and 4 refer to dispensaries and clinics, health centres and sub-County hospitals respectively. Besides, levels 5 and 6 refer to County referral hospitals and National referral hospitals respectively. Therefore, categorization of the health facilities considers resource levels and hence the number of services offered. For example, the national referral hospitals provide the highest level of care including specialized and tertiary services. The study focused on levels 2 to 4 health facilities in Bondo sub-County, all of which provide immunization services. The childhood immunization coverage range between 88% - 98% and 39-70% for the early vaccines and late vaccines respectively 19. This study focused on 26 public, 2 missionary and 1 private health facilities that offer immunization services to a majority of Bondo residents. The island parts of the sub-County were excluded from the study for convenience.

Data collection methods

We modified the WHO standards for improving the quality of care for children and young adolescents in health facilities to develop immunization clinics' quality assessment framework (see Table 1). The framework was developed by selecting relevant quality statements and re-wording to fit elements of immunization services described in the existing literature. Further, we stated relevant measurable indicators in form of questions for research. Therefore, each of the 29 health facilities was assessed against 33 measurable indicators using a checklist. Of the 33 measurable indicators, the first three standards (provision of care) consisted of 9 items, the 4th to 6th standards (experience of care) had 9 items, and the 7th and 8th standards (availability of child friendly resources) had 15 items. In this regard, the assessment data were collected using structured questions presented under measurable indicators in Table 1, most of which were observed and others through interviewing the lead staff of immunization department or clinic. Each measurable indicator was marked as either a "yes" or "no" and scored an immunization clinic 1 point in the rating process. In addition, we collected information on clinic characteristics including level of the hosting health facility, ownership (public, missionary, private), Ward in which the host health facility is located, sex of the clinic's lead staff, cadre of the lead staff, number of vaccinating staff, estimated number of children vaccinated weekly, average waiting time, frequency of healthcare workers' supervision meetings, main source of power, availability of a power backup source, availability of a cold chain, availability of a waiting bay/shade and availability of a handwashing equipment. Finally, we asked those in-charge of immunization clinics to state one of the main challenges to providing immunization services at their health facilities.

Quality control

Three trained data collectors assessed the immunization clinics based on the measurable indicators presented in Table 1. After assessing each immunization clinic, the three data collectors converged before leaving the health facility hosting the immunization clinic to discuss their individual ratings to reach a consensus, especially in cases with discordant records. Where necessary, the three

data collectors sought clarifications from the immunization clinic lead. Assessment records for each immunization clinic were captured on a paper form/checklist and then entered into the Microsoft Excel. All records were reviewed after completion of the entry exercise for accuracy.

Table 1: Immunization clinics' quality assessment framework.

Standard	Selected quality statement	Modified quality statement	Measurable indicators
1. Every child receives evidence-based care and management of illness according to who guidelines	1.6) All infants and young children are assessed for growth, breastfeeding and nutrition, and their carers receive appropriate support and counselling, according to WHO guidelines 1.9) All children are assessed and checked for immunization status and receive appropriate vaccinations according to the guidelines of the WHO expanded programme immunization 1.14) All children receive care with standard precautions to prevent health care-associated infections	1.1) All infants and young children are assessed for growth, breastfeeding and nutrition, and their carers receive appropriate support and counselling 1.2) All children are assessed and checked for immunization status and receive appropriate vaccinations according to the national EPI schedule 1.3) There are efforts to prevent infections i.e., by sterilizing equipment, use of gloves and not sharing injection needles	1) Does the health care worker conduct growth monitoring? 2) Does the health care worker screen children for missed interventions? 3) Does the healthcare worker sensitize caregivers on children's nutrition? 4) Does the vaccinator practice IPC and use one injection needle per child?
2. The health information system ensures the collection, analysis and use of data to ensure early, appropriate action to improve the care of every child	2.1) Every child has a complete, accurate, standardized, up-to-date medical record, which is accessible throughout their care, on discharge and on follow-up 2.2) Every health facility has a functional mechanism for data collection, analysis and use as part of its activities for monitoring performance and quality improvement 2.3) Every health facility has a mechanism for collecting, analyzing and providing feedback on the services provided and the perception of children and their families on the care received	2.1) Every child has a complete, accurate, standardized, up-to-date vaccination records, which is accessible throughout their EPI schedule 2.2) Every health facility has a functional mechanism for collecting immunization data, analysis and use as part of its activities for monitoring performance and quality improvement 2.3) Every health facility has a mechanism for collecting, analyzing and providing feedback on the services provided and the perception of children and their families on the care received, for example active suggestion boxes	5) Does the health care worker record administered vaccine(s) in the child's health card? 6) Do all children visiting the clinic have a standard booklet? 7) Do the health care workers collect and analyze immunization data consistently? 8) Does the health facility have a way of collecting and providing feedbacks from caregivers and other stakeholders?
3. Every child with condition(s) that cannot be managed effectively with the available resources receives appropriate, timely referral, with seamless continuity of care	3.1) Every child who requires referral receives appropriate prereferral care, and the decision to refer is made without delay	3.1) Where a particular vaccine is not available in a health facility, children who need the unavailable vaccine are referred to where they can find it or rescheduled for a re-visit	9) Do the health care workers refer caregivers to a facility where they can get vaccinated if not available at their facility or re-schedule a revisit?
4. Communication with children and their families is effective, with meaningful participation, and responds to their needs and preferences	4.4) All children and their carers receive appropriate counselling and health education, according to their capacity, about the current illness and promotion of the child's health and well-being	4.1) All children and their carers receive appropriate counselling and health education, according to their capacity, about the current vaccine and the child's health and well-being to cope with the condition post immunization	Do the health care workers sensitize caregivers on the following: 10) Importance of vaccines? 11) Vaccines schedule? 12) AEFIs and management?
5. Every child's rights are respected and	5.1) All children have the right to access health care services, with no discrimination of any kind	5.1) All children have the right to access immunization services, with no discrimination of any kind	13) Are all eligible children able to receive vaccines without any form of

Continued.

Standard	Selected quality statement	Modified quality statement	Measurable indicators
fulfilled at all times during care, without discrimination	5.3) All children and their carers are treated with respect and dignity, and their right to privacy and confidentiality is respected	5.3) All children and their carers are treated with respect and dignity, and their right to privacy and confidentiality is respected	discrimination? 14) Do health care workers treat caregivers and their children with respect and dignity, i.e., no shouting and harassment? 15) Do health care workers administer vaccine services in private spaces?
6. All children and their families are provided with educational, emotional and psychosocial support that is sensitive to their needs and strengthens their capability	6.1) All children are allowed to be with their carers, and the role of carers is recognized and supported at all times during care, including rooming-in during the child's hospitalization 6.2) All children and their families are given emotional support that is sensitive to their needs, with opportunities for play and learning that stimulate and strengthen their capability 6.3) Every child is assessed routinely for pain or symptoms of distress and receives appropriate management according to WHO guidelines	6.1) All children are allowed to be with their carers, and the role of carers in the immunization process is recognized and supported, including talking with the child as well as re-assuring and restraining during vaccine administration 6.2) All children and their carers are given emotional support that is sensitive to their needs, with opportunities for play and learning that stimulate and strengthen their capability 6.3) Every child is assessed for pain or symptoms of distress and receives appropriate management	16) Are mothers encouraged to accompany and talk with their children during administration of vaccines? 17) Do health care workers address caregivers and children's concerns post immunization process? 18) Do health care workers ensure that children are okay before leaving the health facility?
7. For every child, competent, motivated, empathic staff are consistently available to provide routine care and management of common childhood illnesses	7.1) All children and their families have access at all times to sufficient health professionals and support staff for routine care and management of childhood illnesses 7.2) Health professionals and support staff have the appropriate skills to fulfill the health, psychological, developmental, communication and cultural needs of children 7.3) Every health facility has managerial leadership that collectively develops, implements and monitors appropriate policies and legal entitlements that foster an environment for continuous quality improvement	7.1) All children and their families have access at all times to sufficient health professionals and support staff for routine childhood immunization 7.2) Health professionals and support staff have the appropriate skills to administer vaccines and fulfill communication and cultural needs of children and their carers 7.3) Every health facility has managerial leadership that collectively develops, implements and monitors appropriate policies and legal entitlements that foster an environment for continuous quality improvement	19) Does the health facility provide immunization services daily? Are the vaccinating staff trained in the following areas: 20) Vaccine administration? 21) Cold chain management? 22) AEFIs? 23) Inventory management? 24) Do the healthcare workers understand culture of the catchment community? 25) Is there a supervision system for the healthcare workers?
8. The health facility has appropriate, child-friendly physical environment, with adequate water, sanitation, waste management, energy supply, medicines, medical supplies and equipment for routine care and management of common childhood illnesses	8.1) Children are cared for in a well-maintained, safe, secure physical environment with an adequate energy supply and which is appropriately designed, furnished and decorated to meet their needs, preferences and developmental age 8.2) Child-friendly water, sanitation, hand hygiene and waste disposal facilities are easily accessible, functional, reliable, safe and sufficient to meet the needs of children, their carers and staff 8.3) Child-friendly, age-appropriate equipment designed to meet children's needs in medical care, learning, recreation and play are available at all times 8.4) Adequate stocks of child-friendly medicines and medical supplies are available for the routine care and management of acute and chronic childhood illnesses and conditions.	8.1) Children are waiting in a well-maintained, safe, secure physical environment with an adequate energy supply and which is appropriately designed, furnished and decorated to meet their needs, preferences and developmental age 8.2) Child-friendly water, sanitation, hand hygiene and waste disposal facilities are easily accessible, functional, reliable, safe and sufficient to meet the needs of children, their carers and staff 8.3) Child-friendly, age-appropriate equipment designed to meet children's needs, learning, recreation and play are available at all times 8.4) Adequate stocks of vaccines and immunization equipment are available for the routine immunization and management of AEFIs.	26) Does the health facility have a child-friendly zone? 27) Does the health facility have a reliable source of energy? 28) Does the health facility have a potable water? 29) Does the health facility have a clean toilet/pit latrine? 30) Does the health facility have a waste disposal system? 31) Does the health facility have age-appropriate toys? 32) Has the health facility experienced a vaccine stock-out in the last 12 months? 33) Has the health facility experienced stock-out of any immunization equipment in the last 12 months?

Data analysis

We analyzed data using descriptive statistics and reported frequencies and percentages of various health facilities and staff characteristics. In addition to the health facility overall scores based on the assessment exercise, we presented a detailed analysis of some measurable indicators to identify gaps that can be filled to improve the quality of immunization services in Bondo sub-County.

Out of the 33 measurable indicators, the immunization clinics' scores were expressed in percentage and then categorized into two, "above average" and "average". none of the clinics scored below 50%, "below average". "Above average" health facilities scored 80% and above while "average" health facilities scored between 50% and 80%. Further, immunization clinics hosted by levels 3 and 4 health facilities were grouped together to form a group of 12. Thereafter, a Mann-Whitney U test was performed to compare the quality-of-service scores of a group of 17 clinics hosted in level 2 health facilities with that of the combined group of levels 3 and 4 (12 health facilities). All the analyses were conducted using Stata version 16.

Ethical considerations

This research study involved observing processes, which included humans at the vaccinating clinics and asking a few questions from the health care workers administering vaccines. Therefore, we sought ethical approval from the Jaramogi Oginga Odinga University of Science and Technology (JOOUST) ethics committee [approval no. ERC/02/2025(4)]. Permission to observe health facilities was obtained from the Siaya County and Bondo sub-County health management teams. Further, all the immunization clinic heads of the 29 health facilities and staff administering vaccines were consented. We did not collect individual identifiers such as names and national identification numbers.

RESULTS

We assessed immunization clinics within 29 health facilities in Bondo sub-County out of which a majority were level 2 (58.6%) and owned by the government (89.7%) (Table 2). The health facilities were almost evenly spread within the six administrative Wards of Bondo sub-County with east Yimbo having the highest proportion (20.8%) and west Yimbo having the lowest proportion (10.4%). Most of the immunization clinics were headed by female nurses (79.3%). In most clinics, there were one or two staff administering vaccines and only 41.4% of the clinics provided vaccines from Monday to Friday. In 37.9% of the clinics, the vaccinating staff conducted supervision meetings monthly while another 31.1% were supervised every three months. Electricity was the main source of energy but 17.2% lacked power supply. Slightly more than a fifth of the health facilities lacked a cold chain system and a waiting bay/shade.

Table 2: Descriptions of the surveyed 29 clinics in Bondo sub-County, June 2025.

Characteristics	N	%
Level of the health facility		
4	2	6.9
3	10	34.5
2	17	58.6
Ownership		
Public	26	89.7
Missionary	2	6.9
Private	1	3.4
Ward		
Central Sakwa	5	17.2
North Sakwa	5	17.2
South Sakwa	5	17.2
West Sakwa	5	17.2
West Yimbo	3	10.4
East Yimbo	6	20.8
Sex of the lead staff		
Female	23	79.3
Male	6	20.7
Cadre of the lead staff		
Nurse	29	100.0
Number of vaccinating staff		
1	11	37.9
2	11	37.9

Continued.

Characteristics	N	%
3	3	10.3
4	2	6.9
5	1	3.5
6	1	3.5
Number of vaccination days in a week		
1	5	17.2
2	11	37.9
4	1	3.5
5	12	41.4
Number of children vaccinated in a week		
1-20	12	41.4
21-50	11	37.9
>50	6	20.7
Average waiting time at the vaccine clinic		
5-30 minutes	23	79.3
31-120 minutes	6	20.7
Frequency of healthcare workers' supervision meetings		
Weekly	7	24.1
Fortnightly	2	6.9
Monthly	11	37.9
Quarterly	9	31.1
Source of power		
Electricity	18	62.1
Solar	5	17.2
Gas	1	3.5
None	5	17.2
Availability of backup power source		
Yes	11	37.9
No	18	62.1
Availability of cold chain		
Yes	23	73.9
No	6	20.7
Availability of a waiting bay/shade		
Yes	23	79.3
No	6	20.7
Availability of a handwashing equipment		
Yes	26	89.7
No	3	10.3

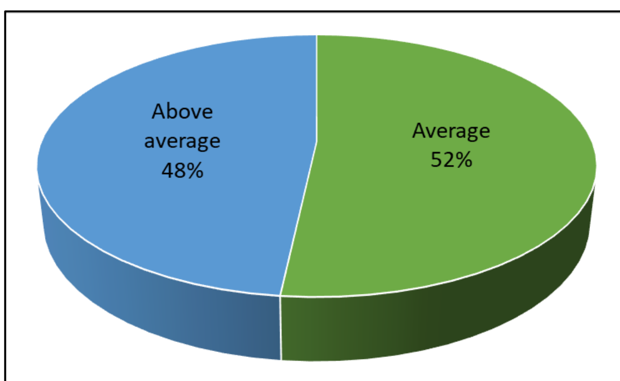

Figure 2: Proportion of the immunization clinics by quality-of-service rating.

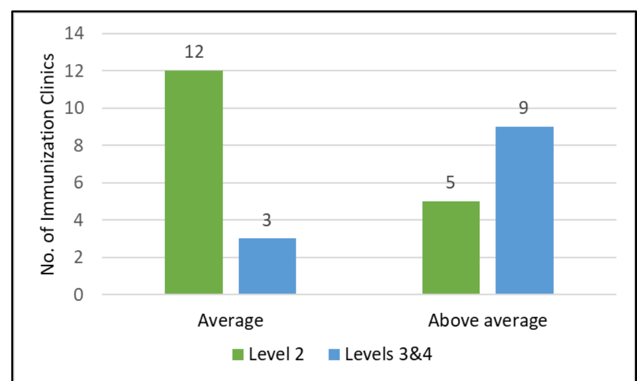

Figure 3: Number of assessed immunization clinics by quality score category, n=29.

Based on the assessment indicators, 48% of the immunization clinics scored between 82% and 91%, and hence rated “above average” (Figure 2). The remaining immunization clinics scored between 70% and 78%, therefore labeled as average health facilities.

Most of the clinics rated average were level 2 (12 versus 3) while a majority of the clinics rated above average were levels 3 and 4 (9 versus 5), see Figure 3.

Figure 4: A matrix of the Bondo sub-County immunization clinics and indicators scores based on the quality assessment framework, July 2025.

Figure 4 presents a matrix of each immunization clinic’s overall score and the score of each indicator across the 29 clinics. The top ten least performing indicators across the surveyed clinics were (indicator 6), which assessed whether all children visiting the clinic had a standard booklet. All clinics (100%) had children who did not have a standard clinic booklet for recording vaccination services received. Similarly, all clinics had experienced vaccine stock-outs in the last 12 months (indicator 32). In addition to the vaccine stock-outs, 69% reported to have experienced stock-out of vaccine related equipment such as syringes, diluents and gloves in the last 12 months (indicator 33). The assessment indicator 31 sought to establish whether the clinics had age-appropriate toys, of which only 14% had. Moreover, only 21% of the clinics had a child-friendly zone (indicator 26). Of interest too was whether the clinics provide immunization services daily (indicator 19). Less than half of the clinics (41%) were determined to provide immunization services daily. The rest scheduled immunization days twice or four times a week. Screening children who are presented at a clinic for any missed or due age-appropriate health service is a primary health requirement (indicator 2). Screening of children was observed in 59% of the immunization clinics. Feedback from key stakeholders such as caregivers is important to the immunization clinics and based on indicator 8, 69% had a system (drop boxes) for such interactions. Also, in 72% of the immunization clinics, healthcare workers were observed to be sensitizing caregivers on adverse events following immunization (AEFIs). Finally, in 69% of the clinics, healthcare workers were supervised regularly within a monthly period (indicator 25). In the remaining 31%, healthcare workers conduct supervision meetings every three months.

A majority of healthcare workers (34.4%) believed that understaffing at the immunization clinics and hosting health facilities was the main challenge to providing adequate immunization services (Figure 5). Others reported challenges including stock-out of vaccines (17.1%), lack of or unstable power supply at the host health facilities (10.2%), and inadequate reminders to caregivers about the next vaccination dates for their children (6.8%).

Figure 5: Healthcare workers’ perception on the main challenges to the immunization services.

A Mann-Whitney U test was conducted to compare performance scores of clinics between a group of levels 3 and 4 and level 2 health facilities. The test revealed a significant difference between the two groups, U=41.5, n_1=17, n_2=12, p=0.006, with a medium effect size, r=0.50.

DISCUSSION

We developed a tool, immunization clinics’ quality assessment framework, by modifying the WHO standards for improving the quality of care for children and young adolescents in health facilities and assessed 29 immunization clinics in Bondo sub-County. Clinics’ quality of care was relatively good with about half scoring a performance rating above average.

All health facilities reported to have experienced a stock-out of at least one of the antigens within the last 12 months from the interview date. These rates are higher compared to the findings of a study conducted in over 1,300 health facilities in Sindh, Pakistan where only 43% had experienced vaccine stockouts.[24] Rotarix, measles containing vaccine (MCV), oral polio vaccine, malaria vaccine (RTS,S/AS01), Bacillus Calmette-Guerin (BCG) and pneumococcal conjugate vaccine (PCV) are the antigens that experienced stockouts, see Figure 4.

Vaccine stockouts indicates a more critical and systemic problem that could hinder progress toward immunization goals and overall health system strengthening. Caregivers who travel long distances to reach an immunization clinic may feel discouraged from returning if they miss immunization due to a stockout. This can lead to fewer children being immunized, ultimately reducing immunization coverage and increasing the risk of vaccine-preventable diseases.[25] Furthermore, diarrheal diseases and measles are common among under five children in Siaya County, which emphasizes the need for the county government to ensure uninterrupted supply of these vaccines. Rotavirus vaccine protects children against the most severe forms of diarrhea diseases.[26] Disruption of measles vaccine coverage was observed to result in outbreaks, which underscores the importance of ensure stable supply.[27]

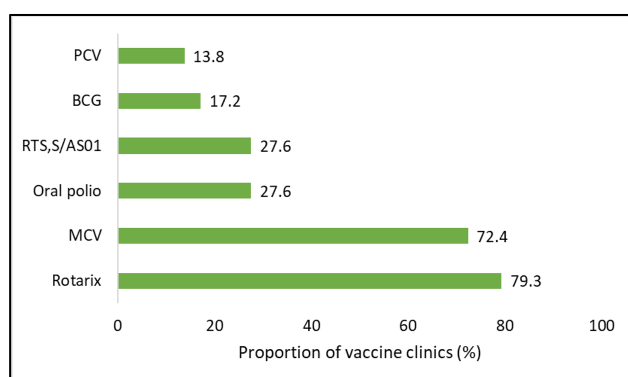

Figure 6: Antigens that experienced stock-outs in the last 12 months.

It was observed that some health facilities and hence immunization clinics lack electricity or a reliable source of energy and therefore depend on the neighboring clinics for vaccines storage. Provision of quality immunization services requires investment infrastructure, development of human resource and ensuring uninterrupted supply of consumables.[28] Inadequate cold chain equipment compromises vaccines storage by exposing vaccines to out of range temperatures, which can alter their potency and increase wastage.[29]

In addition, poorly stored vaccines can result in increased cases of Adverse events following immunization (AEFIs), which in turn discourage caregivers to continue with the vaccination journey.[13] Moreover, where cold chain is unavailable, it is impossible to conduct the monthly outreaches as required by the national policy guidelines. Consequently, lack of a reliable energy source limits provision of immunization services. Immunization clinics that lack electricity have opted to schedule vaccination days twice a week. This is contrary to the expectation of the national policy guideline that recommends uninterrupted supply of vaccines in all working day and on demand.[6]

Very few clinics had shady waiting bays and child friendly play zones and age-appropriate toys. Recommended standards for Immunization clinics include shady waiting bays furnished with comfortable chairs and child-friendly play zones, equipped with age-appropriate toys. Such facilities make the waiting time at the immunization clinics bearable, and children get opportunities to play, which is important for their mental development process.[30] Unfortunately, most of the health facilities lack these critical facilities.

Our findings reveal a shortage of MCH booklets in all immunization clinics. While the MCH booklets provide an opportunity to document important health services received by the mother-child pair, it is inadequately supplied and some caregivers/mothers used exercise books as an alternative. The standard booklet documents all health services that a child has received from birth.[31] The Kenya's Ministry of Health (MOH), through the support of partners such as the United States Agency for International Development (USAID) provides standardized booklets for maternal and child health at the first antenatal care (ANC) clinic visit. Without proper vaccine records, it is challenging to both caregivers and healthcare workers to track health services that a child has received and those that are pending.

Most healthcare workers reported that the main challenge to the immunization system is understaffing. Where there is inadequate staffing, it is challenging to effectively conduct recommended services such as screening all under five children to identify missed opportunities, sensitize all caregivers who come to the clinic on the importance of vaccines, vaccines' schedule and management of AEFIs. Understaffing is common in resource limited settings and adversely affects quality of service delivery.[17] Overall, the quality of immunization services is dependent on the level of invested resources. This is evidenced by the fact that the group of levels 3 and 4 health facilities, which are relatively more equipped, scored higher than that of level 2. In this regard, the Kenyan government needs to prioritize allocating sufficient funds to fill the structural gaps in the immunization system. Presently, the government of Kenya finances some vaccines and operations but rely on external partners such as Gavi, the Vaccine Alliance, WHO and (United Nations Children's Fund) UNICEF for subsidies for several vaccines and strengthening efforts.[32] The identified challenges to provisioning of immunization services will be effectively addressed when the government improves her self-reliance for vaccine financing.

This study has some strengths and weaknesses. We have developed a tool to assist in the rapid quality assessment of immunization clinics at a small scale. The quality assessment tool has the potential of identifying areas that require improvement rapidly and hence useful for targeted interventions. Observation as a data collection method has both the observer bias and the Hawthorne

effect. For the first bias, three data collectors converged to discuss their findings and reach a consensus after every health facility visit. On the other hand, it is possible that the healthcare workers could change their behavior when providing immunization services, a bias that we had limited control over. Nonetheless, not all indicators assessed delivery of service but conditions that could not be easily altered within the assessment period. Although the study covered a relatively small administrative area, there are similarities of the observed conditions in most health facilities within Siaya County due to a standardized management approach by the county health management team (CHMT). Finally, the main strength of the study is highlighting granular, division specific information to the NVIP and other stakeholders on the gaps existing in the immunization system to influence tailored policies.

CONCLUSION

The quality of immunization services in Bondo health facilities range from average to above average. These scores are largely based on the level of immunization resources available at the clinics. Therefore, to improve the service quality, the government needs to allocate more funding to fill the gaps including ensuring that all health facilities are connected to the national electric power grid, operate own cold chain, have comfortable waiting bays and child friendly play zones that are equipped with age-appropriate toys, have uninterrupted supply of vaccines and related equipment, and adequate number of trained staff.

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