Immunization service availability and readiness in primary health care in pastoral and semi-pastoral CGPP Ethiopia implementation districts

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Abstract

Background: The availability of immunization services and the readiness of skilled health workers in health institutions to deliver potent vaccines to end users when required to do so are important inputs that contribute to the reduction of child morbidity and mortality from vaccine-preventable diseases (VPDs).

Objective: Assess immunization service availability and readiness in primary health care units (PHCUs) in pastoral and semi-pastoral regions of CGPP Ethiopia implementation districts.

Methods: A facility-based cross-sectional survey was employed on 14–23 August 2016 in all health centers (HCs) and three randomly selected health posts (HPs) in each HC catchment area in 85 CGPP implementation districts. An observation checklist was filled in by trained data collectors for all study PHCUs.

Results: Immunization service availability and service delivery, based on 19 tracer items, were assessed in 860 PHCUs in both pastoral and semi-pastoral areas. In total, 92% of the PHCUs reported providing an immunization service. However, only 18.1% of the PHCUs were observed and 32.4% reported providing immunization on the day data were collected. Overall, immunization service readiness was 56.6%: 85% of the HCs and 46.6% of the HPs were ready for immunization service over the study period. The proportion of PHCUs found to have functional refrigerators was 65%.

Conclusions and recommendations: Great variability observed in terms of service readiness among HCs and HPs in this study. All PHCUs should be equipped with functional refrigerators that are regularly maintained; all immunization antigens and schedule immunization services should be available at the PHCUs daily to avoid missed opportunities; cold chain managers/immunization service providers should be given supervisory support to ensure that they record refrigerator temperatures.[*Ethiop .J. Health Dev. 2019; 33(Special issue):24-30*]

Key words: Service availability, Service readiness, Pastoralist and semi-pastoralist, Hard to reach community

Background

In 1974, three years prior to its declaration on the eradication of small pox, the World Health Organization (WHO) initiated the Expanded Program on Immunization (EPI), which aims to immunize mothers against tetanus, and children against childhood tuberculosis, poliomyelitis, diphtheria, pertussis, measles and tetanus (1).

Immunization is the most cost-effective public health intervention, providing children with protection from vaccine-preventable diseases (VPDs) (2). Vaccines prevent debilitating illness and disability, and save millions of lives every year. The impact of immunization is not limited to saving lives; it also helps children to grow up healthy, attend and progress through schooling. Despite the overall success of immunization programs to date, it is estimated that almost 11 million children under 5 years of age die each year globally from VPDs. Especially in developing countries; immunization achievement is still far from the universal target which is less than 95% coverage rate, leading to preventable mortality (3).

Equity in access to vaccination remains a challenge and coverage rates vary greatly among countries. Even within countries, where there is greater potential for consistent resource allocation, coverage is uneven (4). In developing countries that have a poorly functioning health system, it is difficult to ensure equity of access to immunization and, as a result, there may be a high degree of variability in immunization coverage (3). Moreover, numerous challenges remain that affect the effectiveness of routine immunization, notably: policy, standards, and guidelines; governance, organization and management; human resources; vaccine, cold chain, and logistics management; service delivery; communication and community partnerships; data generation and use; and sustainable financing (5).

The lack of access to social services over time has resulted in pastoralists lagging significantly behind sedentary populations in Africa in relation to basic indicators of well-being, such as literacy rates; immunization coverage; infant, under-5 and maternal mortality; and school enrollment rates (6).

Cold chain management in resource-poor settings, where electricity is non-existent or erratic, coupled with a lack of adequately trained staff to administer vaccines, present major challenges in most African countries (7), including Ethiopia.

Although EPI was launched in 1980 in Ethiopia, the coverage over the first two decades was very low, due to a lack of awareness of vaccines, insufficient numbers of trained workers, and under reporting due to poor recording of immunization program data(8) Though currently, Ethiopia has witnessed good improvement in immunization coverage due to the health extension program which deployed more than

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30,000 health extension workers at kebelle (the lower administrative structure) level and the construction of health posts closer to the community(10).

Problem statement

A strong health system is needed to ensure the availability, accessibility and affordability of good-quality health services, driving high, sustainable and equitable coverage of immunization and other essential health services across the continuum of care, including for excluded groups (9).

Ethiopia's health decentralization policy provides an opportunity for the districts to mobilize the Expanded Program on Immunization (EPI) resources for low-level health institutions (HCs and HPs) to provide immunization services to end users. Although Ethiopia has witnessed a marked improvement in immunization coverage, regional disparity is huge: full vaccination coverage is highest in Addis Ababa at 89%, and lowest in Afar at 15% (10). This immunization disparity might be related to various determining factors, including health facilities' immunization service availability and readiness.

Immunization service availability

Immunization service availability and readiness have been assessed in different areas in developing nations. For example, a study conducted in Sierra Leone indicated that 92% of the facilities provided child immunization services (11). A similar study conducted in 2012 in Tanzania indicated that 73% of facilities provided child immunization services (12).

In 2010, a service availability and readiness study in Zambia showed that, overall, 84% of facilities included in the assessment provided child immunization services (13). While a similar study done in Ethiopia, in 2016, revealed that 80% of the facilities provided immunization services (2).

Immunization service readiness

The same study conducted in Zambia, using eight tracer items to measure immunization service readiness, revealed that 99% of the facilities had auto disable (AD) syringes and 96% had sharps boxes. The availability of refrigerators and cold boxes was also very high (89% and 87%, respectively). The availability of the four antigens (BCG, DTP-Hib-Hep, OPV and Measles) ranged from 82% for BCG to 86% for DTP-Hib-Hep B (13).

In the study conducted in Tanzania, which used 10 tracer items to measure immunization service readiness, nearly all facilities had cold boxes or vaccine carriers, disposable syringes, sharps containers (79% for each), functional refrigerators (78%), and the four key child and adolescent vaccines – measles, Penta, BCG and tetanus toxoid – were found in 81%, 80%, 77% and 91% of the PHCUs, respectively (12).

A study conducted in Ethiopia, using 16 tracer items to evaluate immunization service readiness, showed that the majority of PHCUs had AD syringes (89%) and sharps containers (95%). Refrigerators and cold boxes were also available in 31% and 71% of PHCUs, respectively. Availability of the six antigens (Penta, BCG, Oral Polio Vaccine, PCV, Measles and Rota Vaccine) ranged from 29% for oral polio vaccine (OPV) to 36% for measles (2).

In a study conducted in central Ethiopia in 2012 to assess cold chain status for immunization, 32.8% of the studied PHCUs had a refrigerator, of which 57.9% were functional. Moreover, 50% and 89.7% of the PHCUs had adequate ice packs and vaccine carriers, respectively. In 72.7% of the PHCUs, refrigerator temperature readings were within the standard range (2ºC–8ºC); 63.6% of functional fridges had temperature monitoring charts; and 93% of the PHCUs updated their refrigerator recordings twice daily on the day of data collection (14).

A study conducted in Ethiopia's Somali Region, Jigjiga Zone, indicated that 72.2% of health care professionals providing immunization services were trained and 66.6% were nurses. Moreover, the study found that all health institutions have adequate supplies to perform immunization service; this indicates the presence of adequate human resources both professionally and in terms of skills mix (15).

Health facilities readiness to provide immunization service timely through skilled provider and using potent vaccines to clients is vital for the reduction of child mortality and morbidity from VPDs. While many studies attempt to understand the determinants of immunization from the consumer's side, there is limited evidence, particularly in the proposed study sites, about the supply side, mainly health facilities' availability and readiness to provide immunization service. This study contributes to an understanding of the supply-side determinants, particularly evidence based on data collected from PHCUs.

Objective

To assess immunization service availability and readiness in PHCUs in pastoral and semi-pastoral regions of CORE Group Polio Project (CGPP) Ethiopia implementing districts.

Methods

A facility-based cross-sectional survey was conducted between 14–23 August 2016 in 860 PHCUs (all health centers in CGPP implementation areas and three randomly selected HPs in areas where the HC catchment has more than three HPs under each HC catchment area) in 85 CGPP implementation districts.

Observation checklists were filled in by trained data collectors for all study PHCUs. Data were collected on the 860 PHCUs (227 HCs and 633 HPs) using an observation checklist.

Two days of training were given to data collectors and facilitators prior to data collection. Double data entry using Epi Data was employed and analysis was done using STATA version 12.

Operational definitions

Immunization service availability: Service is said to be available if the facility was able to provide immunization services at the health facility on the day of the assessment (through observation), irrespective of whether vaccination was actually given.

Immunization service readiness: The component 'domains' that make up the readiness score in the PHCUs generally include: staff and training; equipment; vaccines; and commodities and supplies. A readiness score of 50 signifies that, on average, half of the PHCUs that offered the immunization service had each of the mandatory inputs to deliver the service (16).

Limitation of the study

This study used observation of PHCUs providing an immunization service on the day of the survey for the service to be deemed 'available'. The study could have used interviews as an additional or complementary means of data collection.

Results

A total of 860 PHCUs – 227 (26.3%) health centers (HCs) and 633 (73.7%) health posts (HPs) –were observed in 85 CGPP implementation districts (Table 1).

Table 1: **Distribution of assessed primary health care units, by regional CGPP implementation area**

Region	Health centers	Health posts	Percentage by region
Benishangul-Gumuz	37	111	17
Gambella	29	66	11
Oromiya	49	144	23
SNNPR	45	128	20
Somali	67	184	29
Total	227	633	100

On service provision, 626 (92%) of the PHCUs (99.6% of HCs and 89.7% of HPs) reported providing immunization. Moreover; only 156 (18.1%) facilities (36.2% of HCs and 11.7% of HPs) were observed and 279(32.4%) PHCUs (56.3% of HCs and 23.8% of HPs) were reported providing the service on the day of the survey. The vast majority (86%) of the PHCUs have at least one staff member trained on EPI, and over half of the PHCUs found to have the national/regional immunization guideline (65.5% of HCs and 47.2% of HPs).

Table 2: **Percentage of vaccine availability and vaccine validity in assessed Primary health care units, by facility and vaccine type**

Vaccine	Availability of vaccine			Invalid vaccine		
	HC	HP	Total	HC	HP	Total
BCG	84.2	21.2	38.2	3.7	7.1	5.1
Inactivated polio	86.9	22.4	39.9	7.8	5.2	6.7
Measles	90.5	26	43.3	4.5	3.8	4.2
Oral polio	84	25.1	40.9	5.4	7.9	6.6
Pentavalent	92.3	26.3	44	4.9	4.4	4.7
Pneumococcal	89.5	25.2	42.4	3.6	4	3.7

Availability of cold chain: Of the PHCUs, 505 (58.7%) had refrigerators for vaccine storage (99.1% of HCs and 47.2% of HPs), of which 328 (65%) were functional (78.7% of HCs and 53.9% of HPs) (Figure 1).

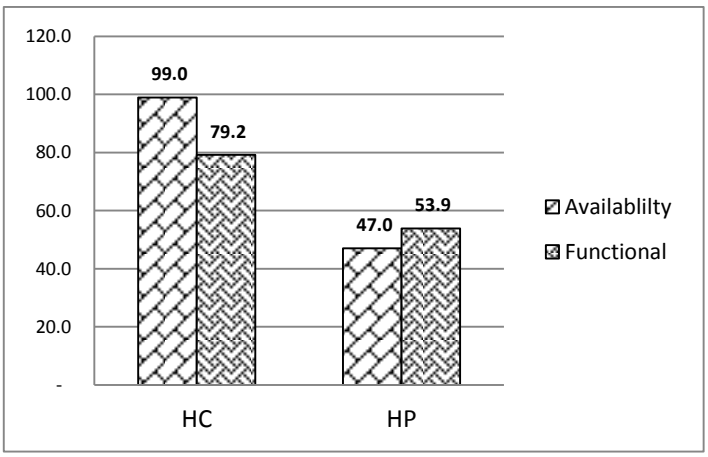

Figure 1: **Availability and functionality of refrigerators in the primary health care units, by facility type**

Monitoring sheets showing the recording of refrigerator temperatures twice a day were observed in 266 (40.4%) of the PHCUs. On the other hand, just 202 (30.2%) and 72 (10.8%) of the PHCUs had fully and partially completed monitoring sheets for the past 30 days, respectively.

Of the observed PHCUs' refrigerator temperature monitoring thermometers, 262 (41.7%) were present, of which 152 (58.5%) were functional. Regarding the availability of continuous temperature monitoring or logging, 216 (35.3%) of the observed PHCUs had continuous temperature monitors or loggers, of which 127 (59.3%) were functional. Similarly, 227 (36.1%) of the PHCUs used fridge-tags, of which 120 (53.8%) were functional.

In 675 (79.5%) of the observed PHCUs, vaccine carriers or cold boxes were available and observed during the period of the survey.

In PHCUs with functional refrigerators, the refrigerator temperatures were observed on the day of the survey and the last 30 days' temperature records were reviewed. A total of 344 (53.2%) (15.9% of HCs and 73.3% of HPs) of the PHCU refrigerator records were not available. Just 30.2% of PHCUs refrigerator temperature monitoring sheets was completed fully for the past 30 days, and 10.8% were completed only partially. Of the PHCUs which had temperature records available, 239 (78.87%) of the observed refrigerators' temperature records were within the acceptable temperature range standard (2°C to 8°C), while 64 (21.13%) were found to have temperatures outside this range (below 2°C or above 8°C) (Figure 2).

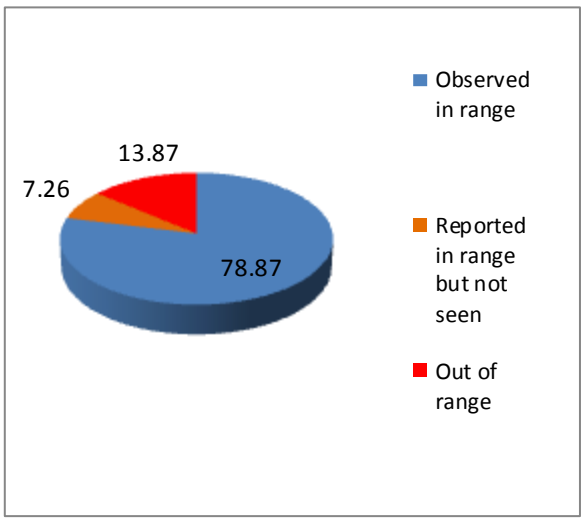

Figure 2: **Percentage of refrigerator temperatures observed on the day of the survey and recorded in the last 30 days**

Vaccine and equipment: The study findings showed that 765 (90.4%) of the observed PHCUs had sharps containers or safety boxes.

Moreover, 735 (86.9%), 430 (51.4%), 579 (68.9%) and 553 (65.8%) of the observed PHCUs were found to have AD syringes, diluents, droppers, and 5ml mixed syringes, respectively.

The study also revealed that 685 (80.9%), 566 (67.5%), 669 (80.4%) and 224 (27.3%) of the observed PHCUs were found to have immunization cards, official immunization tally sheets, official immunization registers, and immunization stock balance sheets, respectively.

Regarding the availability of antigens on the day of the assessment, 90.5% of the HCs and 26% of the HPs had measles vaccines; 84% of HCs and 25.1% of HPs held OPV; and 92.3% of HCs and 26.3% of HPs stocked pentavalent vaccines. The majority of the observed antigens were found to be not expired.

All the observed PHCUs (860) were assessed on their readiness to provide the service based on the availability of the 19 tracer items, as shown in Figure 3.

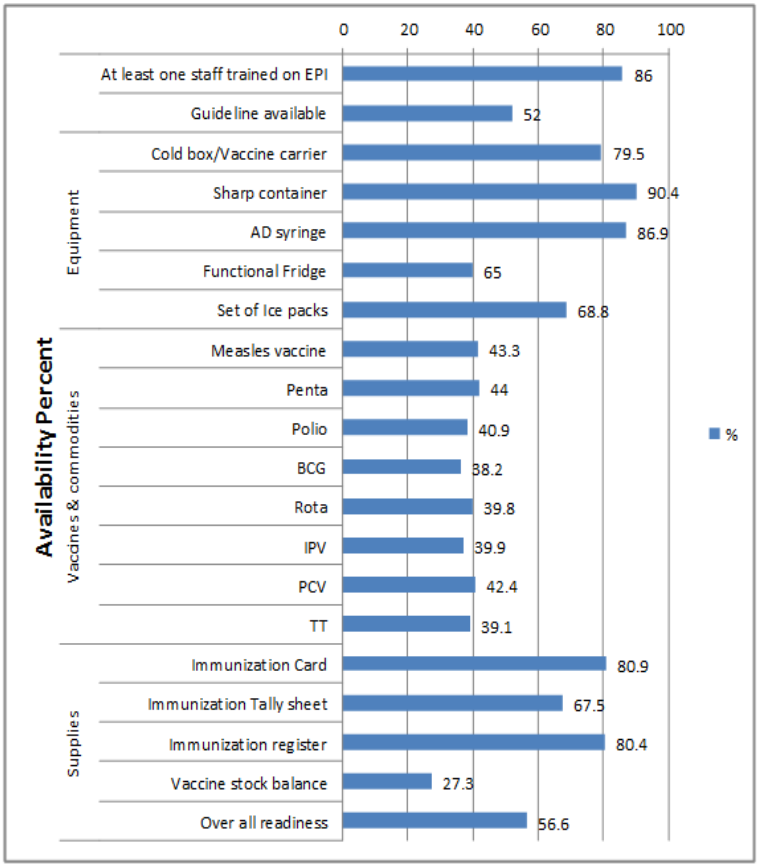

Figure 3: **Percentage of primary health care units' that were ready to provide immunization service, CGPP implementation area**

The data were further sorted to see if there were variations between study PHCUs and by regions. The findings revealed that there was a difference in terms of service readiness – 85% at HCs and 46% at HPs, when evaluated according to the 19 tracer items. Similarly, there was variation among regions, with the highest (63%) in Somali Region and the lowest (46.4%) in Oromiya Region.

Discussion

Although all PHCUs (especially HCs) are expected to provide a routine immunization service daily at the facility to avoid immunization service missed opportunities, this study showed that, overall 32.4% of PHCUs provided immunization service on the day of data collection, and only 36.2% of HCs and 11.7% of HPs were observed providing the service during the survey period. This finding is similar to the SARA study conducted in Ethiopia in 2016, where 51% of the HCs and 11% of HPs were observed providing a child immunization service daily (2). However, this study finding is very low compared with the SARA studies in Tanzania, Sierra Leone and Zambia, where 71%, 92% and 80%, respectively, of the health facilities were observed offered immunization services (11, 12, 13). The low service availability finding in the study might be due to service is said to be available in this study; if the facilities observed offering the services on the day of the assessment, whereas in the other studies it was through interview (service provision was not observed on the day of the assessment rather information collected through interview). In addition, hospitals and private health facilities were not included in the present study, whereas they were included in the Tanzania, Sierra Leone and Zambia studies.

All the observed PHCUs were assessed on their readiness to provide the service, based on the availability of the 19 tracer items (2).

Overall, 86% of the studied PHCUs had at least one staff member trained in EPI, and in 52% of the PHCUs, the EPI guideline was available. The availability of the EPI guideline was lower in this study compared with Sierra Leone and Tanzania SARA study findings, where 85% and 66% of the facilities, respectively, had the EPI guideline (11, 12).

Regarding staff trained on EPI, the finding was similar to the Sierra Leone finding with 88%, and higher than the Tanzania study, which was 74% (11, 12). Most of the observed PHCUs had sharps containers (90.4%) and AD syringes (86.9%). The SARA Ethiopia, Sierra Leone and Zambia study findings in this respect were higher than the current study, Ethiopia with (95% and 89%), Sierra Leone (99% and 96%) and Zambia (94% and 98%). On the other hand the Tanzania study finding was lower than this study, with 79% for both tracers. (2, 11, 12, 13). The low availability of sharp containers and AD syringes might be due to, this study done in hard to reach areas and the difference in the study period.

In the current study, functional refrigerators and cold boxes were available in 65% and 79.5% of PHCUs, respectively. This study finding is higher than the

SARA study conducted in Ethiopia, where refrigerators and cold boxes were available in 31% and 71% of the studied facilities, respectively (2). In another study on assessment of cold chain status for immunization carried out in central Ethiopia, the availability of functional refrigerators was 57.9% and vaccine carriers 89.7%. The availability of cold boxes was higher than in the current study; while refrigerator availability was lower (14). Again, when functional refrigerator availability is compared with the findings of the Zambia, Tanzania and Sierra Leone studies, the current study findings are lower, with 89%, 78% and 67% of the facilities, respectively, having functional refrigerators (11,12, 13).

In the current study, the availability of cold boxes was similar to the Tanzania study (79%) and lower than the Zambia SARA study (87%) (12,13). The finding in this study showed that 40.4% of the PHCUs' refrigerator temperatures were monitored twice daily, which was lower than the assessment of cold chain status for immunization carried out in central Ethiopia, which was 59.1% (2). In total, 78.8% of the observed PHCUs that recorded refrigerator temperatures were in the specified range of 2^{o}C to 8^{o}C, which was higher than the cold chain status studied in central Ethiopia, where 72.7% of the functional refrigerator temperature readings were within the specified range (2).

In the current study, the availability of antigens on the day of the assessment (observed with valid expiry dates) was found to range from 40.9% for OPV to 43.3% for measles, which was a little bit higher than the SARA Ethiopia findings of 29% for OPV to 36% for measles vaccine (2). The availability of antigens was found to be low compared to the studies done in Sierra Leone, Tanzania and Zambia, where all the antigens were more than 65% available (11-13). This difference might be due to the unavailability of refrigerators in most of the study HPs.

Conclusions

Immunization is one of the most cost-effective strategies to prevent VPDs. All PHCUs are expected to provide routine immunization service daily at the facility (especially HCs) in order to avoid immunization missed opportunities. However, this study showed that only 36.2% of HCs and 11.7% of HPs were observed providing the service during the survey period. This may be due to the variation in the observation time and the health facilities' vaccination schedules. The majority of the PHCUs were not observed providing immunization service at the facility (especially the HPs) on the day of the assessment. This may be due to the unavailability of functional refrigerators to store vaccines in the PHCUs, resulting in low antigen availability during the data collection period.

The study findings showed that 53.9% of HPs and 78.7% of HCs had functional refrigerators. As for service readiness, the average value for all the tracer items used to measure service readiness was 56.6%, which means, 90.4% for sharps containers, 40.9% for OPV, 43.3% for measles, and 65% for functional refrigerators.

The reason for the poor availability of antigens might be the unavailability of functional refrigerators in the studied PHCUs.

Recommendations

- Equip all PHCUs, especially HPs, with functional refrigerators and provide regular maintenance.
- Make available all immunization antigens and the schedule immunization service daily at PHCUs to avoid missed opportunities.
- Cold chain managers/immunization service providers to be given supervisory support to ensure refrigerator temperatures are recorded. Make the EPI guideline available in all PHCUs.

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