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Delivering Sustainable Safe Water and Sanitation in Fragile Settings: Lessons from the GFFO Project in Gwoza, Magumeri, and Kaga LGAs, Borno State, Nigeria

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Abstract:

Fragile and conflict-affected settings continue to face acute barriers to achieving sustainable access to safe water and sanitation services in some parts of Borno State, Nigeria. This study examines the outcomes of the German Federal Foreign Office (GFFO) supported water, sanitation and hygiene (WASH) project implemented across Gwoza, Magumeri, and Kaga Local Government Areas (LGAs) in Borno State, Nigeria, regions characterised by prolonged insecurity, population displacement, and weakened service delivery systems. The evaluation analyses the successes achieved, constraints encountered, and lessons learned in the pursuit of sustainable and community-owned WASH service delivery. Using mixed methods, including field observations, key informant interviews, beneficiary surveys, infrastructure functionality assessments, and water quality testing. The study presents evidence on the project's performance and its implications for future programming. Findings show that the rehabilitation and construction of water points and sanitation facilities significantly improved access to safe water and basic sanitation for displaced and host populations. Water quality analyses conducted across the three LGAs indicated that most rehabilitated sources met WHO/FAO guideline values for microbial and physicochemical parameters, demonstrating the effectiveness of technical interventions and water safety measures. However, challenges such as periodic security disruptions, limited supply chain access, high population mobility, and infrastructure vandalism affected the consistency of service delivery and long-term functionality. The study also highlights the critical role of community engagement, capacity building, and strategic partnerships. The establishment and training of Water, Sanitation, and Hygiene Committees (WASHCOMs), integration of local artisans, and collaboration with government institutions enhanced local ownership, strengthened operation and maintenance systems, and improved accountability. Yet, gaps remain in harmonising community structures with formal local government WASH units, securing financing for spare parts, and ensuring inclusive participation, particularly among women. Drawing from these insights, the paper proposes actionable recommendations for strengthening WASH interventions in fragile environments. These include adopting conflict-sensitive service delivery models, institutionalizing community-led monitoring, establishing resilient supply chains for repair materials, integrating water safety planning into routine practice, and prioritizing strategic partnerships that reinforce government leadership while safeguarding community ownership. The lessons

from the GFFO project underscore the need for flexible, context-specific, and sustainability-focused approaches to ensure that safe water and sanitation services endure amid fragility.

Keywords — German Federal Foreign Office (GFFO), Justice Development and Peace Initiative (JDPI), water quality, sanitation, hygiene, displaced persons

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I. INTRODUCTION

About 75% of Nigerians lack basic sanitation, 28% lack access to clean drinking water, 20% defecate in the open, and 2/3 do not live in homes with a hand washing station with soap and water (Victor et al., 2025; Hamza et al., 2025; Aborode et al., 2025; Jaber et al., 2023). The WASH situation in Borno State, particularly in Gwoza, Magumeri, and Kaga LGAs, remains highly vulnerable, especially within Internally Displaced Persons (IDP) camps. Across the state, nearly 70% of displacement sites fall below the minimum Sphere standard of 15 litres of water per person per day, with many residents relying on distant or unsafe water sources (Hamza et al., 2025; Adamu et al., 2022). Sanitation conditions are equally alarming, with inadequate latrines in most camps, resulting in widespread open defecation and unhygienic facilities. Handwashing infrastructure is often non-functional or culturally inappropriate, limiting the adoption of proper hygiene practices.

The continuous influx of displaced populations into existing camps and host communities has placed immense pressure on already fragile WASH infrastructure and services (Salem-Bango et al., 2025; Jaber et al., 2023; Jimoh & Jacob-Oricha, 2022). Latrines, resulting in widespread open defecation and unhygienic facilities. Handwashing infrastructure is often non-functional or culturally inappropriate, limiting the adoption of proper hygiene practices (Hamza et al., 2025; Jimoh & Jacob-Oricha, 2022; Jiménez et al., 2017).

Despite the numerous interventions by various partners, including the recent efforts under the German Federal Foreign Office (GFFO) phase II Project implemented by Caritas Nigeria and Justice Development and Peace Initiative (JDPI) Maiduguri, significant gaps in the sector remain. Most existing monitoring systems primarily focus on location-level indicators, which, while useful for generating averages for planning, often fail to capture the household-level details needed to understand disparities within settlements or to accurately assess the true impact of interventions on individual communities. To address these gaps, the GFFO Project conducted a WASH Knowledge, Attitudes, and Practices (KAP) Survey in Gwoza, Magumeri, and Kaga LGAs. The survey aims to assess the current status of WASH service delivery compared to established standards, the effectiveness of existing interventions in improving access, utilisation, and behavioural outcomes, and identify gaps and priority areas for evidence-based planning and programming and determine the water quality in the communities involved. The findings will support the GFFO project, government agencies, humanitarian partners, and local communities in developing targeted and sustainable strategies to strengthen WASH systems and improve the health and well-being of affected populations.

2.0 Materials and Methods

Study Area

Figure 1 shows the map of the study area, indicating water points (green) and latrines (red).

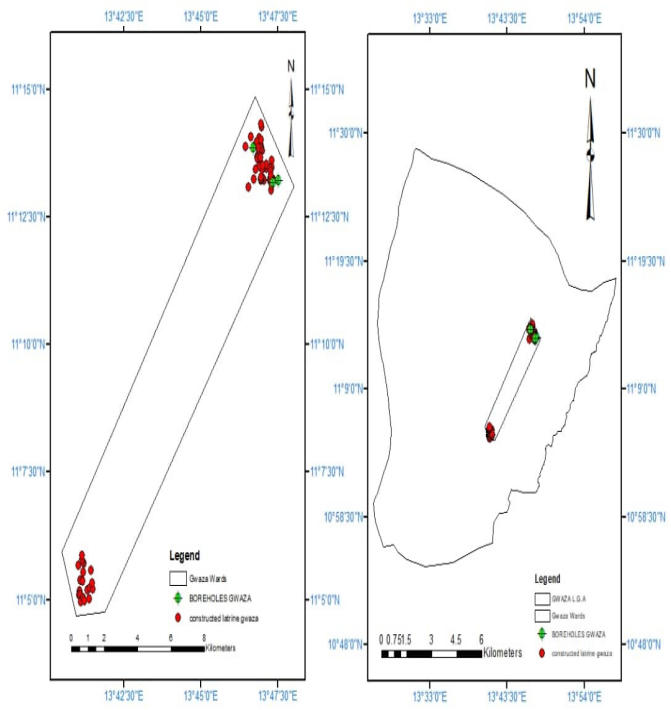

Fig. 1: Map of Gwoza LGA showing the sampling point (Source: Field Survey, 2025)

Study design

This study adopted a mixed-methods, field-based, and analytical approach to document, analyse, and synthesise lessons from the GFFO-funded WASH interventions implemented by JDPI in Magumeri, Kaga, and Gwoza LGAs. The methodology aligns with the revised focus of the learning paper: sustainability of interventions, programme systems, knowledge-sharing, and adaptability in fragile contexts.

This study adopted a mixed-methods, field-based, and analytical approach to document, analyse, and synthesise lessons from the German Federal Foreign Office (GFFO)-funded Water Sanitation and Hygiene (WASH) interventions implemented by Justice, Development and Peace Initiative (JDPI) in Magumeri, Kaga, and Gwoza LGAs of Borno State. The methodology aligns with the revised focus of the learning paper: sustainability of interventions, programme systems, knowledge-sharing, and adaptability in fragile contexts.

The selected beneficiary communities covered across the LGAs, viz, Magumeri (9 communities), Kaga (13 communities) and Gwoza (6 communities). Each LGA was selected based on implementation density and operational relevance to the GFFO project.

Sample size

The sample size for each community was calculated using the WHO Cluster Sampling Method (30x7) and UNHCR/WASH Guidelines (For KAP surveys, minimum 250–400 households). However, for this survey, clusters were created in the communities to improve precision. A sample size of 212 households were interviewed using the questionnaire survey.

Field Observation and Facility Assessment

A standardised infrastructure evaluation tool was used during visits to all GFFO project sites. Information captured included: type of facility: latrine and borehole (Newly constructed, rehabilitated) and dumpsite. Year of construction/rehabilitation, functionality status, structural condition (roofing, slabs, compartments), availability of handwashing facilities, presence of solar components, inverter performance, pump condition, user access and community ownership involvement, and training of host communities on programme sustainability.

Data Collection

The survey primarily utilised a household questionnaire, coded on the Kobo Collect software. The survey covered two clusters each in the three LGAs: Gwoza (6 communities), Kaga (13 communities), and Magumeri (9 communities), respectively. This integrated structured field checklists, infrastructure functionality assessment, Key Informant Interviews (KIIs), Community consultations with users and WASH committees, and observation of behavioural and operational patterns. Secondary data (project reports, handover notes).

Geospatial Data

At each facility, GPS coordinates (Latitude, longitude, altitude and accuracy values) were recorded using handheld GPS devices/KoBo Collect. This enabled geospatial referencing of all WASH assets.

Key Informant Interviews (KIIs)

Key Informant Interviews (KIIs) were administered on community leaders and water committee (WASHCOM) members' perceptions on sustainability, functionality and maintenance challenges, community ownership levels, GBV-related risks during water access, usage patterns of sanitation services and barriers to behaviour change.

Community Consultation

Structured focused discussions were held with men, women (primary water collectors) and youths. The discussions focused on user experience, safety concerns around latrines, acceptability of hygiene training, facility-related conflicts and seasonal access patterns.

Ethical Consideration

Informed consent was verbally obtained from the participants. Community entry protocols were observed. Confidentiality of the responses was maintained throughout documentation. Sensitive information is handled cautiously, given the insecure context.

Data Analysis

Quantitative data (Sustainability, community ownership, infrastructure resilience, operational challenges, innovation and adaptability) was checked for completeness in KoBo™ Toolbox and exported to an Excel spreadsheet. Descriptive statistics used to analyse functionality and. service coverage. A statistical software, Statistical Package for Social Sciences (IBM SPSS ver. 26, Chicago, IL, USA). Mapping software, QGIS, was used for geolocation visualisation. The findings from observation, interviews, and laboratory results were integrated to ensure validity.

3.0 Results

Demography

A total of 212 respondents were interviewed using the household questionnaire survey. Of these, 74% were female and 26% male, with 91% being married. In terms of age distribution, 83% were between 18–49 years, 16% were 50 years and above, while 1% fell within the 5–17 years category. Regarding status, 11% were internally displaced persons (IDPs), 5% were refugees, 10% were returnees, and 73% belonged to the host community.

Based on the survey findings, in Fig. 2 boreholes remain the primary source of drinking water across the three LGAs surveyed, accounting for 85.4%. In Fig. 3, Gwoza, 72% of households reported boreholes as their main source of water, followed by 15% relying on public piped water, while 5% each reported using private piped water, water vendors, and wells. In Kaga, all respondents (100%) indicated boreholes as their sole source of drinking water, highlighting complete dependence on this source within the LGA. In Magumeri, boreholes were also the predominant source at 89%, with 11% of households reporting rivers or streams as their main source of water for domestic use. Their sole source of drinking water highlights complete dependence on this source within the LGA. In Magumeri, boreholes were also the predominant source at 89%, with 11% of households reporting rivers or streams as their main source of water for domestic use. Overall, the results demonstrate that boreholes are the most widely used source of drinking water across the surveyed LGAs, although reliance on unimproved sources like rivers and water vendors persists in some areas, particularly in Magumeri and Gwoza.

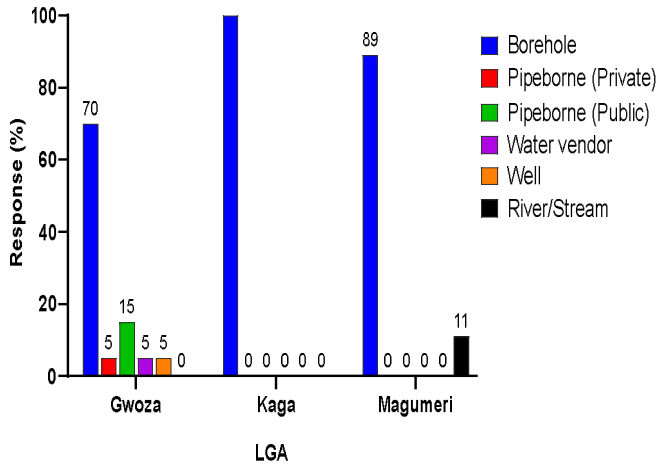

Fig. 2: Source of water for domestic use in three LGAs of Borno State, Nigeria

The survey assessed the types of containers households use to collect water for domestic purposes. Findings revealed that jerrycans (plastic) are the most commonly used containers, accounting for 68% of households. This indicates a strong preference for jerrycans, likely due to their durability, portability, and availability in most communities. About 14% of households reported using buckets with lids, while 15% used buckets without lids. The absence of lids on some buckets raises water safety concerns, as uncovered containers may expose water to contamination before use.

The survey assessed the total volume of water storage containers in households, and the findings show that 47% of households reported a total storage capacity of 20–50 litres, 38% have between 51–100 litres, 4% have less than 20 litres, while 11% have more than 100 litres capacity. This revealed that most households have a water storage capacity. Jerrycans (68%) were the most common containers, explaining the dominance of the 20–50L and 51–100L categories, as a standard jerrycan holds 20 litres. Buckets with lids (14%) and without lids (15%) were associated with smaller capacities and raised water safety concerns, as uncovered containers risk contamination. Households with >100L capacity often used drums/barrels (2%) alongside jerrycans, while clay pots (0%) were no longer in use, indicating a shift to modern storage options. Overall, larger storage capacities must go hand in hand with safe, covered containers to ensure clean water and reduce the risk of waterborne diseases.

The survey findings on the time taken to reach water sources revealed notable variations across Gwoza, Kaga, and Magumeri LGAs. Overall, the majority of households in all three LGAs access water within the Sphere Standard of 30 minutes for a round trip, with a significant proportion managing to fetch water in less than 15 minutes. However, some households in Gwoza (8%) and Magumeri (9%) spend between 31–60 minutes, while 2% of households in Gwoza reported travelling for over an hour to fetch water. These households fall outside the acceptable standards and highlight pockets of limited access in otherwise well-served areas. When comparing across LGAs, Kaga and Magumeri showed better water access times, with 66% and 75% of households, respectively, accessing water in under 15 minutes.

In contrast, Gwoza had 56% accessing water in the same timeframe but recorded the highest proportion of households exceeding 30 minutes, indicating the presence of remote settlements or insufficient water points in certain areas. Further analysis links travel time to the type and distribution of water sources. LGAs like Kaga and Magumeri, where boreholes are the dominant water source, report shorter travel times, suggesting that borehole installations are closer to households and possibly more reliable. In contrast, Gwoza relies on a mix of water sources such as wells, public taps, and vendors, which may be fewer in number or located farther away, contributing to longer travel times for some households (Fig.3).

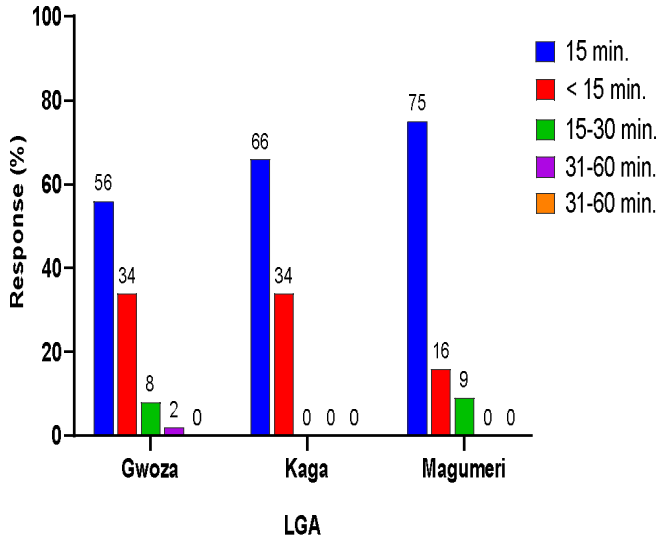

Fig. 3: Time taken to get to the sources of water

From a humanitarian perspective, households spending more than 30 minutes per trip face increased protection risks, especially women and children who are often responsible for water collection, as well as reduced water consumption and lost time for other productive activities. The 2% of households in Gwoza travelling over one hour represent the most vulnerable group, underscoring the need for urgent interventions such as establishing new water points or rehabilitating existing infrastructure to improve equitable access across all settlements.

Significant variations in the time households spend waiting at water sources in Gwoza, Kaga, and Magumeri. In Gwoza, longer waiting times were common, with 33% of households waiting 31–60 minutes and 16% waiting over an hour, indicating high pressure on water points. Only 22% spent less than 15 minutes, suggesting limited access or overcrowding at key water facilities. In Kaga, waiting times were moderate, with nearly half (49%) spending 15–30 minutes in line and 41% spending less than 15 minutes. Only 3% reported waiting for more than an hour, showing relatively better access compared to Gwoza. Magumeri performed the best, with a striking 91% of households waiting less than 15 minutes and only 9% waiting 15–30 minutes, pointing to adequate water supply facilities or less population pressure on existing water points. Overall, the data suggest that Gwoza faces the greatest challenges with long queues, while Magumeri experiences minimal waiting times, likely due to better water infrastructure or lower demand pressure. From the earlier analysis, we saw that Gwoza had the highest proportion of households waiting more than 30 minutes at water points, followed by Kaga, while Magumeri had the least waiting time. Looking at the reasons provided for these delays, the overwhelming majority cited long queues as the main cause, with a few instances mentioning slow water flow or the water source opening at specific times. This pattern aligns with the earlier results, in Gwoza, where the longest waiting times were recorded, long queues were the dominant reason, suggesting a need for either more water points or better water scheduling. In Kaga, moderate waiting times correspond with fewer reports of delays beyond 30 minutes, indicating relatively better water management. While Magumeri, with the shortest waiting times, had minimal issues reported, reinforcing that adequate infrastructure or lower demand pressure may be reducing congestion. Long queues are the key factor behind prolonged waiting times, pointing to the need for increased water access points or improved flow management to reduce delays.

Overall, all three LGAs, 95% of respondents feel safe accessing water points, while 5% reported feeling unsafe. Across all LGAs, the majority of respondents reported feeling safe when accessing water points, with Kaga recording 100% safety perception, followed by Magumeri (98.21%) and Gwoza (89.77%). However, the 10.23% of respondents in Gwoza and the 2% in Magumeri who reported not feeling safe align with the earlier findings where fear of harassment, darkness/lack of lighting, and other security concerns (e.g., fear of insurgents or equipment failure) were highlighted as key reasons for feeling unsafe. While most households feel secure, improving lighting infrastructure and addressing harassment risks could further enhance safety and encourage wider and safer access to water points, especially during evening hours (Fig. 4).

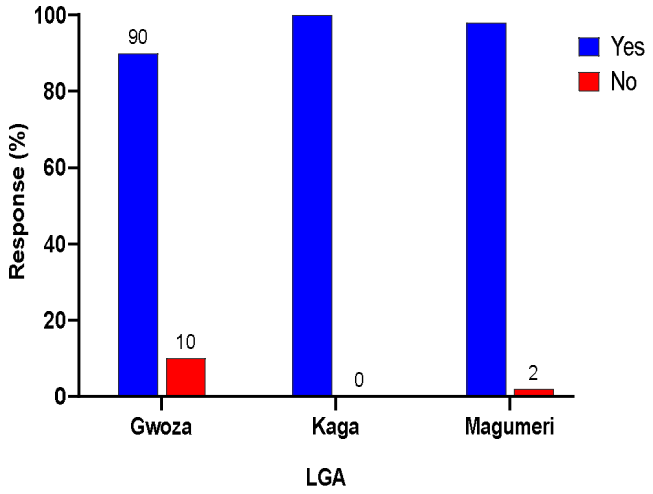

Fig. 4: Perception on the safety of water sources

Fig. 5 shows that the survey looks at whether households collect enough water to meet their needs. The response indicated 85% of households collected enough water for their needs, 15% highlighted significant challenges affecting water sufficiency. The main reasons for insufficient water included long queues at water points, high population pressure on limited water facilities, non-functional or solar-dependent boreholes, long distances to water sources, lack of storage containers, and inadequate vendor supplies.

The analysis further shows a significant variation across LGAs regarding households collecting enough water for their needs. In Gwoza, only 72% of households reported having enough water, with a considerable 28% indicating insufficiency, reflecting serious water access challenges in the area. In contrast, Kaga (94%) and Magumeri (96%) performed much better, with very few households experiencing water shortages (6% and 4%, respectively). This highlights Gwoza as the most vulnerable LGA in terms of water availability, likely due to higher population pressure, limited functional water sources, or longer distances to water points compared to Kaga and Magumeri. Importantly, some households admitted to drinking directly from rivers, canals, or surface water in the past seven days when water was insufficient, raising serious health concerns due to the risk of waterborne diseases.

The findings indicate that water scarcity, inadequate infrastructure, and limited storage capacity are forcing households to resort to unsafe water sources, undermining public health and WASH interventions

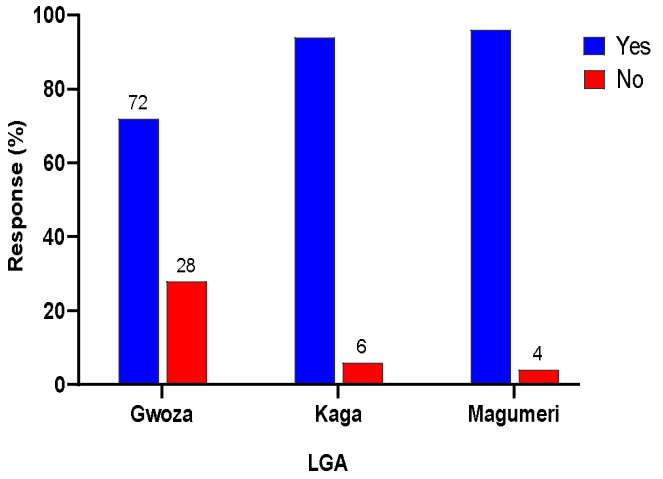

Fig. 5: Adequacy water for domestic usage in some LAGs of Borno State

The analysis shows that 45.3% of households pay for drinking water, while 54.7% access it for free. Among those paying for water, many explained that payments were often part of a community arrangement to raise funds for borehole maintenance, especially for facilities constructed by NGOs.

Further analysis of the amount paid, the litres obtained, and the frequency of purchase revealed that most households pay between ₦10 and ₦50 for 20–25 litres of water, indicating a high per-litre cost for small volumes. Many families reported buying water five to seven times in the past week, suggesting limited storage capacity or an irregular water supply that forces frequent purchases rather than bulk storage. When linked to earlier findings where 15% of households lacked sufficient water, the high frequency of small purchases, variable costs, and reliance on vendors highlight gaps in free or affordable water access. This situation points to a triple challenge of inadequate water infrastructure, high dependence on paid sources, and limited household storage capacity, all of which undermine

efforts to ensure a reliable and equitable water supply.

The analysis shows that adult women are primarily responsible for water collection, accounting for 40% of households. This is followed by girls under 18 (17%) and boys under 18 (16%), indicating that children collectively bear a significant share (33%) of the water collection burden. Adult men contribute only 10%, while all household members share the responsibility in 14% of cases, and others account for 4%. These findings highlight a gendered and age-related division of labour, with women and children disproportionately responsible for water collection, which may have implications for child education, women's workload, and overall household welfare (Fig. 6).

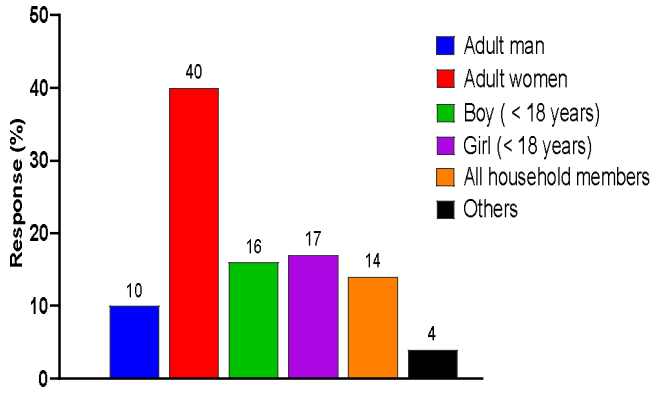

Fig. 6: Persons who collect water for the households

Households were asked how often they clean their drinking water containers, and the responses showed that 46% clean them twice a week while 43% clean them daily, indicating that nearly nine in ten households maintain relatively frequent cleaning practices. A smaller proportion reported cleaning their containers three times a week (6%), while 5% clean rarely, suggesting that a few households may be at higher risk of water contamination. On the materials used for cleaning, the majority reported using soap and water, while others used water only, sand/ash, or Omo (detergents) similar products. A few households mentioned using bleach (hypo) or a combination of detergent, sand, and water for better cleaning. Despite variations in methods and frequency, the overall responses suggest a good level of awareness of maintaining hygiene in water storage, although some households still relied on minimal cleaning methods such as rinsing with water only, which may not effectively remove contaminants.

Across communities in Gwoza, Kaga, and Magumeri LGAs, the majority of households reported not treating water before drinking, with treatment rates varying significantly by location. In Gwoza, water treatment was very low across all communities, with most communities recording less than 5% of households treating water, and some, like Camp D, showing no treatment at all. Kaga performed slightly better, especially in Kumburi and Chiromari, where 6–7% of households treated water, though the majority still did not. Magumeri recorded the highest water treatment rates, particularly in Kellumeri, where 20% of households treated drinking water, followed by Sheruri and Maramari at 11% each, while Karmuwa had only 2% treatment despite a high population. Overall, the results indicate low adoption of water treatment practices, with significant disparities across LGAs and communities, posing potential health risks from waterborne diseases. The analysis also shows that among the few households that reported treating water, filtration emerged as the most common method, followed by solar disinfection, boiling, and the use of salt. A smaller proportion reported using chlorine, water guard (alum), or simply covering containers with lids, while a few mentioned unconventional practices like colouring, which raises concerns about safety and effectiveness.

The analysis shows that 56.6% of households reported not having soap, while only 43.4% had access to soap. The follow-up observation, asking participants to show the soap in their house, revealed mixed responses among those who claimed to have soap. Many households were able to show the soap within a minute, confirming its availability, while others showed it after a delay or could not show it at all. This suggests that even among households

reporting soap ownership, accessibility and consistent availability might be limited, possibly due to small quantities, shared use, or irregular purchase patterns.

Among 43.4% households that reported having soap, 54% purchased it from the market, while 45% received it through distributions by NGOs, and only 1% got it as a gift. This shows that while NGO support plays a significant role in improving soap access, the majority of households still rely on the market, indicating potential affordability. Furthermore, the analysis of soap usage shows that bathing, handwashing, laundry, and dishwashing were the main purposes for which soap was used across nearly all households. Bathing and laundry were the most frequently mentioned uses, followed closely by dishwashing and handwashing. Only a few households reported using soap for other purposes, such as cleaning floors or miscellaneous cleaning tasks. When asked why households do not have soap, 40.8% cited unavailability as the main reason, while 39.2% reported that soap was too expensive, and 20% gave other reasons. From the responses under "Others", participants responded that financial hardship is the dominant reason. Most households indicated they could not afford soap due to lack of income, absence of their primary breadwinner, or seasonal financial challenges such as reduced earnings during the rainy season (Fig. 7).

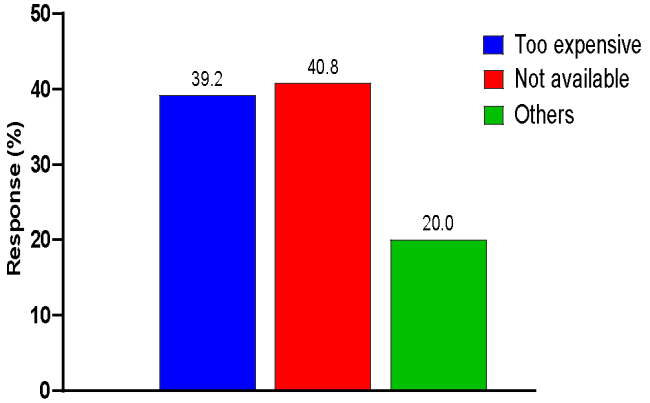

Fig. 7: Respondents' inability to buy soap

A few also mentioned that the soap previously provided by NGOs had finished, leaving them unable to replace it on "water only" as the main alternative for handwashing or cleaning when soap is unavailable. A significant proportion also reported using ash, while a smaller number mentioned sand, Omo/detergent, Dalang (local ash or herbal substitute), or even salt as alternatives. A few households indicated that they wait until soap is available or use nothing at all, highlighting periods with no effective hygiene measures.

A large majority of respondents, 83.49%, reported always washing their hands before eating, indicating strong adherence to this key hygiene practice. However, 16.51% said they wash their hands only sometimes. The households were asked to name at least 3 of the most important times when someone should wash their hands. The survey revealed that the most frequently reported critical times for handwashing were after defecation and before eating, appearing in almost every response and indicating strong awareness of the key moments to prevent faecal-oral disease transmission. Other important times, such as before preparing food and after handling child faeces, were also consistently mentioned but slightly less prioritised, while after working in the garden or with livestock and before breastfeeding appeared less frequently, suggesting areas where awareness could be strengthened (Fig. 8).

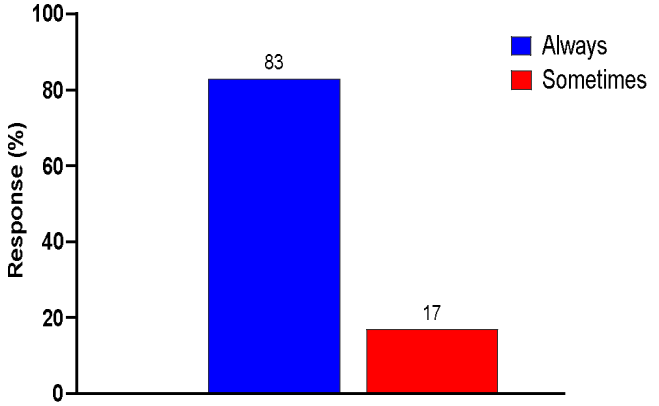

Fig. 8: Frequency of washing hands before meal

In terms of reasons for handwashing, preventing diseases dominated as the main motivator across all responses, followed by keeping the body clean, while factors such as community expectations or peer influence played a minimal role. Very few

respondents indicated a lack of knowledge about why handwashing is important, demonstrating generally good awareness levels. The result also shows that households use different materials for handwashing before eating, with soap being the most preferred material, followed by water only, and ash as an alternative when soap is not available. Most respondents reported washing their hands using running water, while a significant number also used a shared bowl, and a few mentioned using a kettle or other methods. Among households using a shared bowl, some confirmed that the water is shared among household members, while others said it is not shared, indicating variations in hygiene practices. Overall, while many households prioritise soap and running water, economic constraints and water access issues sometimes lead to alternative practices like ash or shared water bowls.

The survey also assessed the presence of a handwashing facility in the household. The result revealed that almost all respondents reported washing their hands after using the toilet. Specifically: Yes: 99.53% of respondents wash their hands after toilet use. Only 0.47% reported that they do not wash their hands after toilet. The findings on handwashing stations across the LGAs show clear disparities in availability. In Gwoza, none of the respondents (100%) reported having a handwashing station in their homes, indicating a complete lack of such facilities. In Kaga, only 16.18% of households had a handwashing station, while the majority (83.82%) did not. In contrast, Magumeri recorded the highest availability, with 58.93% of households reporting the presence of a handwashing station compared to 41.07% without. Overall, these results highlight a significant gap in handwashing infrastructure across the LGAs, with Magumeri performing better than both Kaga and Gwoza, where the situation is most critical (Fig. 9).

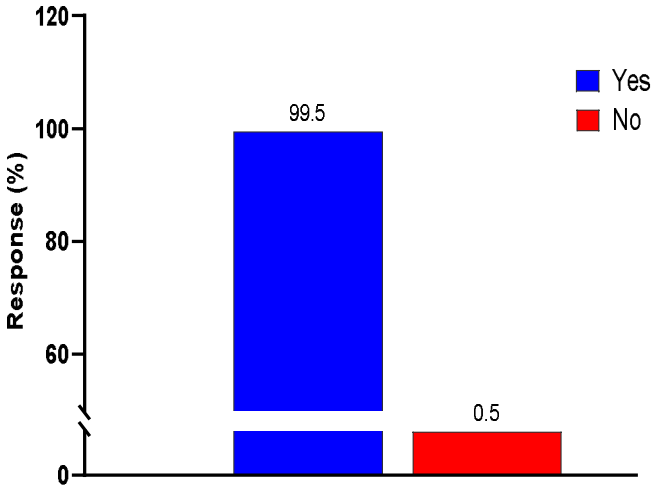

Fig. 9: Washing hands after use of the toilet

Critically checked, the findings on hand station, water, and soap/ash availability show that most households lack proper facilities for hand hygiene. A large proportion of respondents reported having no handwashing station at home, and where stations were available, water and soap/ash were not always consistently present. Specifically, households with handwashing stations that had both water and soap/ash available represented only a small fraction of the total respondents. In many cases, even when a station was available, either water was missing or soap/ash was unavailable, limiting effective handwashing practices. This highlights a significant gap in hand hygiene infrastructure, with the majority of households lacking basic facilities for effective handwashing, thereby increasing the risk of poor hygiene and waterborne diseases

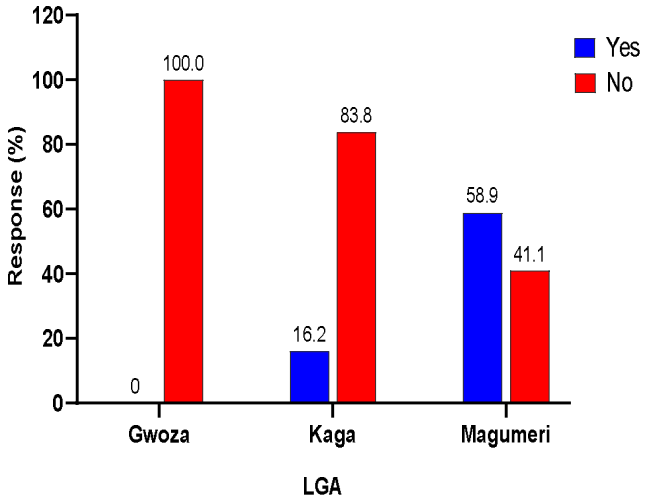

Fig. 10: Availability of household hand washing station

Across all three LGAs, community volunteers emerged as the primary source of hygiene and health messages, reflecting the critical role of local volunteers in mobilising and sensitising households. In Magumeri, community volunteers were dominant, with secondary support from community meetings and health workers. Similarly, in Kaga, while community volunteers remained the main channel, a higher proportion of households also reported receiving messages through health workers and community meetings compared to Magumeri. Gwoza followed the same trend but showed slightly lower diversity in channels, with community volunteers and community meetings making up most of the sources, and minimal reports of SMS or poster use. All three LGAs identified community volunteers as the top choice, followed by community meetings and health workers. This highlights a consistent preference for direct, interpersonal communication methods over digital or print channels across all locations, though Magumeri had a slightly higher reliance on posters and loudspeakers than in Kaga and Gwoza.

Across the locations, the most common hygiene messages focused on handwashing with soap under running water for at least 20 seconds, safe water handling, and safe sanitation practices. These were consistently reported by the majority of households, showing a strong emphasis on preventing disease transmission through proper hygiene. Waste management, food hygiene, and disease prevention messages were also widely mentioned, though slightly less frequently. Menstrual hygiene management was reported but at a lower frequency compared to the other hygiene topics, suggesting either less coverage or limited recall among respondents. In terms of communication access, a significant number of households indicated having mobile phones, enabling broader access to hygiene information through calls or SMS, while fewer households reported having functioning radios, which may limit access to mass media campaigns, although locations like Gwoza LGA may not be suitable as radio transmission is not functional.

Overall, 52% of households use household latrines, while 46% rely on shared latrines. Only 1% practice open defecation, and 1% use other means of defecation. In Gwoza, most households (53%) use household latrines, while 43% rely on shared latrines, and a small proportion use open defecation (1%) or other methods (2%).

In Kaga, access to household latrines is highest at 81%, with only 19% using shared latrines and no significant open defecation reported. Conversely, Magumeri shows the lowest household latrine coverage (14%) and the highest dependence on shared latrines (82%), with 4% still practising open defecation. This indicates better sanitation coverage in Kaga, moderate progress in Gwoza, and gaps in Magumeri, where shared facilities and open defecation remain concerns (Fig.11).

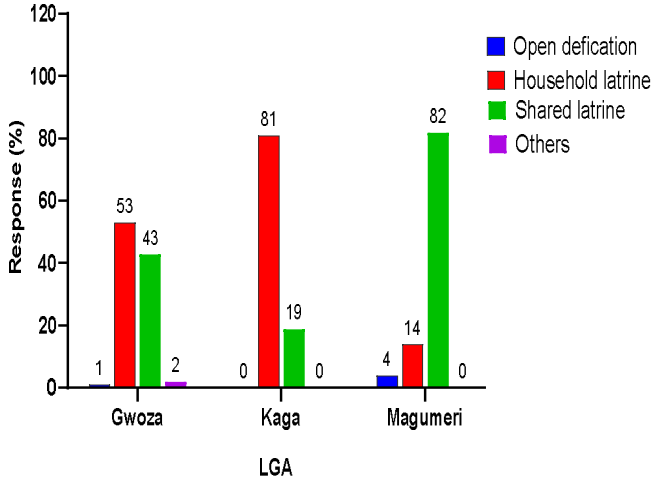

Fig. 11: Mode of conveniences used by the respondents

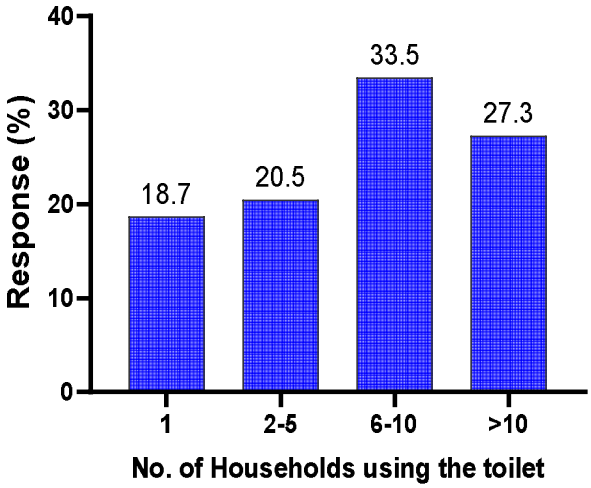

Fig. 12: Number of households per toilet

The main reasons cited for open defecation include lack of familiarity with latrine use ("not used to it"), safety and structural issues such as latrines made with poor materials or collapsing, and lack of access to private or nearby latrines. In some cases, households reported waiting for shared latrines to be free as a factor, while others mentioned open defecation at business places due to the absence of facilities there. Overall, the reasons point to a mix of behavioural factors, infrastructure limitations, and accessibility issues, indicating the need for both awareness campaigns and improved sanitation infrastructure.

Among households that reported using shared latrines, 33.49% indicated that between 6–10 households share the same facility, while 27.27% reported sharing with more than 10 households. About 20.57% share with 2–5 households, and only 18.66% reported having the facility exclusively for their household. This shows that the majority of households (over 60%) share with at least 6 other households, suggesting potential overcrowding and hygiene challenges in many communities (Fig. 12).

Most households reported having latrines that provide privacy and safety, but significant concerns remain, especially during the day due to a lack of doors, vandalized walls, weak fences, and at night because of broken solar lights and security fears such as attacks, rape, or collapsing slabs. Women were primarily responsible for cleaning, usually done daily or weekly, though some facilities were poorly maintained or never cleaned, particularly shared ones. Cleaning relied mainly on water, with limited use of soap or disinfectants, raising hygiene concerns. Additionally, people with disabilities faced challenges accessing facilities, highlighting gaps in inclusive WASH infrastructure, while the poor structural quality and overcrowding of shared latrines further compromised safety, privacy, and sanitation standards.

From the findings, as shown in the data, the majority of households (83%) reported that children under 5 years defecate in a potty, while 9% use other methods, 6% defecate directly in the latrine, and only 2% use diapers. For children under 5 who do not use a latrine, households indicated that the faeces are usually collected and properly disposed of in the latrine to maintain hygiene standards. The majority of households that selected "others" indicated that children under five often defecate on open ground or in open spaces, after which caregivers typically collect the faeces and either dispose of it in the latrine

or bury it. A few respondents mentioned the use of potties alongside open defecation, while some reported accessing neighbours latrines (Fig. 13).

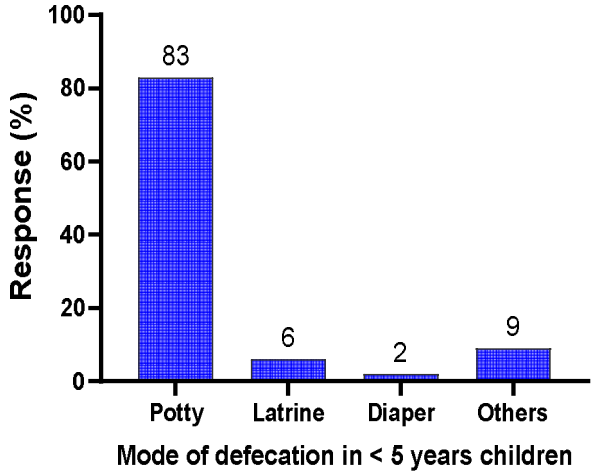

Fig. 13: Mode of defecation by under five children

In Gwoza, most households (40.91%) dispose of solid waste by dumping it in the open, followed by burning (30.68%), while 17.05% use pits, and only 5.68% have their waste collected or use other methods. In Kaga, open dumping (34.33%) is also common, but a significant proportion of households burn their waste (19.40%) or dispose of it in pits (26.87%), with another 19.40% having it collected. Magumeri shows a different trend, with the majority (52.73%) disposing of waste in pits, 25.45% burning it, 14.55% having it collected, and only 7.27% resorting to open dumping.

Overall, Magumeri demonstrates better solid waste management practices compared to Gwoza and Kaga, where open dumping is still prevalent. Some households reported disposing of solid waste in rivers or open grounds, often cleaning or burning the waste after two to three days. When looking at the distance to waste pits or facilities, the majority of households reported a distance of less than 50 meters, making waste disposal relatively accessible for most communities. A smaller proportion reported distances of 50–100 meters, while only a few households indicated waste disposal points located over 100 meters away. However, waste pits located too close to households could pose a contamination risk to water sources and living spaces, especially during rain, highlighting the need for proper siting and management of these facilities (Fig. 14).

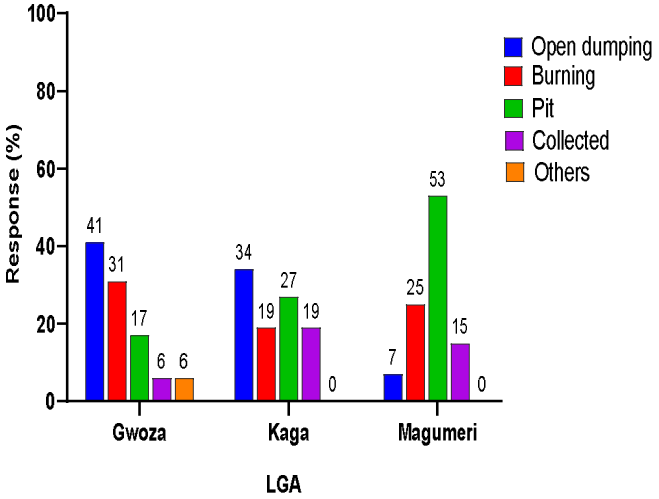

Fig. 14: Mode of solid waste disposal in the three LGAs

Table 1 shows the physicochemical parameters of the water collected from the communities. Most of the parameter were either between the range, or below the permissible level.

Table 1: Physicochemical and bacteriological parameters of some communities of Gwoza, Kaga and Magumeri LGAs, Borno State, Nigeria

Parameters	Maramari (A)	Sheruri (MAM) (B)	Karnowa Alajeri (C)	Kellumeri (D)	Kumburi	Chilonlari	Kumbonderi	Pulka Damri	Wakime Gwoza	Gaviz
EC	719	441	1038	1042	5.21	24.5	8.54	902	1253	1151
Turbidity	4.2	25	1.3	1.4	1.8	2.3	1.9	1.7	1.4	1.5
pH	5.29	2.99	4.5	5.48	8.3	8.3	8.4	6.56	5.89	6.42
Cr	0.05	0.08	0.05	0.45	0.02	0.01	0.01	0.06	0.08	0.05
Fe	0.1	0.5	0.1	0.2	0.22	0.3	0.15	0.12	0.1	0.17
Cd	0.002	0.003	0.002	0.008	ND	0.003	0.001	0.0013	0.00	0.002
Hg	0.03	1.17	0.1	0.04	ND	ND	ND	ND	ND	ND
Ni	0.43	0.18	0	0	ND	ND	ND	ND	ND	ND
Pb	0.5	0.04	0.06	0.02	ND	ND	ND	0.01	0.15	0.11
Coliform	++	+++	++	++	++	++	++	--	--	--
E.coli	0	++	++	+	+	+	+	--	--	--
Salmonella	+	+++	0	++	+	++	0	--	--	--
P. Aeroginosa	0	0	++	0	0	3	1	--	--	--

ND: Not detected, -- = Not determined, +++ = High, ++ = Moderate, + = Low

Recommendations

Most households expressed appreciation for the support already received but highlighted several key challenges and needs. The most common complaints centred around inadequate access to clean water, especially during the dry season, poor drainage during the rainy season, and latrines that were either full, damaged, or lacked privacy. Many households requested sanitary pads, soap, detergents, and hygiene kits, citing high costs and limited availability. Others requested financial or food assistance, solar lighting, health support, and additional training on soap-making to improve livelihoods. Some households also reported health challenges, lack of access to healthcare facilities, and the need for improved water storage containers and waste disposal facilities. Despite these concerns, many respondents expressed gratitude to the organisation and requested more consistent interventions to address water, sanitation, and hygiene needs.

Data shows that most latrines assessed were pit latrines with slabs, followed by pit latrines without slabs and a smaller number of ventilated improved pit latrines, flush toilets, and a few composting toilets. While the majority of latrines were reported to be in use, many were observed to be filled up and lacked proper cleanliness and lids, which compromise hygiene standards. Signs of open defecation were noted in several locations, indicating gaps in sanitation coverage.

Additionally, the presence of handwashing stations was generally low, with many facilities lacking water and especially soap, which are critical for hygiene promotion. Although some compounds appeared clean, vector infestation, such as flies and rodents, was reported in several cases, highlighting environmental health risks. Overall, the findings suggest the need for regular desludging, improved hygiene facilities, provision of handwashing stations with soap and water, and community sensitisation to reduce open defecation and vector-borne diseases.

Challenges

There were challenges in this work, especially during the data collection process. Below are some of the major obstacles that confronted the team. Some community members were reluctant to participate in the survey. They informed the field teams that many surveys have been conducted in the past, and no interventions (projects) have resulted from these surveys. Other community members even exaggerated their condition/situation to elicit sympathy. To triangulate what they were told, field teams had to verify some concerns, like verifying the storage containers of water. Some respondents, especially women, were shy responding to menstrual hygiene questions administered in the presence of male family members.

Lessons learned

Some communities have high knowledge of hygiene, but this does not translate into practice due to economic constraints, cultural beliefs, and poor facility maintenance, which hinder consistent behaviour change.

Conclusion

The WASH KAP Survey reveals that while there are notable gaps in sanitation and hygiene practices, the

GFFO project has significantly contributed to improving WASH standards in the communities through the construction of latrines and boreholes, the delivery of hygiene messages, and the distribution of soap and sanitation materials. Most communities now have access to functional latrines and boreholes, many of which are in active use—a positive step toward eliminating open defecation and ensuring access to clean water. However, challenges remain in borehole maintenance, latrine cleanliness, availability of handwashing stations, and consistent access to soap and water, all of which are critical for sustaining improved hygiene and disease prevention.

Encouragingly, some households have adopted good practices such as maintaining clean compounds and using ventilated improved pit latrines, demonstrating that behaviour change efforts are yielding results. Going forward, interventions should prioritise regular maintenance and rehabilitation of facilities, provision of handwashing stations with soap and water, and continued community education on proper hygiene practices while consolidating gains in latrine adoption and compound cleanliness.

Recommendations

There is a need for continuous maintenance and rehabilitation of water supply systems and boreholes across all locations, with close monitoring by the Water Supply Technical Working Group to ensure standards are adhered to. This will help achieve the required per capita water consumption of 20 litres per person per day. Lead WASH partners should ensure sustainable operation and maintenance mechanisms by setting up community water management committees and promoting livelihood options for local technicians to guarantee continued access to protected and treated water sources. Prioritise the repair of broken boreholes, rehabilitation of non-functional taps, and expansion of water supply infrastructure, especially in areas with high water scarcity.

Introduce appropriate technological options, such as lined pit latrines or septic systems, to address the problem of filling and collapsing pit latrines. Since the settlement is moving towards a post-emergency phase, partners should encourage households to adopt sanitation marketing approaches and cash-based interventions to support the construction and maintenance of improved latrines. Ensure regular distribution of latrine digging kits to households while promoting community-led efforts to construct and maintain private and communal latrines to reduce open defecation and unsafe disposal of children's faeces. Support the construction of bathing facilities in households and public spaces to improve overall sanitation coverage.

Intensify hygiene promotion activities across all locations, focusing on handwashing with soap at critical times, safe water storage, and food hygiene practices to prevent waterborne and hygiene-related diseases. Encourage households to access essential non-food items (NFIs) such as soap, water storage containers, and tippy taps for handwashing, with particular focus on areas with low access to these facilities. Train women of reproductive age on the production, use, and safe disposal of reusable menstrual pads to reduce reliance on disposable pads, which contribute to faster latrine filling and environmental challenges.

Strengthen Information, Education, and Communication (IEC) campaigns on WASH through community health workers, radio messages, posters, and household visits. Priority should be given to promoting handwashing with soap at critical times, safe water handling, and proper sanitation practices. Conduct refresher training for WASH Committees on WASH promotion, hygiene behaviour change, and community monitoring strategies to improve service delivery.

Provide women and girls of reproductive age with menstrual hygiene kits and train them on how to make reusable pads to ensure dignity, reduce cost burdens, and minimise waste disposal challenges. Establish adolescent-friendly spaces and programs to promote awareness on menstrual hygiene management, safe disposal practices, and access to sanitary materials, especially for school-aged girls and women in vulnerable households.

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