

Review Paper

Temporal analysis of water, sanitation, and hygiene data from knowledge, attitudes, and practices surveys in the protracted humanitarian crisis in Myanmar

Marta Domini, Sunny Guidotti and Daniele Lantagne

ABSTRACT

Knowledge, attitudes, and practices (KAP) surveys are commonly conducted by humanitarian actors at project baseline and endline. We hypothesized summarized KAP data could inform water, sanitation, and hygiene (WASH) programming and strategies. In conflict-affected Myanmar, the WASH Cluster collated KAP documents from 2011 to 2016. After developing a methodology for KAP temporal analysis, we reviewed provided documents against inclusion criteria; extracted and categorized data; created a WASH activities and emergency events timeline; completed temporal analysis; and triangulated and summarized results. Sixteen documents met inclusion criteria assessing WASH data at the national level (19%), in Rakhine (56%) or Kachin State (25%). Twenty-five WASH metrics were extracted and categorized. We found WASH knowledge and attitudes (e.g. handwashing knowledge) increased over time; practices (e.g. handwashing) also increased, but at a lower rate and less consistently; and increases were related to WASH programming. Using this methodology, we identified gaps (safe water storage, risk of children's feces, focus on vulnerable populations), barriers (cultural and religious beliefs), and programmatic recommendations (continue hygiene promotion, focusing on closing gaps, and improve waste collection systems) in Myanmar. Additionally, to enable temporal analysis and improve WASH programming, we recommend WASH Clusters standardize KAP data collection tools and analysis in the future.

Key words | behavior change, humanitarian response, hygiene promotion, KAP surveys, WASH programming

HIGHLIGHTS

- The paper analyses knowledge, attitudes, and practices (KAP) surveys on water, sanitation, and hygiene (WASH) conducted in Myanmar internally displaced people camps over 5 years.
- Overall, WASH activities resulted in improvements in knowledge and practice, with knowledge growing more consistently.
- The methodology developed for qualitative temporal analysis was efficacious in tracing trends of WASH-related KAP, identifying gaps, barriers, and evidencing the relation with implemented activities.
- A standardized and focused design is recommended to allow robust qualitative results on trends and link to activities carried out.
- KAP temporal analysis can be effective in informing WASH programming in protracted crisis settings and developing programmatic recommendations.

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INTRODUCTION

Humanitarian emergencies – including natural disasters, disease outbreaks, and complex emergencies – are occurring at increasing rates and affecting an increasing number of people (EM-DAT 2019). Safe water, sanitation, and hygiene (WASH) are immediate priorities for human survival and dignity in humanitarian emergencies. As such, WASH intervention(s) are implemented in the majority of humanitarian responses to interrupt transmission routes and reduce transmission of disease (Sphere Association 2018).

In recent systematic reviews, we found low quality but consistent evidence that WASH interventions are successful at reducing both the risk of disease and the risk of disease transmission, with program design, implementation characteristics, and community aspects found to be critical to program success (Ramesh *et al.* 2015; Yates *et al.* 2018). Additionally, to ensure dignity and safety of women and girls, the WASH sector is particularly focusing on menstrual hygiene management (MHM) (Wendland *et al.* 2017).

To determine the program design, implementation characteristics, and community aspects critical to program success, responding organizations conduct Knowledge, Attitudes, and Practices (KAP) surveys. A KAP survey is a representative study of a specific population to collect quantitative and qualitative information on what is known, believed, and/or done in relation to a particular topic (WHO 2008). While KAP studies were first developed and commonly used in health science (Bulmer & Warwick 1983), they have been adopted for WASH-related researches and studies and are commonly completed. They are attractive because of ease of design, implementation, and analysis, and because they generate quantitative data for comparisons, such as project baseline and endline (Campbell & Stone 1984). However, questions remain as to how KAP survey data are used (beyond providing immediate information), and whether KAP surveys can be used to systematically inform WASH programming (Ali 2009). We aimed to address these questions through the analysis of KAP surveys data collected in Myanmar.

Myanmar has a history of conflict, including some of the world's longest running civil wars (OCHA 2019a). Currently,

there are tensions between the Buddhist Rakhine population and the Muslim Rohingya minority in Rakhine State, and fighting between the Myanmar Army and armed independent groups in Kachin State (OCHA 2019a).

In Rakhine State, conflicts between Rohingya and majority Rakhines re-emerged in 2012 and led to widespread displacement of the Rohingya population (OCHA 2019a). As of September 2019, there were 24 internally displaced persons (IDP) camps in Rakhine, housing about 130,000 people (OCHA 2019b). This IDP population has no freedom of movement, and many lack citizenship.

In Kachin State, fighting between an armed independence group and the Myanmar government army began again in 2011; the resurgence of conflict in late 2012 caused mass displacement (OCHA 2019a). As of October 2019, there were 120 government-controlled areas (GCA) and 19 non-government-controlled area (NGCA) camps (OCHA 2019c). IDPs in Kachin are Christians and have freedom of movement, with populations living with others from similar origins and the WASH response delivered by local faith-based organizations (HARP 2018).

As can be seen, the conflicts in Rakhine and Kachin/Shan States are different, in terms of populations, faith and cultural practices, citizenship status, freedom of movement, and humanitarian response actors (Myanmar WASH Cluster 2018). Humanitarian access is restricted in both conflicts, and thus local partners often lead response activities (Myanmar WASH Cluster 2018). Additionally, Myanmar is a disaster-prone country and is impacted by floods, cyclones, and earthquake.

To respond to these conflicts and natural disasters, UNICEF activated the WASH Cluster in 2013 (Myanmar WASH Cluster 2018). To design, monitor, and inform WASH programs, Cluster partners regularly completed KAP surveys in Rakhine and Kachin states. Uniquely, the Myanmar WASH Cluster has a repository of five years of KAP surveys, available for analysis, along with knowledge of WASH activities and emergency events over time.

In this manuscript, we analyzed and summarized KAP survey data collected over 5 years to identify WASH trends in affected populations in Myanmar over time and,

after comparing results to WASH activities and emergency events, make programmatic recommendations.

METHODS

To complete this work, UNICEF provided documents to Tufts University researchers; researchers reviewed these documents against inclusion criteria; data from included documents were extracted, categorized, and described, including the creation of a timeline of WASH activities and emergency events for each State; temporal analysis was completed; and, results were triangulated and summarized.

Review of documents provided by UNICEF

The WASH Cluster Coordinator of UNICEF/Myanmar reviewed their files and requested documents from members that included KAP survey WASH results. These documents were made available to Tufts researchers via a Box (Mountain View, CA, USA) website (please contact the corresponding author for these freely available data). One Tufts researcher reviewed each document against two inclusion criteria: (1) whether data were included assessing the KAP of beneficiaries related to WASH; and (2) whether the document was conducted in Rakhine State, Kachin State, or at national level in Myanmar.

Data extraction and categorization

Quantitative data were extracted from documents meeting inclusion criteria into an Excel spreadsheet (Redmond, WA, USA), including date, authors, implementing partners, location (region, township), typology (camp/village), ethnicity (Rohyinga/Rakhine), methods, and results, including topics and data points. Additionally, documents were reviewed to determine if they were related (for example, if the documents were a pre- and post-intervention study in the same location). Lastly, throughout document review, qualitative information on WASH activities and emergency events in Rakhine and Kachin was extracted into a Word file (Redmond, WA, USA). This qualitative information was used to develop a 2011–2016 WASH activity and emergency timeline.

As KAP surveys were not standardized and exact questions asked to respondents were not provided in documents, a review of metrics addressed in each included document was conducted. Metrics included in at least three documents were included and categorized into sub-headings of water (W), sanitation (S), or hygiene (H); and, whether they were knowledge (K), attitude (A), and/or practice (P) questions. For example, if a document stated ‘51% of respondents reported washing hands after defecation’ that was categorized as ‘Hygiene, Practice’. If at least three of the included documents included the same metric, the metric was included in Rakhine and Kachin State figures.

Temporal analysis

Results of documents related to one another were compared. The criteria for defining whether documents were related to one another were: (1) studies were carried out in the same location and surveyed at least 50% of the same camps/villages; or (2) documents were the pre- and post-intervention KAP survey of the same project. Metrics included in at least two documents in different years were considered; and only metrics with quantitative comparable data were extracted. Based on the 5% precision reported in most KAP surveys, topics were categorized as: ↑ if over time there was a >5% increase in the metric, ↓ if over time there was a >5% decrease, and same ←→ if there was a change of <5% over time.

Summary analysis

Data from the timeline, topic results, and temporal analysis were triangulated to elucidate themes emerging from the body of KAP surveys over time, which are described in the text, by location: national, Rakhine State, and Kachin State.

RESULTS

After review, 16 of 73 documents, from 2011 to 2016, met inclusion criteria (Table S1). Of the included documents, three were conducted at the national level ([Ministry of Health and UNICEF 2011](#); [MSR 2014](#)), nine in Rakhine ([Oxfam 2013](#); [Boutry 2014](#); [DFID 2014a, 2014b](#); [Mackinnon](#)

2014; Malteser International 2014; SI 2014; DFID 2015, 2016), and four in Kachin (KBC 2015; Shalom 2015; Shalom and UNICEF 2015, 2016). At the national level, two documents were related (Ministry of Health and UNICEF 2011; MSR 2014). In Rakhine, six documents were related: four were conducted in Sittwe in 2014: in Rohyinga IDP camps (DFID 2014a; Mackinnon 2014), a Rakhine camp (Malteser International 2014), and villages (DFID 2014b), followed by two documents in 2015 and 2016 in the same areas (DFID 2015, 2016). The remaining three documents were unrelated: KAP surveys in other townships (Oxfam 2013; SI 2014), and a qualitative anthropological research (Boutry 2014). In Kachin, three documents were related and conducted in one township (Shalom 2015; Shalom and UNICEF 2015, 2016) and one unrelated KAP was conducted in two other townships (KBC 2015).

Across all documents, 15 (94%) used household surveys as a data collection method, 9 (56%) included direct observations, 7 (44%) used focus group discussions, 4 (25%) used key informant interviews, and 1 (6%) used semi-structured interviews. In total, nine documents (56%) used mixed methods and seven (44%) used household surveys only.

Across all 16 documents, 15 (94%) included demographic information, and 25 total metrics were identified (8 in water, 8 in sanitation, 9 in hygiene) (Table 1). Knowledge, attitude, and practice water metrics were included in all 16 documents, and individual metrics included in more than half the documents were: water access (A, P; 69%), water sources (P; 88%), water treatment (K, A, P; 94%), health effects of unsafe water (K; 75%), household water storage and handling (K, A, P; 88%), and diarrhea causes, symptoms, and treatment (K, A, P; 75%). Sanitation metrics were included in 15 of 16 (94%) documents, and individual metrics included in more than half the documents were defecation practice (P; 94%) and disposal of infant feces (P; 63%). Hygiene metrics were included all 16 (100%) documents, and individual metrics included in more than half the documents were key times for hand washing (K, P; 100%), availability/use of soap (P; 81%), handwashing barriers and determinants (K, A; 44%), handling and storage of food (P; 63%), hygiene and sanitation promotion (K, A, P; 50%), solid waste management (K, A, P; 63%); and, other hygiene practices (K, P; 44%).

Overall, 13 of 25 metrics identified had knowledge assessed (52%), 12 had attitudes assessed (48%), and 18 had practice assessed (72%); water and hygiene were more assessed than sanitation.

National documents

For the past two decades, the Myanmar Department of Health has implemented the 'Four Cleans Initiative' to increase awareness on hygienic behaviors on water, food, latrine, and handwashing, and supported initiatives to motivate families to build personal latrines (Bajracharya 2003) and WASH infrastructure and campaigns in schools.

Non-related national documents (1)

In 2013, a survey targeting children (0–14) and caregivers (Ministry of Health and UNICEF 2013) found most households reported treating their water using a cloth (70%), followed by boiling (53%). There was limited awareness of the relationship between unsafe water and diarrhea (17%). Reported open defecation rates were 12% (children) and 13% (adults). Respondents stated latrine use is important because it prevents the spread of germs (46%) and reduces the chances of getting diarrhea (43%). Although the majority of respondents (82%) reported washing hands at some critical times, only 1% reported consistent handwashing in all critical times. About half of respondents understood washing hands with water and soap reduces the chance of disease (52–46%) and prevents diarrhea (40–31%).

Related documents (2)

Two national-level KAP surveys were conducted in 2011 and 2014, including 24 and 16 townships, respectively (Figure 1). In both surveys, >84% of households were aware of unclean/unsafe water can lead to health impacts. Safe water treatment was high in both years (73–75%), and water storage containers were observed clean (85–97%). Adult and child toilet use was high (>75%). Safe disposal of children's feces (37–32%) was a challenge: there were reductions in adult open

Table 1 | WASH metrics summarized from included documents

	K	A	P	National	Rakhine	Kachin	All
Total number of included documents				3	9	4	16
Demographic information	–			1 (33%)	8 (89%)	3 (75%)	12 (75%)
Water	K	A	P	3 (100%)	9 (100%)	4 (100%)	16 (100%)
Water access (quantity, time, difficulties)		A	P	2 (67%)	6 (67%)	3 (75%)	11 (69%)
Water sources			P	2 (67%)	9 (100%)	3 (75%)	14 (88%)
Water treatment	K	A	P	3 (100%)	8 (89%)	4 (100%)	15 (94%)
Household perception of water quality		A		3 (100%)	1 (11%)	1 (25%)	5 (31%)
Health effects of unsafe water	K			3 (100%)	7 (78%)	2 (50%)	12 (75%)
Household water storage and handling	K	A	P	2 (67%)	8 (89%)	4 (100%)	14 (88%)
Knowledge on water contamination	K			2 (67%)	2 (22%)	2 (50%)	6 (38%)
Diarrhea causes, symptoms, and treatment	K	A	P	1 (33%)	8 (89%)	3 (75%)	12 (75%)
Sanitation	K	A	P	3 (100%)	9 (100%)	3 (75%)	15 (94%)
Defecation practice			P	3 (100%)	9 (100%)	3 (75%)	15 (94%)
Disposal of infant feces			P	0 (0%)	7 (78%)	3 (75%)	10 (63%)
Latrine condition (materials, functionality, cleanliness)			P	3 (100%)	2 (22%)	1 (25%)	6 (38%)
Latrine maintenance and desludging			P	2 (67%)	3 (33%)	0 (0%)	5 (31%)
Safety using latrine		A	P	0 (0%)	5 (56%)	1 (25%)	6 (38%)
Determinants/barriers for defecation practice	K	A		3 (100%)	3 (33%)	0 (0%)	6 (38%)
Determinants/barriers for latrine construction	K	A		1 (33%)	3 (33%)	0 (0%)	4 (25%)
Latrine type	K		P	3 (100%)	1 (11%)	0 (0%)	4 (25%)
Hygiene	K	A	P	3 (100%)	9 (100%)	4 (100%)	16 (100%)
Bathing		A		2 (67%)	6 (67%)	0 (0%)	8 (50%)
Key times for hand washing	K		P	3 (100%)	9 (100%)	4 (100%)	16 (100%)
Availability/use of soap			P	3 (100%)	6 (67%)	4 (100%)	13 (81%)
Handwashing barriers and determinants	K	A		1 (33%)	5 (56%)	1 (25%)	7 (44%)
Handling and storage of food			P	0 (0%)	7 (78%)	3 (75%)	10 (73%)
Hygiene and sanitation promotion	K	A	P	3 (100%)	3 (33%)	2 (50%)	8 (50%)
Menstrual hygiene management			P	0 (0%)	3 (33%)	0 (0%)	3 (19%)
Solid waste management	K	A	P	2 (67%)	7 (78%)	1 (25%)	10 (63%)
Other hygiene practices	K		P	3 (100%)	2 (22%)	2 (50%)	7 (44%)

defecation (69–38%), but latrine use among children declined (88–77%). Knowledge of bathing as an hygienic practice was high (89–89%), and respondents reported increases in washing hands after defecation (69–77%) and before eating (40–47%) while reported handwashing rates were similar after handling children's feces (75–73%). Respondents reporting daily bathing increased (33–58%), as did burning solid waste (36–43%). Overall, despite low knowledge, there were

hygiene improvements over the time period 2011–2014; and safe disposal of child's feces, handwashing after handling children's feces, and children's use of latrines remained challenges.

Rakhine state

In Rakhine State, violence occurred in 2012 and 2016, mass displacements in 2012, 2015, and 2016, and floods

K,A,P	Topic and questions	% of responses		Trend
		2011	2014	
WATER				
K, A	Water can be one cause of diarrhea	90	85	↔
K, A	Concept of clean water = treated	57	59	↔
P	Safe water treatment	73	75	↔
P	Do something to treat water	89	91	↔
P	Water storage containers are clean	85	87	↔
SANITATION				
P	Safe disposal of children feces	37	32	↔
P	OD (adults) when work in field	69	38	↓
P	Adult uses toilet	85	85	↔
P	Children (5 - 8) use toilet	88	77	↓
HYGIENE				
K, A	Bathing is an hygienic practice	89	89	↔
P	Wash hand with soap after defecation	69	77	↑
P	Wash hand before eating	40	47	↑
P	Wash hand after handling children excreta	75	73	↔
P	Bath once a day	33	58	↑
P	Burn solid waste	36	43	↑
P	Solid waste disposed in the collection system	3	7	↔

Figure 1 | WASH metrics from related documents, national level. (Shaded bars are the per cent of responses and graphically depict trends over 2 years).

in 2015 and 2016 (Figure 2). The WASH strategies recommended by the Cluster evolved over time, moving from emergency latrines in 2012 to semi-permanent latrines, MHM kits, ceramic water filter promotion, and handwashing promotion at the household level in 2013–2014, to family-shared latrines, bathing spaces at household level, and the construction of desludging plant and

incinerators in 2015, and an update to the behavior change toolkit in 2016. Along this timeframe, hygiene promotion campaigns were carried out to improve WASH knowledge and practice. As can be seen, these activities transitioned from ‘emergency’ activities to more ‘stable’ interventions, reflecting the protracted nature of the situation.

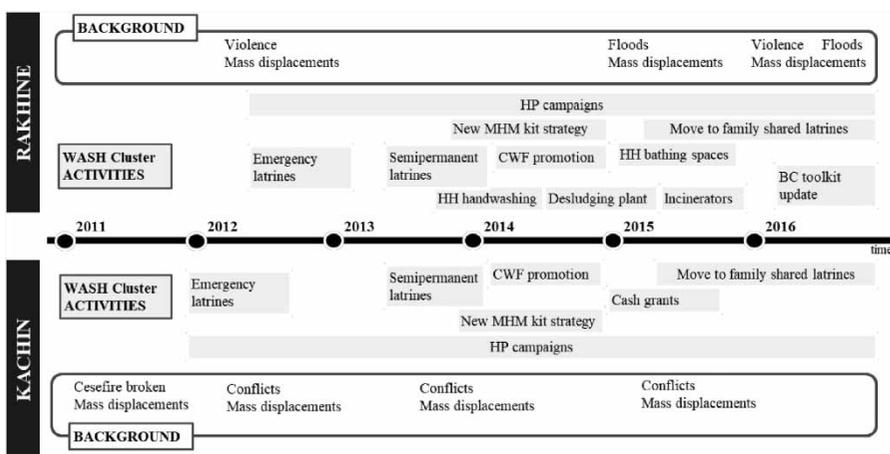


Figure 2 | Timeline of main emergency events and WASH activities in Rakhine and Kachin States (2011–2016). Note: CWF = ceramic water filter, HH = household, HP = hygiene promotion, MHM = menstrual hygiene management, BC = behavior change.

Non-related documents (3)

In Sittwe township, a 2014 anthropological evaluation identified ethnic and religious aspects of Rakhine and Rohingya populations that influenced KAP around WASH (Boutry 2014). Relevant attitudes identified for Rohingya were people are vulnerable to spirits and evil in latrines, open defecation by children is normal and commonly accepted, and, in more traditional communities, women were prohibited from using latrines outside the home. In both Rohingya and Rakhine communities, diarrhea was not considered linked to water or hygiene, instead attributed to a lack of fresh food or bad spirits.

In Pauk Taw in 2014, 75% of Rohingya IDPs identified water as a cause of diarrhea, and cloth filtration of drinking water was common (SI 2014). Open defecation was reported practiced by 13% of adults and 25% of children. More than 70% of respondents reported washing their hands with ash or soap, with about half (56%) stating the reason was to prevent disease. Thus, while disease knowledge was high, the practices reported (e.g. cloth filtration, ash) do not effectively prevent transmission.

In Kyauk Phyu in 2013 (Oxfam 2013), there was low knowledge about the link between water and diarrhea (44%), latrine use and diarrhea (2%), handwashing after handling baby's excreta (12%), and before preparing food (25%). Reported handwashing with soap after defecating and before eating was 69 and 76%, respectively. About 75% of respondents reported safely treating drinking water. Most (95%) water containers observed were covered and clean. After the construction of toilets and a mobilization campaign on defecation practice, 89% of children and >96% of adults reported using latrines for defecation, and 89% of infant feces were safely disposed in latrines.

Related documents (6)

Six documents were conducted in the same area, four documents in 2014 among camps and villages, followed by a pre-/post-KAP survey in 2015 and 2016 in IDP camps (Figure 3). Please note pre-/post-data were aggregated differently, preventing direct comparison.

K,A,P	Topic and questions	% of responses					Trend	
		2014			2015	2016		
		Ra (Mackinnon 2014)	Ro (MI 2014)	Ro (DFID 2014b)				V (DFID 2014b)
WATER								
K, A	Causes of diarrhea: at least 3 answers are correct					10	34	↑
K, A	Unsafe water cause diarrhea			98		83	92	↑
K, A	Knowledge of other water borne diseases (eye infection,...)			21		10	24	↑
K, A	Water can be one cause of diarrhea	-	36	54	55	46	64	↑
K, A	Drink safe water to prevent diarrhea	-	31	55	50	35	79	↑
K, A	Do something to treat water	90	-	97	100	95	100	↔
P	Practice safe water treatment		37	-		62	93	↑
P	Practice safe water storage (cover container)		22	75	31	16	20	↔
P	Water storage containers are clean		44	90	88		17	↓
SANITATION								
K, A	Use of latrines to prevent diarrhea		1	12	11	2	26	↑
P	Safe disposal of children feces		20	45	54	32	60	↑
P	Adults use latrines		100	57	99	61	72	↑
P	Children use latrines		100		87	55	37	↓
HYGIENE								
K, A	Wash hands after defecation		92	77	75	60	83	↑
K, A	Wash hands before eating		50	82	90	42	72	↑
K, A	Wash hands after handling children excreta		8	8	10	9	14	↔
K, A	Wash hands before preparing food		58	67	54	33	61	↑
K, A	Dirty hands is one cause of diarrhea		-	51	33	17	28	↑
K, A	Wash hands with soap to prevent diarrhea		-	62	50	22	17	↑
K, A	To cover food helps hygienic practices			17			88	↑
A	Preference of pads vs cloths for MHM (in villages)			17		25	63	↑
P	Use of soap		70	3	90	77	99	↑
P	Wash hands after defecation			3			89	↑
P	Wash hands after handling children excreta					19	24	↔
P	Garbage disposal in the collection system			94		46	61	↑

Figure 3 | WASH metrics from related KAP studies, Rakhine State. (Shaded bars are the per cent of answers and graphically depict trends over 2 years. Note: Ro = Rohingya camp, Ra = Rakhine camp, V = villages).

All knowledge and attitudes water indicators increased over time, in both Rohyinga and Rakhine areas (Figure 3), except for the knowledge of needing to do something to treat water, which started high (90–100%). Specifically, knowledge on three causes of diarrhea and to drink safe water to prevent diarrhea increased from 10–34% and 31–79%, respectively. As diarrhea was generally not considered a waterborne disease by Rohyinga communities, the increase suggests a relationship with WASH activities and campaigns; this is supported by respondents reporting the reason they changed hygiene behavior was because of hygiene promotion session (>50% of IDPs in camps, 25% of villagers) (DFID 2015). Despite this increase in knowledge, increases in safe water practices were not consistently observed, except for safe water treatment, which increased from 37 to 93% and is a reflection of a move from non-effective cloth filtration to ceramic filtration (Tromble *et al.* 2017).

KAP related to sanitation improved over time, including knowledge of the need to use latrines to prevent diarrhea (1–26%), the practice of safe disposal of children's feces (20–60%), and the practice of adults using latrines (57–88%). However, the practice of children's use of latrines decreased (100–37%). In 2015, respondents reported that open defecation practices were more prevalent in villages than in IDP camps (DFID 2015). Reported reasons for not using latrines were habitual practice (29%), it was during the night, or vulnerable populations (elders, children) could not access (DFID 2015). There were insufficient data to assess the impact of moving from gender segregated to family-shared latrines.

KAP related to handwashing improved over time, including knowledge of washing hands after defecation (60–83%), before eating (42–72%), after handling children's feces (8–14%), and before preparing food (33–61%); that dirty hands can cause diarrhea (17–55%); that covering food is hygienic (17–88%). Hygiene practices also increased (Figure 3). Please note unsafe disposal of waste was practiced where there were no collection systems in place (DFID 2014b; Malteser International 2014), and the installation of bathing areas addressed the cultural need for privacy for Rohyinga women (DFID 2014a, 2014b, 2016).

Two surveys quantitatively investigated menstrual hygiene KAP. In villages, the practice of pad use compared to traditional cloths increased from 2015 to 2016

(45%–98%). In IDP camps, pad use started and remained high (91%–92%). This change in practices in villages is linked to changes in distributed items: from pads and cloth in 2015 to pads only in 2016. The most common practices for pad disposal were burying and disposal in latrines in 2015 and 2016. In 2016, waste bins were placed inside latrines in some locations, although there was insufficient data to evaluate the impact of this intervention.

Overall, knowledge and attitudes increased across all metrics (except water treatment, which was already high) in WASH. Practices also increased, but not by as high as percentages and not as consistently. Critical areas of improvement emerged were increase knowledge on waterborne disease risks, improve safe water storage and cleanliness, address barriers (cultural and physical) to the risk of children's feces, and improve waste collection systems.

KACHIN

In Kachin State, violence and mass displacements occurred in 2011, 2012, 2013, and 2015 (Figure 2). The WASH strategies recommended by the Cluster evolved over time, moving from emergency latrines in 2012 to semi-permanent latrines, MHM kits, and ceramic water filter promotion in 2013–2014, and to family-shared latrines and cash grants for WASH operation and management in 2015–2016. Along this timeframe, hygiene promotion campaigns were carried out to improve WASH knowledge and practice. As in Rakhine, activities transitioned from 'emergency' activities to more 'stable' interventions.

Non-related document summary (1)

Results from Myitkyina and Waing Maw townships (KBC 2015) reported a low knowledge of diarrhea causes, from group discussions. Most people reported treating water at household level, although generally, they reported not to cover water container properly. From group discussion and direct observations, it emerged that in general, people use latrines; however, open defecation was reported among adults and children (12%). Children's feces were safely disposed (77%), but handwashing was

not widely practiced after handling children's feces (35%). Despite households reporting to have soap at home (63%), reported use for handwashing was low (32–34%). In terms of knowledge, more than 60% of people were able to name at least three key times for handwashing. Overall, 43% of people reported using collection points to manage solid waste, and 73% reported burying or disposing waste.

Related document summary (3)

KAP related to water improved over time (Figure 4), including knowledge to drink safe water to prevent diarrhea (47–60%), practice safe water treatment (67–78%), and water storage (15–26%). The most common water treatment reported was boiling, followed by cloth filtration.

While knowledge to use latrines to prevent diarrhea (14–37%) increased over time, other sanitation KAP metrics decreased, including the reported practice of safe disposal of children's feces (59–39%), and children's latrine use (60–18%).

KAP related to handwashing improved over time, including two key moments to wash hands (90–97%), handwashing with soap reduces diarrhea (15–48%), and to wash hands after handling children's feces (16–46%). The reported practices of use of soap and safe food storage started, and remained, high, at 99–97% and 88–92%, respectively.

Overall, in Kachin, knowledge and attitudes increased across all metrics (except water treatment, which was already high) in WASH. Practices also increased, but not by as high as percentages and not as consistently. Similarly, to Rakhine State, there is a need to continue education on waterborne disease risks, educate on safe water storage and cleanliness, and address barriers (cultural and physical) to the risk of children's feces.

DISCUSSION

Working in collaboration with the WASH Cluster members in Myanmar, 16 documents with information on KAP about

K,A,P	Topic and questions	% of responses			Trend
		2014	2015	2016	
WATER					
K, A	Drink safe water to prevent diarrhea		47	60	↑
K, A	Do something to treat water	90	100	100	↔
P	Practice safe water treatment	67	87	78	↓
P	Use clean tools to handle drinking water	75	89	80	↓
P	Practice safe water storage (cover container)		15	26	↑
P	Water storage containers are clean		30	37	↑
SANITATION					
K, A	Use of latrines to prevent diarrhea		14	37	↑
P	Safe disposal of children feces		59	39	↓
P	Adults use latrines		99	100	↔
P	Children use latrines		60	18	↓
HYGIENE					
K, A	Name at least 2 key moment to wash hands		90	97	↑
K, A	Wash hands with soap to prevent diarrhea		15	48	↑
P	Use of soap		99	97	↔
P	Wash hands after defecation	90	90	97	↑
P	Wash hands before eating	45	72	80	↑
P	Wash hands after handling children excreta		16	46	↑
P	Wash hands before preparing food		27	70	↑
P	Safe food storage		88	92	↔

Figure 4 | WASH metrics in related studies, Kachin State. Shaded bars are the per cent of answers and graphically depict trends over 2 years.

WASH from 2011 to 2016 were identified. Documents were summarized, analyzed temporally, and compared with emergency events and WASH programmatic activities and strategies. We found KAP surveys were not standardized, limiting the ability to complete quantitative comparative analysis. However, among affected populations, there were large increases in knowledge and attitudes related to WASH found over time. Practices related to WASH also increased, but not as much or as consistently, highlighting the gap between knowledge/attitudes and practice. Increases in KAP were found to be related to programmatic activities, although vulnerable populations were sometimes not considered adequately. Overall, we found that summarizing KAP surveys can document programmatic success and inform programmatic activities. We recommend standardized KAP surveys be conducted by responders and data collated within the WASH Cluster to develop future WASH strategies in protracted situations.

Inconsistencies in KAP questionnaire designs, observation lists, data collection methods, and analysis limited the ability to conduct the quantitative comparison between KAP results and to relate results with specific activities. For example, knowledge of water-related diseases was determined by asking people to (a) list one or more causes of diarrhea; (2) say which diseases unsafe water can cause; and (3) say if unsafe water can cause disease. Moreover, most documents did not include raw data, and data were aggregated differently across documents.

In both Rakhine and Kachin, large increases in knowledge and attitudes were observed over time and could be related to interventions implemented by responders. In particular, large percentage increases in knowledge were seen in knowledge of diarrhea, the link between diarrhea and safe water and handwashing, the need to drink safe water, the need to complete handwashing at critical times, and the need to keep food hygienically. This can be attributed to hygiene promotion campaigns.

However, increases in knowledge did not always lead to commensurate increases in practice; while practices increased, they were not by as much or as consistently. Thus, with years of hygiene promotion activities, hygiene campaigns have successfully raised knowledge, but more work is needed to address barriers to adoption to increase the improvement in practices. This is consistent with

previous literature that knowledge alone is not sufficient to ensure changes in practice (Launiala 2009; Datta & Mulinathan 2014; Kelly & Barker 2016). To change the behavior, multiple factors (socio-cultural, environmental, economic) affecting the risk perception, sense of vulnerability, or ability of target populations must be addressed (Launiala 2009). For these remaining key risky behaviors, it is recommended to develop strategies to address context-specific barriers. For example, the safe disposal of solid waste increased in both states after the implementation of collection and disposal services. In Rakhine, knowledge and practice was generally higher in camps compared to villages, possibly reflecting the relatively higher number of projects and hygiene education activities in camps compared to villages.

Over time, open defecation remained a common practice, particularly during the night and among children, suggesting a barrier to the use of communal/shared facilities. Additionally, because latrine provision and associated promotion campaigns from 2013 to 2016 targeted adults, children and those with special needs had difficulty using the latrines. Our analysis highlighted a lack of attention in the surveyed time period towards vulnerable groups (e.g. women, elders, people who are disabled) in the KAP surveys, as few questionnaires were designed to capture disaggregated group data. Currently, the WASH Cluster is promoting strategies to address the needs of vulnerable groups and applying other methodologies to complement data available and overcome challenges. Of note is that, between 2015 and 2016, KAP surveys did incorporate additional concerns related to women, including pad disposal, safety, and privacy in using toilets and bathing areas.

Limitations to this research include known limitations of KAP surveys as a methodology, including reliability of self-reported data (Launiala 2009); difficulty with translations (in this case from English-Burmese-Rohinyga) (DFID 2014b, 2016); formulation and order of questions; lack of measurement of the intensity of opinion (Launiala 2009); enumerator rush (Mackinnon 2014); and/or the ability for beneficiaries to feel safe speaking freely. Cluster members adopted strategies to manage those limitations, including the use of multiple data collection methods, crosschecking of questions and observations, and the employment of trained enumerators. Overall, KAP study results should be

interpreted as indicators of the trend more than quantitative values, which is the strategy used in this manuscript.

CONCLUSION

Our analysis found that KAP surveys, if consistently conducted, can support the identification of relationships between programming and KAP over time. KAP surveys in protracted crisis have the potential to be a powerful tool to identify WASH trends and inform responder strategies and future activities. We thus recommend that, in protracted emergencies, the WASH Cluster work with members to design standardized KAP survey, observation tools, and analysis plans in order to refine WASH programmatic strategies. Additionally, raw data should be embedded in documents presenting aggregated results. Specifically, among IDPs in Myanmar, there is a need to continue education on waterborne disease risks to increase knowledge, educate on safe water storage and cleanliness, work to address barriers (cultural and physical) to risk of children's feces, and improve waste collection systems. Lastly, protracted contexts are increasing worldwide, and a coordinated methodology to gather standardized KAP data has benefits in terms of ease of data collection and use of data; UNHCR, WHO, and other agencies have already worked to develop standardized KAP methodologies for other contexts. It is recommended WASH Clusters in protracted situations develop standardized KAP methodologies to assist in program assessment and strategic planning.

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DATA AVAILABILITY STATEMENT

All relevant data are available from an online repository or repositories. Documents are available at the following link:

<https://sites.google.com/view/washclustermyanmar/> and/or can be requested from the authors.

REFERENCES

- Ali, M. 2009 *KAP Surveys in the Context of WASH Projects*. Report. DEW Point Ref. A0292, DFID Resource Centre for Environment, Water and Sanitation, Practical Action Consulting.
- Bajracharya, D. 2003 *Myanmar experiences in sanitation and hygiene promotion: lessons learned and future directions*. *International Journal of Environmental Health Research* 13 (1), 141–152. <https://doi.org/10.1080/0960312031000102903>.
- Boutry, M. 2014 *Qualitative Research and Comprehensive Study on Malnutrition in Displaced and Non-Displaced Communities in Sittwe Township*. Final Report. ACF International (available from authors).
- Bulmer, M. & Warwick, D. P. 1983 *Social Research in Developing Countries: Surveys and Censuses in the Third World*. Psychology Press.
- Campbell, J. G. & Stone, L. 1984 *The Use and misuse of surveys in international development: an experiment from Nepal*. *Human Organization* 43 (1), 27–37. <https://doi.org/10.17730/humo.43.1.6w15k01724878166>.
- Datta, S. & Mullainathan, S. 2014 *Behavioral design: a new approach to development policy*. *Review of Income and Wealth* 60 (1), 7–35. <https://doi.org/10.1111/roiw.12093>.
- DFID 2014a *Survey in Rural Camps of Sittwe Township, Rakhine State, Myanmar*. KAP Survey Report. Sittwe Township, Rakhine State, Myanmar (available from authors).
- DFID 2014b *KAP Survey, Sittwe Villages, Rakhine*. Report. Sittwe Township, Rakhine State, Myanmar (available from authors).
- DFID 2015 *Knowledge Attitudes and Practices Survey of Hygiene Behavior in Sittwe Township, Rakhine State*. Report. Sittwe Township, Rakhine State, Myanmar (available from authors).
- DFID 2016 *Knowledge Attitudes and Practices Survey of Hygiene Behaviours in Sittwe Township, Rakhine State*. Report, Sittwe Township, Rakhine State, Myanmar (available from authors).
- EM-DAT 2019 *EM-DAT. The International Disaster Database*. Available from: <https://www.emdat.be/> (accessed 20 January 2019).
- HARP. 2018 *Kachin and Northern Shan State Context and Vulnerability Review*. Report. Myanmar. Available from: https://themimu.info/sites/themimu.info/files/documents/Report_Context_and_Vulnerability_Review_-_Kachin_N_Shan_HARP_Oct2018.pdf
- KBC, Shalom and Oxfam 2015 *Local Hygiene Behavior Study in Kachin IDP Camps (Formative Research on WASH Related Hygiene Behaviors)*. Report. Kachin State, Myanmar (available from authors).

- Kelly, M. P. & Barker, M. 2016 *Why is changing health-related behaviour so difficult?* *Public Health* **136**, 109–116. <https://doi.org/10.1016/j.puhe.2016.03.030>.
- Launiala, A. 2009 How much can a KAP survey tell us about people's knowledge, attitudes and practices? Some observations from medical anthropology on malaria in pregnancy in Malawi background: KAP surveys. *Anthropology Matters Journal* **11** (1), 1–13.
- Mackinnon, E. 2014 *Urban KAP Survey*. OXFAM Camps. Report. OXFAM (available from authors).
- Malteser International (MI) 2014 *Knowledge, Attitude and Practice (KAP) Survey on Water, Sanitation and Hygiene (WASH) Conditions in Ohn Taw Gyi Camps 3 and 4*. Report. MMRD Research services, Yangon, Myanmar (available from authors).
- Ministry of Health and UNICEF 2011 *Knowledge, Attitude and Practice Study Into Water, Sanitation and Hygiene in 24 Townships of Myanmar*. Report. Ministry of Health of the Government of the Republic of the Union of Myanmar, Myanmar (available from authors).
- Ministry of Health and UNICEF 2013 *KAP Study on Communication Child Survival and Development in Myanmar 2013*. Report. Ministry of Health of the Government of the Republic of the Union of Myanmar, Myanmar (available from authors).
- MSR 2014 *KAP Survey on Water, Sanitation and Hygiene in 16 Townships of Myanmar*. Report. UNICEF, Yangon, Myanmar (available from authors).
- Myanmar WASH Cluster 2018 *Myanmar WASH Cluster Strategic Operational Framework 2017–2019*. Report. Yangon, Myanmar (available from authors).
- OCHA 2019a *Humanitarian Needs Overview Myanmar*. Report. Humanitarian Programme Cycle 2020. Available from: https://reliefweb.int/sites/reliefweb.int/files/resources/MMR_HNO_2020_FINAL_131219.pdf
- OCHA 2019b *Myanmar. IDP Sites in Rakhine State, as of 31 October 2019*. Map. Available from: <https://reliefweb.int/map/myanmar/myanmar-idp-sites-rakhine-state-30-september-2019> (accessed 16 January 2020).
- OCHA 2019c *Myanmar. IDP sites in Kachin State, as of 31 October 2019*. Map. Available from: <https://reliefweb.int/map/myanmar/myanmar-idp-sites-kachin-state-31-october-2019>.
- Oxfam 2013 *Kyauk Phyu Baseline Summary of Key Findings and Recommendations*. (available from authors). WASH Emergency Response Baseline Survey Report. Rakhine, Myanmar.
- Ramesh, A., Blanchet, K., Ensink, J. H. J. & Bayard, R. 2015 *Evidence on the effectiveness of water, sanitation, and hygiene (WASH) interventions on health outcomes in humanitarian crises: a systematic review*. *PLoS One* **10** (9), e0124688. <https://doi.org/10.1371/journal.pone.0124688>.
- Shalom 2015 *Knowledge, Attitude and Practices (KAP) Survey Report*. Report. Kachin State, Myanmar (available from authors).
- Shalom and UNICEF 2015 *Summary of Pre-KAP Survey in Hpakan*. Report. Kachin State, Myanmar (available from authors).
- Shalom and UNICEF 2016 *Post-KAP Survey Finding*. Report. Kachin State, Myanmar (available from authors).
- SI (Solidarités International) 2014 *Knowledge, Attitude and Practice Analysis Report*. Report. Pauktaw township, Rakhine State, Myanmar (available from authors).
- Sphere Association 2018 *The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response*, 4th edn, Geneva, Switzerland. Available from: www.spherestandards.org/handbook
- Tromble, E., Brown, T., Martinsen, A., Husain, F. & Handzel, T. 2017 *Technical Review of Ceramic Water Filters among Surface Water Users in Rakhine State*. Report. Center for Disease Control and Prevention (CDC), Myanmar. Available from: https://themimu.info/sites/themimu.info/files/assessment_file_attachments/CDC_Report_CWF_Rakhine_Myanmar_Cleared.pdf
- Wendland, C., Yadav, M., Stock, A. & Seager, J. 2017 *Gender, women and sanitation*. In: *Global Water Pathogen Project* (B. Rose & B. Jiménez-Cisneros, eds). Michigan State University, E. Lansing, MI. UNESCO. <https://doi.org/10.14321/waterpathogens.4>.
- WHO 2008 *Advocacy, Communication and Social Mobilization for TB Control: A Guide to Developing Knowledge, Attitude and Practice Surveys*. WHO Press, Geneva, Switzerland.
- Yates, T., Vujcic, J., Leandre Joseph, M., Gallandat, K. & Lantagne, D. 2018 *Efficacy and effectiveness of water, sanitation, and hygiene interventions in emergencies in low- and middle-income countries: a systematic review*. *Waterlines* **37** (1), 31–65. <https://doi.org/10.3362/1756-3488.17-00016>.

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