PhD Annexes

Hygiene behaviour and hygiene behaviour change during humanitarian crises

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Annex 1: Supplementary materials for Paper 1

A. Search terms and exclusion criteria

Hygiene and handwashing related terms	Hand washing/ or Hand Disinfection/ or hygiene/ [Mesh] Limit to (human and english language).
General Behaviour / behavioural determinant related terms	Behavio?r* or Theor* or framework* or model or analys* or plan* or determinant* or Factor* or drive* or barrier* or change or Belie* or attitude* or motiv* Limit to (human and english language).
Exclusion terms	Not doctor* not nurs* not medic* not hospital* not health centre not clinic* not patient* not ward* not student* not school* not facility
Executive Brain terms	Know* or plan* or intend or intent*
Motivated Brain terms	motiv* or disgust* or comfort* or affiliat* or nurtur* or status or attract* or lust or love or fear or creat* or curious* or justice or hoard* or hunger or hungry or play* or aspir* or emotion*
Reactive Brain terms	cue* or trigger* or remind* or forget* or habit* or repetition or repeat
Discounts terms	discount* or trade-off* or effort or eas* or cost or expens* or busy* or value or benefit* or priorit* or expect* or reward*
Characteristics terms	Gender or m#n or wom#n or male or female or wealth* or money or socio-economic or age or educat* or employ* or rural or urban or religio*or faith or personality or trait* or characteristic* or socio-demographic or attribute
Senses terms	sense* or dirt* or smell* or soft or moistur* or feel*
Capabilities terms	Skill* or capacity or competen* or will or ability or able or efficacy or commit* or control* or cope or coping
Stage terms	Kitchen or toilet or bathroom or environment or setting or clean*
Infrastructure terms	handwashing facility* or mirror or water or tap* or basin or soap dish or own*
Props terms	Soap or contain* or towel* or bucket or jerry can or jug or ash or product, object or access* or availab*
Roles terms	Role* or identit* or responsibilit* or mother or father or model or teach*
Routine terms	Routine* or script
Norms terms	Norm*
Physical environment terms	Climate or geography or physical or space
Biological Environment	Risk or pathogen or outbreak or germ or disease or threat or vulnerabil*, susceptibility* or contaminat* or sever*
Social Environment terms	Social or connectiv* or network* or influenc* or friend* or peer* or conform* or support* or relationship* or pressure* or judge* or observ* or sanction* or sham* or participat* or Leader or disapproval or approval or stigma* or intergrat* or enforc*
Political and historical context terms	Histor* or politic* or polic* or context* or cultur*or regulat*
Exclusion criteria	Institutional based research (research in schools, universities, day-care centres, aged-care homes, prisons, health facilities or workplaces). Grey literature Conference abstracts Commentaries, editorials or theoretical articles that do not present new data or only analyse secondary data Studies which do not describe the outcome (i.e. no measure of handwashing behaviour) Studies which do not directly link determinants to the outcome

B. Quality appraisal of quantitative studies

Type of study	Author	Year	Description of Context	Participants and Sampling described	Randomization used	Methods described	Systematic data analysis described	Multivariate analysis used	Recall bias minimised	Social desirability bias minimised	Measurement bias minimised	Findings discussed	Score out of 10
Observational	Al-Khatib, et al.	2015	x			x	x					x	4
Observational	Aunger, et al.	2010	x	x	x	x	x	x	x	x		x	9
Observational	Aunger, et al.	2016		x		x	x	x				x	5
Interventional	Biran, et al.	2009	x	x	x	x	x	x	x	x	x	x	10
Interventional	Cairncross, et al.	2005	x	x		x	x	x					5
Observational	Chaung, et al.	2015		x	x		x	x			x	x	6
Interventional	Contzen, Meili, et al.	2015	x	x	x	x	x	x	x	x		x	9
Interventional	Contzen & Inauen	2015	x	x	x	x	x	x			x	x	8
Observational	Contzen, & Mosler	2015	x	x	x		x	x			x	x	7
Observational	Dearden, et al.	2002	x	x	x	x	x					x	6
observational	Dobe, et al.	2013	x	x	x	x	x	x	x			x	8
Observational	Fielding, et al.	2014				x						x	2
Observational	Friedrich, et al.	2017		x	x	x	x	x		x	x	x	8

Type of study	Author	Year	Description of Context	Participants and Sampling described	Randomization used	Methods described	Systematic data analysis described	Multivariate analysis used	Recall bias minimised	Social desirability bias minimised	Measurement bias minimised	Findings discussed	Score out of 10
Interventional	Halder, et al.	2010		x	x	x	x	x	x	x	x	x	9
Observation	Hirai, et al.	2016	x	x		x	x	x	x		x	x	8
Observational	Hoque	2003	x			x	x		x			x	4
Observational	Jenkins, et al.	2013	x	x	x	x	x					x	6
Interventional	Johnson, et al.	2003			x	x	x	x	x	x	x	x	8
Observational	Jones, et al.	2009		x		x	x		x			x	5
Interventional	Judah, et al.	2009		x	x	x	x		x	x	x	x	8
Interventional	Kaewchana, et al.	2012	x	x	x	x	x					x	6
Interventional	Kamm, et al.	2016		x	x	x	x	x	x	x		x	8
Observational	Kumar, et al.	2017	x	x	x	x	x		x	x	x	x	9
Observational	Lau, et al.	2010	x	x	x	x	x	x				x	7
Observational	Lau, et al.	2011	x	x	x	x	x					x	6
Observational	Lau, et al.	2007	x	x	x	x	x	x	x				7
Observational	Liu, et al.	2011	x	x	x		x	x				x	6
Observational	Luby, et al.	2009	x	x	x	x	x	x				x	7
Observation	Luby, et al.	2008	x	x	x	x	x			x		x	7
Observational	Miao, et al.	2012	x	x	x	x	x	x	x			x	8

Type of study	Author	Year	Description of Context	Participants and Sampling described	Randomization used	Methods described	Systematic data analysis described	Multivariate analysis used	Recall bias minimised	Social desirability bias minimised	Measurement bias minimised	Findings discussed	Score out of 10
Observational	Mubarak, et al.	2016	x	x		x	x					x	4
Observational	Nahimana, et al.	2017	x	x		x	x	x				x	6
Interventional	Nalbone, et al.	2005		x	x	x			x		x	x	6
Interventional	Oswald, et al.	2014	x	x		x	x		x	x	x	x	8
Interventional	Pfattheicher, et al.	2018		x	x	x	x	x	x	x	x	x	9
Interventional	Rabbi, et al.	2013	x	x			x						3
Observational	Sakisaka, et al.	2002	x	x	x	x	x	x				x	7
Observational	Saleh, et al.	2014	x	x		x	x					x	5
Interventional	Schlegelmilch, et al.	2016	x	x	x	x	x	x				x	7
Observational	Schmidt, et al.	2009		x	x	x	x	x	x	x	x	x	9
Observational	Scott, Lawson, et al.	2007	x	x	x	x	x	x	x		x	x	9
Observational	Scott, et al.	2010	x	x		x					x	x	5
Interventional	Seimtz, et al.	2016		x		x	x	x					4
Observational	Song, et al.	2013	x	x	x	x	x	x				x	7

Type of study	Author	Year	Description of Context	Participants and Sampling described	Randomization used	Methods described	Systematic data analysis described	Multivariate analysis used	Recall bias minimised	Social desirability bias minimised	Measurement bias minimised	Findings discussed	Score out of 10
Observational	SteelFisher, et al.	2015		x	x	x	x	x				x	6
Observational	Tao, et al.	2013	x	x	x	x	x	x			x	x	8
Observational	Timpka, et al.	2014	x	x	x	x	x	x			x	x	8
Observational	To, et al.	2016	x	x		x	x	x	x	x		x	8
Observational	Tuzun, et al.	2015		x	x	x	x					x	5
Observational	Yang, et al.	2009	x		x	x	x	x				x	5
Observational	Zhang, et al.	2016	x			x	x	x				x	4

C. Quality appraisal of qualitative studies

Type of study	Author	Year	Description of Context	Participants and Sampling	Methods described	Saturation mentioned	Systematic data analysis described	Reliability and validity discussed	Reflexivity of researcher documented	Findings discussed	Score out of 8
Observational	Dell, et al.	2012	x	x	x		x			x	5
Observational	File, et al.	2015	x	x	x	x	x			x	6
Observational	Greenland, et al.	2013	x	x	x		x	x	x	x	7
Observational	Greenwell, et al.	2013	x				x			x	3
Observational	Hulland, et al.	2013	x	x	x		x	x		x	6
Observational	Lohiniva, et al.	2008	x				x			x	3
Observational	McMichael, et al.	2016	x	x	x		x		x	x	6
Observational	Nizame, et al	2016	x	x	x	x	x	x		x	7
Observational	Rheinlander, et al.	2015	x		x		x	x		x	5
Observational	Rheinlander, et al.	2010	x	x	x		x			x	5
Observational	Usfar, et al.	2010	x	x	x	x	x			x	6

D. Quality appraisal of mixed-method studies

Type of study	Author	Year	Description of Context	Participants and Sampling described		Methods described	Systematic Data Analysis described		Multivariate analysis used	Minimization of bias discussed	Integration of Quant/Qual components	Findings discussed	Total score out of 10
				QUAN	QUAL		QUAN	QUAL					
Interventional	Ashraf, et al.	2017	x	x	x	x	x	x		x		x	8
Observational	Baker, et al.	2014	x	x	x	x	x	x	x		x	x	9
Observational	Biran, et al.	2005	x	x		x					x	x	5
Observational	Biran, et al.	2012	x	x	x	x	x		x	x	x	x	9
Interventional	Biswas, et al.	2017	x	x	x	x	x	x			x	x	9
Observational	Clayton, et al.	2003		x	x	x	x	x			x	x	7
Observational	Curtis, et al.	2003		x	x	x	x	x		x	x	x	8
Observational	Curtis, et al.	2009						x		x		x	3
Interventional	Husain, et al.	2015	x	x	x		x	x		x	x	x	8
Interventional	Langford, et al.	2013	x	x	x	x		x		x	x	x	8
Interventional	Mbuya, et al.	2015	x			x		x					3
Interventional	McDonald, et al.	2015	x	x		x	x				x	x	6
Observational	Nizame, et al.	2013	x	x	x	x	x	x		x	x	x	9
Interventional	Rahman, et al.	2017	x	x	x	x	x	x		x	x	x	9

Observational	Scott, Curtis, et al.	2007	x	x		x	x	x		x	x	x	8
Interventional	Yeasmin, et al.	2014	x	x			x		x				4

E. Full descriptive and weighted analysis of handwashing determinants reported by three or more studies

BCD categories		Hypothesised relationship between determinants and HWWS	Number of associations reported	Number of associations clearly defining the determinant	Number of associations using valid / reliable measurement	Mode of assessing the association		Direction of association			Quality weighted score (% = actual quality score out of potential score available)			Assessment of overall Association	Assessment of quality of evidence
						Quali	Quant	+	0	-	+	0	-		
Executive Brain	Knowledge	Biomedical knowledge about health and disease	10	7	5	2	8	4	6	0	10	14	0	Mixed results indicating no association*	Moderate
		Knowledge about the critical times to wash hands	10	9	4	2	8	6	3	1	13	7	1	Mixed evidence indicating a positive association	Moderate
	Risk	Believing that HWWS is efficacious in reducing outbreaks and disease transmission.	11	9	2	1	10	8	2	1	13	4	2	Positive association	Weak
		Believing that there are no preventative or curative treatments for an outbreak related disease.	3	3	0	0	3	3	0	0	6	0	0	Positive association	Moderate
		Perceiving yourself to be vulnerable to disease	9	8	1	1	7	5	2	1	11	5	3	Mixed evidence indicating a positive association	Moderate*

BCD categories		Hypothesised relationship between determinants and HWWS	Number of associations reported	Number of associations clearly defining the determinant	Number of associations using valid / reliable measurement	Mode of assessing the association		Direction of association			Quality weighted score (% = actual quality score out of potential score available)			Assessment of overall Association	Assessment of quality of evidence
						Quali	Quant	+	0	-	+	0	-		
		Perceiving the consequences of getting diarrhoea or an outbreak related disease to be serious.	8	6	1	0	10	5	3	0	10	7	0	Mixed evidence indicating a Positive association	Moderate
	Intention and planning	Intending to wash hands with soap.	5	3	2	0	5	4	1	0	6	3	0	Mixed evidence indicating a positive association	Moderate
	Discounts	Being busy or getting distracted by other tasks	9	7	2	7	3	0	0	9	0	0	16	Negative association	Moderate*
		Perceiving soap to be expensive	6	3	2	4	2	0	1	10	0	2	11	Negative association	Weak
		Thinking that HWWS is not an important activity.	4	4	1	3	1	0	0	4	0	0	9	Negative association	Moderate
		Believing that HWWS requires a lot of water.	4	3	0	4	0	0	0	4	0	0	5	Negative association	Weak
		Feeling tired or lazy	3	3	0	1	2	0	0	3	0	0	6	Negative association	Moderate
Motivated Brain	Disgust	Perceiving unwashed hands to be disgusting	6	4	2	3	3*	6	0	0	15	0	0	Positive association	Moderate*

BCD categories		Hypothesised relationship between determinants and HWWS	Number of associations reported	Number of associations clearly defining the determinant	Number of associations using valid / reliable measurement	Mode of assessing the association		Direction of association			Quality weighted score (% = actual quality score out of potential score available)			Assessment of overall Association	Assessment of quality of evidence
						Quali	Quant	+	0	-	+	0	-		
		Hands being contaminated with something that is dirty, foul or smelly.	16	14	3	14	2	16	0	0	34	0	0	Positive association	Moderate
		A strong desire to avoid germs and contamination.	3	1	1	2	1	3	0	0	4	0	0	Positive association	Weak
	Comfort	Believing that HWWS will leave hands smelling nice.	5	5	1	4	1	5	0	0	10	0	0	Positive association	Moderate
	Comfort	Believing that HWWS will make hands feel nice and help them to feel refreshed, confident and comfortable.	5	4	1	3	2	4	1	0	7	3	0	Mixed results indicating a positive association	Moderate
	Nurture	Parents who have a strong desire to care for their children and are attentive to their needs.	9	5	1	6	3	9	0	0	14	0	0	Positive association	Weak
	Fear	Experiencing worry or anxiety in relation to a disease or outbreak.	9	7	1	3	6	7	2	0	16	3	0	Mixed results indicating a positive association	Moderate

BCD categories		Hypothesised relationship between determinants and HWWS	Number of associations reported	Number of associations clearly defining the determinant	Number of associations using valid / reliable measurement	Mode of assessing the association		Direction of association			Quality weighted score (% = actual quality score out of potential score available)			Assessment of overall Association	Assessment of quality of evidence
						Quali	Quant	+	0	-	+	0	-		
	Status	Believing that HWWS is linked to being respected in society.	3	3	1	2	1	3	0	0	6	0	0	Positive association	Moderate*
Reactive Brain		Being cued to wash hands by the presence of a handwashing facility.	6	6	2	4	2	6	0	0	14	0	0	Positive association	Moderate
		Believing that your HWWS behaviour is habitual.	3	2	1	1	2	3	0	0	7	0	0	Positive association	Moderate
		Visual reminders (e.g. posters about handwashing or images of eyes to make people feel like they are being watched).	4	3	2	0	4	3	1	0	7	3	0	Mixed results indicating a positive association *	Moderate*
		Being taught HWWS behaviour from a young age.	3	0	0	3	0	3	0	0	0	0	0	Positive association	Weak
Characteristics		Having higher levels of education	25	22	11	1	24	18	7	0	34	18	0	Mixed results indicating a positive association	Moderate
		Being female	14	14	4	0	14	12	3	0	23	5	0	Mixed results indicating a positive association	Moderate

BCD categories	Hypothesised relationship between determinants and HWWS	Number of associations reported	Number of associations clearly defining the determinant	Number of associations using valid / reliable measurement	Mode of assessing the association		Direction of association			Quality weighted score (% = actual quality score out of potential score available)			Assessment of overall Association	Assessment of quality of evidence
					Quali	Quant	+	0	-	+	0	-		
	Being wealthy	22	16	7	3	19	20	2	0	42	9	0	Positive association	Moderate
	Having a young child in the family	3	3	2	1	2	2	1	0	6	3	0	Mixed results indicating a positive association *	Good*
	Belonging to certain ethnic groups	4	3	2	0	4	3	1	0	7	2	0	Mixed results indicating a positive association *	Moderate
	Having a professional or office-based job.	3	3	0	0	3	3	0	0	6	0	0	Positive association	Moderate
	Being older.	10	6	2	0	10	6	3	1	8	6	1	Inconsistent results*	Weak*
Stage	Having an improved latrine.	3	3	2	0	3	2	1	0	6	3	0	Mixed results indicating a positive association	Good*
	Having access to a private toilet.	3	2	1	1	2	3	0	0	6	0	0	Positive association	Moderate*
	Working away from home	3	3	2	3	0	0	0	3	0	0	6	Negative association	Moderate

BCD categories	Hypothesised relationship between determinants and HWWS	Number of associations reported	Number of associations clearly defining the determinant	Number of associations using valid / reliable measurement	Mode of assessing the association		Direction of association			Quality weighted score (% = actual quality score out of potential score available)			Assessment of overall Association	Assessment of quality of evidence
					Quali	Quant	+	0	-	+	0	-		
Infrastructure	Having a handwashing facility with soap and water present.	9	8	6	2	7	9	0	0	27	0	0	Positive association	Good
	Having handwashing facilities that are conveniently located close to the kitchen and toilet.	3	2	1	2	1	3	0	0	9	0	0	Positive association	Good
	Having handwashing facilities that are desirable and user friendly (a mirror, a soap holder, a basin, nicely coloured).	5	5	1	3	2	5	0	0	14	0	0	Positive association	Good
	Having piped water or a water source close to the household.	9	9	6	2	7	8	1	0	22	3	0	Positive association	Good
	Having water available at the handwashing facility.	9	4	4	2	7	9	0	0	17	0	0	Positive association	Moderate*
	A real or perceived lack of water.	4	2	1	1	3	0	1	3	0	4	4	Mixed results indicating no association	Moderate*
Props	Having soapy water.	3	2	2	3	1*	3	0	0	9	0	0	Positive association	Good
	An actual or perceived limited availability of soap	5	1	1	3	3*	0	0	3	0	0	4	Negative association	Weak
	Soap being conveniently located and near to the place where hands are washed.	8	6	3	3	5	8	0	0	20	0	0	Positive association	Moderate

BCD categories		Hypothesised relationship between determinants and HWWS	Number of associations reported	Number of associations clearly defining the determinant	Number of associations using valid / reliable measurement	Mode of assessing the association		Direction of association			Quality weighted score (% = actual quality score out of potential score available)			Assessment of overall Association	Assessment of quality of evidence
						Quali	Quant	+	0	-	+	0	-		
Routine	Doing other household tasks involving water within a close time proximity to a critical handwashing occasion.		5	2	0	5	0	0	0	5	0	0	6	Negative association	Weak
Norms	Believing that other people in your community wash their hands you are more likely to wash your hands.		5	2	1	0	5	2	2	1	3	3	3	Inconsistent results	Moderate
	Believing that HWWS is practiced by your friends, family, and others who are important to you.		4	3	1	0	4	2	2	0	2	4	0	Mixed evidence indicating no association *	Weak*
Physical environmen	Living in an urban area		9	9	3	1	8	7	2	0	16	2	0	Positive association	Moderate
	Living in certain geographic regions.		6	6	4	0	6	6	0	0	17	0	0	Positive association	Good
Social Environment	Having role models or people with some authority (e.g. teachers, health workers, parents) encourage and support HWWS.		6	4	0	0	6	6	0	0	8	0	0	Positive association	Weak
	More than one person present in a public bathroom.		3	3	3	0	3	3	0	0	10	0	0	Positive association	Good

*unanimous agreement was not found between all authors.

F. Determinants reported less than 3 times in the literature and therefore not included in the main analysis (shown as classified against the BCD list of determinant

Brain	Executive Brain	If you hold other beliefs about the reasons people get diarrhoea (e.g. belief in evil spirits or fate) then you are less likely to wash your hands with soap. People who are more health conscious are more likely to wash their hands. If you feel responsible for your own health, then you are more likely to wash your hands. Receiving lots of information about an outbreak during an outbreak (from either media or health workers) increases the likelihood of washing hands. If knowledge about the importance of handwashing is activated at the critical times for handwashing people are more likely to hand wash with soap. Heightening people's awareness of risk makes them more likely to wash their hands. If people feel that they need to protect themselves from disease, they are more likely to wash their hands. If people think that handwashing requires time and effort, then they are less likely to wash their hands.
	Motivated Brain	If people feel positively about handwashing (affective belief) then they are more likely to wash their hands. People who value order are more likely to wash their hands. Being hungry is likely to make people less likely to wash their hands. Hand drying after handwashing increases the feeling of comfort post-handwashing and is more likely to make people want to hand wash. If you believe that handwashing will help you achieve religious purity or good luck, then you are more likely to practice handwashing with soap. People are more likely to wash their hands if they feel that it will help them fit in with a social group. People who feel uncomfortable (e.g. sweaty and sticky) are more likely to wash their hands
	Reactive Brain	Handwashing (sometimes without soap) is more likely to happen if associated with religious rituals. Heightening people's awareness of existing cues (e.g. presence of sinks) will make them more likely to wash their hands with soap.
	Discounts	People who consider handwashing to be good manners are more likely to wash their hands even if they feel tired or are busy People who are more stable and more 'conscientious' are more likely to wash their hands even if they feel tired or are busy If handwashing is considered to take too much time, then it is less likely to be practiced Children were less likely to receive assistance and reminders to hand wash when their parents were busy When people have limited money they are less likely to wash their hands with soap. If you have other worries or concerns, then you are less likely to wash your hands If handwashing is considered to take too much time then it is less likely to be practiced
Body	Characteristics	People who are employed are more likely to wash their hands than those who are unemployed. Men are less likely than women to use liquid soap for handwashing. If you belong to certain religions, then you are more likely to wash your hands. People of 'lower' castes are less likely to wash their hands. Parents of older children are more likely to wash their hands. Parents of older children are more likely to use soap when they wash their hands. The older a mother is the more likely she is to wash her hands. Parents of boys are more likely to wash their hands. The more languages a person speaks the more likely they are to wash their hands. Mothers who breastfeed are more likely to also wash their hands.

		People who have uncertain water supply, unimproved sanitation, fewer modern appliances, less education and are less engaged in social activities, are more likely to be concerned about the economic cost of handwashing and less likely to wash their hands with soap. People who have resided in a refugee camp for more than 6 months are less likely to wash their hands than those who have been displaced for shorter durations. Among people who are displaced, those who were originally from urban locations are more likely to wash their hands than people who are from rural areas. Older caregivers are more likely than younger caregivers to wash their hands. Nuclear families are more likely to practice handwashing. If you perceive yourself to be in a poor mental health state, then you are more likely to wash your hands during an outbreak. If you perceive yourself to be in poor physical health, then you are more likely to wash your hands during an outbreak. People who are more stable and more 'conscientious' are more likely to form handwashing routines. People who are parents are more likely to wash their hands. Mothers with more children are likely to wash their hands more than mothers with few children. In larger households people are less likely to wash their hands.
	Capabilities	Children and older people might find it harder to use handwashing facilities and may wash their hands less. If you think you are able to perform all of the steps of handwashing, then you are more likely to wash hands thoroughly. If people feel confident in their ability to wash their hands, then they are more likely to wash their hands during an outbreak. If a person feels confident in their ability to wash their hands, then they are more likely to wash their hands. If you think that handwashing is easy, then you are more likely to wash your hands. If people feel that they are always able to wash their hands then they are more likely to wash their hands.
Behaviour settings	Stage	If a child defecates in an inconvenient location, then a parent is less likely to wash their hands after cleaning them. Practicing open defecation makes people less likely to wash their hands, If the area around the handwashing facility is kept clean and dry, then people are more likely to use it. The longer a person stays in the restroom the more likely they are to wash their hands. People who can wash their hands nearer the toilet or the kitchen are more likely to wash their hands.
	Infrastructure	Being reminded to maintain and look after handwashing facilities makes people more likely to wash their hands. If there is no place for water to drain after handwashing, then handwashing is likely to be practiced. If handwashing facilities are durable, then people are more likely to wash their hands. Handwashing facilities are less likely to be maintained and functional when used by multiple families and therefore handwashing is less likely to happen. People with an improved water source are more likely to wash their hands with soap. People who spend less time collecting water are more likely to wash their hands toughly. If people have access to piped water then they are more likely to use soap when washing their hands.
	Props	Having a special soap just for handwashing is more likely to make people wash their hands. If you believe that soap is a luxury or 'high status' object, then you are less likely to use it for handwashing. Buying soap weekly makes people more likely to make people wash their hands.

		Having containers to aid with handwashing makes you more likely to wash hands. People are more likely to wash their hands with soap if the soap they have is desirable. Having spare soap available in the household increases the likelihood of hand washing.
	Roles	New mothers are more likely to practice handwashing than they were prior to pregnancy, particularly while their children are young. If mothers assist other members of their family to wash their hands, then it is more likely to happen. Children are more likely to wash their hands if parents consider it their role to teach children how to wash their hands. People who think they are setting a good example when they wash their hands are more likely to wash their hands thoroughly. If you feel that it is your role to protect your family and maintain their health, then you are more likely to wash your hands. In societies where more than one person is responsible for caring/minding children and supporting their hygiene behaviours, handwashing is less likely to occur.
	Routine	If you do not conceptualise handwashing as a separate task then you are less likely to wash hands.
	Norms	If you make people think that others notice whether or not they wash their hands with soap, they will be more likely to practice it. In public restrooms people are more likely to wash their hands with soap at times when the restroom is busy. If you feel like handwashing is a socially desirable or expected behaviour, then you are more likely to wash your hands. People who consider handwashing to be good manners are more likely to establish a handwashing routine.
Environment	Physical environment	If the climate is cold, then the water is also likely to be cold, and people are less likely to wash their hands. Living in a camp setting makes you more likely to wash your hands than if you do not. If you live in a dusty environment, then people are more likely to wash their hands. If people's living conditions are poor, then they are less likely to wash their hands with soap People who live in a crowded environment are less likely to wash their hands. People living in a dirty environment are more likely to value good manners and practice handwashing with soap as part of this.
	Biological Environment	If you perceive yourself to live in a dirty environment you will feel at risk of contamination and be more likely to wash hands with soap. Handwashing is likely to decline as worry about a disease outbreak declines. If people perceive specific sub-groups of the population to be susceptible to a disease outbreak, then they are more likely to wash their hands. If people are directly exposed to a person who has an outbreak related pathogen, then they are more likely to wash their hands. As an outbreak progresses, people are more likely to wash their hands, day by day. If you have been sick with an outbreak pathogen recently you are more likely to wash your hands.
	Social Environment	Publically committing to handwashing makes you more likely to practice handwashing. Adolescents whose mothers wash their hands with soap are more likely to wash their hands with soap. If people think that others will judge them negatively for not washing their hands, then they are more likely to wash their hands. If you share a house with other people who do not wash their hands, then you are less likely to wash your hands. If you know someone who has been sick with an outbreak pathogen, then you are more likely to wash your hands. The more social activities a person attends the more likely they are to wash their hands with soap.

		The more forms of media that people own or are exposed to, the more likely they are to wash their hands. During outbreaks people are more likely to wash their hands if they are afraid of unwanted attention from authorities and landlords. Children of divorced parents are less likely to wash their hands. If you are a member of an organisation you are more likely to wash your hands. Seeing another person wash their hands makes you more likely to wash your hands. If a child reminds their parent about handwashing, then the parent is more likely to wash their hands. Repeated home visits encouraging the construction of a handwashing facility and promoting handwashing with soap is likely increase handwashing behaviour.
	Political and historical context	Higher overall wealth within a village increases the likelihood of handwashing with soap. If handwashing is perceived to be part of cultural tradition (such as before making Kyrgyz bread) then it is more likely to happen at these occasions. If a person believes that handwashing should be practiced for religious reasons, then you are more likely to wash hands with soap. If people trust their government, they are more likely to wash their hands. If people trust in official information, then they are more likely to wash their hands during an outbreak. If community are dependent on government for lots of services then they are less likely to practice handwashing because they make be expecting outside assistance.

Annex 2: Supplementary materials for Paper 2

A. Standardised Barrier Analysis Questionnaire for Handwashing

Barrier Analysis Questionnaire:

Hand Washing among Mothers

Demographic Data

Questionnaire No.: _____ Date____/____/____

Community/camp: _____

Section A. Behaviour Screening Questions

1. How old is your youngest child? _____years _____ months

☐ a. 0 months - <5 years

☐ b. >5 years → *End interview and look for another respondent*

2. Yesterday, did you wash your hands?

□ a. Yes

□ b. No → *Mark as Non-doer and continue to Section B*

□ c. Don't remember → *End interview and look for another respondent*

3. Yesterday, what are all the moments that you washed your hands? (DO NOT READ THE LIST – Mark all that are mentioned)

□ a. after defecation

□ b. after cleaning a child's diaper/nappy

□ c. before cooking / preparing food

□ d. before eating

□ e. before feeding a child

□ f. Don't know or won't say→ *End interview and look for another respondent*

4. In addition to water, did you use anything else to wash your hands yesterday?

□ a. Yes

□ b. No → *Mark as Non-doer and continue to Section B*

□ c. Don't remember → *End interview and look for another respondent*

5. In addition to water, what else did you use to wash your hands?

□ a. Soap

□ b. Anything else → *Mark as Non-doer and continue to Section B*

□ c. Don't know/refused to answer → *End interview and look for another respondent*

6. May I see the soap that you use?

□ a. Soap available and looks used

□ b. Soap available but does not look used → *Mark as Non-doer and continue to Section B*

□ c. No soap available→ *Mark as Non-doer and continue to Section B*

7. Where do you normally keep this soap?

□ a. Soap kept at the handwashing facility or near the toilet and/or kitchen

□ b. Soap kept elsewhere → *Mark as Non-doer and continue to Section B*

Classification:

Doer (all of the following)	Non Doer (any one of the following)	Do not Interview (any one of the following)
Question 1 - A		Question 1 -C
Question 2 - A	Question 2 – B	Question 2 – C
Question 3 - A plus any two from B, C, D, E	Question 3 – No A; or A and only one other response between B, C, D, E	Question 3 -C
Question 4 – A	Question 4 – B	Question 4 - C
Question 5 – A	Question 5 - B	Question 5 - C
Question 6- A	Question 6- B or C	
Question 7- A	Question 7 - B	

GROUP: □ DOER □ NON-DOER

Behavior Explanation: In the following questions I am going to be talking about hand washing with soap *at five critical times*. By this I mean 1. after defecation, 2. after changing a baby's diaper/nappy, 3. before cooking, 4. before eating and 5. before feeding a child.

Section B – Research Questions

(Perceived Self-efficacy)

8. With your current knowledge, skills and resources do you think you can wash your hands with soap at the five critical times?

❑ a. Yes

❑ b. No

❑ c. Maybe

❑ d. Don't know/ Won't say

9a. ***Doers: What makes it easier for you to wash your hands with soap at the five critical times each day.***

9b. ***Non-doers: What would make it easier for you to wash your hands with soap at the five critical times each day.***

(Write all responses below. Probe with "What else?")

10a. ***Doers: What makes it difficult for you to washing your hands with soap at the five critical times each day.***

10b. ***Non-doers: What would make it difficult for you to washing your hands with soap at the five critical times each day.***

(Write all responses below. Probe with "What else?")

(Perceived Positive Consequences)

11a. ***Doers:*** **What are the *advantages* of washing your hands with soap at the five critical times each day?**

11b. ***Non-doers:*** **What would be the *advantages* of washing your hands with soap at the five critical times each day?**

(Write all responses below. Probe with "What else?")

(Perceived Negative Consequences)

12a. ***Doers:*** **What are the *disadvantages* of washing your hands with soap at the five critical times each day?**

12b. ***Non-doers:*** **What would be the *disadvantages* of washing your hands with soap at the five critical times each day?**

(Write all responses below. Probe with "What else?")

(Perceived Social Norms)

13a. *Doers:* Who are the people that *approve* of you washing your hands with soap at the five critical times each day.

13b. *Non-doers:* Who are the people that *would approve* of you washing your hands with soap at the five critical times each day.

(Write all responses below. Probe with "Who else?")

(Perceived Social Norms)

14a. *Doers:* Do most of the people that you know approve of you washing your hands with soap at the five critical times each day?

15b. *Non-doers*: Would most of the people that you know approve of you washing your hands with soap at the five critical times each day?

❑ a. Yes

❑ b. Possibly

❑ c. No

❑ d. Don't Know / Won't say

(Perceived Social Norms)

15a. *Doers:* Who are the people that *disapprove* of you washing your hands with soap at the five critical times each day.

15b. *Non-doers:* Who are the people that *would disapprove* of washing your hands with soap at the five critical times each day.

(Write all responses below. Probe with "Who else?")

(Perceived Access)

16a. *Doers:* How difficult is it to get the soap you need to wash your hands at the five critical times each day? Would you say it is very difficult, somewhat difficult or not difficult at all?

16b. *Non-doers:* How difficult would it be to the water soap needed to wash your hands at the five critical times each day? Would you say it is: Very difficult, somewhat difficult, not difficult at all?

❑ a. Very difficult

❑ b. Somewhat difficult

❑ c. Not difficult at all.

(Perceived Cues for Action / Reminders)

17a. ***Doers:*** **How difficult is it to remember to wash your hands with soap at the five critical times each day? Very difficult, somewhat difficult, or not difficult at all?**

17b. ***Non-doers:*** **How difficult do you think it would be to remember to wash your hands with soap at the five critical times each day? Very difficult, somewhat difficult, or not difficult at all?**

❑ a. Very difficult

❑ b. Somewhat difficult

❑ c. Not difficult at all.

❑ d. Don't Know / Won't say

(Perceived Susceptibility / Perceived Risk)

18. ***Doers*** **and Non-doers: How likely is it that your child will get diarrhea in the coming 3 months ? Very likely, somewhat likely, or not likely at all?**

❑ a. Very likely

❑ b. Somewhat likely

❑ c. Not likely at all

(Perceived Severity)

19. Doers and Non-doers: How serious would it be if your child got diarrhea? A very serious problem, somewhat serious problem, or not serious at all?

❑ a. Very serious problem

❑ b. Somewhat serious problem

❑ c. Not serious at all

(Action Efficacy)

20. Doers and Non-doers How likely is it that your child will suffer from diarrhea if you wash your hands with soap at the five critical times each day? Very likely, somewhat likely, not very likely?

❑ a. Very likely

❑ b. Somewhat likely

❑ c. Not likely at all

(Perception of Divine Will)

21. ***Doers and Non-doers:*** **Do you think that it's God will that children get diarrhea?**

❑ a. Yes

❑ b. Sometimes/situation dependent

❑ b. No

❑ c. Don't Know / Won't say

(Culture)

22. Doers and Non-doers: Are there any cultural rules or taboos against washing your hands with soap at the five critical times each day?

❑ a. Yes

❑ b. No

❑ c. Don't Know / Won't say

(Policy)

23. Doers and Non-doers : Are there any community laws or rules in place that make it more likely that you wash your hands with soap at the five critical times each day.

❑ a. Yes

❑ b. No

❑ c. Don't Know / Won't say

THANK THE RESPONDENT FOR HIS OR HER TIME!

Annex 3: Supplementary materials for Paper 3

A. S1: Handwashing determinant definitions adapted from on the BCD checklist of determinants and accompanied by method selection.

Behavioural determinants defined by the BCD framework		**Definitions of each determinant adapted to handwashing**	**Methods contributing to understanding this determinant**
Brain (Cognitive factors)	Executive Brain	The extent to which knowledge of handwashing behaviour and its benefits affects handwashing intentions and plans, and eventually performance of the behaviour.	Risk scaling Free-listing and ranking problems
	Motivated Brain	The goal-related drivers of behaviour. Motives for handwashing can include disgust (the desire to avoid cues to sources of infection), affiliation (the desire to fit in with others) and nurture (the desire to care for your child)	'How do you feel?' Activity
	Reactive Brain	The extent to which handwashing can be automatically triggered based on past experience and repetition.	Observations Handwashing Demonstrations
	Discounts	The perceived time, effort, cost and benefit of washing hands with soap as compared to other courses of action.	Problem free-listing and categorisation Free-listing and ranking problems
Body (Individual characteristics)	Characteristics	Socio-demographic characteristics that may affect handwashing including gender, wealth, age, education, employment and personality.	Socio-demographic survey
	Capabilities	Whether an individual has the skills required to wash their hands with soap. Whether an individual perceives themselves to be able and willing to actually wash their hands at the times required.	Observations Handwashing Demonstrations Problem free-listing and categorisation Free-listing and ranking problems
Behaviour settings	Stage	The design and set up of the specific physical spaces where handwashing behaviour takes place.	Observations Handwashing Demonstrations
	Infrastructure	Durable infrastructure associated with handwashing such as water supply systems, sanitation or kitchen facilities and handwashing facilities.	Designing the ideal handwashing facility Water prioritisation Handwashing Demonstrations Free-listing and ranking problems
	Props	The value, characteristics, usability, ownership and accessibility of soap and other objects used for handwashing.	Soap Attributes Handwashing Demonstrations

			Free-listing and ranking problems
	Roles	The ways in which an individual's role, identity or responsibilities influence their handwashing practices.	Identity Questionnaire Personal Histories
	Routine	The sequence of behaviours regularly performed in association with handwashing.	Routine scripting Personal Histories
	Norms	The extent to which an individual's handwashing practice is influenced by their perception of normative setting-specific rules. This includes an individual's perception of whether handwashing is commonly practiced in their community (descriptive norm); whether handwashing is part of their role and their normal behaviour (personal norm); whether handwashing is socially approved of (injunctive norm); and whether handwashing is practiced by their 'valued others' (subjective norm).	100 people
Broader Environment	Physical environment	Factors in the natural or built environment including climate and geography.	Observations Problem free-listing and categorisation Free-listing and ranking problems
	Biological Environment	Factors associated with an individual's interaction within their biological environment including disease vectors.	Observations Problem free-listing and categorisation Free-listing and ranking problems
	Social Environment	The structure of an individual's social environment, including how they interact with it and perceive themselves within it.	Social Network Diagrams Personal Histories
	Political and historical context	The historical and cultural events that have shaped current perceptions and practices of handwashing. The extent to which handwashing-related policies or local and national leadership on handwashing issues, shape handwashing perceptions and practices at the individual level.	Problem free-listing and categorisation Observations Personal Histories

B. S2: Purpose, description and sample size for each of the methods done within group discussions

Method	Description	Purpose	Origins and prior use	Sample size
Problem free-listing and categorisation	Ask participants to list the things they worry about most in their day to day lives since the crisis. Each worry is written down on a separate small piece of paper. Participants list as many things as come to mind. If not mentioned ask if the following things are challenges for them: 'I often feel dirty and am not always able to wash my hands', 'It is hard to keep my home clean', 'I worry about the bathroom being dirty'. Explain that you would like them to sort these problems and their own problems into categories and give each category a name. Note where the hygiene related challenges are classified. The title of this category will be used for the individual free listing and ranking of problems (see Table 3).	This method is the first part of a two stage process to understand hygiene-related challenges in crisis contexts. This stage of the process aimed to generate an emic understanding of the challenges people faced as a consequence of the crisis and the prompts ensured that hygiene-related challenges were located and classified within this. The secondary purpose of this method was to define the 'domain name' under which people classified challenges relating to handwashing. This locally defined domain would then be used in the second part of the method (described in table 3)	Free-listing and categorisation are commonly used in qualitative research including work in the WASH sector. The two step process used in this research replicated a process outlined by Quinlan [1].	2 focus groups (1 with men one with women)
Risk scaling	Participants are asked about the health issues that they are most concerned about. If diarrhoea is not mentioned this is brought up and participants are asked about their concern about diarrhoea in relation to other health concerns. Participants are then asked to define diarrhoea in terms of symptoms and causes so that this definition is clear for the rest of the session. Participants are introduced to a colour-coded, 5-point Likert scale	This method aims to understand how the perceived risk of diarrhoea and or cholera differs among different population subgroups, at different stages of an emergency and in different types of settings. The group discussion format is designed to create debate and discussion of risk since it is assumed	Risk perception is assessed regularly within the WASH literature. The approach we used draws on risk-related questions from standardised questionnaires developed by the RANAS framework [2] and Barrier Analysis [3] and	5 focus groups (2 with men, 3 with women)

Method	Description	Purpose	Origins and prior use	Sample size
	which ranges from very likely to very unlikely. They are asked questions about their perceived vulnerability and susceptibility to diarrhoea and their perceived relative risk in comparison to other people and as a result of their current predicament. Individually participants select their perceived risk on the scale and then discuss differences.	that everyone's individual perception of risk is different.	adapts them for use in a group discussion.	
Soap attributes	Participants are introduced to a set of 10 locally available soaps. These included laundry soap, scented body soap, liquid soap, and soap typically distributed by organisations. Participants are asked what criteria they use when selecting which soap to buy. They are then asked to rank the soap against these different criterion (e.g. cost, smell, duration of use, likability, perceived, most common, most typically used prior to the crisis).	It is designed to explore human-product relationships on the understanding that products which have certain attributes or 'back-stories' are more likely to be valued and used [4]. This method will contribute to understanding whether soap is readily available; what types of soap people have; attitudes related to soap; and how the available soap types are similar or different to soap products participants had previously been familiar with.	This method evolved from marketing research and product design [5, 6]. Attribute rankings of soap have also been done in several other hygiene studies [7, 8].	5 focus groups (2 with men, 3 with women)
Designing the ideal handwashing facility	Participants are introduced to a set of images of handwashing facilities from around the world. They are asked to go through each and write down the characteristics that they like or dislike about each. They are asked to review the characteristics at the end and select the three 'must have' features of an ideal handwashing facility.	This method assumes that the features of a product vary in importance to the user. This method is designed to identify features of a handwashing facility that are considered to be of greatest importance for encouraging use.	While there is research on participatory design processes for WASH-related products, this work often doesn't describe the participatory process in detail. This process was modelled on a social marketing technique called This method is based upon a design research method	5 Focus groups (2 with men, 3 with women)

Method	Description	Purpose	Origins and prior use	Sample size
			called ‘Prune the Product Tree’[9].	

C. S3: Description and sample size for all methods done at a household or individual level.

Method	Description	Purpose	Origins and prior use	Sample
Observations	Unstructured observations at the household level. 3 hours in duration, beginning at 8am. Observers wrote down all actions that they observed and the time they took place at. Observation included the actions of all household members.	Unstructured observation provides rich, contextual detail about how handwashing behaviour fits within broader daily routines and the community and household environment. This was particularly relevant in crisis contexts where populations may still be adjusting to new or different physical environments. Observation can also highlight unforeseen barriers to desirable handwashing behaviour.	Observation is commonly used both to understand and monitor handwashing behaviour [10-12]. While it has limitations, it is recognised as the gold-standard for handwashing measurement.	20 households
Routine Scripting	Ask the participant what they did yesterday from the moment they got up in the morning right through to when they go to bed at night. Ask them to describe their routine step-by-step. Draw/write each activity on a separate piece of card. Lay the cards out in order. Explore parts of their routine that are of interest to handwashing and which parts of their day have changed since the crisis. Ask the participant what are the best, worst, most boring and most rewarding moments of their day.	It is designed to document the order of actions in people's day-to-day routines. It explores whether the crisis disrupted or changed these routines and whether this has compromised people's ability to practice handwashing with soap.	Similar methods have previously been used to explore handwashing [13] and other behaviours [14].	16 people

Method	Description	Purpose	Origins and prior use	Sample
Personal Histories	Participants are given a blank piece of paper and asked to draw a picture of themselves before the crisis on the left hand side and a picture of themselves currently on the right hand side. Draw a line between the two images to represent the journey the individuals went on between these time points. Ask the participant to help you draw on some of the key milestones that happened in their lives during this time (whatever they are comfortable with sharing). Ask them to describe how they felt during these key time points and how their routines and behaviours changed. At the end ask about whether their handwashing behaviour changed.	This method was designed to generate a broad understanding of the context within which handwashing is situated and provides insights into the participant's emic beliefs and culturally constructed understanding handwashing behaviour, crisis and disease. Cultural beliefs and attitudes about a wide range of things may influence handwashing practice. In some humanitarian emergencies traditional beliefs and rumours may become a more dominant influence on people's behaviour as they search to make sense of the new circumstances they find themselves in.	Narrative interviewing is particularly common in sociology [6, 15, 16] yet infrequently used within the WASH sector.	14 people
Free-listing and ranking problems	This activity uses the emergent category from the FGD discussion (in this case 'hygiene problems'). Introduce the category to the participant and ask them to free-list any hygiene related problems they are currently facing. Draw/write each on a separate piece of card. Once all problems are listed ask the participant to rank them in order of priority. If not mentioned ask if handwashing with soap is problem and get them to insert this into the ranked order.	Free listing is particularly useful for mapping emic understandings of social domains, while ranking can provide insight into how these are structured and classified [17]. Here we used it to understand the relative importance of handwashing in relation to other hygiene concerns. Through this method we were interested in exploring whether changes in risk perception in the wake of a crisis or an increased number of other competing priorities may affect handwashing prioritisation in relation to other hygiene activities.	Free-listing and ranking are both tools which are broadly used in qualitative research [6]. Both have been used widely in WASH related research [18, 19] and in research among crisis affected populations [20, 21].	21 people

Method	Description	Purpose	Origins and prior use	Sample
Handwashing Demonstrations	The researcher asks the participants to show them how they normally wash their hands. With permission the researcher videos the handwashing process. The researcher should pay attention to the behavioural setting, things that enable or create barriers to the behaviour and moments of uncertainty or hesitation that indicate that this may not be part of normal routines.	This method generates quick insights into the barriers and enabling factors related handwashing behaviour. Handwashing Demonstrations are also particularly useful for identifying whether the behaviour is one that is familiar or performed irregularly.	This method has been used in some other WASH studies [18]	24 people
Social Network Diagrams	Explain that you would like to understand more about social relationships in this place and in the place where they came from (prior to the crisis). Draw three concentric circles on a piece of A3 paper. The inner circle is for people who the participant meets daily. The middle circle is for people they meet weekly. The outer circle is for people the meet monthly or less frequently. Divide all the circles into sections, one for acquaintances, one for friends and one for family. Map the participant's relationships prior to the crisis and ask how they are different now. Discuss what has changed, and which individuals are likely to influence their behaviour the most.	Social networks are likely to be important for establishing norms in relation to handwashing and for encouraging adherence. However, in humanitarian emergencies social networks may be disrupted either by displacement or by a reduction of social interactions as a consequence of a disease outbreak.	Social network analysis is a widely-used approach in sociology. It is often used to understand the diffusion of ideas or innovations and explore patterns of influence within social relationships [22-27]. We did not find any examples of it being used within the WASH Sector.	14 people
100 people	Participants are asked to imagine a sample of 100 people in their community (this is represented through 100 counters) and then asked to make predictions about their beliefs and behaviour. Questions include how many people would tell us (the researchers) that they wash their hands, how many do they think actually wash their hands, how many would judge them negatively if they saw a person not washing their hands with soap, how many believe handwashing is the right thing	This method is designed to understand so that descriptive and injunctive norms about handwashing. In stable settings norms and perceptions of social judgement influence handwashing behaviour. Humanitarian emergencies are likely to cause short term or long-term shifts in norms, but to date there has been little research to understand this.	While there are lots of methods for assessing norms, this method was chosen because it is easy to use with audiences with limited literacy [28].	15 people

Method	Description	Purpose	Origins and prior use	Sample
	to do and how many would say handwashing is easy. Twenty counters are then selected and the participant is asked to imagine that these are their closest family and friends. The questions above are repeated for this group.			
Identity questionnaire	Participants are asked about their characteristics (e.g. abilities, possessions, career), personal identity (e.g. values, beliefs, feelings), social identity, (e.g. how they think others perceive them) collective identity (e.g. religion, nationality, culture) and the relational identity (e.g. their roles as friend, parent). They uses a three-point colour coded Likert scale to describe how important each item was to their sense of self.	The purpose of this method is to understand how participants perceive themselves and how they may juggle their different identities – each of which may influence handwashing in different ways. A person's perception of their roles and identities may influence handwashing in a range of ways. For example, major life changes (e.g. pregnancy) have also been found to have an effect on handwashing [13]. Exposure to traumatic events change people's perception of themselves and affect behaviour [29, 30]. This method aimed to disentangle which aspects of identity had changed and how this may affect handwashing behaviour.	This method uses an adapted version of the Aspects of Identity Questionnaire [31]. To the best of our knowledge that has not been previously used within the WASH or humanitarian sectors.	12 people
How would do you feel?	Introduce participants to a set of picture cards and a response sheet. The picture cards show different scenarios including people washing/not washing their hands with soap after the toilet, after cleaning a child or before food preparation. Three cards represent other behaviours (e.g. not greeting a neighbour) so to minimise bias. Each scenario is explained and participants can select	The motives of disgust, nurture, affiliation, status, fear and comfort may all be important determinants of handwashing behaviour in stable settings. There are indications that affiliation, nurture and fear may be important determinants of handwashing during humanitarian	While many handwashing studies explore motives, the methods for doing so are often poorly described. We looked at other methods for assessing motives [36] but felt these had limitations. For example, one method did not	32 people

Method	Description	Purpose	Origins and prior use	Sample
	how they would feel if they witnessed this scenario. There are 18 possible answers each related to the BCD human motives [32]. Participants select yes or no to indicate whether the response is appropriate for each scenario.	emergencies also [33, 34] but this remains a recognized knowledge gap [35].	directly link motivation with the target behaviour and others didn't seem to generate meaningful data when tested. This method was developed based on the strengths and shortfalls of the other methods and was pretested in this setting.	
Water prioritisation	This method was only done in the villages where water was scarce and had to be collected in jerry cans. Ask the participant to show you the containers they use for water collection. Ask how much water they collect per day. If for example, they say 5 containers, use 5 plastic cups to represent this for the activity. Using the cups, get the participant to demonstrate how much water is normally used for different household activities. Note whether handwashing is mentioned as a use of water. Ask the participants whether they ever collect more water than normal. When does this happen? Add cups as necessary and again ask how they divide up the water for different purposes when they have more available. Ask the participant whether they ever collect less water than normal. When does this happen? Remove cups as necessary and again ask how they divide up the water for different purposes when they have less available.	It is designed to understand how patterns of water use within the household may respond to fluctuations in water availability and how this may influence handwashing behaviour.	This method is based on previous formative research on WASH behaviours and trachoma [37]	5 people

D. S4: Exposure to hygiene promotion among interview participants

Exposure to Hygiene Promotion	Total N = 159	Camp 1 N = 58	Camp 2 N = 49	Village 1 N = 18	Village 2 N = 34
Have you ever received a hygiene kit					
Yes, at any point	140 (88%)	58 (100%)	47 (96%)	12 (67%)	23 (68%)
Yes, in the last month	61 (38%)	57 (98%)	4 (8%)	0 (0%)	0 (0%)
Never received	19 (12%)	0 (0%)	2 (4%)	6 (33%)	11 (32%)
Exposed to hygiene promotion					
Yes, posters or other hygiene materials	102 (64%)	52 (90%)	33 (67%)	0 (0%)	17 (50%)
Yes, attended a hygiene promotion event	91 (57%)	48 (83%)	33 (67%)	2 (11%)	8 (24%)
Not exposed to hygiene materials or events	45 (28%)	4 (7%)	11 (22%)	16 (89%)	16 (47%)
Handwashing knowledge					
Believe that handwashing with soap removes invisible germs from hands preventing sickness	158 (99%)	57 (99%)	49 (100%)	18 (100%)	34 (100%)
Does not believe that handwashing with soap removes invisible germs from hands preventing sickness	1 (1%)	1 (1%)	0 (0%)	0 (0%)	0 (0%)

E. S5: Summary of household observations of handwashing

Household observations	**Nargizlia (n=8)**	**Sheikhan (n=6)**	**Villages (n=6)**
Total number of potential handwashing opportunities observed (based only on critical times for handwashing)	35	33	49
Number of critical times for handwashing where hands were not washed with soap	25 (71%)	24 (73%)	35 (71%)
Number of occasions where hands were washed with any kind of soap (including non-critical times)	38	39	27
Number of occasions where hands were rinsed with water only (including non-critical times)	34	37	25
Average number of times hands were washed with soap or just rinsed during an observation period (range)	11.7 (4-14)	12.7 (6-18)	8.7 (5-20)

F. S6: Handwashing facility design factors that group discussion participants thought would be most likely to increase their handwashing behaviour

What aspects of the handwashing facility design would be most likely to increase your handwashing behaviour?					
Nargizlia Men's FGD	**Nargizlia Women's FGD**	**Sheikhan Men's FGD**	**Sheikhan Women's FGD**	**Villages Men's FGD**	**Villages Women's FGD**
Make the facility private/not shared	A mirror above the facility	A mirror above the facility	Sink should be outside the toilet	A mirror above the facility	Liquid Soap
Make the facility comfortable and enjoyable to use	Make the facility private/not shared	A sink to catch waste water	Child friendly / a design that motivates children to wash hands	Easy to keep clean	A sink to catch waste water
Minimise water use	Liquid soap	Reminders/ nudges to cue handwashing	Liquid soap	Minimise water use	A mirror above the facility
Something to prevent the soap from being taken	Easy to keep clean	Child friendly / a design that motivates children to wash hands	A sink to catch waste water	Accessible for people with disabilities	Additional public handwashing facilities throughout the village

G. S7: Heat map of scaled group discussion responses to diarrhoeal risk related questions

	Nargizlia Camp		Sheikhan Camp		Villages	
	Female FGD	**Male FGD**	**Female FGD**	**Male FGD**	**Female FGD**	**Male FGD**
What is the likelihood of your child getting diarrhoea in the next 6 months	Moderate	Moderate	Moderate	Unlikely	Unlikely	Unlikely
If your child got diarrhoea how badly would it affect your life?	Lots of bad effects	Lots of bad effects	Some bad effects	Some bad effects	Lots of bad effects	Some bad effects
If your child got diarrhoeal how likely is it that it could result in death?	Moderate	Moderate	Moderate	Unlikely	Unlikely	Unlikely
What is the likelihood of you or your child getting diarrhoea now that you live here (e.g. in a camp), compared to where you lived before?	More likely	More likely	More likely	More likely	Equal likelihood	Equal likelihood
How worried are you about diarrhoea?	Major concern	Major concern	Minor concern	Minor concern	Minor concern	Minor concern
How easy is it to prevent diarrhoea?	Difficult	Difficult	Difficult	Easy	Easy	Moderate
Do you feel like you have the ability to prevent diarrhoea?	Able to prevent	Unable to prevent	Unable to prevent	Able to prevent	Able to prevent	Some ability to prevent
How important is diarrhoea to other people in this camp/village?	Very important	Moderate importance	Very important	Moderate importance	Moderate importance	Moderate importance

Annex 4: Supplementary materials for Paper 4

A. *Supplementary material 1: Handwashing determinant definitions adapted from on the BCD checklist of determinants (1, 2) and accompanied by method selections.*

Behavioural determinants defined by the BCD framework		**Definitions of each determinant adapted to handwashing**	**Methods contributing to understanding this determinant**
Brain (Cognitive factors)	Executive Brain	The extent to which knowledge of handwashing behaviour and its benefits affects handwashing intentions and plans, and eventually performance of the behaviour.	Risk scaling Free-listing and ranking problems
	Motivated Brain	The goal-related drivers of behaviour. Motives for handwashing can include disgust (the desire to avoid cues to sources of infection), affiliation (the desire to fit in with others) and nurture (the desire to care for your child)	'How do you feel?' Activity
	Reactive Brain	The extent to which handwashing can be automatically triggered based on past experience and repetition.	Observations Handwashing Demonstrations
	Discounts	The perceived time, effort, cost and benefit of washing hands with soap as compared to other courses of action.	Problem free-listing and categorisation Free-listing and ranking problems
Body (Individual characteristics)	Characteristics	Socio-demographic characteristics that may affect handwashing including gender, wealth, age, education, employment and personality.	Socio-demographic survey
	Capabilities	Whether an individual has the skills required to wash their hands with soap. Whether an individual perceives themselves to be able and willing to actually wash their hands at the times required.	Observations Handwashing Demonstrations Problem free-listing and categorisation Free-listing and ranking problems Trials of improved practice
Behaviour settings	Stage	The design and set up of the specific physical spaces where handwashing behaviour takes place.	Observations Handwashing Demonstrations
	Infrastructure	Durable infrastructure associated with handwashing such as water supply systems, sanitation or kitchen facilities and handwashing facilities.	Designing the ideal handwashing facility Water prioritisation Handwashing Demonstrations Free-listing and ranking problems

	Props	The value, characteristics, usability, ownership and accessibility of soap and other objects used for handwashing.	Soap Attributes Handwashing Demonstrations Free-listing and ranking problems
	Roles	The ways in which an individual's role, identity or responsibilities influence their handwashing practices.	Identity Questionnaire Personal Histories
	Routine	The sequence of behaviours regularly performed in association with handwashing.	Routine scripting Personal Histories
	Norms	The extent to which an individual's handwashing practice is influenced by their perception of normative setting-specific rules. This includes an individual's perception of whether handwashing is commonly practiced in their community (descriptive norm); whether handwashing is part of their role and their normal behaviour (personal norm); whether handwashing is socially approved of (injunctive norm); and whether handwashing is practiced by their 'valued others' (subjective norm).	100 people
Broader Environment	Physical and biological environment	Physical environment includes the factors in the natural or built environment including climate and geography. Biological environment includes the factors associated with an individual's interaction within their biological environment including disease vectors.	Observations Problem free-listing and categorisation Free-listing and ranking problems
	Social Environment	The structure of an individual's social environment, including how they interact with it and perceive themselves within it.	Social Network Diagrams Personal Histories
	Political and historical context	The historical and cultural events that have shaped current perceptions and practices of handwashing. The extent to which handwashing-related policies or local and national leadership on handwashing issues, shape handwashing perceptions and practices at the individual level.	Problem free-listing and categorisation Observations Personal Histories

B. Supplementary material 2: Description and sample size for all methods done at a household or individual level.

Method	Description	Purpose	Origins and prior use	Sample
Observations	Unstructured observations at the household level. 3 hours in duration, beginning at 8am. Observers wrote down all actions that they observed and the time they took place at. Observation included the actions of all household members.	Unstructured observation provides rich, contextual detail about how handwashing behaviour fits within broader daily routines and the community and household environment. This was particularly relevant in crisis contexts where populations may still be adjusting to new or different physical environments. Observation can also highlight unforeseen barriers to desirable handwashing behaviour.	Observation is commonly used both to understand and monitor handwashing behaviour [10-12]. While it has limitations, it is recognised as the gold-standard for handwashing measurement.	16
Trials of Improved Practices	Participant households were interviewed three times over the course of two weeks. During the first visit households were given soap and informed about the critical times for handwashing. They were then asked to encourage all family members to wash their hands at these times over the next two weeks.	To understand whether populations in this setting were able to make changes to their social and physical environments to facilitate handwashing practice	TIPs have been used in several previous hygiene studies and aim to understand feasibility and acceptability of improving the practice of target behaviours [38, 39].	6
Routine Scripting	Ask the participant what they did yesterday from the moment they got up in the morning right through to when they go to bed at night. Ask them to describe their routine step-by-step. Draw/write each activity on a separate piece of	It is designed to document the order of actions in people's day-to-day routines. It explores whether the crisis disrupted or changed these routines and whether this has compromised	Similar methods have previously been used to explore handwashing [13] and other behaviours [14].	9

Method	Description	Purpose	Origins and prior use	Sample
	card. Lay the cards out in order. Explore parts of their routine that are of interest to handwashing and which parts of their day have changed since the crisis. Ask the participant what are the best, worst, most boring and most rewarding moments of their day.	people's ability to practice handwashing with soap.		
Personal Histories	Participants are given a blank piece of paper and asked to draw a picture of themselves before the crisis on the left hand side and a picture of themselves currently on the right hand side. Draw a line between the two images to represent the journey the individuals went on between these time points. Ask the participant to help you draw on some of the key milestones that happened in their lives during this time (whatever they are comfortable with sharing). Ask them to describe how they felt during these key time points and how their routines and behaviours changed. At the end ask about whether their handwashing behaviour changed.	This method was designed to generate a broad understanding of the context within which handwashing is situated and provides insights into the participant's emic beliefs and culturally constructed understanding handwashing behaviour, crisis and disease. Cultural beliefs and attitudes about a wide range of things may influence handwashing practice. In some humanitarian emergencies traditional beliefs and rumours may become a more dominant influence on people's behaviour as they search to make sense of the new circumstances they find themselves in.	Narrative interviewing is particularly common in sociology [6, 15, 16] yet infrequently used within the WASH sector.	8
Free-listing and ranking problems	This activity uses the emergent category from the FGD discussion (in this case 'hygiene problems'). Introduce the category to the participant and ask them to free-list any hygiene related problems they are currently facing. Draw/write each on a separate piece of card. Once all problems are listed ask the participant to rank them in order of	Free listing is particularly useful for mapping emic understandings of social domains, while ranking can provide insight into how these are structured and classified [17]. Here we used it to understand the relative importance of handwashing in relation to other	Free-listing and ranking are both tools which are broadly used in qualitative research [6]. Both have been used widely in WASH related research [18, 19] and in	9

Method	Description	Purpose	Origins and prior use	Sample
	priority. If not mentioned ask if handwashing with soap is problem and get them to insert this into the ranked order.	hygiene concerns. Through this method we were interested in exploring whether changes in risk perception in the wake of a crisis or an increased number of other competing priorities may affect handwashing prioritisation in relation to other hygiene activities.	research among crisis affected populations [20, 21].	
Handwashing Demonstrations	The researcher asks the participants to show them how they normally wash their hands. With permission the researcher videos the handwashing process. The researcher should pay attention to the behavioural setting, things that enable or create barriers to the behaviour and moments of uncertainty or hesitation that indicate that this may not be part of normal routines.	This method generates quick insights into the barriers and enabling factors related handwashing behaviour. Handwashing Demonstrations are also particularly useful for identifying whether the behaviour is one that is familiar or performed irregularly.	This method has been used in some other WASH studies [18]	10
Social Network Diagrams	Explain that you would like to understand more about social relationships in this place and in the place where they came from (prior to the crisis). Draw three concentric circles on a piece of A3 paper. The inner circle is for people who the participant meets daily. The middle circle is for people they meet weekly. The outer circle is for people the meet monthly or less frequently. Divide all the circles into sections, one for acquaintances, one for friends and one for family. Map the participant's relationships prior to the crisis and ask how they are different now. Discuss	Social networks are likely to be important for establishing norms in relation to handwashing and for encouraging adherence. However, in humanitarian emergencies social networks may be disrupted either by displacement or by a reduction of social interactions as a consequence of a disease outbreak.	Social network analysis is a widely-used approach in sociology. It is often used to understand the diffusion of ideas or innovations and explore patterns of influence within social relationships [22-27]. We did not find any examples of it being used within the WASH Sector.	6

Method	Description	Purpose	Origins and prior use	Sample
	what has changed, and which individuals are likely to influence their behaviour the most.			
100 people	Participants are asked to imagine a sample of 100 people in their community (this is represented through 100 counters) and then asked to make predictions about their beliefs and behaviour. Questions include how many people would tell us (the researchers) that they wash their hands, how many do they think actually wash their hands, how many would judge them negatively if they saw a person not washing their hands with soap, how many believe handwashing is the right thing to do and how many would say handwashing is easy. Twenty counters are then selected and the participant is asked to imagine that these are their closest family and friends. The questions above are repeated for this group.	This method is designed to understand so that descriptive and injunctive norms about handwashing. In stable settings norms and perceptions of social judgement influence handwashing behaviour. Humanitarian emergencies are likely to cause short term or long-term shifts in norms, but to date there has been little research to understand this.	While there are lots of methods for assessing norms, this method was chosen because it is easy to use with audiences with limited literacy [28].	6
Identity questionnaire	Participants are asked about their characteristics (e.g. abilities, possessions, career), personal identity (e.g. values, beliefs, feelings), social identity, (e.g. how they think others perceive them) collective identity (e.g. religion, nationality, culture) and the relational identity (e.g. their roles as friend, parent). They uses a three-point colour coded Likert scale to describe how important each item was to their sense of self.	The purpose of this method is to understand how participants perceive themselves and how they may juggle their different identities – each of which may influence handwashing in different ways. A person's perception of their roles and identities may influence handwashing in a range of ways. For example, major life changes (e.g.	This method uses an adapted version of the Aspects of Identity Questionnaire [31]. To the best of our knowledge that has not been previously used within the WASH or humanitarian sectors.	8

Method	Description	Purpose	Origins and prior use	Sample
		pregnancy) have also been found to have an effect on handwashing [13]. Exposure to traumatic events change people's perception of themselves and affect behaviour [29, 30]. This method aimed to disentangle which aspects of identity had changed and how this may affect handwashing behaviour.		
Water prioritisation	This method was only done in the villages where water was scarce and had to be collected in jerry cans. Ask the participant to show you the containers they use for water collection. Ask how much water they collect per day. If for example, they say 5 containers, use 5 plastic cups to represent this for the activity. Using the cups, get the participant to demonstrate how much water is normally used for different household activities. Note whether handwashing is mentioned as a use of water. Ask the participants whether they ever collect more water than normal. When does this happen? Add cups as necessary and again ask how they divide up the water for different purposes when they have more available. Ask the participant whether they ever collect less water than normal. When does this happen? Remove cups as necessary and again ask how they divide up the water for different purposes when they have less available.	It is designed to understand how patterns of water use within the household may respond to fluctuations in water availability and how this may influence handwashing behaviour.	This method is based on previous formative research on WASH behaviours and trachoma [37]	14

C. Supplementary material 3: Purpose, description and sample size for each of the methods done within group discussions

D. Method	Description	Purpose	Origins and prior use	Sample size
Problem free-listing and categorisation	Ask participants to list the things they worry about most in their day to day lives since the crisis. Each worry is written down on a separate small piece of paper. Participants list as many things as come to mind. If not mentioned ask if the following things are challenges for them: 'I often feel dirty and am not always able to wash my hands', 'It is hard to keep my home clean', 'I worry about the bathroom being dirty'. Explain that you would like them to sort these problems and their own problems into categories and give each category a name. Note where the hygiene related challenges are classified. The title of this category will be used for the individual free listing and ranking of problems (see Table 3).	This method is the first part of a two stage process to understand hygiene-related challenges in crisis contexts. This stage of the process aimed to generate an emic understanding of the challenges people faced as a consequence of the crisis and the prompts ensured that hygiene-related challenges were located and classified within this. The secondary purpose of this method was to define the 'domain name' under which people classified challenges relating to handwashing. This locally defined domain would then be used in the second part of the method (described in table 3)	Free-listing and categorisation are commonly used in qualitative research including work in the WASH sector. The two step process used in this research replicated a process outlined by Quinlan [1].	2 FGDs (12 people)
Risk scaling	Participants are asked about the health issues that they are most concerned about. If diarrhoea is not mentioned this is brought up and participants are asked about their concern about diarrhoea in relation to other health concerns. Participants are then asked to define diarrhoea in terms of symptoms and causes so that this definition is clear for the rest of the session.	This method aims to understand how the perceived risk of diarrhoea and or cholera differs among different population subgroups, at different stages of an emergency and in different types of settings. The group discussion format is designed to create debate and discussion of risk since it is	Risk perception is assessed regularly within the WASH literature. The approach we used draws on risk-related questions from standardised questionnaires developed by the RANAS framework [2] and Barrier Analysis [3] and	3 FGDs (19 people)

D. Method	Description	Purpose	Origins and prior use	Sample size
	Participants are introduced to a colour-coded, 5-point Likert scale which ranges from very likely to very unlikely. They are asked questions about their perceived vulnerability and susceptibility to diarrhoea and their perceived relative risk in comparison to other people and as a result of their current predicament. Individually participants select their perceived risk on the scale and then discuss differences.	assumed that everyone's individual perception of risk is different.	adapts them for use in a group discussion.	
Soap attributes	Participants are introduced to a set of 10 locally available soaps. These included laundry soap, scented body soap, liquid soap, and soap typically distributed by organisations. Participants are asked what criteria they use when selecting which soap to buy. They are then asked to rank the soap against these different criterion (e.g. cost, smell, duration of use, likability, perceived, most common, most typically used prior to the crisis).	It is designed to explore human-product relationships on the understanding that products which have certain attributes or 'back-stories' are more likely to be valued and used [4]. This method will contribute to understanding whether soap is readily available; what types of soap people have; attitudes related to soap; and how the available soap types are similar or different to soap products participants had previously been familiar with.	This method evolved from marketing research and product design [5, 6]. Attribute rankings of soap have also been done in several other hygiene studies [7, 8].	2 FGDs (12 people)
Designing the ideal handwashing facility	Participants are introduced to a set of images of handwashing facilities from around the world. They are asked to go through each and write down the characteristics that they like or dislike about each. They are asked to review the	This method assumes that the features of a product vary in importance to the user. This method is designed to identify features of a handwashing facility that are considered to be of	While there is research on participatory design processes for WASH-related products, this work often doesn't describe the	2 FGDs (12 people)

D. Method	Description	Purpose	Origins and prior use	Sample size
	characteristics at the end and select the three 'must have' features of an ideal handwashing facility.	greatest importance for encouraging use.	participatory process in detail. This process was modelled on a social marketing technique called This method is based upon a design research method called 'Prune the Product Tree'[9].	
Motives	Participants are introduced to a set of character cards where each of the characters are defined by one characteristic which is linked to a motive e.g. a person who values having lots of friends (affiliation), a person who is hungry (hunger), a person who is respected because of their education or wisdom (status), a person who wants to feel comfortable (comfort) etc. Participants are asked to rank the characters in terms of who is most likely to always remember to wash their hands with soap. As they rearrange the cards in a ranked order they are encouraged to discuss and debate why certain people are more likely to practice handwashing.	To understand the relative importance of the motives outlined by the BCD Framework [40] in relation to their influence on handwashing behaviour.	A range of tools have been used to assess motives in the past [36, 41-43] however these often assess the relative importance of motives in general rather than in relation to the target behaviour. Therefore, this tool built upon previous methods but linked these more directly to the target behaviour.	3 FGDs (19 people)
Description of a cholera case	A simple line drawing of a person was presented to the participants. Participants were told that this character had recently had cholera and were asked to add characteristics and descriptive information to this character reflecting their likely	To understand common assumptions about the kind of person who people perceive to be likely to get cholera and how this person may be treated while they are infectious and afterwards.	The use of vignettes is quite common in qualitative research as it allows participants to describe common perceptions towards a person or event	2 FGDs (12 people)

D. Method	Description	Purpose	Origins and prior use	Sample size
	appearance, behaviour, social interactions and values.		without having to name individuals or describe personal experiences. This method was based on an approach used in hygiene-related trachoma research [37].	

E. Supplementary material 4: Identified determinants and their associated influence on handwashing behaviour in Eastern DRC.

Determinants		Type of effect on handwashing behaviour
Individual characteristics	Gender (being female)	Positive
	Age (being a child or an older person)	Negative
	Personality (Being a person who values cleanliness)	Positive
	Facing extreme poverty	Negative
	Having chronic physical health challenges	Negative
	Permanent or regular employment	Positive
	Ethnicity	None
	Religion	None
	High level of education	None
	Being a single person household	Negative
	Having mental health challenges	Negative
Capabilities	Perceived inability to afford soap	Negative
Physical environment	Exposure to dust or mud	Positive
	Living in a rural area	Mixed
	Dry season	Negative
	Living environments that are perceived to be dirty and hard to clean	Negative
Social Environment	Family members who encourage handwashing	Positive
	Frequent reminders from NGOs about handwashing	Positive
	Ability to borrow soap and water from others	None
	Sociality and interaction with others	None
	No social judgement or social sanctions if handwashing is not practiced	Negative
Stage	Limited space within households	Negative
	Using shared WASH facilities	Negative
Infrastructure	Having insufficient access to water (due to costs or inconsistent supply)	Negative
	Having to walk a long distance to fetch water	Negative
	Having insufficient jerry cans to collect and store water	Negative
	Having a dedicated handwashing facility	Positive
	Using grey water for handwashing	Positive
Props	Having insufficient access to soap	Negative
	Soap not kept in a convenient location	Negative
	Having access to ash	None
Roles	Being an IDP	Negative
Routine	Majority of time spent outside of the house for work	Negative
	Unpredictability of circumstances	Negative

Determinants		Type of effect on handwashing behaviour
	Frequency of other household tasks involving soap and water	Positive
Norms	Handwashing is seen as something that is socially approved	None
	Perceived frequency of handwashing practices of neighbours, friends and family	None
	Belief that more people are practicing handwashing during the cholera outbreak	Positive
Executive Brain (including knowledge, beliefs and risk)	Knowledge about the role of handwashing in interrupting disease transmission	Mixed
	Knowledge of key times for handwashing	None
	Perceived effectiveness of handwashing in preventing cholera	Positive
	Belief that some exposure to dirt is healthy	Negative
	High perceived severity of cholera	Positive
	Low perceived vulnerability to cholera (including due to belief that it would affect Congolese people)	Negative
Discounts	Prioritisation of soap and water for other tasks	Negative
	Busyness and tiredness	Negative
	Concern about other problems	Negative
Reactive Brain	Absence of cues to trigger handwashing at key times	Negative
Motivated Brain	Fear	Positive
	Hunger	Negative
	Nurture	Mixed
	Status	Positive
	Comfort	None
	Hoard	Negative
	Attract	Positive
	Love	Positive
	Affiliation	None
	Disgust	Positive

Annex 4: Supplementary materials for Paper 5

Alignment with the Standards for Reporting Qualitative Research (1)

Title and Abstract	
Title	The title includes a description of the topic of the research and mentions that it is a qualitative study using interviews.
Abstract	The abstract is structured to clearly present the study background, methods, results and conclusions.
Introduction	
Problem Formulation	The introduction provides a summary of the value of the research and the current gaps in evidence and practice. It also introduces relevant other research and theories that are applied to this study.
Purpose or Research Question	A specific study objective is stated at the end of the introduction.
Methods	
Qualitative approach and research paradigm	We specify that this work is grounded in a constructivist research paradigm and uses a comparative case study approach.
Researcher characteristics and reflexivity	In our methods we describe the characteristics of the data collection team. We reflect on the influence our positionality may have had on the findings and interpretation in the limitations section of the manuscript.
Context	We provide a description of the study sites and a rationale for their selection.

Sampling strategy	We provide a description of how participants were sampled and the basis for reaching a point of saturation.
Ethical issues pertaining to human subjects	We provide information on how consent was sought, what this covered and details about the ethical boards who reviewed this work.
Data collection methods	We provide details about when data was collected and how.
Data collection instruments and technologies	We describe how our interview guide was developed and how this was informed by theories and frameworks.
Units of study	In the results section we provide a summary of the participant characteristics.
Data processing	We mention that interviews were audio recorded, translated and transcribed and the development of a coding frame based on the conceptual frameworks used.
Data analysis	We describe the analysis approach used and how this involved multiple phases to verify data and then apply the coding frame and conceptual frameworks.
Techniques to enhance trustworthiness	We describe the participatory workshops that were used as an initial validation of the findings. We also describe how authors contributed to the validation of findings.
Results/findings	
Synthesis and interpretation	We structure our results according to the conceptual framework used and then compare some of the decision-making data to specific frameworks related to this within the humanitarian sector.
Links to empirical data	We provide quotes and examples from participants throughout the results in order to support our findings.

Discussion	
Integration with prior work, implications, transferability, and contributions to the field	We describe our key findings and how these are consistent with prior research but also add new evidence.
Limitations	We outline a range of limitations associated with the study.
Other	
Conflicts of Interest	We reflected on our conflicts of interest but had none to declare
Funding	We describe our funding source

Annex 5: Method Descriptions

A. Household Observation

Rationale for using method:

Observation was mentioned in 30 of the papers included in the literature review and its reliability and validity has been broadly assessed in relation to handwashing.[10-12] Structured observation is generally considered the gold standard for measuring handwashing behaviour as it allows for an understanding of how people actually behave in their normal every day setting. Observation can also provide rich, contextual detail about how handwashing behaviour fits within broader daily routines and the community and household environment. Observation may also highlight unforeseen barriers to desirable handwashing behaviour.

Limitations:

Observation is time consuming, requires skilled enumerators and can be subject to reactivity bias. Due to the time-consuming nature of observation it is often done with relatively small study populations and this carries risk in terms of identifying generalizable patterns of practice.

Setting:

At the household/shelter.

Process:

1) Field workers will visit the potential participant's house the day prior to the observation. Ideally observers should be local young females as experience has found that these individuals are least intimidating and likely to cause observer bias.[44, 45] They will explain the study and what is required of them and that the observation will take place over the course of 3 hours. If happy with this, household members over the age of 16 will be asked to complete the consent form. Consent should also be sought from other family members or friends that are likely to be in that setting during the observation. Assent should be sought from young people aged 8-16. Participants will be told that the field worker will only be observing their regular activities and that they do not need to prepare anything for our visit. Nor will they have to set time aside during the observation, they will just be able to continue their regular duties. Following the consent process, researchers will complete the socio-demographic survey with the female household head, where this person is not present in the household it should be done by the male household head.

2) Field workers will return to the household the following morning at the time when the family are just getting up. Before they begin, the researchers will check with the participants if there is anything they would be uncomfortable with them observing.
3) For the following 3-hour period, the task of the field worker will be to follow the activities of the primary individual, the female head of the household. Observers will also observe the way the primary individual interacts with their environment, objects around them and other individuals in the setting.
4) Observers should try to limit their interactions with participants during the observation. Of course, a certain degree of small talk is permissible but they must not actively probe the participant about her actions or behaviour (until afterwards) or share opinions which may bias her actions. They should also avoid assisting the participant and should definitely avoid correcting behaviour.
5) The fieldworkers will take notes throughout the observation process. These should aim to document everything that happens (even if irrelevant to the target behaviour) and the time at which it happens.
6) When the observation has concluded fieldworkers should find a private location, convenient for the participant to ask them some questions about their behaviours if necessary.
7) In the data analysis stage data from unstructured observation should be reviewed and any behaviours related to the target behaviours should be highlighted.

B. Site observation

Rationale for using method:

As stated above, observation is generally understood to be useful for understanding behaviour in a naturalistic setting. Observing behaviour in a more public location such as at a communal tap-stand, a shared kitchen or outside a sanitation block can help to understand norms, social roles and interactions, and barriers to handwashing behaviour. However, in public settings the process of observation must differ due to the busyness of these settings and ethical limitations.

Limitations:

Like household observation, site observation is also subject to observer bias.

Setting:

At the settings where handwashing may take place such as a communal water point, a shared kitchen or outside a sanitation block.

Process:

1) Permission to observe will initially be sought from individuals in charge of the camp or the village leader of the community. This will be done several days in advance of the site observation so that these individuals can inform camp/community residents about the presence of researchers. Additionally, a written notice about the site observation will placed in the location of the observation several days before. Both modes of communication will include contact details should camp/community members have any questions about the work.
2) On the day of the site observation the research team will have information sheets printed and available for individuals to pick up. On this it will clearly state that no names or identifying information will be recorded. Observation will be broken into 1 hour blocks so that those not wanting to be part of the site observation are not prevented from using the facilities nor significantly inconvenienced.
3) The field researcher will find somewhere at the chosen site where they can passively observe what happens at the location. The research will start by drawing a map of the location, highlighting on it key facilities, how the space is divided and what happens in each area. They will take notes on some of the following:
    a. What people are doing?
    b. What types of things are people talking about (not specifics of conversation)?
    c. Where do people congregate?
    d. Are there any behaviours that everyone does – what, when, how?
    e. Are there any behaviours that are repeated?

f. What are the least expected things you see happening – when, what, involving who?
g. What captures the attention of people at the site?
h. What types of people are present? Who is in charge of who?
i. What do people spend the biggest part of their time doing?
j. What messages being disseminated at the location – verbally, written, images, labels, other. What attention is paid to these by different groups at the location?
k. Does anything happen that appears to generate emotion, what emotions?
l. What do people bring with them to the location?
m. What objects do people interact with most at the location?

C. Behaviour Trials

Rationale for using method:

Behaviour trials were used in three of the studies included in the literature review.[7, 8, 46] Behaviour trials involve getting respondents to try out desired handwashing behaviour over a period of 10 days. During the course of these 10 days, participant households are visited and interviewed about their experiences. The method provides insight into the challenges people face in adopting and adhering to ideal handwashing practice. The use of behaviour trials also enables participants to help develop their own context-specific solutions to improving handwashing behaviour.

Limitations:

Behaviour trials are likely to be subject to social desirability bias. This is largely because it is clear to the participants what the researcher is trying to measure and because handwashing is a socially desirable behaviour. Behaviour trials are also time consuming on the part of the researcher and the participant. This means that they can only be done with a small sample of the population and that some families may give up part way through the trial.

Setting:

At the household/shelter.

Process:

1) Ideally this method is to be done with the same individuals as participated in the household observation. If participants agree, this will give the researchers the benefit of being familiar with the setting and currant handwashing practice.
2) Information about this method and the consent process will be done after the observation concludes. The processes will be explained to the whole family and additional consent and assent will be requested (but follow the same approach as the observation).
3) Researchers will give the researchers soap (a locally available product will be used). Researchers will ask the household to try to wash their hands with that soap for 7 days, telling them also about the 4 key times for handwashing.
4) At the point of initiation, a short interview will be done with the participant family members. This will be audio recorded and later transcribed. The interview will cover the following:
    a. Do any of you think you are likely to encounter any problems doing this task?
    b. Can you think of any ideas for how to overcome these potential problems?

    c. How will the different members of the household contribute to ensuring everyone washes their hands at critical times?
5) Before the researcher leaves they will arrange a time mid-week to return to the house for another follow-up interview. Again this should be audio recorded and transcribed.
    a. How has the experience been going so far?
    b. What have they enjoyed about practicing handwashing regularly or using the new soap product?
    c. Are there any negative effects?
    d. Have they encountered any problems adhering to the ideal handwashing practice? Has this varied among the household members?
    e. Do they have any good ways of working around these problems?
6) Where participants identify solutions, they should be encouraged to try adopting them until the end of the week. At this point the researcher should arrange to return.
7) When the researcher returns at the end of the week they will explore similar questions to the mid-week visit. Additionally researchers will ask:
    a. Is this a product/practice that you would like to keep doing or using?
    b. Do they foresee any long-term obstacles in maintaining it?
    c. How would they convince others in their community that it is a product/practice worth doing/using?

D. Socio-Demographic Survey

Rationale for using this method:

Surveys which document socio-demographic surveys were used in x of the papers included in the literature review. In this research the survey is an essential part of both screening participants for eligibility (so to ensure that the sample is sufficiently diverse) as well as coding during the analysis of results.

Limitations:

Since this survey collects data on relatively objective information rather than reported behaviour, it is not anticipated that this will be subject to bias. However, given that those we are interviewing have faced displacement and trauma obtaining answers to even these relatively straightforward questions must be done with care.

Setting:

This will be done with all research participants (excluding those observed as part of the site observations) prior to participation in any of the other research methods. It will be conducted within their household setting.

Process

1) Upon arriving at a potential household the researcher will go through the information sheet explaining the broad purpose of the research. With the family's permission, the top portion of the survey will be asked to the respondent at this point in order to assess their eligibility to take part in the study. If they are considered eligible a detailed description of the methods will be provided and then the rest of the survey will be asked after undertaking any of the other methods.
2) Only one survey will be completed per household as it aims to capture data about all those residing under that roof/eating from one pot (a decision on this will be made based on the local context). The questions should be answered by the female household head where this person is present, if not it should be answered by the male head of household.

Socio Demographic Questionnaire

Part 1:

Field worker to complete independently (without asking respondent):

1) Is this residence in a camp setting? Yes ☐ No ☐

2) Is this residence in a community or host community? Yes ☐ No ☐

3) Who is being interviewed? ☐ Female household head ☐ Male household head (due to absence of the female household head

Field worker to ask the respondent:

4) How many Individuals, including yourself, live in this household? ☐☐
(by household I mean persons who are normally resident here and share meals together)

5) How long have you personally resided in this place? ☐☐ Years ☐☐ Months

6) What is your religion? _____

7) Which cultural group or ethnicity do you belong to?_____

Part 2:

1) Where do you access your water from?
   (Tick more than one if multiple sources are used)

   - ☐ Bottled water
   - ☐ Tank
   - ☐ Trucked water
   - ☐ Private Tap
   - ☐ Communal tap-stand
   - ☐ Well
   - ☐ Borehole
   - ☐ Surface water
   - ☐ Other _____

2) How long, in minutes, does it take for you to walk to the water point (one-way)? ☐☐ Minutes

3) How long, in minutes, do you have to queue at the water point, if at all? ☐☐ Minutes

4) Can you always get enough water to meet your needs? Yes ☐ No ☐

5) Has anyone in this household been given a hygiene kit or hygiene items (e.g. soap) by an organisation involved in humanitarian response? Yes ☐ No ☐ *go to Q8*

6) When was the last time hygiene items were distributed to your household? ☐☐ Days ago ☐☐ Months ago

7) On this last occasion what items did you receive?
(tick as many as are relevant)

- ☐ Hand soap
- ☐ Body soap
- ☐ Laundry soap
- ☐ Hair Shampoo/conditioner
- ☐ Chlorine tablets
- ☐ Hand sanitiser
- ☐ Women's sanitary items
- ☐ ORS solution
- ☐ Tissues
- ☐ Waste disposal bags
- ☐ Toilet paper
- ☐ Razors
- ☐ Underwear
- ☐ Toothbrush
- ☐ Toothpaste
- ☐ Towel
- ☐ Nappies/diapers
- ☐ Deodorant
- ☐ Handwipes/moist towelettes
- ☐ Other:
- ☐ Other:

8) How long, in minutes, do you have to walk to the nearest latrine (one-way)? ☐☐ Minutes

9) How many people do you share this latrine with? *(approximately)* ☐☐ People

10) Are any of your household members currently earning any income? Yes ☐ *go to Q12*
No ☐

11) In the time since you started residing in this place, has any member of this household earned any income? Yes ☐
No ☐

12) Have you seen any hygiene promotion materials since you have resided in this place?
(Write down whatever the participant describes)

13) Have you attended any events about hygiene since you have resided in this place?
(Write down whatever the participant describes)

E. Personal inventories and attribute ranking

Rationale for using method:

This is an emerging method that evolved from marketing research and product design. It is also sometimes called artefact analysis.[5] It is designed to explore human-product relationships on the understanding that products which have certain attributes or 'back-stories' are more likely to be valued and used.[4] Attribute rankings of soap were done in several studies included in the literature review.[7, 8] The literature review indicated that the availability of soap is an important determinant of handwashing practice. Furthermore, in humanitarian crises many actors are involved in the distribution of soap but studies have found that this has proved insufficient to change practice.[47] Therefore this method will be used to understand whether soap is readily available; what types of soap people have; the perceptions and attitudes related to the available soap; and how these available soap types are similar or different to soap products they have previously been familiar with.

Limitations:
This method is only likely to provide a snapshot of soap availability and will not capture how this changes over time.

Setting:

At the household.

Process:

1) This method will be one of the interactive methods that are done as part of in-depth interviews. Therefore, the information and consent process will follow the standardised process for all interviews.
2) Ask the respondent to list some of the belongings they have in their house. Write each on a piece of separate piece of paper. Ask the respondent if they have soap in their house. If so write soap on one of these pieces of paper. Ask the respondent to do the following tasks.
    a. Rank these items in order of their importance or value to you
    b. Which if these things, if any, remind you of your home?

1) Ask the respondent if they wouldn't mind going to get any types of soap they have in their house. Request that they bring all the soap that they have.
2) Ask the respondent about the soap/soaps presented. These questions will also serve to ensure that no soaps have been omitted:
    a. Which soap do you use to do laundry, if any?
    b. Which soap do you use for dishes, if any?
    c. Which soap do you use for bathing, if any?
    d. Do you use a different soap for washing your hair?
    e. Which soap do you use for cleaning surfaces, if any?
    f. Which soap do you use for handwashing, if any?
    g. Do different people in your family use different soap?
    h. Where do you keep each of these different soaps?
    i. Did you purchase any of these soaps?
3) Introduce other soaps that are available in the local area. Explain to the respondent that you would like them to order the different types of soap based on different headings. Write the headings on small pieces of card and place them at two different ends of a spectrum. These headings should include:
    a. The soap that you like the most – the soap that you like the least

b. The soaps that you would use sparingly – the soap that you would use least sparingly.
c. The soap that is most similar to the soap you used prior to displacement – the soap that you are least familiar with
d. The soap that you would be most likely to wash your hands with - the soap that you would be least likely to wash your hands with.
e. The soap that you think would remove the most germs – the soap that would be least effective in removing germs
f. Think of someone you respect, which soap would they be most likely to use – which soap would this person be least likely to use.
g. The most common soap around here – the least common soap around here.

F. Water prioritisation

Rationale for using method:

This method is based on previous formative research conducted in the WASH sector[48] and is designed to understand how patterns of water use within the household may respond to fluctuations in water availability. This is likely to be particularly relevant for enabling handwashing behaviour (as indicated by the literature review) and of importance in a humanitarian crisis where water scarcity may be a common occurrence.

Limitations:

What people say they would do in a hypothetical scenario may not be what they actually do when this occurs. Additionally, some people may struggle to identify with and respond to the hypothetical scenarios.

Setting:

At the household.

Process:

1) This method will be one of the interactive methods that are done as part of in-depth interviews. Therefore, the information and consent process will follow the standardised process for all interviews.
2) Ask the respondent to show you the vessel they usually use to collect water and document how much water this contains.
3) Ask respondent how much water they collect, on average, most days. Confirm this by getting them to explain how many times they would refill the vessel.
4) Ask the participant how much of their daily water they use on different household activities (e.g. washing clothes, washing dishes, bathing, face washing, handwashing, cleaning floors/surfaces, for toilet use, for livestock or farming, etc).
5) If it is easier use several plastic cups and some water to capture these different amounts. This should be done by asking the participant to imagine that the cups are their water vessel.
6) As the participant whether they ever collect more water than the amount they reported.
    a. On what occasions would they do this?
    b. Ask them to complete the cup exercise again but with the greater amount of water (e.g. an additional two water vessels)
    c. How is water used when more water is available?
    d. What prevents the participant from getting this much water every day?
7) Ask the participant whether there days when it is not possible to get their 'normal' amount of water.
    a. When does this occur?
    b. When there is less water (tip out glasses as appropriate) what do they use water on?
    c. What things do they not do?

8) Ask the participant how much water they would have normally collect prior to moving to this place. Complete the cup activity again to understand past uses of water and how this has changed.

G. The ideal handwashing facility

Rationale for using method:

This method is based upon a design research method called 'Prune the Product Tree'.[9] It assumes that the features of a product vary in importance to the user and therefore this method is designed to identify those that are considered to be of greatest importance for enabling use. Literature in stable setting established that having a handwashing stand or place for handwashing was an important enabler of handwashing behaviour. In a humanitarian crisis handwashing facilities are often provided by emergency responders and may be different to what people are familiar with using. The fact that handwashing facilities are often provided and the fact that handwashing remains low suggests the features of these handwashing stands merit exploration.

Limitations:

Participants may have limited exposure to different designs of handwashing facilities and therefore struggle to imagine alternatives. Participants may be biased in their answers if they think that the results may indirectly influence their personal access to handwashing facilities.

Setting:

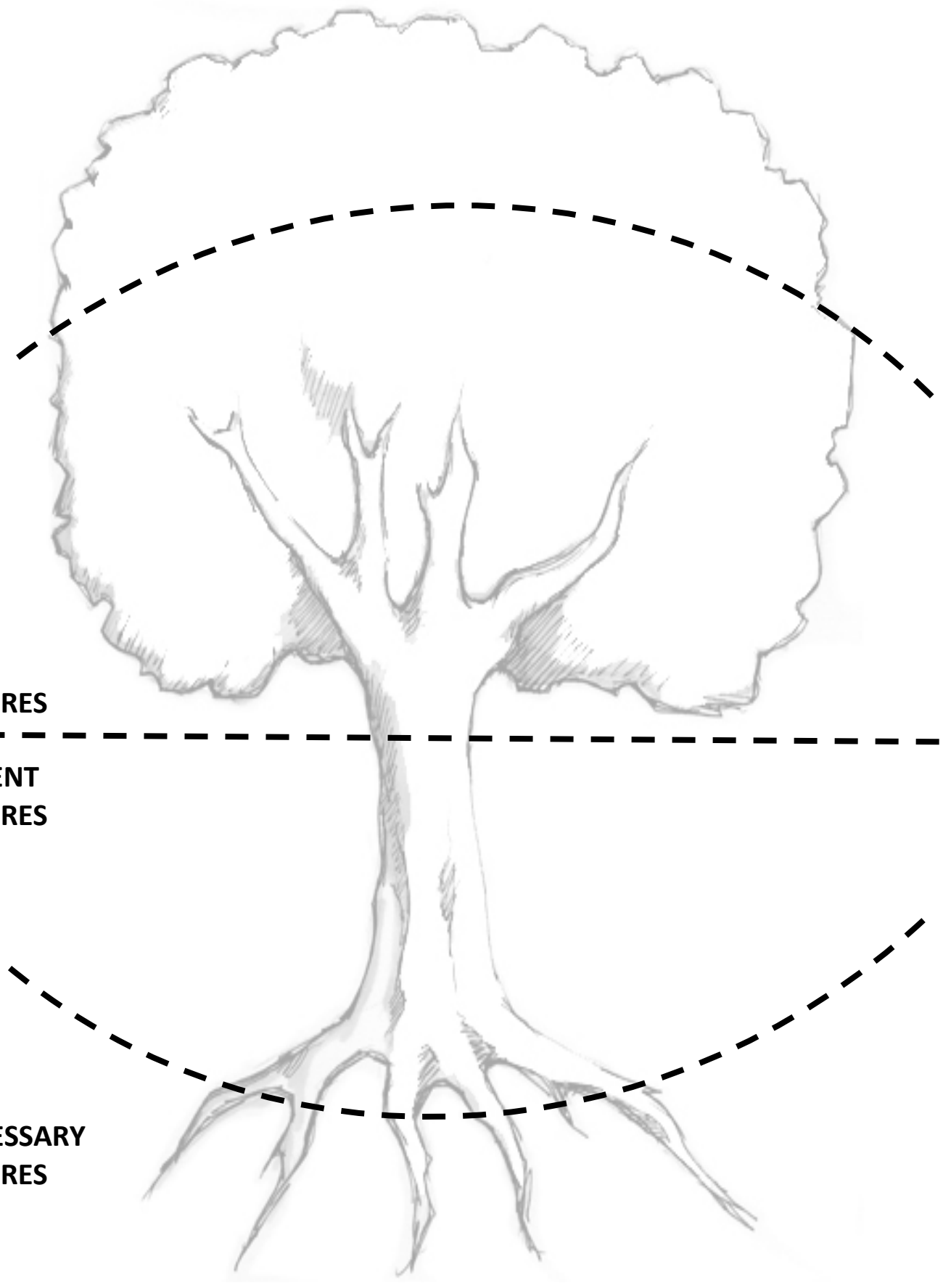
Focus Group Discussion

Process:

1) This method will be one of the interactive methods that are done as part of FGDs. Therefore, the information and consent process will follow the standardised process for all FGDs.
2) Provide the group some images of the typical handwashing facilities that you have observed in the area.
3) Ask them to list some of the features of the current designs. Write each down on a piece of paper.
4) Introduce the tree image (see next page) and explain that you would like them to help you identify the good things and bad things about the current design and make suggestions for how handwashing facilities can be improved.
5) Place the pieces of paper with the current features on the tree diagram in the section called 'current features'. Ask participants:
    a. Are any of these current features really important or which you like?
    b. Are there any of the current features which seem unnecessary or which you don't like?

6) Ask the participants to list the features of previous handwashing facilities that they used before they resided in this place. Again, write each on a piece of paper. Ask participants if these features should be included into current designs. Add the features that are agreed upon into the section called 'new features'.
7) Ask the participants if they can think of any other features of handwashing facilities that they think would make handwashing easier/more enjoyable. Write each of these down and add them to the tree as appropriate.
8) Have some potential features pre-prepared. These may include: handwashing location, handwashing stand material (e.g. wood/metal/plastic), type of soap (bar, liquid, soapy water), warm or cold water, shared or private, water saving, a mirror, limited refilling required, etc. Discuss each before putting them on the tree.
9) Now explain that you are going to try to prune the tree because in reality not all of these features may be possible. Ask participants the following:
    a. Are there any of these features which you feel are not important (if so move these down to the bottom of the tree)?
    b. What if you had to remove 5-10 features that are less important, which would you choose?
    c. If someone was to improve your handwashing facility right away which features should the focus on?
    d. If further improvements could be made when more time and money was available what features should be included then (add these to the ideal feature section)?
10) When they are finished ask them about how they think they would feel using this.
    a. What difference would this make to their lives, if at all?
    b. How much would they spend in order to have a facility like this?

IDEAL COMPONTENTS



H. Social Network Mapping

Rationale for using method:

Social network mapping is a widely used approach in sociology. It is often used to understand the diffusion of ideas or innovations and explore patterns of influence within social relationships.[22-25] Social networks are likely to be important for establishing norms in relation to handwashing behaviour and for encouraging adherence. However, in humanitarian crises social networks may be disrupted either by displacement or by a reduction of social interactions as a consequence of a disease outbreak. This method will therefore hope to explore social relationships before the onset of an emergency and during it.

Limitations:

This must be done with sensitivity as it is possible that some of the people in the participant's social networks may have been adversely affected by the crisis or may no longer be alive. This process can sometime seem quite long and repetitive so participants may get bored and compromise the quality of their responses.

Setting:

At the household.

Process:

1) This method will be one of the interactive methods that are done as part of in-depth interviews. Therefore, the information and consent process will follow the standardised process for all interviews.
2) The first part of the process is designed to ease the participant slowly into the method and flag to the researcher potential traumatic events in the past. Therefore, start broadly by asking the participant about how they came to this place and who they came with.
3) Take out a blank piece of paper and explain that you would like to understand more about social relationships in this place and in the place where they came from. Ask the participant the following questions about their places of origin/ place of long-term displacement where they lived prior to this:
    a. Can you tell me the names of people you saw on a daily basis?
    b. Can you tell me then names of some of your closest friends in that place?
    c. Can you tell me the names of some people you lived with you or near you in place X?
    d. Can you tell me the names of some people you would look to for guidance when you were living in X place?

    e. Can you tell me the names of some people who would look for guidance from you when you were living in X place?
    f. Can you tell me the names of some people in place X who you would be embarrassed to be told off by?
    g. Can you tell me the names of some people in place X that you would like to be more like?
4) For each of the individuals they mention ask for the following information:
    a. Their relationship to them
    b. Their gender
    c. Their age
    d. Their place of residence
    e. Their religion/culture
5) Take out another piece of paper. Repeat the same exercise based on where they currently reside and their current interactions.
6) When this has been completed ask the person to look at the two different diagrams. Ask them:
    a. What has remained constant? How did they maintain these relationships?
    b. What are the differences?
    c. How do you feel your social relationships have changed as a consequence of this emergency?

I. Handwashing demonstrations

Rationale for using method:

This method has been used in other WASH studies.[18] It is useful for being able to rapidly understand how the target behaviour is done within the natural or desired setting. Demonstrations can give you a quick insight into the barriers and enabling factors related to a target behaviour. They are also particularly useful for identifying whether the behaviour is one that is familiar or performed regularly.

Limitations:
In a handwashing demonstration, the behaviour of interest is made clear to the participant. Therefore, the method is subject to desirability bias as participants are likely to show the ideal way that an individual should wash their hands (e.g. the individual is likely to scrub their hands for longer than they may otherwise do).

Setting:

At the household.

Process:

1) This method will be one of the interactive methods that are done as part of in-depth interviews. Therefore, the information and consent process will follow the standardised process for all interviews.
2) The researcher should ask the individual to show them how they would normally wash their hands after going to the toilet. This may mean that the researcher has to walk with the participant to a communal location.
3) The researcher should observe the objects that the participant uses, the setting, the involvement of other individuals, the order of actions and any barriers or enabling factors. It is also interesting to look for any moments of hesitation or uncertainty in how to do the behaviour as this may indicate that it is not how the behaviour is normally done.
4) Now ask the participant to demonstrate how they would wash their hands if they were dirty and they were about to prepare a meal. Observe in the same way as before.

J. Routine Scripting

Purpose:

Routine scripting is a method used for documenting the order of actions in people's day to day routines. It was used by papers included in the literature review to explore handwashing[13] but has also been used to understand other behaviours.[14] The literature review indicated that routines may be an important determinant of behaviour and that certain actions may act as cues for handwashing. In a humanitarian crisis it is likely that familiar routines will be disrupted and therefore this is worthy of exploration.

Limitations:

Recalling routines in detail is challenging and something will be forgotten because they are so habitual (this may include hygiene behaviour) or not reported because they are not socially discussed (this may include hygiene behaviour). Being aware of this can be useful for additional probing. Recall is generally based on what was done yesterday but it may be hard to understand how typical yesterday was.

Setting:

At the household.

Process:

1. This method will be one of the interactive methods that are done as part of in-depth interviews. Therefore, the information and consent process will follow the standardised process for all interviews.
2. Ask the respondent what they did yesterday from the moment they got up in the morning. Explain that you want to learn, step-by-step about their daily routine right through to when they go to bed at night.
3. As they speak, draw a simple picture and write a key word to represent the activity they describe (or lay pre-fabricated paper picture cards). Lay the picture cards out in front of them on an available surface in a row from left to right.
4. With this overview in hand, you can then ask them to describe in more detail the parts of the routine you are interested in. This is likely to relate to cleaning children, preparing food, eating food, and toilet use.
5. Events which might have been missed (e.g., because they are embarrassing or less often practiced) can also be prompted. Look at the cards and ask the respondent about anything that is obviously missing, e.g. did you go shopping, collect water, eat lunch, go to the toilet etc. Insert any additional cards into the daily routine.

6. Next, ask the respondent for more information about each activity/task of particular interest: *people* – who was there, what did they do, who visited the house and when, who did they meet and where, *products* – what did they buy, where and why. They may have already told you some things as you were putting the card down.
7. Ask what is normally the best moment during the day – why? The worst – why? The most boring – why? The most fun – why? The most rewarding – why?
8. Ask the respondent "If you could change one thing about your normal schedule, what would it be? Why?"

K. Motives activity

Rationale for using method:

This method also tries to understand the role of motives in determining handwashing behaviour and is based on the 'I feel'____ method developed as part of the Behaviour Centred Design research methods toolkit. The strength of this method is that it gives people a limited set of options, each related to motives, in order to assess whether these are relevant to the target behaviour. The method is also anonymized in order to reduce social desirability bias.

Limitations:

This method has to be done with people who are literate and is subject to social desirability bias.

Setting:

To be done in focus group discussion.

Process:

1. This method will be one of the interactive methods that will be done as part of FGDs. Therefore, the information and consent process will follow the standardised process for all FGDs.
1) Introduce the motives cards to the participants. For each explain what is written in Swahili and how the image reflects this.
2) Once all have the cards have been explained quiz a few of the FGD participants to see if they remember what each card means (this is particularly important if people are illiterate).
3) Now explain that you would like them to identify who out of these people is most likely to always remember to wash their hands. Make sure everyone has a chance to provide their thoughts and ask them to explain why the person they have chosen would be more likely.
4) Now ask them to arrange all the other cards in order too – from the person most likely to wash hands to the least. Each time get the participants to debate and discuss their decisions.
5) At the end ask them about people in their community who might be like the people on the cards and how this affects behaviour in the their area.
6) Ask them which of the motives cards they identify with and ask them to explain why.
7) Ask them which of the motives cards they aspire to be like and again ask them to explain why.

L. Norms assessment (100 people activity)

Rationale for using method:

There is broad scholarship on the measurement of norms but the below methods, developed by Bicchieri,[28] are easy to replicate in a field context and are considered appropriate (relatively speaking) for audiences with limited literacy. They are also broadly used and recommended by UNICEF and in DHS/MICS surveys.[49] Norms were identified as influencing handwashing behaviour in stable settings. Humanitarian crises are likely to cause short term or long term shifts in norms but to date there has been little research to understand this.

Limitations:

Norms measures are often limited by social desirability bias. Norms questioning, as described below, may seem repetitive and thus the quality of responses may decrease as the exercise progresses. Care must also be taken to translate these questions well to ensure that the same meaning is being conveyed cross culturally.

Setting:

In in- depth interview or Focus Group Discussions.

Process:

1) This method will be one of the interactive methods that are done as part of in-depth interviews or FGDs. Therefore, the information and consent process will follow the standardised process for all interviews or FGDs.
2) For interviews conduct steps 3,4 and 5. For FGDs conduct steps 4 and 6.
3) Explain to the participant that you want to ask some questions about their own behaviour and about the behaviour of others in their community. Start by asking about their current behaviour:
    A. Do you always wash your hands with soap after going to the toilet?
    B. Do you always wash your hands with soap before eating?
    C. Do you think you should always wash your hands with soap after going to the toilet?
    D. Do you think you should always wash your hands with soap before eating?
4) Now ask the participant to imagine that we are going to speak to 100 people of different ages and sexes from her community. We want her to help us predict what we would learn from them. If literacy is low suggest a sample of 10 or 20 and/or use rocks or counters to represent the people. If researchers like us came into this camp/community and identified 100 randomly selected people…

A. How many of them would tell us that they always wash their hands with soap after going to the toilet?
B. How many of them would tell us that they always wash their hands with soap before eating?
C. How many of those 100 people do you think actually wash their hands with soap after going to the toilet?
D. How many of those 100 people do you think actually wash their hands with soap before eating?
E. How many of those 100 people do you think always have soap available in their homes?
F. Of those 100 people, how many do you think would judge you negatively if they saw you not washing your hands with soap?
G. Of those 100 people, how many do you think believe that handwashing with soap is the right thing to do?
h. Of those 100 people, how many would say it was easy to always wash your hands in this camp/community?

5) Now imagine that instead of us randomly choosing 100 people in this camp/community, we ask you to choose 20 people. We ask that you choose the people who are your closest friends or family or the people you respect the most.
    A. How many of these 20 people would tell us that they always wash their hands with soap after going to the toilet?
    B. How many of these 20 people would tell us that they always wash their hands with soap before eating?
    C. How many of those 20 people do you think actually wash their hands with soap after going to the toilet?
    D. How many of those 20 people do you think actually wash their hands with soap before eating?
    E. How many of those 20 people do you think always have soap available in their homes?
    F. Of those 20 people, how many do you think would judge you negatively if they saw you not washing your hands with soap?
    G. Of those 20 people, how many do you think believe that handwashing with soap is the right thing to do?
    h. Of those 20 people, how many would say it was easy to always wash your hands in this camp/community?
6) Now explain that you would like to repeat the same activity but that you would like the participant to think about their place of origin or the place they resided long-term prior to coming here. Repeat points 2, 3 and 4 with reference to their previous practices and the previous practices of people in their community of origin.
7) Now explain that you would like to present them with some scenarios about a person called Mr X who lives in a nearby camp/community like this one.
    a. 90% of people in Mr. X's community used not wash their hands after going to the toilet, including Mr. X himself. At the current time, 90% of people in his community do not wash their hands after going to the toilet, and 10% of people think it is wrong to do so. How likely do you think it is that Mr. X will continue to not wash his hands after going to the toilet? Introduce a scale with 0 as not likely and 10 as very likely and ask the group to decide collectively on the likelihood.

b. 90% of people in Mr. X's community used not wash their hands after going to the toilet, including Mr. X himself. At the current time, 90% of people in his community do not wash their hands after going to the toilet, and 90% of people think it is wrong to do so. How likely do you think it is that Mr. X will continue to not wash his hands after going to the toilet? Again ask the group to decide on the likelihood.
c. 90% of people in Mr. X's community used not wash their hands after going to the toilet, including Mr. X himself. At the current time, 10% of people in his community do not wash their hands after going to the toilet, and 10% of people think it is wrong to do so. How likely do you think it is that Mr. X will continue to not wash his hands after going to the toilet? Again ask the group to decide on the likelihood.
d. 90% of people in Mr. X's community used not wash their hands after going to the toilet, including Mr. X himself. At the current time, 10% of people in his community do not wash their hands after going to the toilet, and 90% of people think it is wrong to do so. How likely do you think it is that Mr. X will continue to not wash his hands after going to the toilet? Again ask the group to decide on the likelihood.

M. Free listing and ranking

Rationale for using method:

Free listing and ranking are both tools which are broadly used in qualitative research. Both have been used widely in WASH related research[18, 19] and in research among crisis affected populations.[20, 21] Free listing is particularly useful for mapping emic understandings of social domains, while ranking can provide insight into how these area structured and classified.[17] Although the literature review found that people's attitudes towards handwashing were generally positive, it was found to be an unmemorable routine activity that is not highly valued. At the onset of a disease outbreak we hypothesised that hygiene related behaviours might increase in value while in acute and protracted crises handwashing is likely to be deprioritised. This method will aim to explore how people's priorities change and whether, if at all, hygiene practices feature among them.

Limitations:

This activity will focus on the challenges people face in their day to day lives. Given the fact that many participants may have experienced recent trauma or distress this should be done with great sensitivity and stopped if it seems to be causing discomfort.

Setting:

At the household

Process:

1) This method will be one of the interactive methods that are done as part of in-depth interviews. Therefore, the information and consent process will follow the standardised process for all interviews.
2) Explain to the participant that you want to understand more about what life is like for them here in this camp/community. Participants will be asked to list the things they worry about most in their day to day lives since they moved to this place. Every time they mention something the researcher should write it down on a separate small piece of paper. Encourage the individual to list as many things as come to mind.
3) When all of the things have been listed ask the participant to rank the pieces of paper in order from their greatest to their least troublesome worry. As they do so ask about the order they position things in.
4) Now explain that you would like to do the same activity again but instead of focusing on their current concerns, you would like them to list the things they worried about in their

place of origin/their prior place of long-term displacement. Write down their answers and rank the concerns in the same manner.

5) When they have done both tasks ask the following questions related to hygiene and health:
    a. Do you worry about your health/your family's health?
    b. What specific illnesses concern you? If they mention things that have not been written down already add these and then ask where they fit in the ranking order. Ask if they are current concerns and whether they were a concern in their place of origin.
    c. Do you worry about being able to maintain your personal hygiene?
    d. What specific aspects of personal hygiene maintenance concern you? Again, if they mention things that have not been written down already add these and then ask where they fit in the ranking order. Ask if they are current concerns and whether they were a concern in their place of origin.
    e. Do they think that these concerns are shared by other people in their camp/community? Do they talk about these concerns with others?
    f. Ask the participant what they think can be done to mitigate, prepare for or prevent each worry. Are they actively trying to do things in their daily lives to counter these concerns?

N. Risk perception scaling

Rationale for using method:

The method described below is derived from a relatively general approach to assessing perceived risk.[50] There is a broad history of assessing risk perception, one which is predominantly grounded in psychology. Over several decades of research the following have been identified as important contributing factors to perceived risk: knowledge or awareness of the risk; perceived impact of the risk occurring; perceived likelihood of the risk occurring; perceived ability to prevent the risk occurring or deal with it if the risk does occur; perceived novelty of the risk; perceived personal risk in relation to others; familiarity with the risk; and the perceived dread or fear associated with the risk.[51] People are also known to have different levels of personal risk tolerance. This method proposes to assess risk within a FGD setting so that insights can also be gleaned from the debate and discussion between different individuals in the group. Based on the literature review findings about handwashing in stable settings, diarrhoea was generally seen as relatively normal and not something that posed a great risk. However, there was some suggestion that this may increase in humanitarian crises. Diseases like cholera were also associated with a heightened sense of fear and perceived risk. This method aims to understand how the perceived risk of diarrhoea and or cholera differs among different population subgroups, at different stages of an emergency and in different types of settings.

Limitations:

This method may be more difficult for individuals with limited literacy and numeracy. To participants the questions and the possible responses may seem quite similar and therefore hard to decide between. This will hopefully be minimised by spending time on the translations of these tools and pretesting them.

Setting:

Within FGDs

Process:

1) This method will be one of the interactive methods that are done as part of FGDs. Therefore, the information and consent process will follow the standardised process for all FGDs.

2) Ask FGD group to list the health concerns they are worried about. Write each on a separate piece of paper.
1) If it does not come up naturally ask if diarrhoea/cholera is something they worry about and write it down on a piece of paper too.
2) Ask the group to discuss which concerns they worry most about. Get them to identify their 5 biggest concerns.
3) For each of the selected 5 health concerns ask the group what they know about the health issue. Probe to understand
    a. their perceptions of the things that might cause the health issue
    b. the consequences of the health issue
    c. how the health issue can be prevented or reduced in impact.
    d. When did each health issue become a concern for them
4) Introduce participants to the scales below and help them to grade the 5 main health issues against each measure. For each problem leave a sticker on the scale so that the group can make comparative judgements.

What is the likelihood of you or your child getting the health problem in the next 6 months?

If your child got the health problem how badly would it affect your life?

If your child got the health problem how likely is it that it could result in death?

How predicable is the likelihood of you or your child getting the health condition?

What is the likelihood of you or your child getting the health problem compared to your neighbours?

What is the likelihood of you or your children getting the health problem now that you live here compared to where you lived before?

How do you feel towards the health problem? (common – dread)

Do you feel that this is a new health problem? (old new/novel)

How easy is it to prevent the health problem?

Do you feel like you have the ability to prevent the health problem?

How important is the health issue to other people in this camp/community?

How important is the health issue to the organisations who support this camp/community?

O. Identity mapping

Rationale for using method:

The method described below is predominantly drawn from metrics used in psychology. Specifically this method uses an adapted version of the Aspects of Identity Questionnaire.[31] The purpose of this method is to understand how participants perceive themselves and juggle or prioritise their different identities – each of which may influence handwashing behaviour in different ways. The literature review suggested that roles and identities may influence handwashing behaviour in stable settings. Findings highlighted the influence of role models, social and familial relationships, personality traits and 'teachable moments' associated with major life changes in roles. There is evidence that exposure to traumatic events changes people's perception of themselves and affects behaviour.[29, 30] Therefore it is reasonable to assume that following a humanitarian crises people's roles and perceptions of themselves will change also.

Limitations:

This method assumes some level of literacy. Some of the questions may initially appear quite similar to each other and therefore it will be important that time is take to translate questions well and test them. If this method process too difficult to be understood a simplified version (also given below) will be used. The concept of identity may be perceived differently in different cultures. In some cultures, it may seem strange to separate out these different identities and as such some people might not grasp the activity.

Setting:

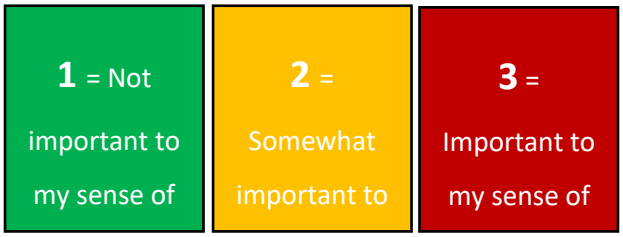
At the household.

Process:

1) This method will be one of the interactive methods that are done as part of in-depth interviews. Therefore, the information and consent process will follow the standardised process for all in-depth interviews.
2) Present the table below to the participant and tell them that you want to understand more about how they perceive themselves. Explain to them that for each statement you read you would like them to rate the level of influence it has on who they are.

3) Show them the grading scale and explain this. Explain that you want them to answer based on their current view of themselves.
4) Once the participant has completed the table based on their current situation. Explain that you would like to repeat the exercise. This time, instead of thinking about their current state, you would like them to think back to before they came to this place and the person they were then. It may help to define with the participant exactly when they will be thinking of.
5) After both are complete compare both pieces of paper and identify where there are changes in the ranking of different factors. Discuss these factors with the individuals to better understand the changes that have occurred.

Grading scale:



Characteristics		Level of influence on who you are
1	The things I own, my possessions	
2	My age, being part of my generation	
3	My sex, being a male or a female	
4	My social class, the economic group I belong to whether lower, middle, or upper class	
5	My physical abilities, being coordinated and good at athletic activities	
6	Being a sports fan, identifying with a sports team	
7	My occupational choice and career plans	
8	My academic ability and performance,	
Personal Identity Orientation		Level of influence on who you are
1	My personal values and moral standards	
2	My personal goals and hopes for the future	
3	My thoughts and ideas	
4	My emotions and feelings	
5	The ways I deal with my fears and anxieties	
6	My feeling of being a unique person, being distinct from others	
7	My personal self-evaluation, the private opinion I have of myself	
8	My ability to control the situations I find myself in	
9	My attention to detail	
10	Maintaining a daily routine	

Social Identity Orientation		Level of influence on who you are
1	My popularity with other people	
2	The ways in which other people react to what I say and do	
3	My physical appearance: my height, my weight, and the shape of my body	
4	My attractiveness to other people	
5	Being perceived as clean and hygienic	
6	Having other people look to me for advice.	
Collective Identity Orientation		Level of influence on who you are
1	Being a part of the many generations of my family	
2	My race or ethnic background	
3	My religion	
4	The place where I live	
5	The place where I was raised	
6	My feeling of belonging to my community	
7	My feeling of pride in my country, being proud to be a citizen	
8	My commitments on political issues or my political activities	
9	My language, such as my regional accent or dialect or a second language that I know	
Relational Identity Orientation		Level of influence on who you are
1	Being a good friend to those I really care about	
2	My commitment to being a concerned relationship partner	
3	Sharing significant experiences with my close friends	
4	Having mutually satisfying personal relationships	
5	My feeling of connectedness with those I am close to	
6	Being a caring parent who seeks the best his/her children	

Alternative approach:

1) Present the participant with the following set of descriptions about how they would like to be perceived – each one is written on a different piece of paper 9images can be used to help understanding):
    a. I like to be seen as someone whose clothes always look clean.
    b. I like to be seen as someone who always keeps her house neat and tidy.
    c. I like to be seen as someone who always keeps her children clean and tidy.
    d. I like to be seen as a good mother.
    e. I like to be seen as someone who always looks fresh and smells good.
    f. I like to be seen as a hard worker.
    g. I like to be seen as someone who helps other people.
    h. I like to be seen as someone who uses her time wisely.
    i. I like to be seen as a dutiful wife.
    j. I like to be seen as someone who could guide others on the right thing to do.
2) Ask the participant if there are other ways she likes to be perceived. Write these down.
3) Ask the participant to rank which of these descriptions is most likely to be said about her to the least likely to be said about her by people in this camp/community.

4) Ask the participant to rank which of these descriptions is most likely to be said about her to the least likely to be said about her by people in the place where she lived previously.
5) Ask the participant to rank which of these descriptions she would most like to be described as.
6) Explore the reasons for her choices.

P. Local Histories

Rationale for using method:

Narrative interviewing is particularly common in sociology[15] and behavioural research.[16] This method invites a participant to narrate their personal experiences, with limited direction and without structured questioning. In doing so it allows for broad understandings of the context within which handwashing behaviour is situated and provides insights into the participant's emic beliefs and constructed understanding of the behaviour. Cultural beliefs and attitudes about a wide range of things are understood to influence handwashing practice. The literature review suggested that this may include everything from manners, cultural practices in relation to childrearing, attitudes towards soap and attitudes towards the physical, social and biological environment that one is surrounded by. There is some evidence that in times of emergency cultural beliefs are essential to consider in order to achieve behaviour change. In some humanitarian crises it may also be that that traditional beliefs and rumours or hearsay become a more dominant influence on people's behaviour as they search to make sense of the new circumstances they find themselves in.

Limitations:

For some people it may be the first time someone has asked them to talk about their experiences or their personal beliefs. Thus the researcher must be sensitive to this fact and be clear about why we are interested in their experiences, that these will remain anonymous and that they can stop at any time. Some of this reporting may be subject to social desirability bias. For example although traditional beliefs may be common people are often embarrassed to admit that they believe in them.

Setting:

To be in interviews and focus group discussions.

Process for in-depth interviews.

1. This method will be one of the interactive methods that are done as part of in-depth interviews. Therefore, the information and consent process will follow the standardised process for all in-depth interviews.

2. Present the participant with a blank piece of paper. On the right hand side of the paper ask them to draw themselves currently. On the left hand side ask them to draw themselves before they came to this place or at a time when life was different to what it is now. Draw a line between the two drawings. Clarify the time period that the timeline covers.
3. Ask the participant to tell you about some of the milestones that happened between these two periods of time.
4. Explain that you understand that many things have changed during this time, some of them very traumatic. However, you would like them to tell you about how their daily routines changed at each of the time points they mentioned. How did all of the things that were going on at each stage on the timeline affect their day-to-day activities?

Process for FGDs:

1. This method will be one of the interactive methods that are done as part of FGDs. Therefore, the information and consent process will follow the standardised process for all FGDs.
2. Split the focus group discussion group into pairs. For example, if you have 6 people altogether for 3 pairs.
3. Hand out a large sheet of paper and a range of coloured markers to each pair. On the top of each sheet of paper write the topic you wish people to focus on. These could include things like:
    a. Stories that I was told when I was young
    b. Cultural beliefs
    c. Things that make our village/district/cultural group unique
    d. Major events in our countries history
    e. Things that symbolise my country/district/culture
4. Each pair will be asked to discuss the topic and draw pictures relating to the topic on the piece of paper they have.
5. Give people approximately 10 minutes to do this. Bring the pairs back to a group and ask them to discuss and present what they have drawn.
6. Then rotate the pieces of paper and ask the other groups to add new things on to the piece of paper.
7. Repeat steps 4 and 5 until everyone has had the chance to provide input into the various different sheets.

Q. How would you feel?

Rationale for method:

This method is designed to assess which motives are likely to be most strongly associated with handwashing in this context.

Limitations:

Motives are understood to operate at a partially or fully sub-conscious level so any attempt to explore them in a self-reported manner will invariably be limited. The method is anonymized in order to reduce social desirability bias and intentionally includes behaviours other than handwashing. This too is designed to reduce social desirability bias and improve the validity of the method. A limitation of this method is that it has to be done with people who are literate.

Setting:

This method is completed individually but can be done in a large group so that it is quicker.

Process:

1. The method requires the researcher to have a pre-developed set of picture cards. These should depict different scenarios related to handwashing (note this list also includes unrelated behaviors as a way of reducing bias and testing validity).
    a. A person who accidentally bumps into someone as they pass them by
    b. A person leaving the toilet and not washing their hands
    c. A person leaving the toilet and washing their hands
    d. A person who coughs without covering their mouth
    e. A person preparing food without washing their hands first
    f. A person washing their hands before food preparation
    g. A person who does not say hello when he walks past his neighbor.
    h. A person not washing their hands after cleaning a child

2. Present each scenario to the group and describe what is happening in the image. Hand out 'response sheets' and pens to each participant. Explain that these response sheets will be anonymous so the researchers will not know who has completed each. Explain the response sheets to them. Alongside each scenario explanation the following options should be given with options to tick yes or no.
    a. That is disgusting
    b. They behaved just like everyone around here
    c. They must be busy
    d. That is what a respectable person does
    e. That is not a big deal
    f. That would feel pleasant
    g. That person must be poor
    h. That person must be uneducated

i. That person would be a good parent
j. That is the kind of person I would be friends with
k. That person would feel refreshed after doing that
l. That is understandable
m. That is embarrassing
n. That person is wasteful
o. It scares me to see that
p. Someone should tell that person how to behave correctly
q. That person would not have done that in front of someone else
r. I would find that person attractive

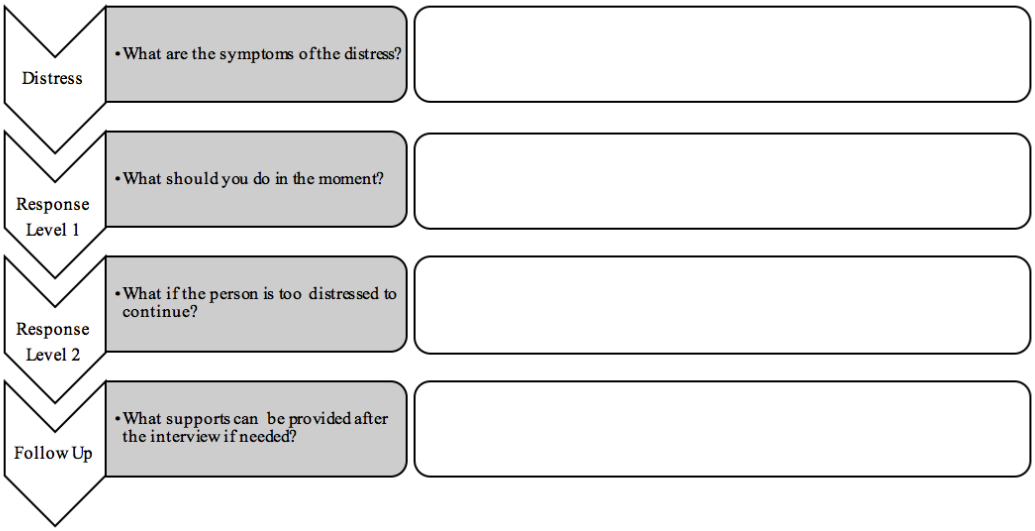
Participants should be asked to tick yes or no for each of the options for each scenario.

Annex 6: Distress Planning Tool

Distress Plan Participants

Instructions:

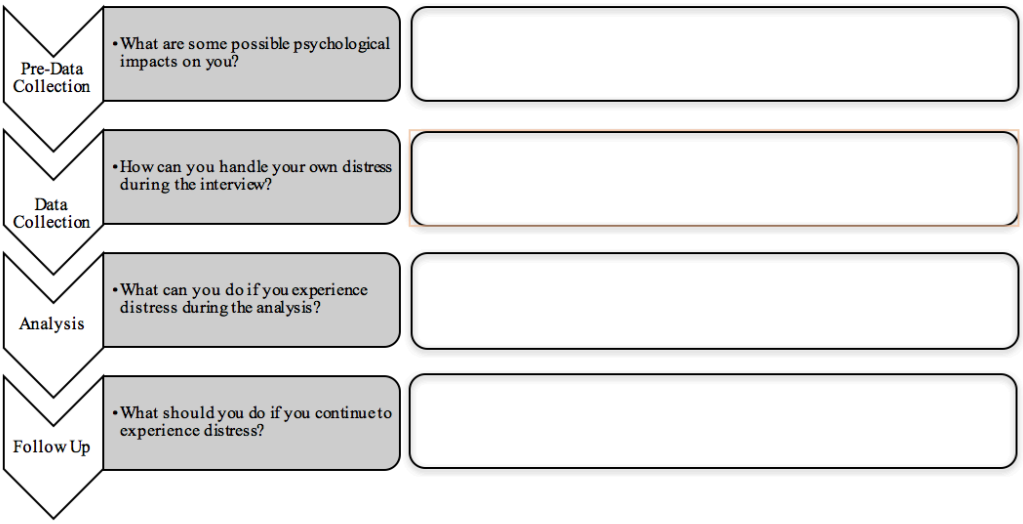
1. Discuss the following questions.
2. Decide on a plan for handling a participant in distress.
3. Share your plan with the other group.
4. Reach a consensus on both plans as a team.



Distress Plan Interviewers

Activity Instructions:

1. Discuss the following questions.
1. Decide on a plan for handling distress as the team member.
2. Share your plan with the other group.
3. Reach a consensus on both plans as a team.



Annex 7: Information and consent forms

A. Information and consent form for interviews with humanitarians

Action Against Hunger and London School of Hygiene and Tropical Medicine are conducting a study about health and behaviour in your area

Study Name: Research into the design of hygiene programs in humanitarian crises

Lead researcher: Sian White (London School of Hygiene and Tropical Medicine)

Tel: XXXXXXXX

Who is sponsoring this study?

This study is being conducted by the Action Against Hunger (ACF) and the London School of Hygiene & Tropical Medicine, based in the UK.

What is the purpose of this study?

The purpose of this study is to learn more about the way organisations within the WASH sector in the Kurdistan Region of Iraq (KRI) /Easter region of the Democratic Republic of the Congo (DRC) design hygiene programs. In particular, this study is interested in learning more about the range of activities that are currently done, how these activities are decided upon and what constraints actors face when designing and delivering their hygiene programs. The results of this research will be widely shared within the WASH sector in the hope that this can improve hygiene programming for the future.

Your participation is VOLUNTARY

Our study staff will help you understand this form and answer your questions. You are free to choose whether you want to participate or not. If you do agree, you are still free to withdraw participation at any time.

Will people find out what I say?

Your personal identity and your organisation's will be protected at all times. Nothing you discuss with the researcher will linked to you or your organisation by name when they write up the study. If you feel uncomfortable at any point you should say so. You can stop the study at any time, for any reason.

What will I be asked to do if I participate in this study?

An in-depth interview: Should you agree to participate the researchers will ask you some questions about your organisation's approach to hygiene in humanitarian crises. The topics that the interview will cover include: how you design and deliver your programs; your personal reflections about the constraints of working in humanitarian crises; and the types of tools or resources that could enable you or your organisation to improve hygiene programming. The discussion may take up to an hour and will be audio recorded.

What are the possible benefits to being in the study?

Research is designed to benefit society by gaining new knowledge in this case this will help shape future health and emergency response programs. You may receive no direct benefit from the study. However we guarantee that you will get a copy of the findings from this research and be invited to a workshop where we discuss what we have learned.

What are the possible risks or discomforts involved with being in this study?

Researchers are always asked to explain any risks to people who take part in the study. This study does not pose any direct risks to potential participants or the organisations they represent.

What if I have questions about this study?

You have the right to ask, and have answered, any questions you may have about this research. If you have questions, complaints, or concerns please contact:

Local team lead: XXXXXX

Mobile Telephone: XXXXXX

ID:

Informed Consent Form

Title of Study: Research on health and behaviour change

Participant's Agreement:

I have read/been read the information provided above and I have understood it. I have asked all the questions I have at this time. I understand that it is my right to withdraw from the study at any time.

I voluntarily agree to participate in this research study (tick one box).

☐ **Yes** ☐ **No**

I give permission for things that I say during interviews reported anonymously in order to communicate the findings of this research, to analyse this research and for teaching purposes.

☐ **Yes** ☐ **No**

I give my permission for the transcript of what I say to be completely anonymised and shared with others who may use what I say for future research.

☐ **Yes** ☐ **No**

_____

Signature of research participant:

_____

B. Information and consent form for interviews, observation or FGDs with crisis affected populations

Action Against Hunger and London School of Hygiene and Tropical Medicine are conducting a study about health and behaviour in your area

Study Name: Qualitative research on health and behaviour during a protracted conflict

Lead researcher: Sian White (London School of Hygiene and Tropical Medicine)

Local team lead: XXXXXX

Tel: XXXXXX

Who is behind this study?

This study is being conducted by the Action Against Hunger (ACF). The study is being conducted in collaboration with the London School of Hygiene & Tropical Medicine, based in the UK.

What is the purpose of this study?

The purpose of this study is to learn more about the daily routines and behaviours of people who have been displaced due to a protracted crisis/ who live in an area affected by cholera. We hope that we will be able to use the information we learn from this study to influence the work of humanitarian organisations in responding to an emergency of this kind.

Where is the study taking place?

This research is taking place in communities and IDP camps in Kurdistan and Iraq/ IDP and host communities in Minova, DRC. Approximately 100 people will participate in the research.

Your participation is VOLUNTARY

Our study staff will help you understand this form and answer your questions. You are free to choose whether you want to participate or not. If you do agree, you are still free to withdraw participation at any time without any consequences to you or your family. It will not affect your access to services provided by ACF in anyway.

What will I be asked to do if I participate in this study? (researcher to tick and read out the relevant components only)

☐ **Unstructured Observation + Household survey:** Should you agree to participate two of our field workers will arrange a time to visit your house. The researchers will spend a period time in your home and will take notes about your daily routines and the way you do things as a family. The researchers will take notes because we want to learn from you. They will not judge you on how you behave. The observations they make will be anonymous and when the results of this study are shared your name and identity will not be mentioned. The researcher may also ask to take photos or video footage or photos of you. You can decide whether you are happy with us using these photos or videos and specify how we may use them on the consent form. At any point you can change your mind or say no. Once the observation has concluded, the field staff will conduct a short interview with you. They will ask you some questions about your family's household routines and your health. Altogether it is expected that we will spend about 4 hours with you, but during this time we expect you to continue doing things as you normally would.

☐ **In depth interviews:** Should you agree to participate the researchers will ask you some questions about your relationships in the community, your culture and personal history, your concerns, your family's household routines and your health. These discussions will be audio recorded. The recordings will only be listened to by the researchers undertaking this study and will be used to anonymously capture things that you have said without reference to your name or your family. The interview will take place in a private location that is convenient for you. The discussion may take up to an hour.

☐ **Focus Group Discussions:** Should you agree to participate our field workers will arrange a time for you and a group of 4/5 others from your community to have a group discussion. During this discussion our field workers will ask you and the other group members questions

about your culture and personal history, your concerns, you family's household routines and your health. You should understand that your responses will be heard by the other members of the group but that we will ask all participants not talk about the content of the discussion with others individuals in the community who were not part of the discussion. These discussions will be video recorded. The video recordings will only be watched by the researchers undertaking this study and will be used to anonymously capture things that you have said without reference to your name or your family. The discussion may take up to two hours.

What are the possible benefits to being in the study?

Research is designed to benefit society by gaining new knowledge in this case this will help shape future health and emergency response programs. You may receive no direct benefit from the study.

What are the possible risks or discomforts involved with being in this study?

Researchers are always asked to explain any risks to people who take part in the study. This study does not pose any direct risks to potential participants or their families. However, it is possible that we may talk about things which are difficult for you personally due to recent traumatic events. If you feel uncomfortable, emotional, or unwilling to talk about something further, you should let our staff know and can either stop completely or pause what we are doing.

Will people find out what I do or say?

Your personal identity will be protected at all times and nothing the researcher observes you doing or discusses with you will linked to you by name when they write up the study. If you feel uncomfortable with the researcher being in your house or watching what you do then you should say so. You can stop the study at any time, for any reason.

What if I have questions about this study?

You have the right to ask, and have answered, any questions you may have about this research. If you have questions, complaints, or concerns please contact:

Local team lead: name

Mobile Telephone: number

What if I have questions about my rights as a research participant?

If you have questions or concerns about your rights as a research participant you may contact:

Name: Representative of local ethics board

Address

Phone

ID:

Informed Consent Form

(18 + year olds/ parents and guardians)

Title of Study: Research on health and behaviour change

Participant's Agreement:

I have read/been read the information provided above and I have understood it. I have asked all the questions I have at this time. I understand that it is my right to withdraw from the study at any time without it affecting myself or my family. I understand that these conditions also apply to any children or dependents for whom I give consent to participate in the study.

I voluntarily agree to participate in this research study (tick one box).

☐ **Yes** ☐ **No**

I give permission for things that I say during interviews or focus groups to be reported anonymously in order to communicate the findings of this research, to analyse this research and for teaching purposes.

☐ **Yes** ☐ **No**

I give my permission for the transcript of what I say to be completely anonymised and shared with others who may use what I say for future research.

☐ **Yes** ☐ **No**

[COMPLETE SECTION BELOW FOR OBSERVATION PARTICIPANTS ONLY]

I give permission for observations of things that I do to be reported anonymously to communicate

the findings of this research, to analyse this research and for teaching purposes.

☐ **Yes** ☐ **No**

I give my consent for all household members below the age of 18 years and for whom I am the parent of guardian to participate in the study and for their actions to be observed and documented.

☐ **Yes** ☐ **No** ☐ **Not Applicable**

Members of my household who are younger than 18 also give their assent to participate in the study and for their actions to be observed and documented

☐ **Yes** ☐ **No** ☐ **Not Applicable**

I give permission for photos and/or videos to be taken to document the research and understand that I will have the opportunity to view these and ask for some to be deleted if I wish.

☐ **Yes** ☐ **No**

I give permission for these photos/videos to be used in the following ways: (Show examples if these are beyond the participant's frame of reference)	**YES** ✓	**NO** ✗
As part of this study report		
To share the research findings in other ways such as through the media, on websites or as part of training materials		

As part of other reports, online publications, or awareness and fundraising campaigns. These may not be directly related to this research but are produced by the organisations who are doing this research.				
For photos of me to be used in this way for: (circle one)	6 months	1 year	5 years	No time limit

Signature or Thumbprint of Research Participant/s over 18:

_____ _____ _____

_____ _____ _____

Signature of Witness [For thumbprint only] Date

Signing on behalf of _____ number of people in the household who are under the age of 18.

Annex 8: Ethical Approvals

A. LSHTM Ethics approval

London School of Hygiene & Tropical Medicine
Keppel Street, London WC1E 7HT
United Kingdom
Switchboard: +44 (0)20 7636 8636

www.lshtm.ac.uk

Observational / Interventions Research Ethics Committee

Ms Sian White
LSHTM

19 April 2017

Dear Sian

Study Title: A multi-country descriptive case study of the determinants of handwashing behaviour in humanitarian crises

LSHTM Ethics Ref: 13545

Thank you for responding to the Observational Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

Approval is dependent on local ethical approval having been received, where relevant.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document Type	File Name	Date	Version
Investigator CV	Sian White - resume 2016	21/02/2017	1
Information Sheet	consent and assent forms and information sheets	21/02/2017	1
Investigator CV	LSHTM- Valerie Ann Curtis- CV	21/02/2017	1
Information Sheet	consent and information form for WASH sector	21/02/2017	1
Protocol / Proposal	Reserach protocol	24/02/2017	1
Protocol / Proposal	literature review methods and flowchart	24/02/2017	1
Protocol / Proposal	methods protocols	24/02/2017	1
Advertisements	public notice for site observation	24/02/2017	1
Protocol / Proposal	methods protocols	12/04/2017	2
Protocol / Proposal	Sian White upgrading feedback	12/04/2017	1
Information Sheet	Consent forms KRI and DRC	12/04/2017	2
Protocol / Proposal	High Risk Travel- Risk Assessment	12/04/2017	1
Protocol / Proposal	Reserach protocol	12/04/2017	2
Covering Letter	ethics responses	12/04/2017	1
Protocol / Proposal	Data management plan	12/04/2017	1
Protocol / Proposal	Responses to Upgrading feedback	13/04/2017	1

After ethical review

The Chief Investigator (CI) or delegate is responsible for informing the ethics committee of any subsequent changes to the application. These must be submitted to the Committee for review using an Amendment form. Amendments must not be initiated before receipt of written favourable opinion from the committee.

The CI or delegate is also required to notify the ethics committee of any protocol violations and/or Suspected Unexpected Serious Adverse Reactions (SUSARs) which occur during the project

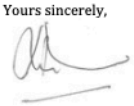
by submitting a Serious Adverse Event form.

At the end of the study, the CI or delegate must notify the committee using an End of Study form.

All aforementioned forms are available on the ethics online applications website and can only be submitted to the committee via the website at: http://leo.lshtm.ac.uk

Additional information is available at: www.lshtm.ac.uk/ethics

Yours sincerely,

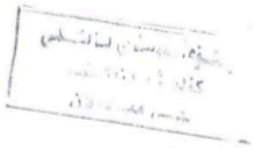


Professor John DH Porter
Chair

ethics@lshtm.ac.uk
http://www.lshtm.ac.uk/ethics/

B. Hawler Medical University Ethics approval

Meeting code: 5
Paper code: 6
Date: 28/5/2017



HAWLER MEDICAL UNIVERSITY
COLLEGE OF MEDICINE

RESEARCH ETHICS COMMITTEE APPROVAL SHEET

Title of the project: A multi-country descriptive case study of the determinants of handwashing behaviour in humanitarian crises

Names of the author and co-authors:
Sian White
Val Curtis
Karl Blanchet

Principle investigator: Sian White

[redacted]

Prof. Dr.
Abbas Al rabaty
Health of Ethics Committee

[redacted]

Prof. Dr.
Abdulkareem A. Al-Othman
Member

[redacted]

Assistant Prof. Dr.
Nidhal AbdulKader
Member

[redacted]

Assistant Prof. Dr.
Asmaa Ghanim Hussein
Member

University of Kinshasa's Public Health School Ethical Approval

ECOLE DE SANTE PUBLIQUE
Université de Kinshasa
Ministère de l'Enseignement Supérieur et Universitaire
République Démocratique du Congo
COMITE D'ETHIQUE

No d'Approbation: ESP/CE/.038.../2017

Kinshasa, le 10 juillet 2017

A Madame Sian White
Investigateur Principal
LSHTM
République Démocratique du Congo

Objet: Décision du Comité d'éthique portant sur l'étude intitulée : « *Etude de cas multi-pays: le comportement du lavage des mains dans un contexte de crise humanitaire*».

Madame l'Investigateur Principal,

Le Comité d'Ethique de l'Ecole de Santé Publique de l'Université de Kinshasa a bien reçu le protocole dont le titre est repris en marge.

Après examen du protocole selon les normes d'éthique nationales sur les études impliquant les êtres humains, le Comité a donné un avis favorable à cette recherche et autorise sa mise en œuvre pour la période allant du 10 juillet 2017 au 09 juillet 2018.

Veuillez agréer, Madame l'Investigateur Principal, l'expression de notre considération distinguée.

Prof. BONGOPASI MOKE SANGOL
[redacted]
Vice Président du Comité Ethique

Université de Kinshasa, Ecole de Santé Publique : B.P 11850 Kin I.

References

1. Quinlan, M., *Considerations for Collecting Freelists in the Field: Examples from Ethobotany.* Field Methods, 2005. **17**(3): p. 219-234.

2. Mosler, H.-J., *A systematic approach to behavior change interventions for the water and sanitation sector in developing countries: a conceptual model, a review, and a guideline.* Int J Environ Health Res, 2012. **22**.

3. Behaviour Change Network, *Barrier Analaysis (BA)*. 2019: Behaviour Change Network website.

4. Odom, W., *Personal inventories: toward durable human-product relationships*, in *CHI '08 Extended Abstracts on Human Factors in Computing Systems*. 2008, ACM: Florence, Italy. p. 3777-3782.

5. Hanington, B. and B. Martin, *Universal Methods of Design: 100 ways to research complex problems, develop innovative ideas and design effective solutions.* . 2012, MA, USA: Rockport Publishers.

6. Beebe, J., *Rapid assessment process: An introduction*. 2001: AltaMira Press.

7. Scott, B., et al., *Health in our hands, but not in our heads: understanding hygiene motivation in Ghana.* Health policy and planning, 2007. **22**: p. 225-33.

8. Curtis, V., L.O. Danquah, and R.V. Aunger, *Planned, motivated and habitual hygiene behaviour: an eleven country review.* Health education research, 2009. **24**: p. 655-73.

9. Hohmann, L., *Part 2: The Games - Prune the Product Tree*, in *Innovation Games*. 2006, Addison-Wesley Professional. p. 48-55.

10. Ram, P.K., et al., *Is Structured Observation a Valid Technique to Measure Handwashing Behavior? Use of Acceleration Sensors Embedded in Soap to Assess Reactivity to Structured Observation.* The American Journal of Tropical Medicine and Hygiene, 2010. **83**(5): p. 1070-1076.

11. Ram, P., *Practical Guidance for Measuring Handwashing Behavior*, in *Global Scaling Up Handwashing Project*. 2010, Water and Sanitation Program WSP website.

12. Biran, A., et al., *Comparing the performance of indicators of hand-washing practices in rural Indian households.* Tropical medicine & international health : TM & IH, 2008. **13**(2): p. 278-285.

13. Greenland, K., et al., *The context and practice of handwashing among new mothers in Serang, Indonesia: a formative research study.* BMC Public Health, 2013. **13**: p. 830-830.

14. Aunger, R., *Tooth brushing as routine behaviour.* International Dental Journal, 2007. **57**(S5): p. 364-376.

15. Mishler, E.G., *Models of Narrative Analysis: A Typology.* Journal of Narrative and Life History, 1995. **5**(2): p. 87-123.

16. Bates, J.A., *Use of narrative interviewing in everyday information behavior research.* Library & Information Science Research, 2004. **26**(1): p. 15-28.

17. Borgatti, S.P., *Elicitation Techniques for Cultural Domain Analysis.* , in *Ethnographer's Toolkit*, J. Schensul, Editor. 1998, Sage: Newbury Park.

18. White, S., et al., *A Qualitative Study of Barriers to Accessing Water, Sanitation and Hygiene for Disabled People in Malawi.* PLoS ONE, 2016. **11**(5): p. e0155043.

19. Domènech, L., H. Heijnen, and D. Saurí, *Rainwater harvesting for human consumption and livelihood improvement in rural Nepal: benefits and risks.* Water and Environment Journal, 2012. **26**(4): p. 465-472.

20. Palmer, C.A., *Rapid appraisal of needs in reproductive health care in southern Sudan: qualitative study.* BMJ, 1999. **319**(7212): p. 743-748.

21. Betancourt, T.S., et al., *A Qualitative Study of Mental Health Problems among Children Displaced by War in Northern Uganda.* Transcultural Psychiatry, 2009. **46**(2): p. 238-256.

22. Centola, D., *The Spread of Behavior in an Online Social Network Experiment.* Science, 2010. **329**(5996): p. 1194-1197.

23. Bond, R.M., et al., *A 61-million-person experiment in social influence and political mobilization.* Nature, 2012. **489**(7415): p. 295-298.

24. Abrahamson, E. and L. Rosenkopf, *Social Network Effects on the Extent of Innovation Diffusion: A Computer Simulation.* Organization Science, 1997. **8**(3): p. 289-309.

25. Kempe, D., J. Kleinberg, and É. Tardos, *Influential Nodes in a Diffusion Model for Social Networks*, in *Automata, Languages and Programming: 32nd International Colloquium, ICALP 2005, Lisbon, Portugal, July 11-15, 2005. Proceedings*, L. Caires, et al., Editors. 2005, Springer Berlin Heidelberg: Berlin, Heidelberg. p. 1127-1138.

26. Scott, J., *Social network analysis*. 2012: Sage.

27. Borgatti, S.P., et al., *Network analysis in the social sciences.* science, 2009. **323**(5916): p. 892-895.

28. Bicchieri, C., J.W. Lindemans, and T. Jiang, *A structured approach to a diagnostic of collective practices.* Frontiers in Psychology, 2014. **5**: p. 1418.

29. Ullrich, P.M., et al., *Self regard and concealment of homosexuality as predictors of CD4+ cell count over time among hiv seropositive gay men.* Psychology & Health, 2004. **19**(2): p. 183-196.

30. Horowitz, M., et al., *Self-regard: a new measure.* Am J Psychiatry, 1996. **153**(3): p. 382-5.

31. Cheek, J.M. and S.R. Briggs, *Aspects of Identity Questionnaire (AIQ-IV) . .* Measurement Instrument Database for the Social Science., 2013.

32. Aunger, R. and V. Curtis, *Behaviour Centred Design: Toward and applied science of behaviour change. .* Health Psychology Review. , 2016.

33. D'Mello-Guyett, L., *7th Emergency Environmental Health Forum (EEHF) Event Report*. 2016, SHARE consortium: UK.

34. George, C.M., et al., *Psychosocial Factors Mediating the Effect of the CHoBI7 Intervention on Handwashing With Soap.* Health Education & Behavior, 2017: p. 1090198116683141.

35. Vujcic, J., P.K. Ram, and L.S. Blum, *Handwashing promotion in humanitarian emergencies: strategies and challenges according to experts.* Journal of Water Sanitation and Hygiene for Development, 2015. **5**(4): p. 574-585.

36. Aunger, R., et al., *Behaviour Centred Design: Formative Research Tools*. 2017, London School of Hygiene and Tropical Medicine. : UK.

37. Greenland, K., et al., *Selecting behaviour change priorities for trachoma 'F' and 'E' interventions: A formative research study in Oromia, Ethiopia.* PLOS Neglected Tropical Diseases, 2019. **13**(10): p. e0007784.

38. Simiyu, S., et al., *Designing a Food Hygiene Intervention in Low-Income, Peri-Urban Context of Kisumu, Kenya: Application of the Trials of Improved Practices Methodology.* The American Journal of Tropical Medicine and Hygiene, 2020. **102**(5): p. 1116-1123.

39. Hulland, K.R., et al., *Designing a handwashing station for infrastructure-restricted communities in Bangladesh using the integrated behavioural model for water, sanitation and hygiene interventions (IBM-WASH).* BMC Public Health, 2013. **13**: p. 877.

40. Aunger, R. and V. Curtis, *The anatomy of motivation: An evolutionary ecological approach.* Biological Theory, 2013. **8: 49-63.**

41. Watson, J., et al., *Child handwashing in an internally displaced persons camp in Northern Iraq: A qualitative multi-method exploration of motivational drivers and other handwashing determinants.* PLOS ONE, 2020. **15**(2): p. e0228482.

42. Blum, L.S., et al., *Programmatic implications for promotion of handwashing behavior in an internally displaced persons camp in North Kivu, Democratic Republic of Congo.* Conflict and Health, 2019. **13**(1): p. 54.

43. Sagan, S., et al., *Assessing emotional motivators for handwashing with soap in emergencies: results from three Asian countries.* Waterlines, 2019. **38**(1): p. 20-35.

44. Hoque, B.A., et al., *Research methodology for developing efficient handwashing options: an example from Bangladesh.* Journal of Tropical Medicine & Hygiene, 1995. **98**(6): p. 469-75.

45. Biran, A., et al., *The effect of a soap promotion and hygiene education campaign on handwashing behaviour in rural India: a cluster randomised trial.* Trop Med Int Health, 2009. **14**.

46. Biran, A., A. Tabyshalieva, and Z. Salmorbekova, *Formative research for hygiene promotion in Kyrgyzstan.* Health Policy Plan, 2005. **20**(4): p. 213-21.

47. Phillips, R.M., et al., *Soap is not enough: handwashing practices and knowledge in refugee camps, Maban County, South Sudan.* Conflict and Health, 2015. **9**: p. 39.

48. Greenland, K. and S. White, *Formative Research to inform design of a behaviour change intervention for the "F" and "E" of the SAFE strategy in Oromia, Ethiopia*. 2016, LSHTM: London.

49. Mackie, G., et al., *What are Social Norms? How are They Measured?* 2015, UNICEF: California.

50. Fischer, G.W., et al., *What Risks Are People Concerned About.* Risk Analysis, 1991. **11**(2): p. 303-314.

51. Sjoberg, L., B. Moen, and T. Rundmo, *Explaining risk perception. An evaluation of the psychometric paradigm in risk perception reserach*. 2004, Rotund Publikasjoner: Tondheim, Norway.