WASH Baseline in Cholera Hotspots
Zanzibar Experience

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Objective of WASH Baselines in Cholera Hotspots

- Create baseline estimates for water, sanitation, and hygiene (WASH) coverage in cholera hotspots
- Used to measure progress over time as WASH infrastructure is developed
  - Can be linked to other activities such as oral cholera vaccine (OCV) coverage surveys or be stand alone
    - Leverage resources
  - Show progress on National Cholera Roadmaps

Assumptions for Proposed Baseline Survey

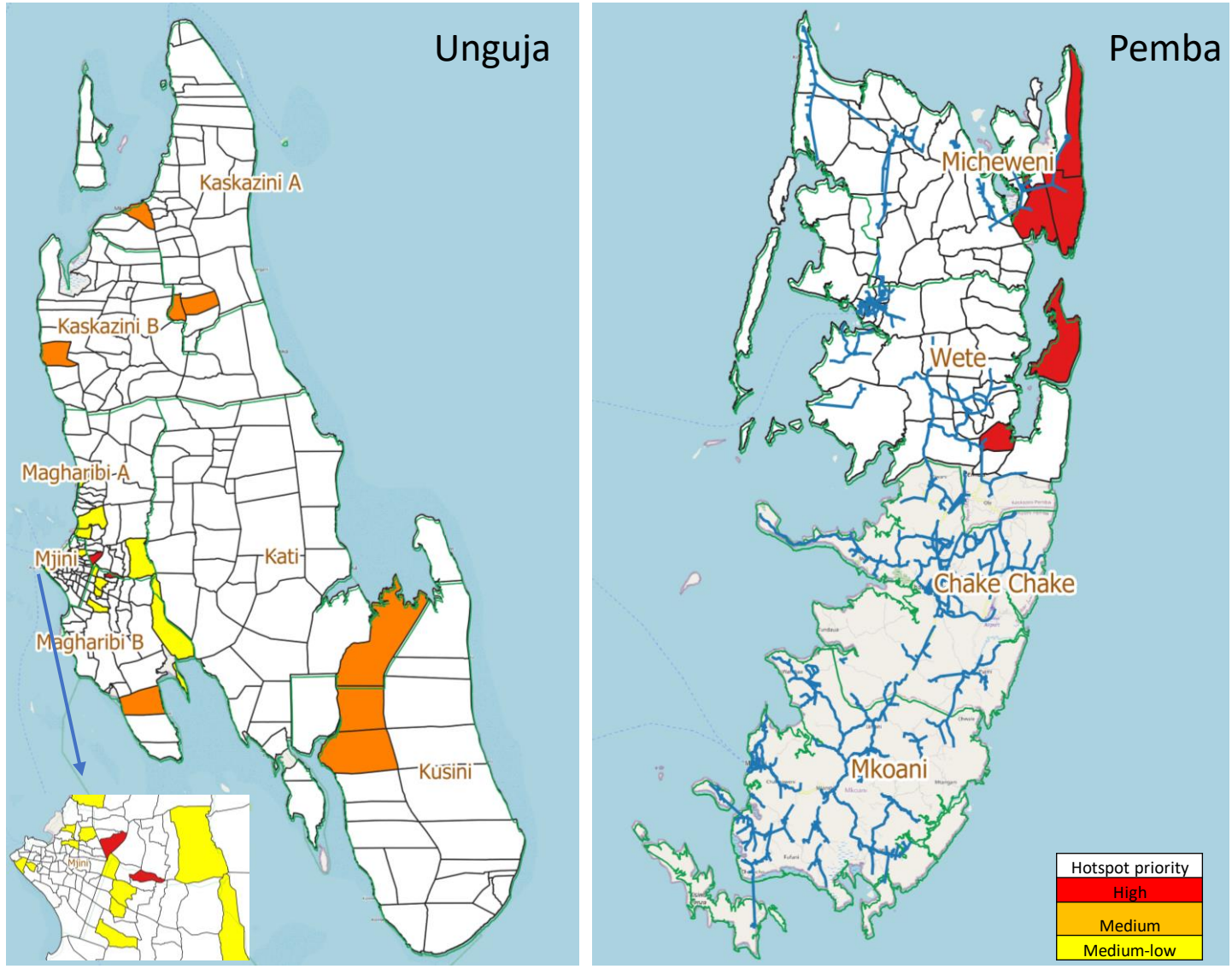
- Cholera hotspot is pre-defined by country using 5-year cholera epi data
- WASH interventions are planned for the hotspot
- Representative sampling
  - Random or cluster sampling (no convenience sampling)
- Include standard WASH questions from JMP to compare across surveys and over time
- Standardized methodology
- Powered for comparison of surveys over time
  - Baseline, midline, & endline

Piloted Methodology in Zanzibar

- **Goal:** Create WASH Baseline estimates for cholera hotspot(s) targeted for OCV campaign
- **Methods:**
  - Include WASH questionnaire in OCV coverage survey
  - Multi-stage cluster survey
    - Sample size is powered enough to make WASH coverage estimates by hotspot(s) areas
  - Include free residual chlorine water quality testing of household stored water
  - Microbiological testing of source waters

Background

- Zanzibar is made up of two islands
  - Unguja
  - Pemba
- Population ~ 1.6 million persons
- 17 major outbreaks identified in Zanzibar since 1978
- OCV Campaign in Jul and Aug 2021
  - Targeted 349,478 persons
- Coverage survey collaboration between MoH-Z, WHO, and CDC
  - Conducted Nov-Dec 2021



Zanzibar Survey Planning

Step 1: MOH identified hotspot Shehias targeted by OCV campaign in Unguja and Pemba

Step 2: Used country's hotspot prioritization to determine areas where WASH Baseline estimates are a priority

Step 3: Determined sample size required in each hotspot to be able to estimate WASH coverage

Step 4: Determined how many WASH baseline estimates are financially or logistically feasible

Hotspot priority
High
Medium
Medium-low

DISTRICT	SHEHIA *	POPULATION 2019
Mjini	Shaurimoyo	9950
	M/Makumbi	9973
	Chumbuni	13042
	K/bondeni	2694
	Jangombe	7308
	K/mtipura	13814
	Amani	7349
Magharibi A	Welezo	16898
	Mwera	13186
	Mtoni	8463
	Bububu	20177
	Mtoni Kidatu	21397
Magharibi B	Kinuni	12421
	Dimani	2249
	M/Kwerekwe	22156
	Mtopepo	18018
	Magogoni	16361
	Fuoni Kibondeni	16894
	Tomondo	25486
	Meli 4	18614
Kaskazini A	Mkokotoni	3280
	Kikobweni	3226
	Bandamaji	1891
Kaskazini B	Manga pwani	2703
Kati	Ukongoroni	1026
Kusini	Muungoni	1847
	Kitogani	1279
Micheweni	Kiuyu Mbuyuni	8277
	Maziwa Ngombe	7508
	Micheweni	7994
	Mjini Wingwi	5832
Wete	Kojani	3007
	Kiuyu Minungwini	3995

Step 3: Determine sample size required in each hotspot to be able to estimate WASH coverage

- OCV Coverage Survey
- (WHO calculator)

Precision	+/- 7%
Expected coverage	50%
95% CI	0.05
ICC	0.15
Average Number of HHs to find child 1-4 years	1.2
Response rate	80%
Sample Size per estimate	**1,196**
Number of Clusters	**40**
Cluster Size	**30 HHs**

- WASH Baseline
- (Cluster Survey- Proportion)

Precision	+/- 5%
Expected proportion (access to an improved water source)	80%
95% CI	0.05
Design Effect	2.0
Oversample	10%
Sample Size	**595 HHs per area**

Step 3 continued: Sample Size Options

- **Option A**: **<u>One</u>** OCV coverage estimate for both islands (combined)
- **Option B**: **<u>Two</u>** OCV coverage estimates, one for Unjuga and one for Pemba
- Multi-stage cluster survey
- Clusters were selected using probability proportional to size (PPS)
- Mobile data collection

Determine how many WASH baseline estimates are feasible

- Cost prohibitive to do two OCV surveys
  - WASH Baseline estimates therefore too costly to complete on Pemba (Micheweni and Wete districts)
- **Conclusion**: WASH oversampling was done in 3 districts on Unguja (Magharibi A, Magharibi B, Mjini)

Island	District	Pop	Number of Clusters Selected	Number of households (Without WASH clusters)	Additional WASH Clusters	Total Clusters (with WASH)	Total number of households with extra WASH clusters
Pemba	Wete	7002	1	30		1	30
Pemba	Micheweni	23779	3	90		3	90
Unguja	Kusini	3126	0	0		0	0
Unguja	**Magharibi A**	80121	10	300	10	20	600
Unguja	**Magharibi B**	132199	13	390	7	20	600
Unguja	Kaskani A	8397	2	60		2	60
Unguja	Kaskani B	2703	0	0		0	0
Unguja	Kati	1026	1	30		1	30
Unguja	**Mjini**	64130	10	300	10	20	600
			40	1200			**2010**

Results

- ## Individual Survey Demographics

Age Groups	<1 n (%)	1-4 n (%)	5-14 n (%)	≥15 n (%)	Unknown ages n (%)	Total n (%)
Total	220 (2.0%)	1074 (9.6%)	2822 (25.1%)	6574 (58.5%)	518 (4.8%)	11,208

- ## Household Survey

Households	N(%)
Consented to interview	1914 (95.2)
Declined interview	12 (0.6)
Unavailable	84 (4.2)

Key WASH Results- Primary Drinking Water Source

Drinking Water- Primary Source	Magharibi A		Magharibi B		Mjini		Total (all districts)	
	N	Weighted estimates % (95% CI)	N	Weighted estimates % (95% CI)	N	Weighted estimates % (95% CI)	N	Total Weighted estimates % (95% CI)
Borehole	218	38.6(28-50.4)	134	23.1(15.2-33.3)	96	17.2(8.8-30.8)	468	24.1(19-30.1)
Piped water into dwelling (ZAWA or Private)	140	24.8(16.1-36.1)	264	45.4(34.4-56.9)	324	58(46.5-68.6)	790	39.6(33.8-45.7)
Piped water, public tapstand (ZAWA or private)	43	7.6(4.7-12)	68	11.7(7.4-18)	72	12.9(7.2-21.9)	268	15.6(11.2-21.3)
Protected Dug Well	148	26.2(17.7-36.9)	73	12.6(6.9-21.8)	43	7.7(3.3-16.8)	269	13.4(9.8-18.2)
Unprotected Dug Well	2	0.4(0.1-1.4)	31	5.3(1.1-21.6)	7	1.3(0.5-3.4)	73	5.2(2.2-11.7)
Other	14		8		16		42	0.1(0-0.4)
Total	565		581		559		1910	

Key WASH Results- Primary Drinking Water Source

Drinking Water-Primary Source	Magharibi A		Magharibi B		Mjini		Total (all districts)	
	n	Weighted estimates % (95% CI)	n	Weighted estimates % (95% CI)	n	Weighted estimates % (95% CI)	n	Total Weighted estimates % (95% CI)
Safely managed or Basic +	116	31.7(21.7-43.7)	165	40.2(30-51.4)	139	34.2(24.5-45.4)	467	**36.7 (30.2-43.7)**
Basic	237	64.8(52.1-75.6)	212	51.7(40.9-62.4)	255	62.7(51.4-72.7)	772	**56.3 (49.9-62.5)**
Limited	10	2.7(1.2-6.1)	8	2(1-3.8)	6	1.5(0.6-3.3)	24	**1.8 (1.1-2.8)**
Unimproved	3	0.8(0.2-3.5)	25	6.1(1.4-23.1)	5	1.2(0.4-3.8)	50	**5.1 (2-12.3)**
Surface water	0	0.0(0-0)	0	0.0(0-0)	2	0.5(0.1-3.4)	2	**0.1 (0-0.8)**
Total	366		410		407		1315	

*unable to test source waters to determine whether safely managed ** HHs that reported not knowing drinking water collection times not included

- Safely managed = Drinking water from an improved water source that is accessible on premises, available when needed and free from fecal and priority chemical contamination
- Basic + = an improved source within 30 minutes round trip collection time and water treatment
- Basic = Drinking water from an improved source, provided collection time is not more than 30 minutes for a roundtrip including queuing
- Limited = Drinking water from an improved source for which collection time exceeds 30 minutes for a roundtrip including queuing
- Unimproved = unprotected dug wells, unprotected springs
- Surface water= surface water

Key WASH Results- Free Residual Chlorine Results

Free Residual Chlorine (FRC) Results	Magharibi A N	Weighted estimates % (95% CI)	Magharibi B N	Weighted estimates % (95% CI)	Mjini N	Weighted estimates % (95% CI)	Total (67 clusters)	Total Weighted estimates % (95% CI)
< 0.1 mg/L	395	96.1(89.8-98.6)	448	95.7(91-98)	353	86.9(77.2-92.9)	1357	94.6(91.8-96.5)
0.1 - < 0.2 mg/L	4	1(0.2-4.5)	5	1.1(0.3-3.8)	3	0.7(0.3-2)	15	0.9(0.4-2)
0.2 - < 0.5 mg/L	9	2.2(0.7-6.7)	11	2.4(0.9-5.8)	25	6.2(3.7-10.2)	45	2.7(1.7-4.3)
0.5 - 1.0 mg/L	1	0.2(0-1.7)	3	0.6(0.2-2.6)	10	2.5(0.4-13.3)	14	0.8(0.3-2.6)
>1.0 mg/L	2	0.5(0.1-1.8)	1	0.2(0-1.5)	15	3.7(1.9-7.1)	18	0.9(0.5-1.7)
Total	411		468		406		1449	

Key WASH Results- Sanitation facilities

Main facility	Magharibi A N	Weighted estimates % (95% CI)	Magharibi B N	Weighted estimates % (95% CI)	Mjini N	Weighted estimates % (95% CI)	Total (67 clusters)	Total Weighted estimates % (95% CI)
Flush Toilet	250	44.2(34.1-54.8)	248	42.7(35-50.7)	255	45.4(37.1-53.9)	800	40.0(35.5-44.6)
Flush/pour Toilet	198	35(27-43.9)	166	28.6(23.2-34.6)	148	26.3(19.7-34.2)	524	26.5(23-30.3)
Pit Latrine	89	15.7(10.7-22.5)	119	20.5(14.7-27.8)	124	22.1(17.7-27.2)	412	22.4(19-26.1)
Ventilated Pit latrine	28	4.9(2.5-9.6)	44	7.6(5.1-11)	34	6(3.5-10.3)	115	6.3(4.8-8.3)
Open defecation	1	0.2(0-1.3)	1	0.2(0-1.2)	0	0.0(0-0)	28	2.0(1.3-3.1)
Other	0	0.0(0-0)	1	0.2(0-1.2)	0	0.0(0-0)	32	2.7(1.6-4.4)
Don't Know	0	0.0(0-0)	2	0.3(0-2.4)	1	0.2(0-1.3)	3	0.2(0-0.9)
Total	566		581		562		1914	

- 19.8% of HHs reported to share sanitation facilities
- Of those sharing, 43.7% reported sharing with less than 4 other households

Key WASH Results- Sanitation facilities

Sanitation facilities	Magharibi A		Magharibi B		Mjini		Total (all districts)	
	n	Weighted estimates % (95% CI)	n	Weighted estimates % (95% CI)	n	Weighted estimates % (95% CI)	n	Total Weighted estimates % (95% CI)
Safely managed	6	1.1(0.4-2.5)	10	1.7(1.1-2.7)	16	2.8(1.8-4.6)	33	**1.6(1.2-2.2)**
Basic	493	87.1(81-91.4)	455	78.3(72.8-83.0)	404	71.9(65.3-77.7)	1459	**74.6(71.4-77.5)**
Limited	58	10.2(6.4-15.9)	92	15.8(11.5-21.4)	126	22.4(17-28.9)	305	**16.0(13.4-18.9)**
Unimproved	8	1.4(0.6-3.2)	23	4(2.1-7.4)	16	2.8(1.7-4.8)	89	**5.8(4.7-7.3)**
Open defecation	1	0.2(0-1.3)	1	0.2(0-1.2)	0	0.0(0-0)	28	**2.0(1.3-3.1)**
Total	566		581		562		1914	

- Safely managed = Use of improved facilities that are not shared with other households and where excreta are safely disposed of in situ or removed and treated offsite
- Basic = Use of improved facilities which are not shared with other households
- Limited = Use of improved facilities shared between two or more households
- Unimproved = Use of pit latrines without a slab or platform, hanging latrines or bucket latrines
- Open defecation= Disposal of human feces in fields, forests, bushes, open bodies of water, beaches and other open spaces or with solid waste

Key WASH Results- Handwashing facilities

Supplies	Magharibi A N	Weighted estimates % (95% CI)	Magharibi B N	Weighted estimates % (95% CI)	Mjini N	Weighted estimates % (95% CI)	Total (67 clusters)	Total Weighted estimates % (95% CI)
both water and soap available	371	65.5(58-72.4)	320	55.1(49.5-60.5)	362	64.4(57-71.2)	1130	57.1(53.5-60.5)
neither soap or water available	122	21.6(15.5-29.1)	141	24.3(17.9-32)	125	22.2(16-30.1)	476	25.9(21.8-30.5)
soap only available	8	1.4(0.6-3.2)	9	1.5(0.7-3.4)	7	1.2(0.5-3.1)	27	1.4(0.8-2.3)
water only available	65	11.5(7.6-16.9)	111	19.1(13.7-26)	68	12.1(9.1-15.9)	281	15.6(12.6-19.1)
Total	566		581		562		1914	

Key WASH Results- Handwashing facilities

Handwashing	Magharibi A		Magharibi B		Mjini		Total (all districts)	
	n	Weighted estimates % (95% CI)	n	Weighted estimates % (95% CI)	n	Weighted estimates % (95% CI)	n	Total Weighted estimates % (95% CI)
Basic	362	64(56.3-70.9)	301	51.8(46.1-57.5)	354	63(55.3-70.1)	1088	**54.6(51-58.2)**
Limited	79	14(9.8-19.5)	130	22.4(18.5-26.8)	87	15.5(11.4-20.7)	322	**17.3(14.8-20.1)**
No facility	125	22.1(16.4-29)	150	25.8(19.7-33)	121	21.5(15-29.9)	504	**28.1(24.3-32.2)**
Total	566		581		562		1914	

- Basic = Availability of a handwashing facility with soap and water at home
- Limited = Availability of a handwashing facility lacking soap and/or water at home
- No facility = No handwashing facility on premises

Summary

- WASH coverage relatively high
  - Access to Basic+ or Safely Managed was 36.7% and basic water was 56.3%
  - Access to treated water was low
  - Access to basic sanitation was 74.6%
  - Access to basic handwashing facilities was 54.6%

Lessons Learned

- WASH coverage survey can be easily added on to a planned OCV coverage survey
  - Add WASH specific questions
  - Add water quality testing
- Can oversample if you want district level estimates that are not generated by the OCV survey alone
  - Zanzibar – increased sample size from 1200 to 1900 to get 3 district level estimates in addition to overall WASH coverage estimate
- Can be cost effective to add WASH to OCV survey

Lessons Learned

- **However:**
  - We can’t select exactly where we collect data from as the sampling frame is the target population for the OCV campaign
    - In Zanzibar, we needed to oversample to get WASH estimates in certain areas
    - Oversampling for WASH estimates can be complicated if hotspot sizes are small (Zanzibar hotspots were at Admin level 3)
  - Timing is dependent on OCV coverage survey

Future considerations

- Should there be one WASH baseline per hotspot or can nearby hotspots be merged for baselines?
  - Example: according to hotspot mapping Harare, Zimbabwe has 8 tier 1 high risk hotspots. Should each hotspot have its own baseline or can they be merged?
- Can these general WASH estimates be used to prioritize specific WASH interventions in cholera hotspots?
  - Can we use baseline results for a costed WASH plan?
- **Next Steps**:
  - Pilot one stand-alone baseline without OCV survey
  - Pilot one more baseline with an OCV survey

Baseline Methodology (No OCV campaign)

- **Cholera hotspot(s) with no planned OCV campaigns**
  - Use standard WASH questionnaire
    - Test stored household water for FRC
  - Use representative sampling methodology
    - Simple random sample (smaller hotspots)
      - Assumptions: 80% power, 95% CIs, 10% non-response, proportion 50%
      - Sample size: 430 households is powered to make an estimate and detect at least a 10% difference between survey rounds
    - Multi-stage cluster survey (larger hot spots)
      - Assumptions: Default design effect of 1.5, 80% power, 95% CIs, 10% non-response, proportion 50%
      - Sample size: 698 households is powered to make an estimate and detect at least a 10% difference between survey rounds
  - Water quality samples taken from a proportion of households and water sources of those households for microbiological testing

Thank you

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Reported water treatment

- 38.7% (CI: 34.6-43.0%) reported treating water at household level
- Reported methods used
  - Boiling - 55.2% (CI: 47.6-62.6%)
  - Aquatabs- 34.2% (CI:27.3-41.8%)