

## Prevention Of an Outbreak of Cholera Among immigrant's People Living In Khartoum City 2025

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### ABSTRACT

**Background:** Cholera is an acute bacterial epidemic infectious disease which characterized by severe sudden onset, profuse painless watery stool. It is an epidemic infection which consider as is a major global health challenge affecting many parts of the world and cholera epidemics often coincide with armed conflict and humanitarian crises. Quick access to treatment is crucial. Investigators estimated that about 1.3 to 4.0 million cases and 21 000 to 143 000 deaths from cholera throughout the world each year.

**Methods:** This is exploratory descriptive cross-sectional study which conducted in Omdurman city study was conducted in May 2025. sample were 250 among general population selected randomly questionnaire consist of four parts regard knowledge, attitude and practice regard prevention of cholera infection The data were self-administered questionnaire. analysed using descriptive statistics (frequency and percent ,Mean and SD) and Inferential analysis included independent t-tests for comparing two groups and a statistical significance for correlation using chi squire of  $p < 0.00$ .

**Results:** The study, male 183(73.2%) and female 67(26.8%)with a mean age and SD of 1.6320.48323. The mean knowledge score was 229 (91.6%) considered as poor knowledge, and significant knowledge gaps in recognizing definitions and the route of transmission, The mean attitude score was 149 (59.6%)which considered as positive attitude. The practices score was good which is , 155(62.0 which considered as positive practice in preventive measures such as washing hands pre and after eating and after using toilet and also using safe water in drinking .the analysis showed significant associations, with social data with attitude and practice p value .000 while insignifant correlation with knowledge.025 specifically with the residence.

**Conclusion:** From study we concluded that From the results we conclude that our participants showed poor knowledge regard cholera infection while they report good practice and positive attitude .

**Recommendation:** From the results the researcher suggested that attitude and practice were not enough to prevent cholera infection but they need to conduct health education program to increase their knowledge so that can remove the gap of knowledge.

**Keywords:** *outbreak and prevention of cholera, population, Omdurman city*

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## 1. INTRODUCTION AND BACKGROUND:

Cholera is an acute bacterial epidemic infectious disease which is characterized by severe sudden onset, profuse, painless watery stool (Wahid T, et al., 2013).

It is an epidemic infection which is considered a major global health challenge affecting many parts of the world and cholera epidemics often coincide with armed conflict and humanitarian crises (Ingelbeen B, et al., 2019).

The disease is characterized by severe diarrhea that can cause death within a few hours if not cured and replace the lost fluid. Quick access to treatment is crucial. Investigators estimate that there are about 1.3 to 4.0 million cases and a sharp increase in the percent of deaths from cholera worldwide each year (Ali M, et al. (2015). WHO reported 2023, 535, 321 cases and 4007 deaths. The number of cases has continued to rise in recent years. There was 2023 in the world facing outbreak of cholera from 45 countries. Sudan is one of these countries, which is seen in a report by WHO (Cholera Annual Report 2023).

The last report for UNICEF in 2025 More than 7,700 cholera cases - including over 1,000 cases in children under the age of five - and in Khartoum State 185 associated deaths have been seen in the UNICEF report since January 2025, according to health authorities. UNICEF and the minister of health work as a team to control the spread of the deadly disease and promote lives. Since the beginning of physical force and aggression, more than 3 million people have been forced to escape and leave their homes in Khartoum State and the vigor has raised the lives of millions. More than 34,000 have become accessed to the outbreak of the infection, people have returned to Khartoum State since the beginning of 2025. Their homes were damaged and services regarding the use of curtailed water and safe sanitation are extensively in excess. From all these, there were about one million children facing the outbreak of cholera across Khartoum State (UNICEF report.2025).

Sudan and Khartoum have been affected by cholera so many times, but the conflict has clearly compromised basic infrastructure, and this sudden rise in cholera cases is definitely one of the consequences of the war. There are so many causes of the continuing outbreak of cholera, like the difficulty with access to safe drinkable water. Due to carbon aggression on power plants in Omdurman, in the station where the water was treated, there was no electricity that provided clean water from the Nile. While people in southern Khartoum and Jabal Awliya localities are forbidden from accessing drinkable water and electricity, it explains why these are some of the heavily affected areas. The needs in Khartoum remain immense. The recent outbreak of cholera in Khartoum state is facing people still living there or returning from other parts of the country," access facilitated and medical care protected to ensure that all those who need it, in Khartoum and in the other parts of Sudan, can access healthcare." (Slaymen Ammar, 2025)

Cholera is caused by the Gram-negative bacterium *Vibrio cholera* and transmitted via the fecal-oral route through contaminated water or food, and is a highly virulent diarrheal disease primarily linked to serogroups O1 and O139 (Momba M, etal. 2017)

Cholera can be caused by many risk factors and the literature exhibits that water-source contamination (29%), rainfall and flooding (25%), rainfall and flooding (25%), and refugee settings (13%) are the most common risk factors for cholera globally (Msyamboza KP, et al. 2014). The manifestation and acuteness of cholera outbreaks is mostly increased by misconceptions of behavior about practicing healthy hygiene and sanitation (Griffith DC, et al. (2006). Transmission of cholera. It has so many ways that can be transmitted to people.

The disease can be transmitted by two routes, basic transmission from water circumstance and secondary transmission from infected peoples, with outbreaks and epidemics in endemic areas. The polluted water is considered as being the main vehicle in endemic regions, while primary transmission is often obtained from undercooked seafood. The infective dose depends on individual vulnerability, with higher doses required for healthy individuals, while lower doses affect those with those who have low gastric acid protection or poor health (Alqato S, Fadhl H N, Al-Bawah N, et al. (February 12, 2025). Outbreaks of cholera have frequently appeared

Among displaced people (refugees) who flee from their homes and sometimes cause dangerous public health problems for residents of the hosting countries. In addition to escaping from civil conflicts and natural (Swad diwudhipong W, et al. (2008). Some research conducted elsewhere has reported that factors such as absolute poverty, adult illiteracy, utilization of unimproved water sources, inadequate water treatment methods, open defecation, suboptimal food preservation techniques and participation in social or commercial mass gatherings can play a pivotal role in the persistence of cholera (Blake A, Keita VS, Sauvageot D, et al .2012)

Migrants are different and migration arrangements and pathways are varied and complex. Therefore, a lifecycle approach and epigenetics at the individual level must be considered. Forced excommunication has become one of the most significant challenges facing the world. According to the latest statistics (Duany, G. (2015)

For signs and symptoms, patients with cholera infections may present with profuse diarrhea and vomiting of clear fluid. These symptoms usually start suddenly, half a day to five days after ingestion of the bacteria (Mutreja A., 2020). Shock and severe Shock and severe dehydration are the most devastating complications of cholera, other problems can occur, such as hypoglycemia (Martin et al., 2012). The spread of cholera is increased by pauper decontamination, like contaminated food, and water. As result of all this deficit knowledge, a negative attitude, and bad living practices. All these scenarios are common in overcrowded areas (Wahed et al., 2013).

Those who work in the clinical field (healthcare workers) and others who regularly interact with vulnerable populations know very well the best practices for the way of disease prevention. They can teach individuals how to care for themselves, keep their families safe and prevent diseases from spreading. Some campaigns need to receive the knowledge and skills of public health nurses extensively (CDC, 2016).

Nurses play an important role in educating people about the risk factors and early recognition of signs of a cholera outbreak and encourage women to be regularly taught best practice for disease prevention. This can be achieved by conducting additional educational programs for nurses who are considered to play a vital role in the healthcare delivery system (WHO, (2017a).

To prevent the outbreak of cholera, we need to: increase funding for water and sanitation activities; increase investments in clean water and sanitation infrastructure; enhance epidemiological and biological surveillance, e.g., mapping cholera hotspots; improve access to timely treatment; strengthen cross-border surveillance; promote community engagement and use of Oral Cholera Vaccine in addition migration health involves the quick action from public health so that can prevent, detect and respond to health challenges in the context of human mobility. It also includes the recognition of identifying and primary public health measures that need to be strengthened (WHO (2017b). To focus on cholera preventions among people in the outbreak area of cholera, the study was conducted to assess the knowledge attitude and practice regarding outbreaks of cholera and its prevention in people living in Khartoum state and find any correlation of their social data with knowledge attitude and practice regard cholera

Research questions:

1What is people level of knowledge regard cholera?

2What is people level of attitude regard cholera?

3 What is people level of practice regard cholera?

4 is there any correlation between their knowledge attitude and practice with their social data?

## 2. METHODS:

This is an exploratory cross-sectional community-based study.

Study area:

The study was conducted in Khartoum state in 2025.

Study setting:

The study was done in Khartoum state in Omdurman city in 2025.

Duration of study:

The data collected between April 2025 to May 2025

Study population:

All male and female, immigrants and residence in Omdurman since the beginning of 2025

Accept to participate in the study

Exclusion criteria:

Those who refused to participate in the study

Not available at the time of data collection

Sample size and sampling procedures

An exploratory cross-sectional study was between April 2025 to May 2025. The sample size is measured according to the formula:

$$N = Z^2 \times p \times d^2 (1-p)$$

Where N is the sample size;  $Z=1.96$  at a 5% level of significance;  $p=0.5$  is the sample proportion which provides the maximum sample size; and  $d$  is the margin of error taken as 5%. Accordingly, the minimum sample size required for this study was calculated to be 250. A 15% non-compliance rate was then estimated, resulting in a sample size of 250.

(2013) Albitar L, et al. (2023). The questionnaire was previously tested for clarity, accuracy, and face validity by previous researchers from a similar study in Syria.

Sample size 250, which is selected randomly.

Data collection:

Data collected according to a structure questionnaire used by (Halbesleben JRB, Whitman MV (2013), modified to be suitable for our culture and participants and translated into Arabic. This questionnaire consists of four parts: socio-demographic characteristics (age, Gender education

Status and residence) and the second part (25) are questions related to knowledge of cholera infection definitions and transmissions and risk factors and causes and signs and symptoms and treatment and preventions. The third part about the attitude regarding cholera infection are (11) questions. The fourth part of the practice regards the prevention of cholera.

Data analysis :used descriptive statistics (frequency, percent, mean and SD, and we divided the knowledge answers into yes, which is a score of (2) for every correct answer and (1) for the wrong answer and (0) to don't know the total score is (50) for the right answer, and consider 80%-7-% as good knowledge while less than 70% as poor knowledge.

Regard attitude using descriptive statistics (frequency, percent, mean and SD and, we have (11) questions divided as agree which given (2) and disagree (1) and neutral (0). The total score is (22), and consider 80%-7-% as a positive attitude, while less than 70% as a poor attitude.

Regardless, practice also uses descriptive statistics (frequency, percent, mean and SD, and we have (17) questions divided into (2) for yes and (1) for no and (0) for not decided. The total score is (34), and I consider 80%-7-% as good practice, while less than 70% as poor practice.

Finally, we analyzed the correlations of our participant's social data with their knowledge, attitude and practice using chi square and considered  $p$  value .0001 as significant correlations.

Ethical approval:

Before starting the study, ethical approval was obtained. Verbal consent was taken from the participants after explaining the purpose of the study and explained that it has no risks to them, and they have the right to withdraw from the study at any time without giving any reasons.

### 3. RESULTS:

This is a descriptive community-based study which was carried out in Omdurman city among the general population living in their homes and camps.

In table (1) of the results, we found that 183 (73.2%) are males, 92(36.8%) and 67(26.8 %) are females; their ages between (20–35 years) are

92(36.8%) and 158(63.2%) their age. More than most of them live in camps 183(73.2%) and the rest of them live in their home 67(26.8%).

Also, from the results, we found that most of them are illiterate. 205(82.0%)

We used one sample test to compare means (1.6320 SD.48323) (mean1.2680 SD.44381) (Mean 1.2560, SD.43730) respectively.

Table (2) showed that most of the participants answered by no to the question regarding that is definition of cholera, and the route of transmission or what can transmit the infection 155(62%) 157(62.8%), 200(80%) 158(63.2%) respectively, and when asked them if lack of safe drinking-water, or drinking of polluted water or eating rotten food/lack of food protection against contamination/if the food has not been covered up most of the answered by no 169(67.6%) 156(62.4%) respectively, while 163(65.2%) cholera Affected by cholera germ

In the same table, we asked participants about the signs and symptoms of cholera infections. Most of them know the signs and symptoms. Also, they know very well that cholera is prevented by vaccination. Their mean knowledge is poor, which represents less than 70% 229(91.6%), while the rest is good. The mean and SD and P values are 1.92 .278 .971, respectively.

Table (3) represents the responses of the participants' attitudes. When asked them if they agree that cholera can be contagious or fatal, their response they agree 219(87.6%) and 149(59.6%) respectively.

Also, they agreed that traveling to an area that has an outbreak of cholera can make you contract the disease. 182(72.8%) while 44(17.6%) do not decide.

Again, we asked them if habits of eating in groups observed in families may promote the spread of cholera and poor hand-washing habits in restaurants will promote the spread of cholera. They agreed by 170(68%) and 174(69.6%) respectively. The rest of the questions shown in table (3) their mean attitude is good. Half of them reported a positive attitude. 149(59.6%) regarding their mean SD and P value attitudes were 1.40, .492, .000 respectively.

Table (4) showed the responses of participants practicing regarding the prevention of cholera infections when they asked them if they go to hospital to treat them if they suspect they have cholera. They behave when there is an outbreak of cholera infection. 122(48.8%) always go while 92(36.8%) never go and the rest are not decided. We asked them if they are seeking traditional medicine to treat or if they suspect you have cholera. Their responses were 174(69.6%) always seeking traditional treatment and 152(60.8%) when they were suspected to have cholera. They also asked them regarding washing their hands before and after taking food and washing them with soap and water after defecation. They always do this: 154(61.6%), 179(71.6%) and 167(66.8%) respectively.

On the other hand, we asked them where to collect their rubbish. They reported that they always collect the rubbish and do not throw it in the wrong place. 170(68%)

The mean practice was good. From the results, we found that 155 (62%) have good practice while the rest have poor practice, and there is significant correlation between their sociodemographic data (age, gender, residence and education with practice and attitude, while insignificant correlations with knowledge as in table (5).

**Table (1) Socio demographic data of participants (n=250)**

variable	frequency	Percent (%)	Mean	SD
Age				
20-35	92	36.8	1.6320	.48323
More than 35	158	63.2		
Gender				
male	183	73.2		
female	67	26.8		
Residence				
camp	183	73.2	1.2680	.44381
home	67	26.8		
Family members				
3-6	186	74.4	1.2560	.43730
More than 6	64	25.6		
Marital status				
Married	74	29.6	2.2160	.99059
single	75	30.0		
divorced	74	29.6		
widowed	27	10.8		
Education status				

illiterate	205	82.0	1.1800	.38496
illiterate	45	18.0		

**Table (2) participants response knowledge towards cholera and its prevention (n=250)**

item	yes	no	I don't know
Cholera is Watery stool with or without vomiting	41(16.4%)	155(62%)	41(16.4%)
cholera spread by contaminated water	69(27.6%)	157(62.8%)	24(9.6%)
cholera spread by contaminated food	29(11.6%)	200(80%)	21(8.4%)
cholera spread by flies& Mosquitoes	92(36.8%)	158(63.2%)	0
cholera spread by poor hygiene	69(27.6%)	147(58.8%)	34(13.6%)
cholera spread by poor sanitation	70(28%)	156(62.4%)	24(9.6%)
Lack of safe drinking-water, or drinking of polluted water	57(22.8%)	169(67.6%)	24(9.6%)
Eating rotten food/lack of food protection against contamination/if the food has not been covered up	94(37.6%)	156(62.4%)	0
Cholera Affected by cholera germ	163(65.2%)	66(26.4%)	21(8.4%)
Signs and symptoms of cholera			
Severe diarrhea	219(87.6%)	20(8%)	11(4.4%)
Severe vomiting	166(66.4%)	48(19.2%)	36(14.4%)
Excessive thirst	128(51.2%)	65(26%)	57(22.8%)
Low blood circulation	134(53.6%)	89(35.6%)	27(10.8%)
Anuria	158(63.2%)	32(12.8%)	60(24%)
Type of cholera management/ORS			
Rice saline	140(56%)	50(20%)	60(24%)
Diarrhea treatment center, hospital and clinic	143(57.2%)	61(24.4%)	46(18.4%)
ORS	199(79.6%)	40(16%)	11(4.4%)
cholera Prevented by			
Use of potable water	155(62%)	35(14%)	60(24%)
Adequate sanitation Health education	146(58.4%)	46(18.4%)	58(23.2%)
Food safety	155(62%)	45(18%)	50(20%)
Basic hygiene practices	186(74.4%)	24(9.6%)	40(16%)
Use of safe water	194(77.6%)	20(8%)	36(14.4%)
Cholera Vaccination			
Cholera vaccine is important in case of epidemic	219(87.6%)	20(8%)	11(4.4%)
Cholera control and reduce by vaccine.	194(77.6%)	20(8%)	36(14.4%)
Oral vaccine divided to two doses	170(68%)	20(8%)	60(24%)
Mean knowledge	Frequency		percent



Good knowledge 80%-70%	21	8.4
Poor knowledge less than 70%	229	91.6

**Table (2) participants response attitude towards cholera and its prevention (n=250)**

item	agree	disagree	Not decided
Cholera can be contagious	219(87.6%)	20(8%)	11(4.4%)
Cholera can be fatal	149(59.6%)	54(21.7%)	48(19.2%)
spread of cholera can be prevented	162(64.8%)	40(16%)	48(19.2%)
travelling to an area having an outbreak of cholera can make you contract the disease	182(72.8%)	24(9.6%)	44(17.6%)
Cultural practice may encourage or influence the spread of cholera	162(64.8%)	20(8%)	68(27.2%)
habits of eating in groups observed in families may promote the spread of cholera	170(68%)	40(16%)	40(16%)
Drinking from local road will encourage the spread of cholera	158(63.2%)	56(22.4%)	36(14.4%)
poor hand washing habits in restaurants will promote the spread of cholera	174(69.6%)	36(14.4%)	40(16%)
Unhygienic circumstance surrounding Khartoum state will encourage the spread of cholera	219(87.6%)	20(8%)	11(4.4%)
Inappropriate use of latrines will encourage the spread of cholera	194(77.6%)	40(16%)	16(6.4%)
the presence of animal feces and the practice of setting in the sand will encourage spread of cholera	152(60.8%)	38(15.2%)	60(24%)
Mean attitude	Frequency		percent
Positive attitude 80%-70%	149		59.6
Poor attitude less than 70%	101		40.4

**Table (3) participants response practice towards cholera and its prevention (n=250)**

items	always	sometimes	never
you go to hospital to treat yourself if you suspect you have cholera	122(48.8%)	92(36.8%)	36(14.4%)
you seeking traditional medicine to treat yourself if you suspect you have cholera	174(69.6%)	45(18%)	31(12.4%)
drink chlorinated water or boiling water only	152(60.8%)	60(24%)	38(15.2%)
Store water in clean and airtight bottles	162(64.8%)	46(18.8%)	42(16.8%)
Do not eat foods from public places	128(51.2%)	78(31.2%)	44(17.6%)
Hands should be washed with soap and water after defecation	119(47.6%)	91(36.4%)	40(16%)
Indiscriminate passing of stool can cause disease	167(66.8%)	32(12.8%)	51(20.5%)

Hands should be washed before taking food	154(61.6%)	75(30%)	21(8.4%)
washing hands before eating and after using the toilet	179(71.6%)	52(20(8%)	19(7.6%)
Cholera also affects children	194(78%)	20.(8%)	35(14%)
Cholera also affects adults	219(87.6%)	20. (8%)	11(4.4%)
cholera is sever health problem lead to death	154(61.6%)	49(19.6%)	47(18.8%)
cholera can be prevented by vaccine	180(64%)	20. (8%)	70(28%)
Hands should be washed with soap and water after defecation	160(64%)	28(11.2%)	62(24.8%)
Hands should be washed before taking food	219(87.6%)	20(8%)	11(4.4%)
washing hands before eating and after using the toilet	165(66%)	40(16%)	45(18%)
Collect the rubbish and do not throw it in the wrong place	170(68%)	45(18%)	35(14%)
Mean practice	Frequency		percent
Positive practice 80%-70%	155		62.0
Poor practice less than 70%	95		38.0

**Table (4) Mean, SD and p value for participants knowledge, attitude and practice**

item	Mean	SD	P value
Knowledge	1.92	.278	.971
Attitude	1.40	.492	.000
Practice	2.13	.986	.000

**Table (5) correlation between knowledge attitude and practice of participants with their social data**

item	Social data	P value
Knowledge	Age	.265
	gender	.119
	education	.235
	residence	.025
Attitude	Age	.000
	gender	.000
	education	.000
	residence	.000
practice	Age	.000
	gender	.000
	education	.060
	residence	.000



#### 4. DISCUSSION:

This is a descriptive community-based study done among the general population living in Omdurman during the outbreak of cholera. Most of them were aged more than 35 years and most of them were male, and they were illiterate, while most of them lived in camps. This comes in the same line with study done by TANZNIA where their participants aged between 30–44 years 101 (91.8%) and are also similar to the people who live in campaign and 15 (93.8%). Incomplete pr. educ. (Mpazi, V.M. & Mnyika, K.S. (2005).

Regarding their knowledge, our participants' responses to knowledge of cholera were low at 21 (8.4%). As expected, analysis of knowledge levels compared to socio-cultural practices and attitudes was residual above knowledge in this population. These findings are consistent with and a study from Tanzania Chae SR, Lukupulo H, Kim S, et al. (2022) revealed similar gaps in awareness about transmission routes and prevention methods. Another study done in Africa showed the level of their participants' knowledge concerning cholera was very low, which is similar to our finding, while 20 % of their attitudes regard cholera 35% of people when using unsafe water. 20% this inconsistent with our finding (Prüss-Ustün A, Wolf J, Bartram J, et al (2019)

Also, the results of knowledge in this study came in same line with study done in Daka city, where the mean score of knowledge regarding diarrheal disease is 23%, which is poor (Wahid T, et al. 2013). Regarding our participants' attitude, we found they had a positive attitude that came harmonious.

With studies done in Tanzania, where their results showed positive attitudes (97.4%)(Mpazi, V.M. & Mnyika, K.S. (2005).) While inconsistent with studies done in Central Africa, their results were not consistent, which revealed negative beliefs towards cholera (Nsungu M, et al. (1996). In the Yemen study done among medical students which showed that their participants reported poor preventive behavior towards cholera prevention, with fewer than 20% identifying all basic measures, such as drinking clean water (bottled or previously boiled) or washing hands with soap well and frequently. This is inconsistent with our participants' responses, which showed good practice regarding cholera prevention, although most of them were illiterate (Alqato S, Fadhl H N, Al-Bawah N, et al. (February 12, 2025).

Again, our finding is similar to Al-Diwania province (Fatima A Alkhaledi (2016). Their respondents showed good practice regarding using safe water and proper sanitation 95.6%, and practice-based hygiene 88.9 % and health education 93.3% and also agree with study done in Dhaka, Bangladesh (Wahid T, et al., 2013). Where their participants had more positive practice regarding cholera prevention.

Finally, our participants' responses showed a significant correlation of sociodemographic data with attitude and practice, while insignificant correlation with knowledge which agrees with Wahed 2013  $p < 0.001$  [(Wahid T, et al. 2013) and disagree with study done in Yemen (Alqato S, Fadhl H N, Al-Bawah N, et al. (February 12, 2025)

#### 5. CONCLUSION AND RECOMMENDATION:

From the final results, researchers concluded that our participants' responses did not possess satisfactory knowledge regarding cholera infection, while they reported good practice and a positive attitude.

From the results, the researchers suggested that attitude and practice were not enough to prevent cholera infection, but they need to conduct a health education program to increase their knowledge so that they can remove the gap in knowledge

#### REFERENCES

- [1] . Ali M, et al (2015). PLoS Negl Trop Dis 9(6): e0003832. doi:10.1371/journal.pntd.0003832. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4455997>
- [2] Albitar L, Almasri IA: Cholera in Syria, a crisis following crises: assessment of knowledge, attitude, and practice in a cohort of Syrian population. Heliyon. 2023, 9:e18278. 10.1016/j.heliyon.2023.e18278
- [3] Alqato S, Fadhl H N, Al-Bawah N, et al. (February 12, 2025). Knowledge, Attitudes, and Practices Related to Cholera Outbreak Among Medical.Students in Yemen: A Cross-Sectional Study. Cureus 17(2): e78885. DOI 10.7759/cureus.78885
- [4] Blake A, Keita VS, Sauvageot D, et al.(2018). Temporo- spatial dynamics and behavioural patterns of 2012 cholera epidemic in the African mega- city of Conakry, Guinea. Infect Dis Poverty 7:13.
- [5] CDC (2016): Cholera—Vibrio cholerae infection | Cholera | CDC [Internet]. Available: <https://www.cdc.gov/cholera/index.htm>
- [6] Chae SR, Lukupulo H, Kim S, et al.: An assessment of household knowledge and practices during a cholera epidemic- Dar es Salaam, Tanzania, 2016. Am J Trop Med Hyg. 2022, 107:766-72. 10.4269/ajtmh.21-0597
- [7] cholera Annual Report 2023. Weekly Epidemiological Record, 9 September 2024, Vol 99 (36), (pp 481- 496). [https://cdn.who.int/media/docs/default-source/dco/wer\\_36\\_2024\\_cholera-annual-report-for-2023\\_bilingual-proof.pdf?sfvrsn=86fb1faf\\_1](https://cdn.who.int/media/docs/default-source/dco/wer_36_2024_cholera-annual-report-for-2023_bilingual-proof.pdf?sfvrsn=86fb1faf_1)

- [8] [https://doi.org/10.1016/s0921-8009\(02\)00029-0](https://doi.org/10.1016/s0921-8009(02)00029-0)
- [9] Duany, G. (2015) Sudanese Lost Boy to Promote Refugee Cause as UNHCR High Profile Supporter. <https://www.unhcr.org/news/stories/sudanese-lost-boy-promote-refugee-cause-unhcr-high-profile-supporter>
- [10] Fatima A Alkhaledi. (2016). Knowledge, attitude and Practice on cholera epidemic in AL-Diwaniya Province. *Al-qadisiya Medical journal*. 12; 22.
- [11] Griffith DC, et al. (2006). Review of reported cholera outbreaks worldwide, 1995-2005. *Am J Trop Med Hyg*. Nov; 75(5):973-7. PMID: 17123999.
- [12] -Martin S., Costa A., &Perea W.,(2012) : Stockpiling oral cholera vaccine. *Bull World Health Organ.*;90(10):714.
- [13] Meftahuddin T. Review of the trends and causes of food born outbreaks in Malaysia from 1988 to1997. 2002 Mar; 57(1): 70-9
- [14] Momba M, etal . 2017) .*Vibrio cholerae* and Cholera biotypes. In *Water and Sanitation for the 21st Century: Health and Microbiological Aspects of Excreta and Wastewater Management*. Rose JB, Jiménez-Cisneros B, editors. Global Water Pathogen Project; Michigan State University: East Lansing, MI, USA.
- [15] Mutreja A., (2020): Evidence for several waves of global transmission in the seventh cholera pandemic. *Nature* 477, 462–465
- [16] Msyamboza KP, et al (2014). Cholera outbreaks in Malawi in 1998-2012: social and cultural challenges in prevention and control. *J Infect Dev Ctries*. Jun 11;8(6):720-6. doi: 10.3855/jidc.3506. PMID: 24916870.
- [17] Mpazi, V.M. & Mnyika, K.S. (2005). Knowledge, attitudes and practices regarding cholera outbreaks in Ilala Municipality of Dar Es Salaam region, Tanzania. *East African Journal of Public Health*, 2, 6-11.
- [18] Ngelbeen B, et al.2019. Recurrent Cholera Outbreaks, Democratic Republic of the Congo, 2008-2017. *Emerg Infect Dis.*; 25(5):856-64.
- [19] Prüss-Ustün A, Wolf J, Bartram J, et al.: Burden of disease from inadequate water, sanitation and hygiene for selected adverse health outcomes: an updated analysis with a focus on low- and middle-income countries. *Int J Hyg Environ Health*. 2019, 222:765-77. 10.1016/j.ijheh.2019.05.004
- [20] Quick RE, et al(1996). Using a knowledge, attitudes and practices survey to supplement findings of an outbreak investigation: cholera prevention measures during the 1991 epidemic in Peru. *International Journal of Epidemiology*, Vol 25, 872-878,
- [21] Slaymen Ammar, MSF medical coordinator in Khartoum. | Sudan 2025 © MS Swad diwudhipong W, et al. (2008). An outbreak of cholera among migrants living in a Thai-Myanmar border area. *J Med Assoc Thai*. Sep; 91(9):1433-40. PMID: 18843875
- [22] Unicef and World Health Organization. Progress on Sanitation and Drinking Water—2015 Update and MDG Assessment [Internet]. Geneva:WHO. 2015. p. 50. Available from: [http://files.unicef.org/publications/files/Progress\\_on\\_Sanitation\\_and\\_Drinking\\_Water\\_2015\\_Update\\_.pdf](http://files.unicef.org/publications/files/Progress_on_Sanitation_and_Drinking_Water_2015_Update_.pdf)
- [23] UNICEF report over 1 million children at risk as cholera spreads in Sudan's Khartoum State.may 2025
- [24] Wahid T, et al2013. KAP relating to cholera and oral cholera vaccine among urban high-risk groups: findings of a cross-sectional study in Dhaka Bangladesh. 10: 13-242.
- [25] WHO, (2017a): Cholera Situation in Yemen, May 2017 ,<http://applications.emro.who.int>. <https://tspace.library.utoronto.ca/handle/1807/39135>
- [26] WHO (2017b) Regional Action Agenda on Achieving the Sustainable Development Goals in the Western Pacific. WHO Regional Office for the Western Pacific..