



FIGHTING CHOLERA

OPERATIONAL HANDBOOK

Response to outbreaks and
risk prevention in endemic areas



SOLIDARITÉS
INTERNATIONAL

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THIS HANDBOOK HAS BEEN PRODUCED BY THE **TECHNICAL
AND PROGRAMME QUALITY DEPARTMENT OF SOLIDARITÉS
INTERNATIONAL.**

Graphic design by Frédéric Javelaud

Email: technicaldepartment@solidarites.org.

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Email : technicaldepartment@solidarites.org.

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The appendices of this technical handbook are available on the Intranet of SOLIDARITÉS INTERNATIONAL or on request from the Deputy Direction of Operations for Programmes: technicaldepartment@solidarites.org

You can also find many tools and lessons learned documents on the Intranet.

LIST OF ACRONYMS

BCZ	BUREAU CENTRAL DE ZONE DE SANTÉ (CENTRAL OFFICE OF A HEALTH ZONE)
CTC	CHOLERA TREATMENT CENTRE
CTU	CHOLERA TREATMENT UNIT
FRC	FREE RESIDUAL CHLORINE
ORS	ORAL REHYDRATION SOLUTION
SI	SOLIDARITÉS INTERNATIONAL
SOP	STANDARD OPERATIONAL PROCEDURES
WaSH	WATER, SANITATION AND HYGIENE
WHO	WORLD HEALTH ORGANISATION



SOLIDARITÉS INTERNATIONAL TOOL



BIBLIOGRAPHY



AVAILABLE ON THE INTRANET



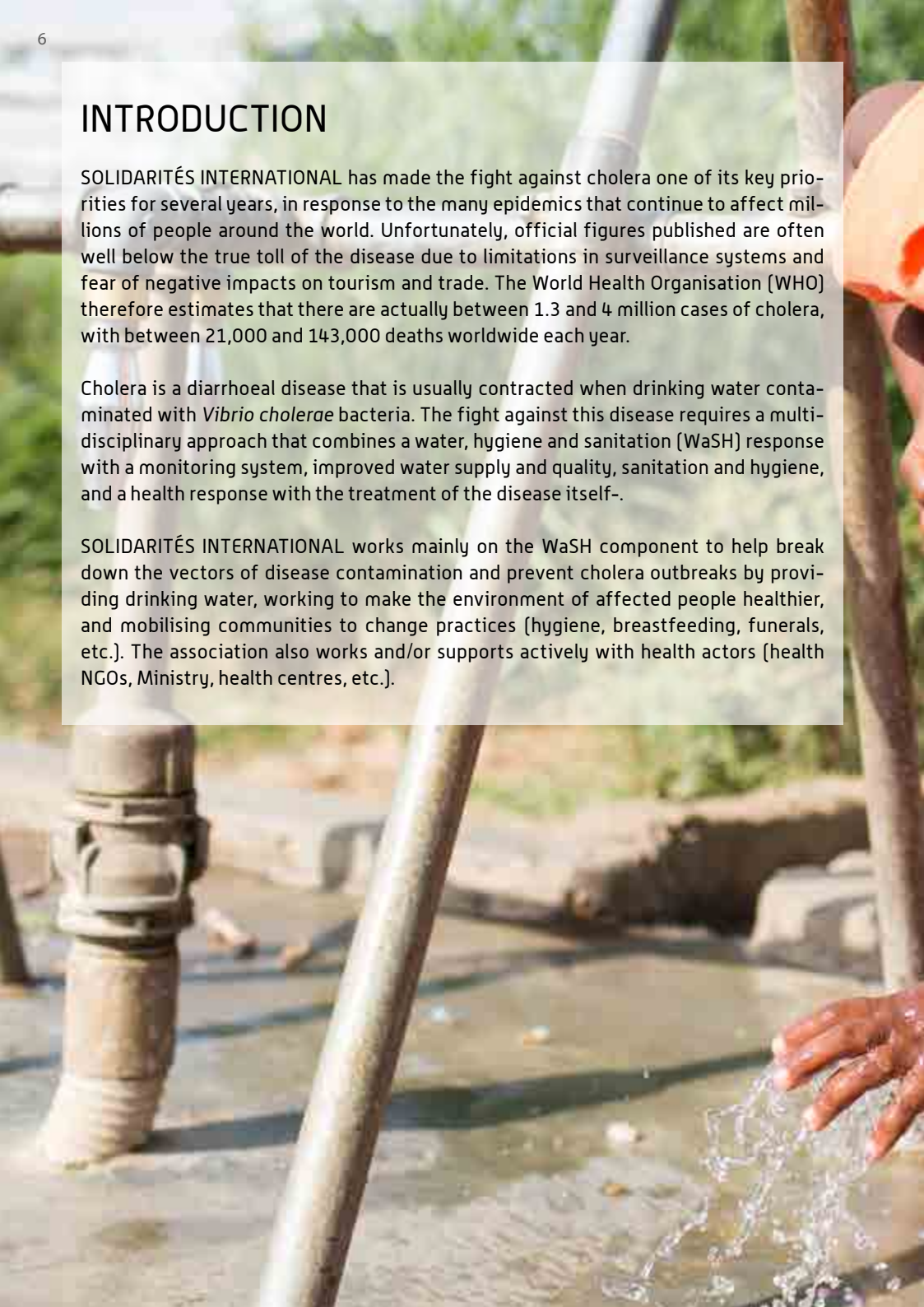
IMPORTANT

INTRODUCTION

SOLIDARITÉS INTERNACIONAL has made the fight against cholera one of its key priorities for several years, in response to the many epidemics that continue to affect millions of people around the world. Unfortunately, official figures published are often well below the true toll of the disease due to limitations in surveillance systems and fear of negative impacts on tourism and trade. The World Health Organisation (WHO) therefore estimates that there are actually between 1.3 and 4 million cases of cholera, with between 21,000 and 143,000 deaths worldwide each year.

Cholera is a diarrhoeal disease that is usually contracted when drinking water contaminated with *Vibrio cholerae* bacteria. The fight against this disease requires a multi-disciplinary approach that combines a water, hygiene and sanitation (WaSH) response with a monitoring system, improved water supply and quality, sanitation and hygiene, and a health response with the treatment of the disease itself-.

SOLIDARITÉS INTERNACIONAL works mainly on the WaSH component to help break down the vectors of disease contamination and prevent cholera outbreaks by providing drinking water, working to make the environment of affected people healthier, and mobilising communities to change practices (hygiene, breastfeeding, funerals, etc.). The association also works and/or supports actively with health actors (health NGOs, Ministry, health centres, etc.).



SCOPE

The purpose of this operational manual is to help missions improve their WaSH response strategies in the context of recurrent outbreaks.

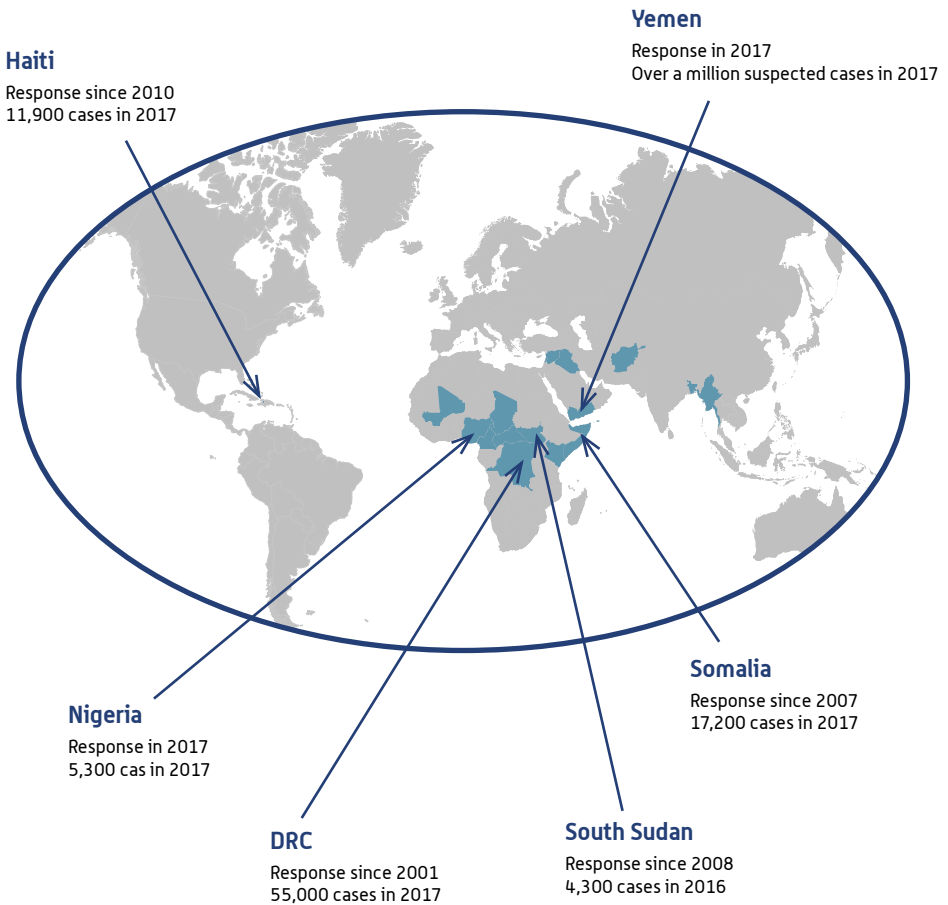
It contains key elements to guide teams in setting up cholera epidemic response and disease prevention programmes in endemo-epidemic areas.

This guide is based on the experience of SOLIDARITÉS INTERNATIONALE. It is complemented by a reference bibliography in the field of cholera control and prevention and, more generally, diarrhoeal diseases. It consists of 3 parts:

1. General information on cholera
2. Before and between epidemics
3. Response to cholera epidemics

This handbook is not intended to replace other existing handbooks, such as those of UNICEF or ACF, but sheds light on the fight against cholera by SOLIDARITÉS INTERNATIONALE and the methodological elements promoted and implemented by the organisation. It provides lessons learned from SOLIDARITÉS INTERNATIONALE past experiences in this field, as well as other related advice.

Below is the list of countries in which SOLIDARITÉS INTERNATIONALE has been fighting cholera in recent years, either through rapid responses or through prevention and preparedness.



GENERAL INFORMATION ON CHOLERA

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A - DEFINITIONS AND BASIC EPIDEMIOLOGICAL CONCEPTS

► Case fatality rate

Ratio between the number of deaths caused by a disease over a given period and the number of people with the disease over the same period. This ratio is usually expressed as a percentage. This rate describes the severity of an outbreak and provides information of adequate case management and access to treatment. Like the incidence, in case of an epidemic outbreak, the Case Fatality Ratio can be expressed over a short period (daily / weekly), and as a cumulative measure (over a year, or since the beginning of the outbreak).

$$\text{CFR} = \frac{\text{Number of deaths caused by a disease during the period}}{\text{Number of new cases reported during the same period}} \times 100$$

In the event of a cholera epidemic, the Case Fatality Ratio can rapidly be reduced to below 1% through quality case management. Case Fatality ratio is usually high at the onset of the epidemic when care centers and alert mechanisms are not yet activated.

A distinction must be made between **hospital and community fatality**. The former refers to individuals who died while receiving medical care, thus providing information on the quality of care. The latter corresponds to deaths in the communities, so it refers to the persons with the disease who have not been able (distance, access, resources) or unwilling (beliefs, habits) to go to the health centres. The latter is often underestimated and lacks precision. It is therefore important to try to measure it during preventative responses and discuss it at coordination meetings with health actors.

► Endemic

Persistence of a particular human disease or of its specific pathogen in a given region or zone that is continuously present or fluctuates; for cholera, the WHO considers countries notifying cases over three of the last five years as endemic.

► Epidemic

Exceptionally fast rise and spread of the number of cases of a human disease (usually contagious) in a given zone or region over a limited period of time; for cholera, an epidemic is declared when the disease arises suddenly and is difficult to predict in space and time.

► Epidemiology

A scientific discipline studying the various factors influencing the emergence, frequency, transmission pathways and evolution of diseases affecting a certain group of individuals. Originally, the term

“epidemiology” only means “epidemic science”. Today, the original meaning of this term only constitutes a small part of modern epidemiology. The study of the distribution and determinants of health events is a founding base behind the interventions launched in the interest of public health and preventive medicine. Epidemiologists’ approaches are varied: they span from the “field” to the research front and the fight against disease emergence through modelling and surveillance

► Incidence

Number of new cases of disease that have appeared over a given period of time (day, week, month or year). The incidence risk is the ratio between the number of new disease cases over a given period (numerator) and the number of individual at risk of contracting the disease over this same period (denominator). The incidence risk can be expressed per 100, 1,000, 10,000 or per 100,000 persons at risk, depending on the disease frequency in the population. This morbidity indicator provides information on the rapidity of the spread of the disease within the population. Attention should be made not to confuse incidence and prevalence.

For cholera, incidence risk is commonly measured in two ways:

- **Daily or weekly Incidence Risk (IR, per 1,000 persons (ou 100)**

$$IR = \frac{\text{Number of new cases in one day (or one week)}}{\text{Population exposed to cholera during that day (or week)}} \times 1\,000 \text{ (ou 100)}$$

To monitor the course of a cholera outbreak, daily incidence is used initially, followed by weekly incidence when the outbreak has stabilized. Incidence risks can be compared between groups and with other areas since the incidence is adjusted by the population size, and is therefore a key indicator to prioritize areas of interventions.

- **Attack rate (AR) or Cumulative Incidence (CI)**

It indicates the impact of an epidemic on the population over a longer period of time, such as 1 year, or the whole duration of the epidemic. The AR (CI) is usually expressed as a percentage and can be calculated by age, sex and area.

$$AR = \frac{\text{Number of new cases during the year (or since the beginning of the epidemic)}}{\text{Population exposée au risque de choléra pendant cette période (1 jour ou 1 semaine)}} \times 100$$

(or CI)

During inter-epidemic periods, knowing the evolution of ARs (or CIs) in a given area helps to dimension contingency stocks. In rural settings, the AR is normally between 0.1 and 2%, while in crowded places (e.g. urban settings, refugee camps etc), the ARs tend to be higher [2-5%]. In settings with no immunity and poor water and sanitation conditions, ARs can exceed 5%.

► Incubation period

The period between the infection of an individual by a pathogen and the manifestation of signs and symptoms of the disease. For cholera, the incubation period is particularly short, and estimated between less than one day to five days.

► Morbidity

Number of people with a given disease (cases), in a population over a specified period. Incidence (new cases) and prevalence (all cases) are two different approaches to measuring morbidity.

► Mortality rate

Estimate of the total number of deaths in a given population, over a given period of time, relative to the average total population over the same period. This ratio is calculated by dividing the number of deaths over a period of time (numerator), by the average number of people in the population (denominator). The mortality rate can be calculated for deaths in general, i.e. all-cause mortality, or for deaths due to a specific disease, i.e. cause-specific mortality. In the first case (all-cause mortality), the rate is usually expressed as the number of deaths per 1,000 persons, whereas in the second case (cause-specific mortality) depending on the disease frequency and fatality rate, it is often expressed as the number of deaths per 10,000 or 100,000 persons.

Mortality rates can be calculated on the overall population (**Crude Mortality Rate**), for specific demographic groups ie per age, gender, marital status etc (**Specific Mortality Rate**), or by adjusting the Crude Mortality Rate for variables influencing mortality, such as age, in order to account for the weight of these different groups within the overall population, to enable effective comparison of Mortality rates between different populations (**Standardised Mortality Rates**).

► Pandemic

An epidemic spreading beyond international borders – at the continent, hemisphere or global level – which can affect a very high number of people, if they are not immunised against the disease or when medicine has not developed any treatment to cure infected individuals.

► Pathogen

A disease causing agent that is foreign to the body. It can be an infectious, physical or chemical (caustic, toxic) agent.

► Prevalence

Number of people with the disease (cases) at a given time. The prevalence rate is the ratio between the number of cases at a given time (numerator) over the population from which the cases originate (denominator). This is therefore a proportion, rather than a rate, although it is sometimes referred to as a «rate». Prevalence depends on the incidence and duration of the disease, and is a good way to indicate the weight of the disease in a population, especially for chronic diseases. Because the duration of a particular episode of cholera is of short duration (only a matter of days) and because many people with cholera either are cured, or die, in such a short time, cholera prevalence is not a particularly useful indicator for describing an outbreak.

► *Vibrio cholerae*

The *Vibrio cholerae* bacterium is a gram negative bacillus shaped like a comma. It is mobile and causes cholera in humans.

Examples of indicator calculations

In a province of 300,000 inhabitants, 150 new cases of cholera were recorded between January 15 - 21 (week 3).

$$\text{Weekly IR} = 150 / 300,000 \times 1,000 = 0.5 / 1000 \text{ (or } 150 / 300,000 \times 100 = 0,05\%)$$

Among the 150 cases, 6 persons died during the same reporting week.

$$\text{CFR (week 3)} = 6 / 150 \times 100 = 4 \%$$

At the end of the epidemic, there was a total of 1,600 cholera cases and 46 deaths. The population at risk was the same: 300,000 persons.

$$\text{AR} = 1,600 / 300,000 \times 100 = 0.53 \%$$

$$\text{CFR} = 46 / 1,600 \times 100 = 2.8 \%$$



John Hopkins Bloomberg School of Public Health, *Glossary of terms related to cholera and cholera vaccine programs*, November 2016

B - HISTORY AND CURRENT SITUATION

1. CHOLERA IN HISTORY

Cholera is a disease that has been known since Ancient Greece. 'Cholera' is thought to be composed of *chole-* (bile) and *-rhein* (flow, as in having a cold or diarrhea). Cholera is said to have been a "flow of bile" for ancient Greeks.

Cholera was identified for the first time in the **Ganges delta**. For centuries, it remained limited to Bangladesh and extended episodically over the neighbouring territories of the Far East until 1817. This date marks the beginning of the first cholera pandemic in Asia and the Middle East. Other pandemics followed one another, all originating from Asia, reaching all continents and progressing at an ever-increasing pace with the improvement of means of transport. **The seventh pandemic, which is still raging today, began in 1961** in Indonesia, spread throughout Asia in 1962, then through the Middle-East and part of Europe in 1965, before reaching Africa in 1971 and Latin America in 1991 [still due to improved transportation]. One of the main characteristics of this new pandemic is the **major bacteriological change of the infectious agent, the El Tor Biotype replacing the classical Biotype**.

During the 19th and 20th centuries, European and Latin American countries succeeded in stopping cholera epidemics by improving drinking water and sanitation services.



Image 1 - Le Petit Journal Illustré, 01/12/1912

In London in 1854, **Dr. John Snow** highlighted the link between a water source [a public water pump on Broad Street] and cases of cholera in the neighbourhood. This work represents a significant step forward in the history of modern epidemiology, thanks in particular to the use of explanatory cartography.

Cholera currently affects all continents. However, the countries most affected are those with **inadequate sanitation facilities and low socio-economic status**. High popu-

lation concentrations or population displacements due to conflicts in areas considered endemic are aggravating socio-demographic factors.

2. CHOLERA IN THE WORLD TODAY

“In 2015, 42 countries notified a cumulative total of 172,454 cases of cholera, including 1,304 deaths. However, many cases are never recorded because of the limitations of surveillance systems and the fear of international sanctions restricting travel and trade. The true toll of the disease is estimated to be

between 1.3 to 4 million cases with 21,000 and 143,000 deaths per year”. (Weekly Epidemiological survey, September 26th, WHO)

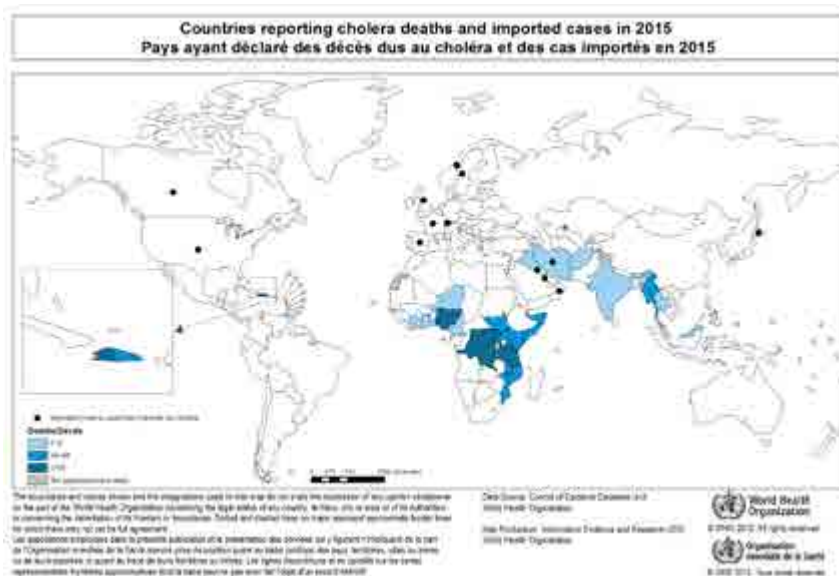


Figure 1 - Map of countries reporting cholera deaths and imported cases in 2015



Global Task Force on Cholera Control, *Ending cholera: a global roadmap to 2030*, Octobre 2017

Website of the Cholera Platform of Western and Central Africa

C - DESCRIPTION OF THE CHOLERA PATHOGEN

1. CHARACTERISTICS

The cholera pathogen is a Gram-negative bacillus called **Vibrio cholerae**. This bacterium is shaped like a comma, hence the name Pacini gave it in 1854. Of the many strains identified (over 155 serogroups), only strains O1 and O139, which produce cholera toxin, are classified as *Vibrio cholerae*. The other strains are either non-pathogenic, or cause mild diarrheas and septicaemias.



Image 1 - Vibrio cholerae O1

Biotypes and serotypes

Inside the O1 strain, 2 biotypes were described: the "classic" and "El Tor" biotypes, the latter having been discovered during the 7th pandemic. These two biotypes are divided

into 3 serotypes according to the proportion of determinants: A, B and C. They are usually specified at the time of clinical diagnosis.

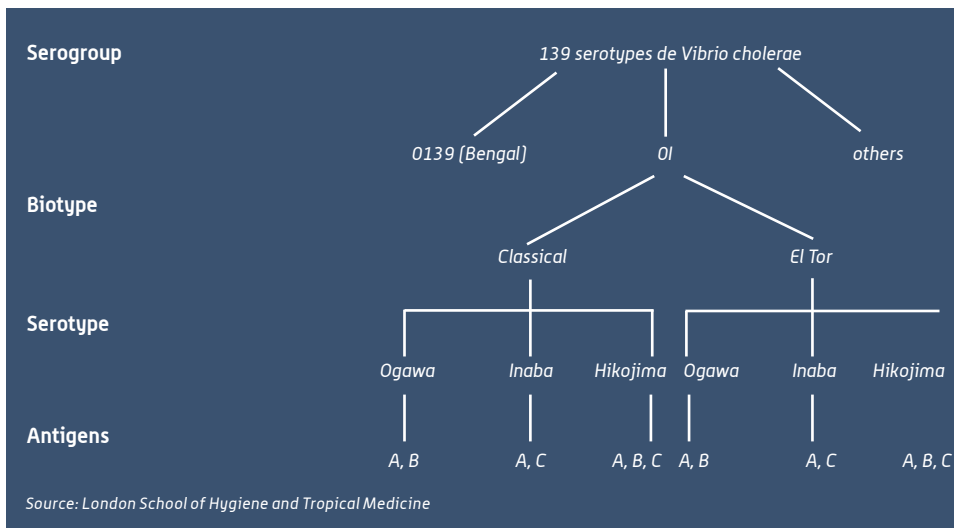


Figure 2 - Classification of the types of strains of *Vibrio cholerae*

The appearance of a genetic variant

The last major epidemics in Zimbabwe in 2009, Haiti since 2010, countries in the Lake Chad basin since 2009 and along the Gulf of Guinea since 2012 are believed to be due to a genetically derived strain of the El Tor bio-

type, a strain associated with a more severe form of the disease in terms of dehydration, length and incidence of epidemics.

2. RESERVOIRS AND TRANSMISSION CYCLES

During the inter-epidemic period, *Vibrio cholerae* can be found in the environment – this is the **environmental reservoir**. The bacteria is found in the brackish waters of estuaries (both salty and alkaline), loaded with organic matter and rich in plankton. *Vibrio cholerae* colonises the surface of certain algae and copepods (zooplankton), which can persist in the environment in the absence of humans

for prolonged periods of time. Research is still ongoing to determine the accuracy of this environmental survival and the mechanisms for the emergence of epidemics from environmental reservoirs. Figure 3 below shows a model of human transmission of *Vibrio cholera* from an environmental reservoir.

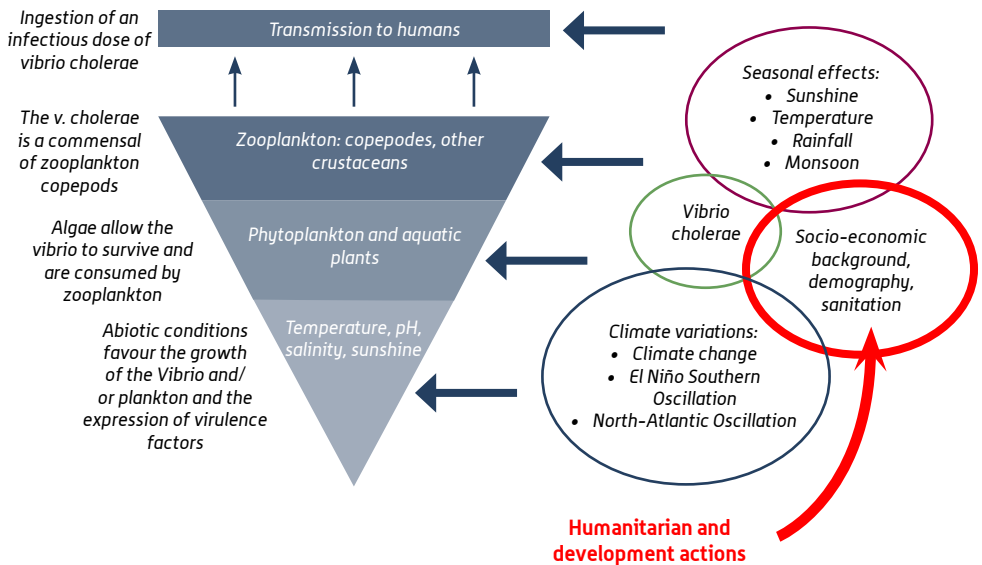


Figure 3 - Hierarchical model for cholera transmission from an environmental reservoir

Adapted from the Lipp et al. model, 2002 (American Society for Microbiology)

Vibrio cholerae is a water bacterium that is well adapted to salt concentrations from 5 to 30 / 1000. It develops when the temperature rises (over 15°C) in humid, alkaline and salty environments. Concentration in organic matter also promotes its development. The bacterium is **destroyed by heat (>70°C), drying, chlorination and acidity.**

During epidemics, the **human reservoir** is the main, if not the only, reservoir for *Vibrio cholerae*. **The main factors contributing to the transmission of infection are the living conditions of populations and hygiene and food habits.** New outbreaks can occur sporadically in all regions of the world where water supply, access to sanitation, food safety and hygiene are lacking.

The people most at risk are those living in **overcrowded areas** (i.e. in refugee camps), or **areas bordering lakes** and estuaries where the sanitation and quality of drinking water are inadequate and where the risk of inter-personal transmission is heightened, or in places of intense movements and passage (ports, railway stations, etc.) for the same reasons.

In countries where epidemics are recurrent, cholera is a **seasonal disease** that occurs every year, usually during the **rainy season** (i.e. during the planktonic boom on the shores of lakes at the same time as soil leaching, which can cause large amounts of faecal matter in areas with low levels of improved sanitation coverage). It can also happen during the dry season when the amount of water is no longer sufficient to ensure minimal hygiene. In these regions, it is important to understand the role of each geographic area in the

dynamics of cholera epidemics. Following work carried out between 2005 and 2009 by the University of Franche-Comté in collaboration with the Direction de la Lutte contre la Maladie (Directorate of Disease Control) of the Ministry of Health of the DRC, two types of areas have been distinguished, the nomenclature of which can be used in many contexts:

- **“source” areas** which act as outbreak starting points but also as disease “sanctuaries” in during lulls. These are exclusively towns and villages located on the shores of lakes and swampy, flood-prone areas. Even in these areas, there is a great spatial heterogeneity and sometimes more or less long periods of extinction of the disease;
- **“high risk” spaces** zones are big towns or cities, densely populated with important problems of hygiene, water and sanitation issues and maintaining commercial relations with the “source” zones.

The *Vibrio cholerae* is a **highly mobile bacterium** with modest nutritional needs, of which **humans are the main reservoir in the event of a cholera epidemic**. The disease results from the absorption of water or food contaminated by faecal matter. Diarrheal faeces released in large quantities are responsible for the spread of bacilli in the environment and fecal-oral transmission (the vomit of the patients also contains vibrio).

Due to the **short incubation period of the disease** (from a few hours to 5 days), the number of cases can grow extremely rapidly. Human beings play both the role of culture

medium and transportation means for the vibrio cholerae. Transporters, traders or fishermen for example, can be important vectors spreading the disease on the communication routes from the source of the outbreak (roads, railway stations, ports, etc.). The funerals of victims of cholera can spread an epidemic (the corpses are highly contagious) in the absence of appropriate body care protocols.

Transmission

Fecal-oral transmission, through direct or indirect ingestion of stool or vomit, can occur in two ways:

- **Waterborne:** by drinking water contaminated by faeces or dirty hands of sick or healthy carriers,
- **Interpersonal:** by contact with hands, by eating food contaminated with dirty hands of the cook or by flies.

Cholera is the **disease of dirty hands and poor hygiene**. *Vibrio Cholera* passes directly from hand to hand and then from hand to mouth.

Healthy carriers

During an epidemic, **the majority of people are carriers of the vibrio who do not have cholera symptoms: they are healthy carriers**. These individuals are not sick but can transmit the disease. **It is estimated that for**

a person who reports the disease, up to 30 health carriers can be found. More generally, it is estimated that 80% of infected persons are asymptomatic carriers (ACF, 10, 2013).

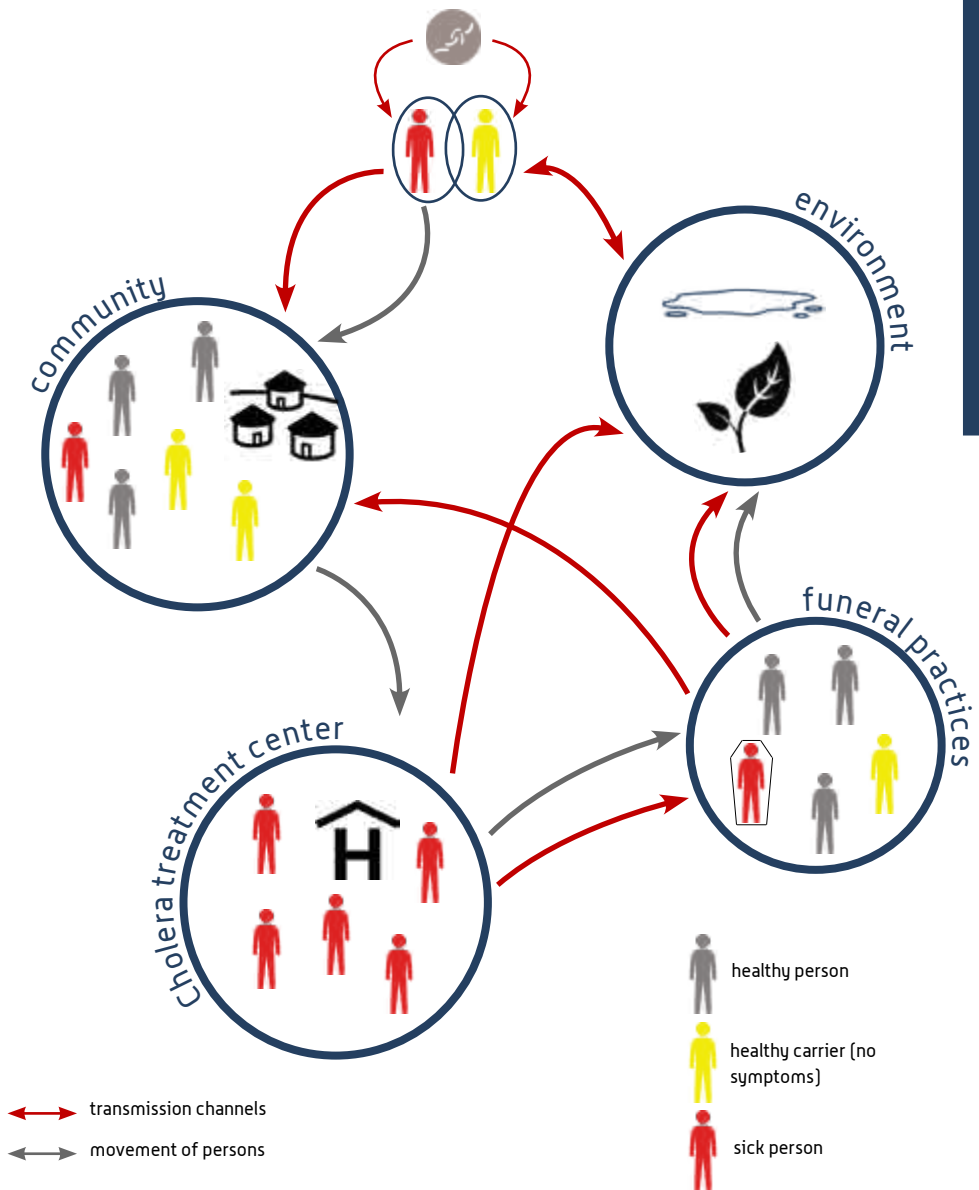


Figure 4 - Contexts of transmission of the *Vibrio cholerae*, adapted from the practical handbook on WaSH and Mental Health and Care Practices in the fight against cholera by ACF, 2013



Site internet du CDC, Sources of infection and risk factors

D - CLINICAL PRESENTATION, TREATMENT AND PREVENTION

1. CLINICAL PRESENTATION

The onset of the disease depends on **the amount of vibrios absorbed** (magnitude of the infection dose between 1,000 and 1,000,000 germs ingested). The higher the dose of vibrio absorbed, the more likely the person is to report the disease and the faster and more pronounced the onset of symptoms. The very short incubation period – from a few hours to five days – increases the risk of explosive outbreaks because the number of cases can rise very rapidly.

Once in the intestine, vibrios secrete **enterotoxins** (cholera toxins) that are the main cause of the important dehydration that characterises the infection. Water and electrolyte losses can reach 15 litres per day.

Most people infected with *Vibrio cholerae* **have no symptoms**, although the bacillus may be present in their faeces for 7 to 14 days. In the event of illness, approximately 75% of episodes are mild or moderately severe and it is difficult to distinguish them clinically from other types of acute diarrhea. About 25% of infected individuals have “typical” symptoms of the disease:

- **Acute watery diarrhea** (liquid), no pain, with more than three liquid stools per day with the release of matter resembling rice water,
- Can be accompanied by **heavy vomiting** (but not always),
- **No fever,**
- **Abdominal cramps** in case of severe infection.

Case definition

According to UNICEF, a case of cholera must be suspected when:

Outside an epidemic

- in an area where the disease is not usually present (non-endemic area), a person five years of age or older develops severe dehydration or dies from acute watery diarrhea;
- in an endemic area, a person develops acute watery diarrhea with or without vomiting (WHO, 2012).

During an epidemic

- a person aged 5 years (sometimes 2 years) or older who develops an acute watery diarrhea with or without vomiting (WHO, 2012) ;
- one individual evacuating 3 or more loose stools with or without vomiting over 24-hours period (MSF, 2004).

Case definition for the community

As suggested by ACF in its cholera handbook (ACF, 2013), the determination of a “community-based” definition allows early detection and referral of suspect cases. Communities are in fact the first level of epidemiological surveillance, and key individuals need to know the simple symptoms of the disease. Simplified case definitions are then adapted by health ministries and the WHO for each particular country or zone:

- **cholera:** profuse watery diarrhea in individuals aged over 5 years old;
- **acute watery diarrhea:** at least three liquid stools within the last 24 hours, and presence of a sign of danger* or dehydration.

(*signs of danger : lethargy, loss of consciousness, vomiting, convulsions and, for children under the age of 5, inability to drink or breastfeed)



WHO website, case definition

ACF, Lutter contre le choléra !, p. 25 (in French only)

2. TREATMENT

In the absence of appropriate rapid treatment, loss of fluid and mineral salts can lead to **severe dehydration and death** within a few hours. The case mortality rate in untreated cases can reach 30-50%. The risk of death is greater in immune-compromised subjects such as malnourished children or HIV carriers.

Cholera is essentially treated by rehydrating the patients to compensate for the loss of electrolytes. Rehydration is provided orally if the patient's condition permits or intravenously for the treatment of severe cases.

The administration of **Oral Rehydration Salts (ORS)** alone is sufficient in most cases to treat the patient, without the need for intra-

venous administration. Severe cases require parenteral rehydration with IV liquids (preferably Ringer Lactate solution), given in parallel with ORS.

The degrees of dehydration are differentiated as follows:

- **No dehydration:** treatment plan A (ORS at home - or sweet-salted solution as a substitute for ORS: 5 spoonfuls of sugar, a pinch of salt and juice from half a lemon)
- **Moderate:** treatment plan B (ORS),
- **Severe :** treatment plan C (intravenous treatment - antibiotics/ORS).

Oral Rehydration Salts (ORS)

The use of ORS is the most effective way to control diarrheal diseases. Before considering any ORS distribution, you must first coordinate with the relevant health services. Your approach must be consistent with the WHO recommendations in the target area.

In case of a distribution, you should ensure that families know how and when to use them: training/information sessions for communities, instructions for use adapted to the illiterate public...



It is strictly forbidden to give drinking water on its own (without salt or sugar) to a patient, at the risk of further accelerating diarrhea and dehydration.



WHO, First steps for managing an outbreak of acute diarrhea

Rehydration

The treatment is simple and based on significant rehydration; applied properly, it should keep the case mortality rate below 1%. Rehydration is assured by **oral or intravenous means**, depending on the degree of dehydration.

80% of cases can be treated successfully with ORS alone. The improvement is noticeable after a few hours and healing, without sequelae, is achieved within a few days.

Antibiotherapy

According to Institut Pasteur, "antibiotherapy can be useful in severe cases, but the emergence of multi-resistant vibrio cholerae strains limits the indication". For the WHO, "in some cases of severe cholera, an effective antibiotic can shorten the pathological episode even if the treatment is based

primarily on rehydration. At the community level, however, mass antibiotic prophylaxis does not prevent cholera from spreading and should not be recommended. Antidiarrhea drugs, such as loperamide, are also not recommended and should never be used."



WHO website, case management



3. PREVENTION

Vaccination

There are various vaccines that are not absolutely effective and are not mandatory in any country. **Dukoral** and **Shancholz** are two oral vaccines available.



SOLIDARITÉS INTERNATIONALE does not vaccinate against cholera and does not promote its use in areas where humanitarian actors fight against the risk factors of poor access to water, sanitation and hygiene. In fact, the use of the vaccine in areas where actions for sustainable improvement of health conditions are possible could have a perverse effect on the adoption of adequate hygiene practices and the establishment of mechanisms for the sustainability of water and sanitation systems, under the guise of a false sense of security.

However, it is important to note that the WHO recommends targeting vulnerable populations living in high risk areas. Within this framework, SOLIDARITÉS INTERNATIONALE can help to identify and direct health actors towards endemic areas where traditional actions to improve access to water, sanitation and hygiene are complex or impossible in the medium term. SI is also willing to share all types of useful information for better targeting in preventive control and response.

Other prevention measures

Prevention measures are simple and are derived from the modes of transmission, although messages and measures must be tailored to each context based on the observed risk factors. Some examples of basic messages:

- Wash your hands with soap and water after using the toilet, before eating or preparing a meal, before taking care of your child or after changing, after touching someone with diarrhea;
- Drink only bottled or treated (chlorinated) water;
- Cook the food and eat it still warm, peel vegetables and fruit;
- Prohibit foods prepared and sold on the street;
- Do not use any water-based preparations of uncontrollable origin (ice, ice cubes, fruit juice);
- Use latrines or other sanitary systems to defecate; do not defecate outdoors, especially near water points or rivers.

BETWEEN CHOLERA EPIDEMICS

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A - UNDERSTANDING THE DYNAMICS OF EPIDEMICS

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B - PREPARE FOR THE RESPONSE:
STRENGTHENING TEAMS
AND POPULATIONS



A - UNDERSTANDING THE DYNAMICS OF EPIDEMICS

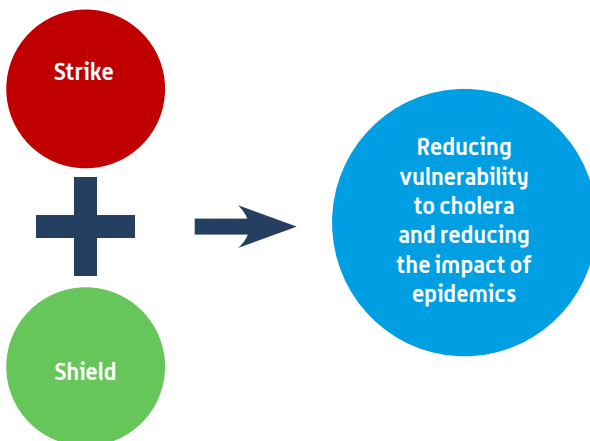
1. FORECAST AND CONTAIN AN EPIDEMIC: THE SHIELD AND STRIKE STRATEGY

The shield and strike strategy is built on the long term in high risk and endemic zones. On the one hand, this strategy offers opportunities to **respond rapidly and effectively**, and on the other hand, it helps **set up long term projects to reduce population's exposure to cholera**. This strategy is always laid out in a zone or particular region before an epidemic or between two outbreaks. It presupposes the acquisition of reliable data (i.e. data from MSF, Ministries of Health, geographically and chronologically well pinpointed) on the dynamics of epidemics at a given location. Thus necessary to have access to reliable data on epidemics' dynamics in each location.

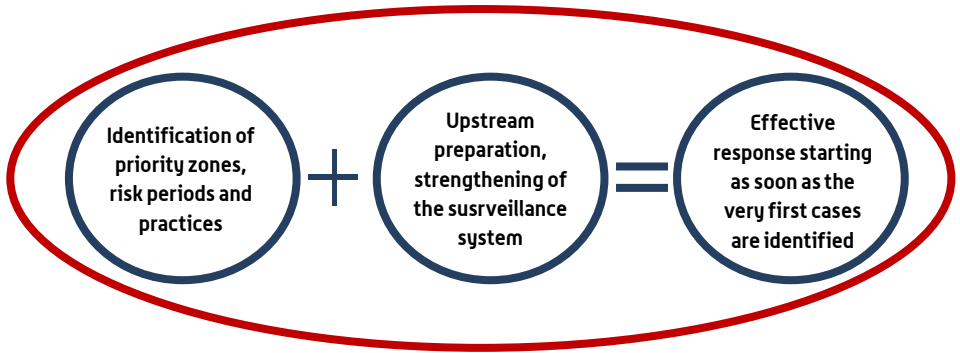
The spread of cholera can be avoided with **early detection and confirmation of cases, following by the implementation of appropriate measures**. It is therefore of the utmost importance, in the event of

an **OUTBREAK**, that the response is well coordinated and implemented in a timely and effective manner. To this end, the actors will have to strengthen the epidemiological surveillance systems (to give early warning and alerts), case management and coordination of all the actors involved in the fight against cholera.

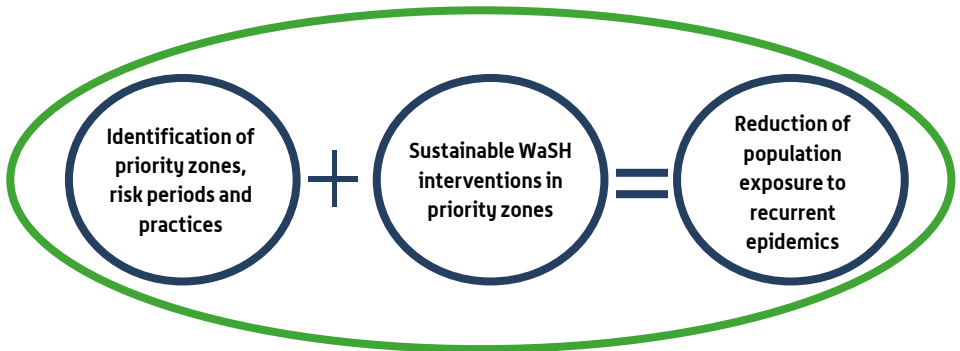
IN TIMES OF LULL, it is necessary to strengthen prevention measures in areas at risk by introducing **specific interventions addressing access to drinking water, sanitation and hygiene**, but also by supporting the **strengthening of local monitoring and response capacities**. A comprehensive strategy based on a **multi-sectoral approach** and the simultaneous development of a curative, preventive and promotional approach could indeed help to control the situation in a sustainable way.



Strike



Shield



2. EPIDEMIOLOGICAL AND ANTHROPOLOGICAL STUDIES

Identification of propagation areas, “risk” periods and practices

In the INTER-EPIDEMIC PERIOD, **retrospective epidemiological studies of the spatial and temporal dynamics of cholera are essential.**

These studies can be conducted at the level of a city, province, river basin, country or even continental sub-region as part of cross-border cooperation. SI partners with research organisations to analyse and interpret field data.

The study of these risk areas either as “source” or as “basin” areas helps refine preventive and response interventions and contain epidemics as early as possible. In endemic areas, these studies will help design action plans to sustainably prevent the emergence of new outbreaks.

Temporal analysis

The objective is to identify the **seasonal dynamics** of cholera. Data are available from either the Ministries of Health, the local WHO office or more likely from health NGOs. If the data are not available, teams then need to obtain data from the most recent years of cholera epidemics, the seasonal rainy season schedule and correlate them.

It is important for cholera control teams to **know whether or not there is seasonality in their work areas.** This makes it possible to pre-

pare teams before the arrival of a risk season or period. This knowledge and simple analysis allows them to prepare the contingency plan, to reconnect with all partners, to check the operation of the surveillance system, to review the contingency stocks and to do a refresher with rapid response teams.

- the possible seasonality of epidemics,
- preferential transmission channels,
- most-at-risk population groups and risky practices,
- the factors that promote the presence or spread of the *Vibrio Cholerae*.



SI EXAMPLE in DRC

In DRC, the first epidemiological research work highlighted the seasonal nature of cholera in Katanga Province. Other studies have been replicated in other provinces of the country. The rainy season generally begins around August (each blue bar represents one week), which corresponds each year to the time of the first outbreaks.

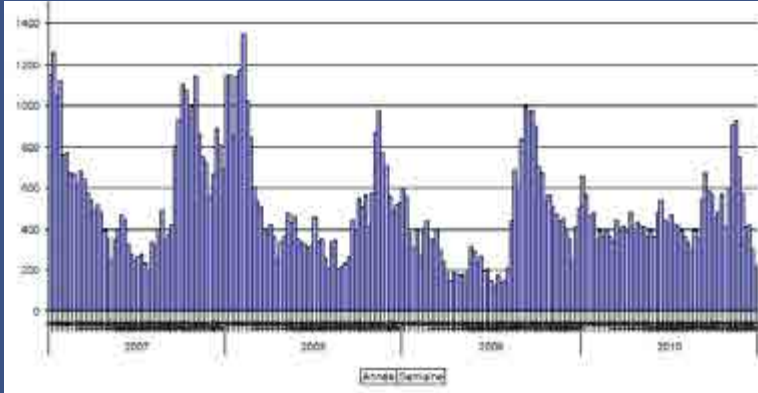


Figure 5 - Evolution per week of cholera cases according to the seasons in Goma, DRC

Source: DRC WaSH Cluster, 2012

Spatial analysis of risk factors

The main risk factors leading to an epidemic or likely to accelerate the transmission of the *Vibrio* in the territory must be categorised.

The **areas for the exchange of goods** (stations, ports), the **transport of goods and the movement of people** (road, rail, inland

waterway) are all places to be particularly monitored as the risk period approaches; the first awareness raising actions should be carried out there if an epidemic is declared.

Anthropological and psychosocial analysis of risky practices

Understanding the **local populations' perception of the disease** and recognising and understanding the **psychosocial**

consequences of cholera is an integral part of the endemic preparedness component.

SOLIDARITÉS INTERNACIONAL does not have expertise in anthropological and psychosocial studies, it is thus necessary to **work with a local or international partner** (NGO, universities, consultants) to develop these themes on a mission.

The local perception of the disease, especially through traditional beliefs, has a strong

impact on the acceptance of prevention and treatment measures. Knowledge of these perceptions also helps refine our communication techniques and messages to reach people at risk. This is about finding the bridge between traditional and expert knowledge for scientific answers to be understood and accepted.



SI EXAMPLE

In Haiti for example, the presence of a Cholera Treatment Center (CTC) was perceived as a danger in some areas because people believed cholera spread from there. Also in Haiti, cholera was not associated with sanitary conditions as no one had changed their practices, and while no one remembered cholera ever striking the island, it nevertheless appeared for no apparent reason. It was considered as a poison introduced by foreigners. In such a case, being a foreign actor that raises awareness on the use of chlorinated water can be very complex.

Identifying the psychosocial consequences for cholera patient is also essential. We fight the disease but we also fight the negative effects of our actions. Yet, the **stigmatisation of patients** can be very strong. This may simply be the result of an assumption on the disease and a de facto rejection of the sick, but it may also be the consequence of a insufficiently

explained humanitarian responses: targeted awareness raising in certain neighborhoods may lead to stigmatisation of the poor, disinfection in unaffected households may also generate doubt and rejection of these families suspected of having the disease, etc.



Médecins du Monde, *Entre savoir experts et mauvais sort, pratiques d'utilisation de l'eau et perception de l'épidémie de choléra dans le District de Tanganyika*, 2011 (in French)

Croix-Rouge haïtienne, *Epidémie de choléra : note sur les croyances, sentiments et perceptions de la communauté*, 2010 (in French)

Example of a spatial and temporal analysis in sub-Saharan Africa

B - PREPARE FOR THE RESPONSE: STRENGTHENING TEAMS AND POPULATIONS

This section refers both to the **shield strategy**, since it is a question of sustainably strengthening response capacities, and to the **strike strategy**, providing the immediate

means to respond quickly and properly. Control of an epidemic can only be achieved through timely and adapted responses.

1. EPIDEMIOLOGICAL SURVEILLANCE

Between two outbreaks, in endemo-epidemic zones, **epidemiological surveillance** is one of the major axes in terms of local and internal capacity building. This includes epidemiological studies as described in epidemiological studies such as those mentioned in Chapter 2 – A.

The epidemiological surveillance component between outbreaks means:

- ensuring that local relay points or sentinel sites are operational to detect cases, ,
- ensuring the functionality of a protocol for collecting, reporting and confirming rumors,

- having human resources (external or internal) to analyse the information.

The aim is therefore to monitor and, if necessary, support an early warning system in anticipation of a future epidemic.

In endemic zones, epidemiological surveillance activities should **identify risk areas, categories of persons at risk and seasons conducive to outbreaks.**

2. IMPROVING RESPONSE EFFECTIVENESS

Inter-epidemic periods are also an opportunity to review the preventive response protocol:

- contingency plan,
- training plan and simulations,
- long-term strategies.



SI EXAMPLE

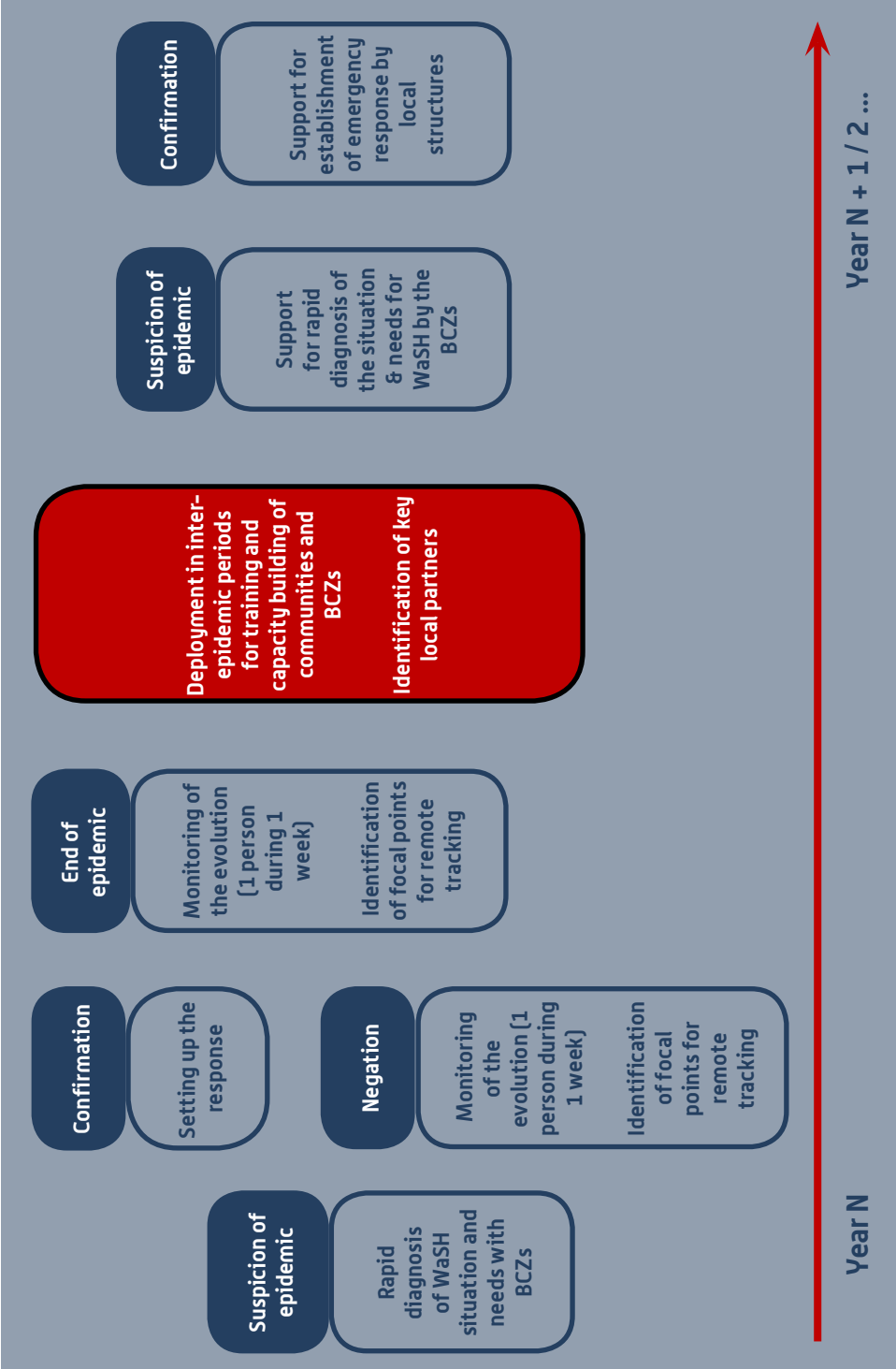
Cholera risk reduction project, DRC

In the DRC, a three-year DFID-funded project includes a DRR-cholera component; one of the objectives of this project is to **strengthen local capacities in inter-epidemic periods**. This activity is conducted by a team dedicated firstly to rapid responses to cholera outbreaks, and secondly, to strengthening communities so that they themselves can provide the first preventive responses, particularly in terms of raising awareness and chlorinating water points.

During the inter-epidemic period, teams of community preparedness workers are deployed in the worst-affected areas with the aim of strengthening community-based cholera prevention via:

- the establishment of **community contingency plans** in conjunction with the Central offices of health zones (*Bureau Central de Zone de Santé - BCZ in DRC*), associations and civil society to respond to the emergence of the first cases;
- **training in chlorination and water treatment** in general, targeted cholera emergency awareness techniques (based on both expert and traditional knowledge). SI teams can intervene to support local partners for the local production of liquid chlorine to enable them to be autonomous at the start of epidemics;
- the members of these teams **work closely with the Ministry of Health** through its local representatives.

A two-year cholera epidemic preparedness programme can be carried out over two years as proposed in the cholera strategy of our mission in the DRC.



Contingency plan

To be more effective, national or local cholera control strategies – whether for prevention, emergency preparedness or response – need to be translated into **multi-sectoral plans** that prioritise risk areas. These plans should be designed and implemented by all partners involved in the fight against cholera, ideally coordinated by Ministries of Health or the Water and Sanitation Directorate.

Depending on the context, at the local level, SI may be called upon to facilitate and support this coordination. A detailed cholera response plan must therefore be developed (and regularly updated) for each region or country, clearly defining the role of each actor in the area.

In all cases, it is also necessary to establish an **internal “cholera response” plan** that takes into account our response capacities, whether logistical, financial or in terms of human resources.

Internally, the cholera epidemic contingency plan should include a list of essential elements of good outbreak preparedness and measures to be implemented:

- Communication lines and monitoring;
- Staff responsibilities (reassignment of staff according to need, designation of the person in charge at each level);
- Logistics (what is available, what is needed);
- Availability of funds for preparedness and response;
- Application of prevention measures (what to do, who should act and when, the resources are required and available).



Contents of a contingency plan:

- Define Who does What Where and When, 4 W matrix (Who What Where When);
- Determine and weight the risk factors or triggers of an outbreak;
- Define one or more crisis scenarios with logistical (contingency stock), financial, technical and human needs that allow to meet them.

► 4 W matrix

External use:

In a complex emergency situation, coordination between the various associated actors is essential for the implementation of control measures. The 4 W matrix must establish **a protocol for implementing emergency responses. An inventory of the immediate or future capacities of each actor** is also necessary. For example, a coordination matrix can be established within the WaSH Cluster when it is activated. The integration of health actors, and therefore the Health Cluster or Ministry of Health, is a crucial point in preparing responses.

Internal use:

Based on a 3 W matrix (Who What When), it is important to determine the roles and responsibilities (R&R) of each member of the response team. The **communication scheme** is specified in a summary table, as well as each staff's R&R according to the stage of the emergency. In general, a first table allows to specify who is in charge of what during the first 48-72 hours following the announcement of an epidemic outbreak. In order to refine the level of preparation, more detailed work needs to be done on each basis to determine the persons in charge of rapid diagnosis, sensitisation and chlorination. In the inter-epidemic period, each person is thus regularly trained and informed on the response scheme.

Photo 2 - Onion tanks set up in a drinking water treatment plant



IMMEDIATE ACTIONS WITHIN THE FIRST 48 TO 72 HOURS

WHAT?	WHO?
<input type="checkbox"/> Contact the coordination for useful information	Field Coordinator, WaSH Programme Manager, Emergency Manager
<input type="checkbox"/> Ensure the safety of staff and their families, reminding them of basic hygiene messages and taking the necessary actions in every base/office	Field Coordinator, WaSH Programme Manager, Emergency Manager
<input type="checkbox"/> Organise a rapid assessment of the situation in collaboration with other actors: confirmation of the rumor, identification of local contacts and capacities, local associations, committees, representatives; collection of information on the onset of the outbreak (case index, case mortality, apparent transmission routes and risk groups, risk factors, etc.)	Project Manager, Emergency Manager WaSH Coordinator Other NGOs and Government
<input type="checkbox"/> Check stock status (base/office and coordination) and estimate response capacity	Logistics, WaSH Coordinator
<input type="checkbox"/> Write a situation report and send it to the coordination and donors	WaSH Coordinator
<input type="checkbox"/> Identify priority water, hygiene and sanitation needs: - organise and equip response teams, ensure everyone knows their roles and responsibilities - start the first preventive control actions: awareness raising, chlorination	Project Manager, Emergency Manager
<input type="checkbox"/> Identify needs for additional human and material resources	WaSH Coordinator, Country Director
<input type="checkbox"/> Contact donors and WaSH Cluster coordination	WaSH Coordinator, Country Director



National plan for the elimination of cholera in Haiti 2013 - 2022

Elimination of cholera in the DRC: the new national policy

► *Risk factors and emergency stages*

Depending on the context, each epidemic will have been fueled and spread by several

concomitant factors. It is therefore crucial to have identified the main risk factors during the inter-epidemic in order to act at the slightest sign.



There are five broad categories of factors that can generate an outbreak or facilitate its spread:

- i) Environmental
- ii) Socio-demographic
- iii) Structural
- iv) Biological
- v) Cultural

These categories can then be applied either at the global or regional level, or at a more local level when there is a need to study the precise dynamic of an epidemic in a given area or city.

i) **Environmental factors** are:

- the **seasons**, the onset of rains especially, often coincides with an upsurge in the disease;
- the **hydrographic network**, as it is known that the presence of a water course and human movements alongside this river or stream can facilitate transmission of the disease;
- **global climate change**, including increases in the average surface water temperature;
- **physico-chemical characteristics** of surface water.

ii) **Socio-demographic factors** are:

- **population density**: it is known that an epidemic will be more likely to spread in a high density environment;
- growing **urbanisation** of many cities in the South combined with impoverishment of populations can trigger an epidemic;
- **population movements**, planned (i.e. traveling merchants) or unforeseen (i.e. population movements caused by a social conflict);
- traditional **gatherings** (i.e. pilgrimage, markets) or unforeseen (i.e. sites with displaced populations often associated with poor sanitary conditions).

iii) **Structural factors** are:

- **access to drinking water**, whether as part of the outbreak (i.e. after a shutdown of a drinking water distribution network) or to stop the spread of an epidemic (i.e. emergency water supply);
- the **sanitation situation**, in particular excreta and waste water management, both of which can very quickly lead to the outbreak of an epidemic in the event of an uncontrolled disposal of waste water (as was the case in Haiti for example);
- the coverage and quality of care services also play a major role in the spread or control of an epidemic;
- the existence of **busy communication routes** (i.e. ports, bus or train stations) is an important risk factor for the spread of an epidemic.

iv) **Biological factors** are:

- the **nutritional status** of the population is an important factor, because at equal doses of infection, a malnourished person will trigger symptoms more easily than a well-

fed person, especially because of low gastric activity;

- **immunity** exists but is acquired, which means that in areas where cholera has never or only slightly struck, it does not exist, resulting in explosive outbreaks [ACF, 2013, 13].

v) **Cultural factors** are:

- **traditional medicine practices** can directly influence the dynamics of an epidemic, for example, by slowing patients' access to care provided in CTCs or hospitals;
- the **traditional management of cadavers** is also an important risk factor to be considered;
- **knowledge, behaviors and beliefs related to cholera**, infectious diseases in general, water, food, human excreta, are all cultural characteristics that are essential to control an epidemic, especially for the transmission of awareness messages.



Study on the environmental determinants of cholera outbreaks in Inland Africa

A matrix must then be developed to determine the risk attributable to each factor and the cross-checking of factors. Based on studies and experiences of previous epidemics, the correlation between these situations and the evolution of cholera incidence determines a phase. With this risk matrix, WaSH actors can establish a contingency plan to respond

adequately to each phase. This work of identifying local risk factors is to be done by the field teams in our intervention zones where cholera is endemic. Preferably, this will involve seeking a partnership with an expert structure in epidemiology (NGOs, Research Institute, University).



SI EXAMPLE Cholera risk reduction project, DRC

Annex 2.B shows the risk factors that were identified in Goma (DRC) in 2009 after an outbreak and in preparation for future the next ones:

- Water shutdown on the network between 24 and 48 hours
- Water cut on the network of over 48h
- Population displacement to Goma
- Epidemic outbreak in a neighbouring area
- Number of cases inferior to 10 / week
- Number of cases superior to 10 / week

A matrix was then developed to determine the risk attributable to each factor and the cross-checking of factors within each factor:

Phase 1	<ul style="list-style-type: none"> • at least one element/factor with the potential to trigger an epidemic is observed, but the situation remains below 10 cases per week. • a planned or unexpected water interruption between 24 and 48 hours in at-risk neighbourhoods and/or massive displacement of the population, which does not lead to an increase in the number of cases above the threshold.
Phase 2	<ul style="list-style-type: none"> • at least one element/factor with a potential to trigger an epidemic is observed, and/or a planned or unexpected water interruption for over 48 hours in at-risk neighbourhoods, and/or notification of a cholera outbreak in a neighbouring zone, but the situation is stable and the number of cases remains below 10 per week.
Phase 3	<ul style="list-style-type: none"> • at least one confirmed outbreak triggering element/factor and/or a water interruption of over 48 hours and/or notification of an outbreak in a neighbouring zone, generating more than 10 cases per week for at least three consecutive weeks, is a sign of a relapse of an outbreak in the city.

► *Plan for team training*

Rapid diagnosis training:

At the start of an outbreak, it is essential that teams be able to **analyse the dynamics of the epidemic**. Most importantly, they must be able to quickly identify which are the **main factors that favour the transmission** of the disease so that they can intervene in the right places in order to block its progression and stop transmission.

This analysis is carried out through dynamic epidemiological surveillance using the assessment tools presented in the third chapter of this handbook.

Response team members must therefore be trained in the use of these tools and in reading the results.

Workshops should be planned during the inter-epidemic period to familiarise team members with the use of those tools.

WaSH-cholera emergency activities training:

Each of the response activities described in the third chapter of this handbook must be mastered by our teams.

Practical training workshops and simulation exercises should be planned in the inter-epidemic periods.

Staff should be regularly trained (refreshers) on the following topics:

- Key messages and awareness-raising techniques to fight cholera;
- Water treatment techniques at collection points (bucket chlorination);
- Drinking water production techniques with treatment plant;
- Emergency sanitation techniques.



Training modules are available on the Intranet

► **Contingency stock**

In order to be able to provide an emergency response when a cholera outbreak occurs, missions must need contingency stocks.

It is difficult to define a “typical” stock as the contexts vary (frequency of intervention, types of water resources, local practices and knowledge, etc.). However, the elements listed below and annexes II.B 2, 3, 4 should help you to size your “cholera emergency” contingency stock.

Le stock doit permettre de mettre en place, dans les délais les plus courts, les activités d'urgence suivantes :

- Hygiene promotion focused on cholera*;
- Chlorination at the collection point or in the bucket;
- Chlorination of wells, water sources and drinking water supply systems;
- Water treatment (with more or less heavy treatment depending on the type of resource;
- Water-trucking (or any other adapted transportation system);
- Emergency latrines if the outbreak occurs in a zone of gathering with no sanitation and a high risk of oral fecal transmission;
- Household disinfection with appropriate chlorinated solutions.



Appendix 1 SI cholera emergency stock



* Hygiene promotion:

All mission bases must have a “Cholera emergency sensitisation stock” ideally comprising the following items:

- 20 Watt megaphones (with rechargeable batteries and a battery charger)
- A3 information poster with images (for public places)
- A3 poster promoting the use of chlorine (chlorination sites)
- Plain banners with short messages (slogans in local language) – 2/3m wide
- Brochures to be distributed (in local language(s))
- Image box (illustrating key hygiene messages)
- Awareness-raising signs near the facilities
- Pre-recorded radio messages
- T-shirts / caps with printed messages (for community facilitators)

Since SI can intervene in support of health NGOs at the level of water and sanitation in medical care facilities (Cholera Treatment Center, Cholera Treatment Unit), the stock must also allow the following activities:

- Installation of footbaths and hand wash basins with a chlorinated solution reservoir;
- Temporary latrines with or without a draining system;
- Showers;
- Use of lime;
- Waste pits (the management of medical waste is delicate and should be left to a health actor or at least be accompanied by a health actor).

For each of these activities, you will find in the appendices mentioned above the logistics dimensioning of the intervention, storage and use of the equipment.



Useful websites to help you design a WaSH contingency stock:

[IFRC Catalogue](#)

[A.Aqua](#)

[Labaronne Citaf](#)

For emergency WaSH equipment

[Butyl Products](#)

[Even products](#)

Preparation at the community level

The preparation of the community-based response must target a number of preventive activities consistent with local capacities and competencies.

► *Capacity analysis*

As in the case of disaster risk reduction projects, it is important to know the **internal**

community capacities to build on them in the initial responses. The capacity analysis exercise (used in the context of Vulnerability and Capacity Assessments done in DRR) also enables communities themselves to identify their own capacities and skills at undertaking a preventive response before external actors arrive.



Important local capacities can be:

- **structural:** health centers, associations, city halls, road networks, electricity networks, phone network, radios, boreholes and protected water sources etc.
- **human:** doctors and nurses, traditional healers, midwives, professors and teachers, technicians (water, electricity, etc.), notables, authorities, etc.

Analysing these strengths with the communities using **participatory tools**, such as community mapping, can help trace the basis of a first contingency plan at the community level.

Analysis of **traditional knowledge** is also a key issue. Traditional healers sometimes have a power of conviction over their people, which can have both a positive and negative effect on the transmission of the disease. It is thus necessary to recognise this power and to work with traditional healers and to get them involved in the alert and referral system.

► *Case detection and alert*

BETWEEN EPIDEMICS, SI teams can return to the communities to work with key people (doctors and nurses, traditional healers, midwives, professors and teachers, technicians (electricity, water, etc.), elders, authorities etc.) on the definition and detections of first cases.

When a suspect case is identified, the community needs to know:

- 1) how to look after him through simple rehydration,

- 2) where to refer the patient if severely affected. These two aspects must therefore be integrated in the community contingency plan.

The **communication and early warning protocol** is also defined to enable the higher administrative level to:

- 1) implement means of checking the rumor,
- 2) take the necessary steps to contain the epidemic if new cases are confirmed.

► *Information and training in the inter-epidemic period*

IN THE INTER-EPIDEMIC PERIOD, key actors, such as health workers and community relays, are trained in **dynamic and targeted cholera awareness methods**. Messages are defined with them in the local language. Megaphones, posters and awareness brochures can be made available to enable these key people to take action before the arrival of external actors.

If there is a market in the vicinity where fruits, vegetables, seafood or cooked meals can be found, agents are trained to disseminate food hygiene messages to the merchants.

They are trained on making ORS with water, salt and sugar and on educating families to their use in cases of suspected diarrhea.

► *Awareness raising and behaviour change*

IN THE INTER-EPIDEMIC PERIOD, ambitious programmes will therefore be implemented to encourage populations to **adopt safe hygiene practices over the long term**. In-depth surveys will allow us to have a better understanding

of peoples' risky behaviors and practices and thus to better tailor messages. Participatory methodologies based on the search for levers, motivations and barriers that encourage or slow down a change in habits can be used.

In addition to mass awareness campaigns, **hygiene education activities will be carried out for the most at-risk groups of people and areas**, such as fishermen along lakes and rivers, itinerant merchants, food vendors in markets, but also the entire community in the most exposed urban or peri-urban neighborhoods, and any area considered to be "endemo-epidemic".

As these activities require long-term work, it is important to **train, strengthen and rely on local relays**. These relay actors will be able to perpetuate the actions initiated. This will include training health workers and teachers, as well as women's associations and community leaders.

Contrary to the mass awareness media used in times of emergency to inform the population, in periods of lull, awareness raising methods should be used to allow for real awareness within households. Participatory methods that stimulate debate and reflection within the target audience will have a much greater impact on people's hygiene behaviours. This may include approaches such as **PHAST** (Participa-

tory Hygiene and Sanitation Transformation), **SARAR** (Self-esteem, Associative strengths, Resourcefulness, Action-planning and Responsibility), **CLTS** (Community-Led Total Sanitation) or the **method of identification of social perceptions** developed by SI (Social Perception Approach for Levers of Practices and Hygiene Identification - SPALPHI).

► *Water treatment*

Similarly, identified key persons are trained on the use of chlorinated solutions (prepared with HTH, hydrolysis systems, tablets or vials) to act quickly in neighborhoods where the first cases are detected:

- well disinfection;
- chlorination in buckets at the collection points;
- verification of residual chlorine at taps for small drinking water distribution systems;
- distribution and awareness-raising on the use of home water treatment products and alternative means of purification (boiling, filtration, solar disinfection, etc.).

RESPONDING TO CHOLERA EPIDEMICS

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H - CTC WATER AND
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A - UNDERSTANDING THE EPIDEMICS

When SOLIDARITÉS INTERNATIONAL intervenes in an emergency in an area after health actors have reported a new outbreak, it is important to identify the **sources of the epidemic and the pathways through which the disease spreads**. In order to do this, it is necessary to carry out an **assessment** in the first few days of the epidemic outbreak that will make it possible to better target the emergency measures that must be put in place to effectively control the epidemic.

This investigation must be carried out **in parallel with the initial emergency activities** (distribution of treated water, awareness-raising, etc.), as the aim is to prevent the spread of a possible epidemic as soon as possible. The diagnosis must therefore make it possible to reorient or refine the actions carried out as quickly as possible.

Prior to a field diagnosis, there are a number of key issues that need to be addressed through the collection and analysis of secondary data (see table below).

Key questions	Source / collection method
<p>Data on the epidemic:</p> <ul style="list-style-type: none"> ▶ What is the geographical area of the epidemic? (What was the geographical origin of the first sick persons?) ▶ How many people reside in this area / neighbourhood / site? <p>Which neighbourhoods are currently most affected by cholera? (based on case/day/zone numbers; death rate and attack rate per zone)</p> <ul style="list-style-type: none"> ▶ Which populations are most affected (men, women, displaced persons, other specific groups)? why? Is there a socio-economic group that is particularly affected than others (e. g., a specific workplace)? ▶ What are the likely triggers of the epidemic (rainfall, power interruptions, disruption of drinking water supplies, massive population displacement, etc.)? 	<p>Liaise with health actors (CTC, authorities and medical NGOs) to retrieve the figures and better identify the sources of the problem.</p> <p>For demographic data, ask local authorities (but health facilities should have them)</p>

Key questions	Source / collection method
<p>Beliefs and local knowledge of the disease:</p> <ul style="list-style-type: none"> ▶ When was the last outbreak? ▶ Do people know about the disease and how it is transmitted? ▶ What is the local belief that contracting the disease is associated with? Punishment, witchcraft, poverty, marginalized groups, other? ▶ Are there any beliefs about the use of the chlorine? 	<p>Discussion in small groups with the population, health authorities, NGO managers</p>
<p>Behaviour, hygiene and sanitation:</p> <ul style="list-style-type: none"> ▶ Do people wash their hands generally? ▶ Is soap available and is it used for handwashing? ▶ What are sanitation practices? What percentage of the population has access to sanitation? (coverage of access to sanitation) ▶ Are there open defecation sites in affected areas? Do sanitation practices pose a risk or pollute the water resources used? ▶ Are high-traffic public places (markets, railway stations, ports, schools, churches, etc.) equipped with an appropriate sanitation system? ▶ Do public latrines present a risk of pollution (especially water resources)? What conditions are they in? Are they maintained? Do people use them? ▶ How are funeral rites practiced and do they represent a possible mode of transmission? 	<p>Discussion in small groups with the population, health authorities, NGO managers</p>

Key questions	Source / collection method
<p>Water supply:</p> <ul style="list-style-type: none"> ▶ What is the main source of water used by households in the most affected areas? ▶ Are there risks of fecal pollution from the main sources used? ▶ What percentage of the population has access to safe drinking water? (Number of drinking water points compared to the total population in the affected area) ▶ What is the likely quality of water used for drinking? (bacteriological, pH and turbidity) ▶ Is the water treated? How (by which technique and/or product)? by whom? with what result? ▶ Is there a risk of contamination from water transport and storage? 	<p>Discussion in small groups with the population, health authorities and NGO managers</p>
<p>Food hygiene:</p> <ul style="list-style-type: none"> ▶ Are there specific markets or locations where prepared meals, fresh fruit and vegetables, ice cream are sold? Are some of the cases listed merchants/families frequenting these markets? ▶ Is the food properly prepared in these markets? (cooked foods, fresh fruits and vegetables eaten and washed with drinking water or peeled) ▶ Do households eat fresh fruit, fish or seafood, prepared meals on the market? 	<p>Discussion in small groups with the population, health authorities and NGO managers</p>



Appendices 2 Assessment tools

B - TEAM PROTOCOLS

1. EQUIPMENT ON THE BASES

On bases located in areas where an epidemic is declared, it will be important to put in place

some arrangements to ensure that people entering the base do not transmit cholera.



On each base, a member of the WaSH team will be in charge at the beginning of the week of preparing the various chlorinated solutions required to implement the procedures outlined below.

The following actions and decisions will be implemented or taken:

- A **single point of entry into the base**, with a watchman stationed who, as people enter the base, must carefully spray their shoes with a solution containing at least 0.2% active chlorine.
- After disinfection, people must wash their hands with a 0.05% chlorine solution. A **handwashing point**, preferably a tap bucket, should be installed at the base entrance behind the guard, and soap should be available. It will be essential that hands are washed thoroughly with chlorinated water.
- In the basement enclosure, the same handwashing stations with soap and 0.05% chlorinated water will be installed in the toilet blocks. Shared towels are not permitted. **Hands should be air dry.**
- In the base, **all drinking water should be chlorinated** to ensure a free residual chlorine content (FRC) of 0.5mg/l.
- Rules of hygiene should be reinforced for the **preparation of meals** (washing fruits and vegetables well, cooking well).
- A **stock of ORS** and mineral water bottles must be available for quicker intervention.
- Toilets will be cleaned with a 2% solution every day.
- When the latrines (dry pits or septic tanks) are emptied, **it is our responsibility to ensure that the emptying is carried out in a suitable place without risk of contamination of surrounding people, surface water sources or aquifers** for people in the area and that the sludge is disinfected with a 2% solution. Those in charge of emptying the pit/tank must be properly protected and must respect the internal disinfection rules at the base.

- Each base should identify the **nearest health centre** where any sick employee could be brought quickly. If a staff member begins to suffer from severe diarrhea resembling cholera symptoms, prepare a solution with one litre of chlorinated water (or mineral water) with ORS to drink until they can be admitted in the health centre or CTC.



To sum up, each base must have:

- At least 1 tap bucket at the entrance to the base, to be used as a handwashing point,
- 1 tap bucket per toilet block,
- Supply of chlorinated drinking water,
- At least 2 sprayers,
- Protective equipment for watchmen because chlorine stains a lot and is corrosive (gloves for chemicals, masks, plastic goggles, protective overcoat, boots),
- Supply of soap,
- Supply of ORS,
- Supply of Aquatab, HTH and PUR for on-site and field chlorination.

2. EQUIPMENT FOR FIELD TEAMS

For any field trip (whether by car or motorbike), it is important that teams leave with a 0.05% chlorine solution, ORS sachets and soap to ensure that handwashing is possible throughout the day, as well as drinking water.

Lorsqu'un véhicule sera en déplacement, le chauffeur devra s'assurer d'avoir :

- 1 sprayer filled with a 2% solution,
- Protection equipment (chemical-resistant gloves, mask, plastic goggles, overcoat, boots),
- Several bottles of 0.05% solution for handwashing. After use, it will be important to rinse the bottle and neck thoroughly with chlorinated water to avoid contamination during subsequent handling,
- Treated drinking water, or Aquatab or PUR tablets to treat water in the field,
- Soaps,
- 1 box of ORS sachets,
- Contact details of the nearest CTC and health centres,
- Contact details of the SI mission in the country.

In the event of displacement by boat or fishing smack, in addition to the above provisions, the following are necessary:

- A single entry point into the boat, where a person is in charge of carefully spraying the team's shoes with a 2% active chlorine solution.
- No motorcycle or equipment such as bladder can be loaded in the boat without having previously had the wheels disinfected.
- **Toilets must be blocked and excreta collected.** Waste must then be treated with a 2% solution before being buried at a minimum depth of 50cm.
- Before travelling, a supply of 0.05% chlorinated water should be placed on board so that team members can wash their hands.

As field teams often travel for several consecutive days, it is essential to remember that cholera is also easily caught through **food**. It is therefore necessary to be careful when preparing meals to cook or wash fruits and vegetables, and to make sure that this is done properly in case of purchased food.

As explained in the previous pages, cholera is a disease of “dirty hands”. It is therefore of the utmost importance that the right gestures are made by our teams who can be in contact with sick persons and healthy carriers throughout the day as part of their activities. It is not a question of banning contact, but

just remembering to wash hands at regular intervals. This is especially important for smokers who, if they do not wash their hands before smoking, could be contaminated by putting the cigarette to their mouth. Also remember to clean the bottlenecks if you have to drink from the bottle or can.

If one of SI's employees or partners in the field begins to show symptoms of the disease, they should be given ORS and taken as quickly as possible to a pre-identified health centre with the Field Coordinator or Base Manager. Supervisors should be informed immediately.



C - DYNAMIC EPIDEMIOLOGICAL ALERT SYSTEM AND SURVEILLANCE

The three main stages of the rapid response process

Early warning system:

- The first control actions must be carried out as soon as the first suspicions of cholera cases, »adults who died of rapid dehydration following an episode of diarrhoea and sudden onset vomiting»,
- Notification of cases at the health centre level and sending of information through a clear and known communication channel, or sentinel community screening and sending of information through a clear and known communication channel,
- Confirmation of cases in the laboratory if possible or failing that, a rapid diagnostic test, continuation of the response if positive confirmation, enhanced monitoring if case is invalidated.

Dynamic monitoring:

- Case registration at the CTC through a precise alert system (register template elaborated and validated by the response actors, harmonised for all CTCs in the area).
- Data collection and analysis: daily monitoring of the evolution of the number of new cases at the start of the outbreak (a weekly follow-up may suffice in a second stage), geolocation of each new case, identification of the most affected areas and diagnosis of possible causes through village and household surveys.

Adaptation of the response:

- The analysis of epidemic dynamics identifies the most affected areas and provides an immediate response, isolates the main spreading factors and pathways, and directs or redirects response activities according to risk groups and risk areas not yet affected.
- After the epidemic, the analysis of the causes of the outbreak must allow the prioritisation of prevention activities in the medium and long term.

1. EARLY WARNING SYSTEM

Case alert and alert system

Based on field sentinel surveillance, including community-based screening, a **communication mechanism for suspicious cases** must be established to enable alerts to be sent to higher administrative levels. SI can support local actors at the peripheral level (health zone, region or district, health centres) in partnership with a health NGO where possible, to improve the alert system.

In any case, since each country has its own alert system, it is essential to **know the flow of information** through successive levels (role and responsibility for each level), the **functioning and reliability of the alerts** (registers, information collected, completeness etc.), and to propose improvements where necessary to the extent of our capabilities.

Laboratory confirmation

One of the challenges of the cholera response is the confirmation of the first suspect cases. These are confirmed by laboratories. However, it is not necessary to wait for confirmation before starting to intervene, as the results may take too long.

In high-risk or endemic areas, where cases have already been recorded during the year, **it will not be necessary to wait for biological**

confirmation to intervene in preventive control. As soon as the health structures are alert, investigations and initial measures can be launched.

In addition, biological confirmation is only valid to confirm the start of an epidemic, but is no longer essential once the epidemic is ongoing.



Rapid diagnostic test

Rapid diagnostic test strips (RDT) exist, either for direct use at the slightest rumour, or to equip and train local public health personnel on how to use them. Be careful, these tests give a high proportion of false-positive re-

sults; in the event of positive results (presence of vibrios in stools), it will be necessary to ask for laboratory confirmation.



Appendix 3 Using rapid diagnostic tests for cholera ACF

Case screening by the community

According to ACF in its cholera handbook (ACF, 2013), the determination of a “community-based” definition allows early screening and referral of suspected cases. The community is the first level of epidemiological surveillance, and key people need to know simple symptoms of the disease. The simplified case definitions are then adapted by the Ministries of Health and WHO for each particular country or zone:

- **Cholera:** watery diarrhea profuse in children over 5 years old;
- **Acute aqueous diarrhea:** at least 3 liquid stools within the last 24 hours and presence of danger sign* or dehydration

* *danger signs: lethargy, loss of consciousness, convulsions and, for children under 5 years of age, inability to drink to breastfeed.*



ACF, Lutter contre le choléra !, p. 25 (*in French only*)

2. CONTROLLING THE EPIDEMIC THROUGH DYNAMIC SURVEILLANCE

An effective epidemiological surveillance system enables a rapid understanding of how the epidemic evolves. Knowledge of the epidemic dynamics helps the early identification of preferential transmission factors in the areas concerned, at different scales (districts, health areas or zones, cities, transport routes, risk groups, etc.). Disease control activities are thus identified more quickly thanks to geo-localised or spatio-temporal analysis (time, location and person) of the epidemic. Finally, populations or areas not yet affected can be better protected (shield) by using mapping tools to sectorise risk areas, provide a package of appropriate responses and implement prevention actions in these non-affected areas.

An effective epidemiological surveillance system will provide useful information for:

- **predicting outbreaks:** a good disease surveillance system facilitates the early detection (and confirmation) of an outbreak, allowing resources to be mobilised for more rapid and targeted interventions (see Chapter 2 - A);
- **detecting in time any early warning event of an epidemic,** responding quickly to rumours, evaluating the severity, extent and spatio-temporal evolution of the epidemic in real time;
- **analysing who is at risk** (and why), in order to stop the spread of the epidemic and prevent future outbreaks.

Regular analysis of the basic data (persons, location, period) is therefore important for proper preparation and effective monitoring of the situation.

Case registration at the CTC

The quality of the response will depend to a large extent on the quality of case reporting. This begins as soon as patients are registered in the health centres, CTC/UTC. For example, it must be ensured with the health centre that the registers contain the following basic information:

- name, age, gender;
- the patient's origin (in a very precise way: village, district, street, house);
- his or her last trips or those of a family member;

- his profession or living conditions (fishermen, transhumant stockbreeder, for example);
- the source of water supply;
- one or more neighbour contacts for field investigations.

GENDER AND SOCIO-DEMOGRAPHIC DATA



Information on the gender and profession of patients is essential. In the DRC for instance, specific populations of fishermen and traders have been identified as vulnerable to the disease, playing an important role in its transmission.

In Haiti, a study by MSF had shown that the risk of transmission through food in markets was greater than through water, with the result that awareness

activities had to be redirected towards vendors of prepared meals, fruits and vegetables.

Again in Haiti, the common NGO strategy was to target women for hygiene promotion, based on the stereotype that women collect water, prepare food, and are therefore more exposed than men. In fact, men moved far more often and were thus more exposed to cholera during the first few months of the epidemic..

Source: IASC, GenCap

Two tools to ensure the quality of recording and monitoring must be developed in advance, for example:

- A form for data collection;
- A database for archiving data (e.g.: Excel spreadsheet or Epi Info™).

Epidemic control is based on information about where cases come from, changes in the number of new cases and transmission factors.

It is therefore essential to **establish close and regular communication lines with the health sector**. The daily monitoring of the number of cases recorded at the CTCs must be ensured, either by physical collection on the spot, by computer transmission, or by telephone calls to the CTCs/CTUs and/or health centres.

The data collection form must be the same for all CTCs in the intervention area (always use the same case definition during the epidemic). These centres should record the number of cases and deaths by zone and period.

Data on the number of cases, deaths and demographics will be used to calculate attack and death rates. These two indicators make it possible to compare different zones and periods and to prioritise interventions, sometimes according to thresholds previously defined by the health authorities.



Appendix 4 Reference thresholds, attack and death rates



Example of a data collection files:

At the CTC level (per patient):

N°	Entry date	Sex	Age	Profession	Address (Av.)	Health zone	GPS	Evolution (1/ death, 2/ recovery, 3/ transfer)	Release date
1	01/01/2008	1	6	Student	Av. Benz	1	XXX	2	02/01/2008
2	01/01/2008	1	1	SP	Av. Hôpital	2	XXX	2	02/01/2008
3	01/01/2008	1	10	Student	Av. Kakonge	3	XXX	2	02/01/2008
4	01/01/2008	2	32	Housekeeper	Av. Saleh	3	XXX	1	02/01/2008
5	01/01/2008	1	28	Fisherman	Moni B	4	XXX	3	02/01/2008

All patients seen at the CLC who are not sent home immediately are considered cholera cases. Among these cases, it is necessary to differentiate between hospitalised cases (**severe**) and those kept under observation for several hours (**moderate**).

These records must be collected and processed at the highest level to ensure that the epidemic is managed throughout the affected area. SI can support this collection and processing of information where local capacity is limited.

In order to allow geo-localised monitoring, it is necessary to add a GPS measurement of the patient's home; once consolidated these measurements will make it possible to establish a dynamic mapping.

At the level of each zone (health district, health zone, etc.) per week:

Kalémie health district			Week X		Week X+1		Week X+2		Week X+3							
Health zone	Street Code	Avenue	- 5 y.o.		+ 5 y.o.		- 5 y.o.		+ 5 y.o.							
			c	d	c	d	c	d	c	d						
Kataki	Ka1	Tanganyika														
	Ka2	Tumbwe														
	Ka3	Donjo														
	Ka4	Kamaimba														
Kifungo	Kf1	Nord Shaba														
	Kf2	Mulongo														
	Kf3	Wele														
	Kf4	Mulongo														

Example of the form used in Kalémie, DRC (c = case, d = death)

In the case presented above, codes were issued for each street to avoid data entry errors (different spelling of street names made interpretation of the data very complicated).

Reports should be provided to the surveillance team at the district or national level on a **weekly basis**. There is a need to ensure that information flows correctly between all levels of the health system and is shared with other stakeholders. Only then can epidemics be managed from the very beginning of the outbreak.

Year	Week	Health district	Health zone	Avenue	Cases	Deaths
2008	S03	Kalémie	Kataki	Tanganyika	8	0
2008	S03	Kalémie	Hôpital Général	Kankomba	1	0
2008	S03	Kalémie	Hôpital Général	Mutoa	1	
2008	S03	Kalémie	Hôpital Général	Hôpital I	1	0
2008	S03	Kalémie	Bwana Kutcha	Sendwe	1	0
2008	S03	Kalémie	Bwana Kutcha	Kamalondo	1	0

Example of a weekly report used in Kalémie, DRC

Data analysis

Ces données peuvent ensuite être analysées sous forme de graphique.

► *Temporal analysis of the epidemic*

The graph presented below allows a first interpretation of the collected data. It makes it possible to make certain hypotheses about the dynamics of epidemics, in particular

their causes: rainy season, water cuts in a neighbourhood. Other criteria can be taken into account before the selection of the information to be collected, depending on the knowledge of risk factors, such as the start of the fishing season and the departure of fishermen from the camps, the time of year when major festivities are held with a large group of people.



Figure 7 - Evolution over time of cholera cases in Kalemie, year 2012

► *Dynamic mapping of notified cases*

Rapid screening should be accompanied by dynamic case mapping to allow:

- anticipating the trajectory of the disease;
- identify potential sources (for example, contaminated wells);
- identify potential vectors/carriers.

Different types of maps can be made:

- weekly attack rate per zone;
- map of localised cases per week
→ investigation at household level
- Identification of clusters presenting permanence cases → more in-depth diagnosis in these areas.

In the epicentres of cholera, it is relevant to further develop the mapping of risk areas, as has been done for the city of Kalemie.



SI EXAMPLE of Kalemie, DRC

The CTC in Kalemie keeps a record of cholera cases that the BCZ (Central Bureau of Health Zones) circulate weekly to all humanitarian and institutional actors.

In order to refine the search for the origin of cholera cases, a ranking of avenues presenting the most cholera cases for 2009 was established. To take into account the density of avenues in terms of population, cholera cases were compared to the population of the corresponding avenues: number of cases per 1000 inhabitants.

Example of representation of avenues with a number of cases greater than 5 per 1000 inhabitants for weeks X to Y of year Z:



Figure 8 - Example of representation of avenues having a number of cases superior to 5 for 1,000 inhabitants for the weeks X to Y of year Z. Source: SOLIDARITES INTERNATIONALE, Kalemie, DRC, 2010

This real-time mapping makes it possible to **identify the most affected areas, prioritise response actions** in these areas and directly **monitor** the expected impact on the reduction of new weekly cases.

In the same areas, surveys should be conducted to better understand the sources and factors of disease transmission (**active surveillance**). Various diagnostic tools have been developed by ACF and adapted by SI:

- 1. Context sheet of transmission and adapted responses:** it helps prioritise preventive control actions according to the identified transmission routes;
- 2. Village health survey,** determination of vulnerability to cholera epidemics makes it possible to:
 - diagnose the most exposed villages in a given area,
 - prioritise the positioning of a preventive response within a village/town in the strategic areas of gathering
 - block the spread of the epidemic by prioritising preventive actions in the most vulnerable villages not yet affected by the dynamic, as part of the shield strategy
 - understand, a posteriori, what triggered the epidemic.

3. Investigation sheet of a cholera case allows to diagnose the causes of the outbreak (diagnosis of the index case if possible) and of transmission of the disease.

4. Household survey to determine vulnerability to cholera makes it possible to:

- understand the intra-home context of transmission according to sanitary conditions
- know about hygiene practices and adapt awareness messages
- know the levels of knowledge related to the disease and be able to adapt awareness messages

5. Rapid household survey sheet, water analysis and minimum KAP allows for:

- ensuring the quality of water at home or, failing that, its role in the transmission of the disease
- quickly obtain a measure of the knowledge of the disease and the right reflexes to be held in the face of an epidemic.



D - INFORMATION AND AWARENESS-RAISING

Dissemination of key messages

Hand washing, drinking treated water, food hygiene and proper excreta management are essential to prevent the spread of cholera.

However, changing people's behaviour requires **participatory actions** that take time. We consequently do not aim for a change in behavior during an epidemic, but rather a minimal adaptation to contain the epidemic.

During an epidemic, the population has to be alerted as quickly and as widely as possible on the risks associated with cholera. It is therefore a matter of focusing on the few most important key messages, so that they can be easily understood and assimilated by the population. The most risky behaviours have to be identified as soon as possible through a rapid survey based on the key questions above and on knowledge of the key messages in the table on pages 68-69. Depending on the results of the survey, the messages will be adapted and widely disseminated.

Awareness actions have either a **"strike"** function when they are implemented in an area affected by an epidemic, or a **"shield"** function to prevent surrounding areas from being affected.

In the first case, the grouping of people will be avoided, and instead **mass media, door-to-door, sensitisers equipped with loudspeakers** will be used in existing spontaneous gathering places. The location of actions has to be flexible to follow the dynamics of the epidemic according to case mapping.

In the second case, **discussion groups** could be held in villages at risk with the most exposed socio-professional groups (fishermen, caterers, street vendors, students, etc.).



In a new context, it is recommended to focus on the perception of the disease, the relationship of the population with water, excreta, or their beliefs in the matter. Information messages must then be adapted so that habits and beliefs do not constitute an obstacle to temporary changes in practices, at least over the duration of the epidemic.



Strike

Do not provoke new gatherings
Use mass media (radio, TV, social networks), door-to-door, existing groups



Shield

Possibility of organising discussion groups, awareness activities in schools, markets, with groups at risk

Key messages		Target audience
<p>Body hygiene:</p> <p>Wash your hands</p>	<p>To protect your family from the disease, wash your hands thoroughly (back, palm, wrists, between fingers and under fingernails) with soap or ash and clean drinking water:</p> <ul style="list-style-type: none"> ▶ After using latrines or cleaning children after they have used latrines; ▶ Before cooking; ▶ Before eating or feeding children (including before breastfeeding). 	<p>All – Door-to-door awareness, radio or television messages, social networks, billposting in frequented places*</p> <p><i>* In times of epidemics, we should not provoke the gathering of people, including to disseminate awareness-raising messages; on the other hand, the existence of usual groups can be used to conduct awareness-raising campaigns (markets, public events, public buildings).</i></p>
<p>Water hygiene:</p> <p>Drink potable water</p>	<p>Water may look clear but it can contain bacteria that transmit cholera.</p> <p>To avoid contamination, drink only water from a drinking water source or treat water by boiling or chlorinating it.</p> <p>Store water in a clean, closed container (with a cap or lid).</p> <p>Pour water from the container to the cup (do not dip the cup into the container or use a cup with a handle).</p> <p>Keep water points as clean as possible (cover wells when not in use).</p> <p>Use a clean container to draw water (preferably with a closed lid and no objects entering the water during transport).</p> <p>Clean the area around the water point daily.</p>	

<p>Food hygiene:</p> <p>Cook, peel or leave it</p>	<p>Cook raw foods and heat cooked foods thoroughly before eating - eat immediately while the dish is still hot.</p> <p>Peel fruits and vegetables yourself or wash them with drinking water before eating them.</p> <p>Keep the kitchen clean and wash kitchen utensils (dishes, cutting boards, cutlery...) with soap and water.</p>	<p>All - especially women, food traders (in markets) and caterers*</p> <p><i>* It is important to involve traders in this awareness-raising action, because consumer mistrust can quickly take hold and have negative impacts on their economic activity.</i></p>
<p>Sanitation promotion:</p> <p>Use clean latrines</p>	<p>Do not defecate in the open in general and especially near a water source.</p> <p>Use hygienic latrines to defecate.</p> <p>Keep latrines clean by cleaning them daily.</p>	
<p>Health:</p> <p>Consult immediately if you have symptoms and rehydrate</p>	<p>If you contract cholera, the danger is dehydration due to the loss of water in the body.</p> <p>Do not panic but react quickly: drink an oral rehydration salt solution prepared with clean (boiled or chlorinated) water.</p> <p>Go immediately to the health centre / CTC - Continue drinking on the way.</p> <p>In case of death due to watery diarrhea in your environment, immediately notify the nearest health centre, do not handle the body yourself.</p>	<p>All - Door-to-door awareness, radio or television messages, social networks, billposting in frequented places</p>

In order to reach a maximum number of people and maximise their impact, messages can be disseminated through various communication media. For greater responsiveness in the event of an outbreak, each mission should therefore constitute a **cholera emergency awareness toolbox** containing a kit of communication materials that can be used directly in the field.

This box could for example be equipped with the following communication tools (all must be in local language):

► Pre-recorded radio messages

When people have access to radio, it is a good medium to reach as many people as possible at a time.

Each radio spot must transmit a single message. Several spots will be pre-recorded on each message to be broadcast.

To reach the listener, the spots must be attractive. This may include the use of acoustic effects or music to evoke emotion in the listener. **Personalities** may also be asked to support the messages.

The purpose of the spot is to inform the population about the epidemic and to explain to the listener what he can do to protect himself from it.

It is best to **hammer messages over a short period** (e.g. 10 spots/day over a 10-day period), rather than spread the spots over a long period of time.

► Pre-recorded radio debates

Ask local personalities, well-known and appreciated politicians, teachers from local institutes and universities, men (and women) from churches of different faiths to come and answer questions (asked by a local journalist) about the best ways to protect themselves from cholera.



Knowing who is listening to the radio in communities and families is essential. In some contexts, it is the men in the family who have the radio with them and listen to it, so messages need to be made to sensitise them, rather than women who are too often seen as the automatic recipients of hygiene awareness.

► Hygiene kits with instruction and awareness messages

In some contexts, it is necessary to **complement awareness-raising activities with the distribution of kits** enabling populations to protect themselves against the disease. This is the case, for example, for fishing populations with non-existent access to a protected water source for which it is more appropriate to distribute water treatment and storage products and soap during the epidemic period.

In all cases, the content of the kits should be **adapted to people's preferences and practices**. Instructions must be given as to the correct use of the products during distributions.

The table below provides the common elements of a “cholera” hygiene kit, however, in general, **the minimum that a kit must contain is soap for personal hygiene and a disinfection product** for drinking and cooking water for a period of 1 month (see *Sheet III - D for additional information on home water treatment*). Whenever possible, it is important to know the **availability of these products** and to have identified the type of treatment product to be used even before the outbreak starts (when preparing the contingency plan) or to have them pre-positioned.



It is necessary to ensure that there is no duplication, for example, we will avoid distributing purifiers to people who use chlorinated water that we distribute or that another actor distributes.

Since the effectiveness of the products depends on the physico-chemical properties of the water to be treated, the type of chlorinated product must be appropriate for the water source used by the communities.

Item	Context of distribution	Associated messages	Quantity
Soap	Low soap use in households due to lack of access or habit	Wash your hands with soap at key moments	250g soap bar per person per month
Chlorinated products for home treatment	Limited access to potable water / use of a contaminated water source (be careful with the turbidity and pH)	Only drink treated water (for drinking and cooking) <i>Warning: train on how to do it, and distribute an instruction manual on the products.</i>	Enough to treat 15 L/person/day during 1 month (for drinking and cooking)
Jerrycan	Inadequate water collection/ storage containers	Transport and store water in a clean, closed container	1 container of 20L/family
ORS	Isolated areas far from health centres <i>Warning: Coordinate with health actors before distributing.</i>	Use ORS when symptoms appear and go directly to the CTC for treatment	According to OMS recommendations

Equipment (particularly purifiers and ORS) may also be distributed to local authorities (health centres) after training relay actors, particularly during periods of lull, so that they can subsequently intervene in the event of an outbreak. In some cases, the distribution of kitchen sets may be relevant (for example, if it is found that in a camp, households lend each other items and that this is a source of transmission).

► Megaphones

Used by promoters to spread messages in camps, markets, during public events.

► Linking with other events

In order to reach a maximum number of people, hygiene promotion can also be adapted and become a partner of other external events. It is possible to convey awareness messages at events such as football tournaments, concerts, public meetings, cinema/video clubs, etc. These messages can be in the form of activities grafted to others (handwashing contests during the half-time of a football tournament for example) or simply in the form of messages passed to the microphone (by the DJ or the presenter of the event for example).

In peripheral areas that have not yet been affected, or in endemic areas with permanent cases, the use of participatory hygiene promotion methods (PHAST, CLTS) can be coupled with more **passive communication methods**, such as:

► **Information posters** of A3 or larger format with images: posters to be displayed in public places (health centres, markets, schools...). Different posters can be made, for example:

- 1 Poster illustrating the correct way to wash your hands
- 1 Poster illustrating key hand washing moments
- 1 Poster educating against open defecation
- 1 Poster encouraging the construction and use of latrines
- 1 Poster with the 4 key messages
- 1 Poster promoting the use of chlorine to be installed on chlorination sites.

A poster must convey only one message. Use simple words, used locally and understandable by everyone. The text must be readable at a distance of at least two metres. The images used should be simple and familiar to the target audience. Symbols should be avoided unless you are sure they will be interpreted correctly. Beforehand, the poster should be tested on a sample of people to ensure that people interpret the illustration correctly and make the necessary improvements.

- ▶ **Plain banners** with short messages – 2/3m wide – to install in neighbourhoods, camps, markets...
- ▶ **Brochures to distribute with images and text (illustrating key messages)** – A5 or A6 format

Brochures should not be overloaded with text or they may not be read. Common language (local dialect or spoken language) and large, easy-to-read characters should be used.

- ▶ **Awareness signs near structures.** For example, on public latrines, messages about the importance of maintenance (and hand washing at the exit) will be put up.
- ▶ **Image toolbox:** used by promoters during group awareness sessions. In particular, they can be used to explain the cycle of transmission of diarrheal diseases, to learn to recognise cholera symptoms and to protect against them.
- ▶ **Social networks:** where possible, develop messages, images and videos for distribution on the most commonly used social networks in the country.



It is important to bear in mind that cholera transmission is also man-to-man, interpersonal transmission, promoted by high density contexts. In this way, we will avoid generating large groups of people during epidemic periods. However, public awareness opportunities exist including during an epidemic, markets, school, sporting events, film/video clubs generally not stopping.



Appendice 5 Booklet for sensitisers

You can find numerous formats and sensitisation tools on the Intranet

D - ACCESS TO WATER

1. WATER QUANTITY AND QUALITY

Treating water or providing the means to treat it at home is sometimes the only and last resort to control a cholera epidemic. The objective is then to cut transmission of the disease by implementing a series of measures and activities as shown in Figure 8.

When a water source (surface water, wells, springs etc.) has been contaminated or is considered dangerous and the population has no other solution than to use it, it is essential to do everything possible to ensure the consumption of safe water. A secondary barrier should then be established as shown in the figure below.

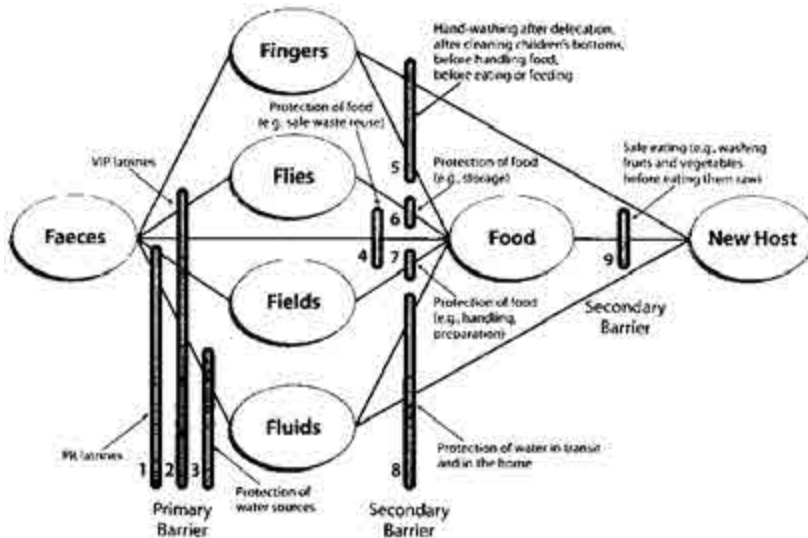


Figure 8 - Fecal-oral disease transmission routes and protective barriers

How much water is needed?

When responding to an epidemic, the first priority is to secure **access to an adequate quantities of pathogen-free (especially from fecal matter) water**, and then improve the physico-chemical qualities of the water

distributed as quickly as possible. Cholera is a disease that is also transmitted from person to person (inter-personal transmission) due to poor hand-washing, inadequate food hygiene, lack of water and soap, and bad habits.

Programme teams must primarily provide water to target populations in sufficient quantity, i.e. the amount that allows households to meet all their needs without having to make compromises in uses, such as

sacrificing hygiene at the expense of other uses.

It is therefore necessary to provide at least 15 litres per person per day to households.

What quality is required?

The aim is to eliminate as many fecal pathogens as possible from the water, including *Vibron Cholerae*, and to protect the water from re-contamination.

There are several ways to treat water but **chlorination is to be preferred during a “strike” response** against cholera. Chlorine not only destroys pathogens but also protects water from future contamination due to its residual effect.

This effect is verified by measuring the **Free Residual Chlorine (FRC)** in the water which must be between 0.5 mg/l and 1 mg/l after a contact time to be determined according to the pH of the water.

The action of the chlorine depends on the pH of the water with which it is in contact.

Depending on the pH, we will therefore have more or less active chlorine:

- if the pH is acidic, we will have 100% active chlorine;
- if the pH is basic, we will have little active chlorine (for example, with a pH = 9, there is only 10% of active chlorine).

This has direct influence on the dose to be applied, which should be higher in basic pH. A higher concentration allows more effective protection in case of an outbreak but gives a taste to the water which can lead to a refusal of people to consume it.



pH	Required chlorine residual at 20°C (mg/l)	Minimum contact time needed for effective disinfection (min)
8.0	0.5	30
8.5	0.2	206.0
	0.5	82.5
	0.8	52.0
	1.0	41.0
	1.5	27.5
9.0	0.2	412.0
	0.5	165.0
	0.8	103.0
	1.0	82.0
	1.5	55.0

Table 2 - Table of the contact time to be expected according to the pH and the expected FRC value. Source: OXFAM

Water turbidity must be low for chlorination to be effective. The aim is to have a **turbidity level below 5 NTU¹** (Nephelometric Turbidity Units). Chlorination will be relatively effective up to 20 NTU but measures must be taken to reduce turbidity as soon as possible. At higher

turbidity levels, greater amounts of chlorine are needed to oxidise the organic matter in the water and chlorination will be less effective due to the “umbrella effect”².

Turbidity value	Recommended action
NTU < 5	Colourless water, which can be chlorinated or filtered directly
5 < NTU < 30	Water with low turbidity, requiring treatment (filtration, decantation) before chlorination
NTU > 50	Turbid water, requiring treatment (flocculation, decantation, filtration) before disinfection

Tableau 3 - Turbidity value scale. Source: ACF, 2006

1. There are 2 other units of turbidity measurement: Jackson unit (UJ) and Turbidity Formazine Unit (UFT).
1 NTU = 1 UJ = 1 UFT
2. Bacteria can “hide” behind solid particles.



Water must therefore be treated until the free residual chlorine reaches between 0.5mg/l and 1mg/l for raw water with a turbidity of less than 5 NTU and a pH < 8 with a contact time of not less than 30 minutes.

However, a turbidity level between 5 and 20 NTU is sometimes accepted in emergency situations if the risk of Coliform contamination is low.



WEDC/WHO technical notes on water treatment in emergencies (notes 5 and 9)

MSF - *Public health engineering in precarious situations* - Technical brief 2.12 *Water treatment methods*

2. WATER QUALITY MONITORING

To be able to control the epidemic, it is **essential to continuously monitor the quality of water** from water supplies and of treated and distributed water. The frequency of monitoring will depend on local experience and available resources. However, water analyses should be more frequent during cholera outbreaks than during lull periods..

A monitoring and reporting tool for chlorination (and disinfection) activities was developed for the DRC. This tool contains all the necessary elements for regular and minimum monitoring. Of course, it can be adapted to each context according to access constraints, staff, etc.

The main water quality parameters to be monitored are:

1

CHLORINE RESIDUAL LEVELS

Chlorination quality varies with raw water pH and turbidity changes (see the previous section on water quality requirements).

In an epidemic situation, when distribution points along a water network are involved, the FRC should be 1 mg/l at any point in the network. If distribution is by tanker and chlorine is injecting during filling, then the FRC should be 1.5 mg/l (after 30 minutes).

The FRC is usually measured by using simple **Pool Testers or Disk Comparators**, adding the reagent DPD1 to the chlorinated water to be monitored. However, for more precise measurements, the use of Photometers is preferable.

Warning: Note that DPD1 tablets for Pool Testers, Disk Comparators and Photometers are different. Make sure you have the right DPD1 for the equipment you are using.

For **WAGTECH equipment:**

AL010 or AT010 are quick-dissolving reagents for Pool Testers

AK011 is the reagent for Disk Comparators, with the matching disk CD 011/2

AP011 is the photometer reagent.

[These references could also vary according to the year of publication of the catalogue used; make sure it is the catalogue in force at the time of the order that is used].

Using...	Dilution for a 1% solution	Remarks
Hypochlorite de calcium à 70% de chlore actif	15g/l = 1 full tablespoon / litre	Let deposit settle and use the supernatant
Lime chloride (“bleaching powder”) at 30% active chlorine	33 g/l = 2 full tablespoons/ litre	
Sodium dichloroisocyanurate (NaDCC): - 60% active chlorine tablets - 55% active chlorine pellets actif	10 tablets of 1.67g/l	For large volumes, HTH is preferred. Ensure that containers are suitable to use with the tablets.

Tableau 4 - Chlorinated products to prepare a 1% stock solution

The chlorine concentration (or content) is expressed:

- in % **chlorine**,
- in **chlorometric degrees**, for bleach, where 1° Cl = 0.3% active chlorine

- or in “**parts per million**” (ppm) per mg of active chlorine per litre, where 1ppm = 1mg/l = 0.0001% active chlorine.



Once you know the dosage required, mix the disinfectant with clear water. Let the solution settle for one hour before using it.

The solution should be stored in an opaque airtight non-metallic container, away from light and heat, and renewed at least once a week. In all cases, residual chlorine monitoring allows the quality of the product used to be checked and adjusted if necessary.

JAR TEST FOR COAGULANTS

A jar test determines the quantity of a coagulant (mother) solution that is required to treat a certain volume of turbid water. If the added coagulant dose is too low or way too high, no coagulation / flocculation will occur. A small overdose will work, but it represents a spillage of resources and an increased residual concentration.

It is not necessary to perform this test every day. However, free residual chlorine must be measured after each chlorination.

Source: MSF, Public health engineering in precarious situations

► Adjusting the dosage with regular Jar Tests

Raw water quality can vary at different times of the year (rainy season, low water levels, fishing season etc.), even over a single week. This can lead to variations in water turbidity that will affect the final FRC content.

It is essential to carry out regular Jar Tests to check that the dosage used is still appropriate.

Jar tests are simple procedures (MSF, 2010, TB 2.21), but a number of questions need to be answered upstream:

- Are there critical times of the year when water quality varies?
- How often is it important to carry out a Jar Test per intervention zone and type of water source?
- Who will be responsible for carrying them out? Will specific training be required?
- How and where will the results be listed?



Note that when the pH is > 8 , it is preferable to choose the higher concentration indicated by the Jar test. For example, if we have to choose between 0.8mg/l and 1.2mg/l, the second should be chosen. This is due to the fact that in basic pHs, the CRL mainly takes the form of hypochlorous ions. These have weaker oxidising properties than hypochlorite ions, which are in the majority when the pH < 8 .

It will however be necessary to check that these levels are acceptable for the population, because it is preferable that the water is less chlorinated but actually consumed. Similarly, if this water is consumed by the population over a long period, it is best that it is not over-chlorinated.

You can also refer to the table above to allow for a longer contact time in order to keep a FRC that best matches the taste preferred by the beneficiaries.



MSF - *Public health engineering in precarious situations* - Technical brief 2.21 *Batch chlorination of drinking water*

2

BACTERIOLOGICAL QUALITY OF DRINKING WATER

Testing for bacterial indicators of fecal pollution serves two purposes:

1. **Localising contaminated water supplies** in and around affected areas that are vulnerable to cholera vibrio contamination.
2. **Checking the impact of preventive chlorination activities** carried out on these same sources in order to stop the epidemic from spreading.

For practical reasons, the most widely used method in the field is to **search for Escherichia coli (E. coli)**, a bacterium which is heat-resistant and abundant in human feces. To do this, a **portable analysis kit** is used. The WAGTECH brand offers models adapted to field conditions.

In rural zones, where water points are far from each other and from bases, and where conditions make it difficult to carry out regular bacteriological analyses, **we recommend using H2S kits** (see photo below). These kits are easy to read (present-absent) and do not require any particular training. These quick kits can also be used to pre-select water sources when there is a large area to cover.

Once filled with the water to be tested, they are left for **24 to 48 hours between 25°C and 37°C**. If the contents turn brown, the probability of water contamination is about 90%³.



3. Hirulkar N. B. and Tambekar D. H. [2006] *Suitability of the H2S test for detection of fecal contamination in drinking water*, Amravati University, India

► Equipment required

the following equipment:

On a cholera prevention programme, it is essential that teams going in the field have

Parameters to be tested	Residual chlorine and pH		Bacteriological (fecal coliforms)	
	Recommended equipment	Pool Tester / Colour comparator disk	Reagents: DPD 1	Portable bacteriological analysis kit
Urban	4 per 50,000 inhabitants	50 tablets per Pool Tester or disk comparator per week	2 kits per surveillance zone. Consumables: for 10-30 tests / kit / week	
Peri-urban	1 per 1 000 inhabitants			
Rural	1 chlorination point	10 tablets per Pool Tester or disk comparator per week par semaine	For 10-30 tests / kit / week	20 / week

Table 5 - Water quality control equipment

This same equipment can be used to equip authority/suppliers, Reference Health Centres, [state] structures in charge of water quality control if this is part of a programme (Water etc.).



Internal note on WAGTECH water analysis products



Appendices 6 WAGTECH Equipment Manuals

3. ACTIONS TO BE IMPLEMENTED

The following table summarises the main interventions that could be implemented in response to a cholera outbreak or as a preventive measure:

Type of intervention	Water availability	Recommendations
<p>Cleaning and chlorination of wells</p> <p>Emergency response and prevention (shield).</p> <p>Very quick to implement (1 day) even if reusing wells will depend on their return to normal in terms of FRC or taste/look for the population.</p>	Existing wells that are contaminated or at risk of becoming so	<p>Protect wells from sources of re-contamination and ensure that minimum distances between defecation zones and wells are maintained.</p> <p>Chlorinating a well only once during an epidemic episode is ineffective. Rather than seeking to cover all wells, look for those in the most affected areas and ensure that they are chlorinated regularly.</p>
<p>Cleaning and chlorination of boreholes</p> <p>Emergency response and prevention (shield).</p> <p>Extremely quick to put in place (1 day).</p>	Existing boreholes that are contaminated or at risk of becoming so	Perform bacteriological tests (at least presence/absence) to identify high-risk boreholes among those most used in the affected area.
<p>Cleaning and chlorination of water storage tanks</p> <p>Emergency response and prevention (shield).</p> <p>Extremely quick to put in place (1 day)</p>	Existing storage tanks in use that may have become contaminated	Perform bacteriological tests (at least presence/absence) to identify contaminated water storage tanks among those most used in the affected area, by cross-referencing this data with the map of cholera cases to target tanks in the worst-affected areas.
<p>Water trucking - simple chlorination</p> <p>In an emergency, implemented immediately for direct distribution, several days if building distribution hubs is required</p>	<p>River/lake with low turbidity or polluted source with low turbidity/ Drinking water supply</p> <p>Preconditions: Turbidity < 20 NTU pH < 8*</p>	<p>Ensure trucks deliver the quantity required on time.</p> <p>Ensure that sufficient volumes are delivered and that the public accepts the taste of chlorine.</p> <p>Find an exit strategy quickly.</p> <p>If the pH is over 8, refer to the contact times table.</p>

* If the pH > 8, refer to the table of contact times

Type of intervention	Water availability	Recommendations
<p>Water trucking - after coagulation/flocculation/ chlorination or filtration/ chlorination</p> <p>In an emergency, but requires several days for the treatment process to get under way. Quicker if using a mobile filtration station.</p>	<p>River/lake with turbidity superior to 20 NTU</p> <p>pH < 8*</p>	<p>Same recommendations as above.</p> <p>Make sure that staff are well trained in treatment protocols and in monitoring the effectiveness of treatments.</p> <p>Guards are required day and night.</p> <p>Keep a stock of ferric chloride in areas where pH > 8.</p>
<p>Installation of a chlorination point or site</p> <p>Emergency, very rapid (1 day) if “sprayers” have already been trained.</p>	<p>Contaminated river/ lake or spring with low turbidity.</p> <p>Precondition: Turbidity < 5 NTU pH < 8*</p>	<p>List high-risk well sites and cross-reference their location with dynamic case mapping to select those located in the worst-affected areas.</p> <p>Build the capacities of resource people and make sure that chlorination is effective [especially if the water has a turbidity over 5 NTU and/or a pH over 8].</p>
<p>Chlorination point with added sand filter</p>	<p>River/lake with turbidity > 30 NTU</p> <p>pH < 8*</p>	<p>Install awareness-raising signs at chlorination stations.</p> <p>Chlorination of containers at water drawing points of all kinds (including boreholes) has the advantage of protecting the domestic water stock from being quickly recontaminated.</p>
<p>Distribution of Aquatab-type purifiers (NaDCC) or flasks of liquid chlorine for home chlorination</p>	<p>Contaminated river/ lake, spring or well with low turbidity.</p> <p>Precondition: Turbidity < 5 NTU pH < 8</p>	<p>Suitable for use when the population is dispersed and not easily accessible by road to carry out water source cleaning/ chlorination activities.</p> <p>Preferably when the product is known and used in the area. In all cases, significant awareness-raising and support is required to ensure the product is used properly.</p>
<p>Distribution of PUR/ WATERMAKER-type purifiers (coagulant/flocculant + chlorinated product) for home chlorination</p>	<p>Contaminated river/ lake, spring or well with high turbidity</p>	<p>Turbidity > 5 NTU and difficult to reduce by simple decantation and sand filtration.</p>

Tableau 6 - Type of interventions, constraints, conditions and recommendations

Cleaning and chlorination of wells, boreholes and water storage tanks

During the assessment, some polluted water sources used by the population could be identified as sources of the epidemic.

These infrastructures may have been polluted by the **intrusion of contaminated utensils** (bucket, rope, etc.) or by the **infiltration of fecal matter** if the water point is not properly protected (for example if there are latrines nearby).

If they are polluted or present high risks of sensitivity to external pollution, wells and tanks can be cleaned then disinfected.

Cleaning should reduce turbidity (although stirring might cloud the water for a few hours or even days) to ensure effective chlorination. The FRC level must then be monitored (approximately 0.5mg/l after disinfection).

Boreholes are developed then disinfected. Wells and water storage tanks can be regularly chlorinated; which is however not the case for boreholes, as they are more difficult to access. In all cases, it will be necessary to monitor the bacteriological quality of the water and, if pollution persists, to work with both health authorities and the population to find the most appropriate solutions: temporary closure of the water point (but what alternative solution?), chlorination at the water point, increased home chlorination.

For simple gravity water networks, disinfection is done at the reservoir level, using the same methodology as for a well. If after 24 hours the FRC level is higher than 1mg/litre, it will be necessary to empty the tank and refill it with water. If FRC levels are lower than or equal to 1mg/litre, the valves can be opened. The FRC should then be measured at the taps (at least 0.5 mg/l at the end of the network).

Bacteriological tests must be carried out frequently during epidemic periods (frequency to be decided with the authority in charge of managing the network). If pollution remains, conduct a health survey at 1) the source, and 2) the protection perimeter around the reservoir. If this fails, consider chlorinating the tank a little every day.

When a distribution network includes a water treatment plant, FRC levels should be systematically monitored at various points along the network and chlorine doses at the plant increased if necessary.

When the only available water sources are unfit for human consumption (river, lake, etc.) or in the absence of a water point, it will be necessary to resort to water treatment and/or distribution (see following points).



In endemo-epidemic areas, identifying and mapping the points of use and their characteristics (GPS coordinates, number of users, flow rates, owner, manager, bacteriological quality or health risk, etc.) is an essential preparatory activity to facilitate responses to epidemics.

Water trucking – simple chlorination

When an outbreak occurs and water sources are contaminated or at high risk, or when it is not possible to restore water supply systems to working order, it is sometimes necessary to **provide water to affected populations by tank truck**. In this case, after having calculated the water needs of the target population, calculate the number of trucks needed to ensure the number of round trips needed, taking into account:

- the time to fill and empty the truck;
- the journey time between the water supply point and the distribution sites.

Care should be taken to keep room for manoeuvre for unforeseen circumstances (breakdowns, rest breaks, etc.), water loss during transport and possible additional beneficiaries (such as host communities in the context of an IDP site).

Particular attention should be paid to **the cleanliness of the water transport tank**. Before the first use, the inside of the tank truck should be rinsed with a chlorinated solution (sprayed on the internal walls with a pump), then the tanker closed and left overnight. The cistern should then be rinsed with clean water.

When the truck is filled with chlorinated drinking water, it can then supply the tanks located near the distribution sites. **Chlorination can be done in the tank truck or directly in the water storage tank**. However, chlorination in the tank truck can save time (mixing and 30 minutes contact time during transport).

If no tanker truck is available, one alternative is to attach a transport bladder (with side straps) to a flat-bed truck. In this case, it is important to check that the truck can support the weight of the filled bladder.

Chlorination should preferably be carried out directly in the water storage tank (due to the reaction of chlorine with the tank metal). After 30 minutes, the chlorine level at the tapstand should be checked before distribution begins.



MSF, *Public health engineering in precarious situations* - Technical Brief 2.03 *Cleaning and disinfection of a well*

WEDC/WHO, Technical note 3 *Cleaning and disinfecting water storage tanks and tankers*

WEDC/WHO, Technical note 12 *Delivering safe water by tanker*

Water trucking – after coagulation/flocculation/chlorination or filtration/ chlorination

When water turbidity is greater than 5 NTU (up to 20 NTU accepted in emergency situations if the risk of contamination of the water source with Coliforms is low), chlorination alone is no longer sufficient and **upstream pre-treatment is required to reduce turbidity**.

To do this, several treatment methods can be used:

Natural decantation:

When the type of particles allows, the water can be decanted “naturally” into a large capacity tank. A simple empirical test can determine whether this method can be used. It consists in filling a bottle with the water to be treated. If after one hour the water has decanted, a large-scale decantation can be done. Otherwise, the suspended particles must first be coagulated so that they can settle. The water is then transferred to another tank to be chlorinated.

Assisted sedimentation (coagulation/flocculation):

When suspended matter in raw water do not settle naturally to the bottom of the tank, a **coagulant** can “assist” the settling. The addition of this coagulant to the water will allow the particles to agglomerate to form “flocs” which are heavier and will therefore settle. In the field, the most frequently used coagulant is **aluminium sulphate** (depending on the pH of the raw water and the availability of products in the field, other coagulants will be used such as ferric chloride or polymers). As for the preparation of a chlorinated solution using HTH, a mother solution is first prepared with 1% aluminium sulphate (i.e. 10 g of aluminium sulphate for 1 litre of pure water). A **Jar test** is then carried out to know what dosage is required (i.e. the minimum dosage which allows a good flocculation of suspended matter). This dosage generally varies between 10 and 150 g of aluminium sulphate per cubic metre of water to be treated.

Photo 4: Emptying the tank truck to fill the bladders - North Kivu, DRC © SOLIDARITÉS INTERNATIONALE



The coagulant should preferably gradually be added to the tank as it is filled, either by a simple drip system, by a lateral suction dosing mechanism installed before the pump⁴. This will allow a better mixing of the product in water.

Once the tank is full (open tanker, or onion tank), the flocs are left to decant for the necessary time (1 to 2 hours on average) before transferring the clear water into

another tank to chlorinate it. Make sure that the drain valve or the suction filter are high enough (approx. 30 cm from the bottom of the tank) so that the sludge from the decantation is not sucked up, unless you opt for pumping from the top of the tank.

This method produces water with a turbidity less than 5 NTU and which can therefore be chlorinated.



- The settled sludge should be removed regularly, ideally with a dewatering pump. These sludges are heavily loaded with metals, so it is important to ensure that they are properly buried in a soak-away pit without danger to the neighbourhood.

- It is **ESSENTIAL** to be equipped with residual aluminium measuring equipment when aluminium sulphate has been used to clarify the water. WHO standard < 0.2mg/l.
-> WAGTECH AP 166 reagents (Photometre) or
CD+AK 166 (comparator disk 0-0.5mg/l + reagent)

Mobile water treatment unit (filtration):

Another option for assisted sedimentation is the use of a **mobile treatment station**.

Several types of mobile stations are used in the field: Aquaforce 500, A-Aqua, Scanwater etc.

They are generally composed of a flocculation/coagulation, filtration, and chlorination treatment chain. The advantage of these stations is that they are quick to install, they produce better quality water than assisted sedimentation and are easier to monitor.

However, they require **staff training** for optimal use and **mandatory daily maintenance**, as well as an adapted storage and security system due to their high cost.

As this market is constantly evolving, it is recommended that you contact the head office logistics department to find out which models are included in any framework agreements with providers.

4. Not recommended if using polymers.

Chlorination points

This activity consists of organising a system for chlorinating containers and/or buckets at the most frequently used water points, both in a reactive (where the epidemic has started) and preventive way (around the affected areas to prevent the epidemic from spreading). Two people take turns to ensure a permanent staff presence at the well site to which they are assigned. Often, one person chlorinates from 5-6am to 12 noon, followed by a second person from 12 to 6-7pm.

The first and most fundamental step is to **identify and prioritise drawing sites** based on:

- how often they are used: priority will be given to the most commonly used sites.
- the assessment of the risk of contamination: priority is given to sites that are most likely to be contaminated (surface water, unprotected wells near single pit latrines, etc.). H2S detection kits may be used for rapid analysis of fecal contamination if there is a large area to cover.

However, if the drawing point is too contaminated (or if the turbidity is too high without a rapid pre-treatment solution), or if the risk is considered too great, it is better to discuss with local authorities to close it and encourage the population to draw water elsewhere.

The chlorination method follows the procedure explained in previous sections. As water turbidity can vary over time, this parameter must be monitored regularly to adjust the chlorine dosage. Jar tests must be conducted at pre-determined intervals, taking into account the way in which the chlorinated solution is injected when deciding on the minimum contact time required.

Some principles regarding contact time:

- **Mixing by stirring** when possible: 30 minutes contact time if standard turbidity and pH conditions;
- **Mixing by diffusion**, with a syringe that deposits the chlorine on the surface: prefer a contact time of 45 minutes or even 1 hour (preferably use a syringe with a long hose);
- Same rule for pH as mentioned in previous sections.



Although this type of response is simple, to be sure of its positive impact, it is **ESSENTIAL** to measure the FRC very regularly. This means that a sufficient number of chlorination site supervisors should be planned and trained to monitor FRC, pH and turbidity. In order to do this, a complete tool for monitoring chlorination activities is proposed below, adaptable to field conditions.

It is essential to **know the precise location of all chlorination sites**, whether permanent or temporary. A simple table in Excel should be updated with each modification, and GPS coordinates for each site should be transferred on a map. This work makes it possible to cross-reference data from cholera treatment centres or healthcare workers concerning the origin of cases with the distribution of chlorination points. It is indeed necessary that the latter are initially installed in the most affected areas, then to be able to move them according to the dynamics of the epidemic.

In order for the sites to be identifiable by the users and for the chlorination agents to be correctly installed, the stations will at least be equipped with a table, a chair and a parasol. For less temporary sites, a shelter, made of wood for instance, can be built. You might consider displaying posters at the stand with positive messages on the use of chlorine.

Chlorinating agents should be trained (in chlorination, awareness-raising and monitoring their own activity) and equipped (see list of standard equipment below). It is important to regularly ensure that chlorination is carried out correctly and to train agents again if necessary.



Photo 5 - Example of a poster to put up (to be translated into local language)

A document may be left at each chlorination point specifying the volume of mother solution to be used according to the type of container.

Chlorinating agents should also be equipped with a **monitoring logbook**, allowing them to note the number of users of a water point, the volume of water treated, peak usage times etc.

Coupled with KAP surveys, this makes it possible to collect information for monitoring and to adjust activities.



Appendix 7 SI chlorinator sheet

Appendix 8 Booklet for chlorinators

Appendix 9 Booklet for hygienists

5 ml syringe	16	Chair	4
20 L closed container with the mother solution	4	Parasol	2
Plastic cup	4	Waterproof coat	4
Pair of medical gloves	30	Pens	4
Mask	8	Chlorination monitoring pack: training module, corresponding form between the volume of the container and the quantities injected, notebook or paper to note down visite frequency	2

Table 7: Equipment to be given to teams of chlorination agents

In endemic areas, this kind of activity can be transferred to local stakeholders, notably as part of an exit and local capacity building strategy, so as to enable the population to respond to the next epidemic by itself.

This may involve training community health workers or local volunteers in the preparation of the mother solution, the identification of at-risk water drawing points, and the chlorination of containers. In addition, it is possible to provide the stakeholders in question with a small amount of pre-positioned contingency stock. This stock can also be used by one of our

teams if the population alone cannot respond to the epidemic.

Where relevant (especially in isolated areas where access to chlorine is difficult, or where access to the area is time-consuming), agents can be equipped and trained in the manufacture of liquid chlorine using electrochlorination systems such as *Antenna WATA* or *Vergnet Photalia E'Chlo*.



If transfer of skills and responsibility is planned, the following is required:

1. Allow sufficient time in the activity schedule;
2. Disassociate it from the ongoing response project as this represents a risk for the quality of action through the sprinkling of efforts;
3. Have a joint decision with the relevant actor to strengthen a training programme based on its current capabilities and limits.



MSF, *Public health engineering in precarious situations* - Technical Brief 2.23 *Controlled bucket coordination*



Fiche d'activité Haïti - Mise en place de points de chlorination pendant les épidémies de maladies diarrhéiques (contexte choléra) (*in French only*)

Home chlorination

In certain contexts, home chlorination may be preferable to collective chlorination, **in rural areas where houses are scattered or access is difficult for instance**. This treatment method can also be developed **in parallel with collective treatment systems** to reach a population that is not covered by existing systems.

It is necessary to ensure that there is no duplication: we will avoid distributing purification agents to people who use chlorinated water.

With this solution, we can **respond quickly to an emergency situation**, insofar as there is a pre-positioned stock of purification agents.

It is all the more appropriate if the population already knows this treatment method, but in this case it is likely that a network of local distributors exists, and it is therefore important to be careful not to compete with them. If the network has sufficient supply capacity, we can make use of it.

The distribution of packets or bottles of chlorine can be **included in hygiene kits**, alongside awareness-raising and information activities. It is **ESSENTIAL** to ensure that the target population **understands how to use these products to avoid any risk of accident or misuse**. Instructions in the local language will systematically be distributed with the chlorinated products (version with pictures for those who cannot read).

Between epidemics, it is sometimes appropriate to promote the use of chlorine through awareness-raising activities, but also by strengthening supply chains.

Beyond simple water disinfection, the development of home treatment methods may also involve **family filtration systems**: ceramic filters (whether traditional, ceramic candle, or membrane filters), biosand filters, etc.



SI EXAMPLE in DRC

In the DRC, the local association “Mamans UZIMA” produces chlorine locally (using electrochlorinators). They can then sell it to families through several approaches:

- Resale in existing stalls;
- Resale in neighbourhoods, at private homes: a family in a neighbourhood has chlorine where neighbouring families come to buy;
- Resale door-to-door by members of the association in neighbourhoods affected by cholera in the previous weeks.



Actions to strengthen home water treatment systems during inter-epidemic periods are possible under certain conditions:

1. The activity is part of the association's strategy in the country and respects the national disease control framework;
2. There are no other actors who are better placed or more experienced in the area, and this area is a priority for cholera prevention;
3. The programme is long enough (>18 months) to be able to work on information, education and communication elements;
4. Our teams have the capacity to carry out social marketing activities in an appropriate manner: support for market studies, business plans, training plans, etc.;
5. There are local supply or production circuits and local stakeholders who can ensure that the system is sustainable after the end of the programme (resale, awareness raising).

There are different types of products that can be used for home chlorination. One or the other will be chosen depending on the possibilities to be supplied locally but also to the context.



Appendix 10 Water home disinfection products



Activity form Afghanistan - Biosand filters

E - EXCRETA MANAGEMENT

1. EXCRETA CONTROL

During an epidemic, the basic principle is to find the fastest ways to **cut off contact between excreta, water resources used for human consumption, fields, flies, food and ultimately the future host**, in order to contain the epidemic.

In the long term, **excreta control is the approach that has the greatest impact on reducing diarrheal diseases**. As a primary barrier, it contributes to the protection of water resources against fecal contamination, limits mechanical transmission by flies or fields, and thus reduces the risks of contamination of fecal-oral diseases.

During outbreaks, short-term excreta control is not always possible or the most effective solution. This is particularly the case in flood-prone areas where there is an epidemic (i.e. lake or riverside areas). In these cases, setting up an excreta management system

does not guarantee that the epidemic can be controlled because the primary barrier is not ensured. The complexity of cutting the route of fecal matter to the water resource used by the population is very high. It is then better to concentrate efforts on the consumption of treated water and appropriate hygiene practices such as proper water transport and storage, hand washing, washing and cooking food, i.e. on secondary barriers.

However, in other contexts, **such as closed IPD camps or urban areas**, where promiscuity is a high-risk factor, it will be necessary to seek rapid solutions to control excreta and avoid the spread of the epidemic. It is then a matter of **setting up conventional emergency sanitation systems** when they do not exist or ensuring that existing ones function properly.



It is not systematic or timely to aim for behaviour change to ensure appropriate excreta management during an epidemic. It is first and foremost a question of informing the population so that they can **adapt their practices** during the duration of the epidemic at least, and to this end, systems are often temporary and do not seek to be sustainable either. Information and awareness should therefore focus on the immediate danger of open defecation or defecation near water sources in times of epidemic.

Behaviour change and sustainability are objectives sought in the “shield” prevention phases in inter-epidemic periods. In this sense, the use of participatory methodologies such as CLTS is not recommended in times of emergency.

2. ACTIONS TO BE IMPLEMENTED

The methods and techniques for managing excreta during cholera outbreaks are the same as for any other type of health response in humanitarian emergencies. In most cases, this involves setting up **temporary collective latrines** while respecting precautions linked to the risk of contamination of water sources

and the spread of disease due to poor maintenance. The **Sphere** excreta management guidance notes and standards are applicable, and it goes without saying that they need to be adapted to each context.



MSF, *Public health engineering in precarious situations* - Chapter 3 *Safe excreta disposal*

WEDC/WHO, Technical note 13 - Planning for excreta disposal in emergencies

The Sphere Project, Standards and guidance notes on excreta disposal

Targeting

The identification or targeting of priority areas to be covered is done through **continuous analysis of the origin of cases** resulting from the surveillance system.

The first objective is to limit:

- open defecation in the most affected areas;
- defecation near springs, wells, rivers and lakes used for drinking water (drinking, cooking).

Particular attention will be paid to the way in which excreta are managed in **places with high population concentrations or gatherings** such as markets, ports and railway stations. In permanently densely populated areas such as IDP or refugee camps, the entire site must

be covered in order to eliminate all open defecation.

Depending on the dynamics of the epidemic, in particular the geographical evolution of the origin of the cases, we must try to set up **health barriers** (shields) around the affected areas connected to them (trade exchanges, places of passage and important population crossings such as stations, ports, etc.). If logistical capacity is not sufficient to support the implementation of temporary latrines in these connected areas, information activities at least should be reinforced among the population to remind them that in times of epidemics, it is essential not to defecate in the open or near water sources.

Densely populated areas

The greatest danger is open defecation, which can contribute to a rapid spread from neighbourhood to neighbourhood (in urban areas), from area to area (in camps). The objective is then to propose to the population simple and fast systems to implement so that they can defecate so as not to leave excrements exposed on the surface:

- **Single pit latrines with temporary superstructure** – provided that the minimum distances (vertical and lateral) between the pits and the nearest water sources used are respected.
- **Raised latrines with collection of excreta in drums**, suitable in areas where there is not enough space to replenish pits or it is not possible to empty them on site (provided that an appropriate emptying, transport and storage or treatment system is planned).

- **Mobile, watertight and drainable toilets** – provided that an appropriate emptying, transport and unloading system is planned.
- **Bags, such as “peepoo bags”, waterproof, biodegradable** – provided that a suitable collection system, transport method and disposal site are planned and that the population accepts this method.

The specificity of urban zones is the multiplicity of pre-existing sanitation systems. Neighbourhoods where the cases originate and those where excreta management is the worst will be prioritised. But it will also be necessary to ensure that the family systems that can be emptied (simple watertight tank or septic tank) or collective systems (collection network) in the districts least at risk are functional and properly managed.

Photo 6 - Temporary toilets in Kanyaruchinya camp, DRC



► *Lack of space, shallow bedrock*

In densely populated areas where there is little space available (i.e. in urban IDP camps) or where the bedrock is shallow, it is sometimes impossible to dig pits or to dig them again when the former are full.

Flood-prone areas

The choice of excreta management system will depend in part on the **water resource used for human consumption**. If it consists of surface water or unprotected wells nearby, then it will be very difficult to find a simple and quick system to limit their contamination. Single pit latrines, for example, will have little impact because they are in direct contact with the water resource and, unless they are positioned far away from the collection points, feces may end up in the users' cans.

In most cases, it is best to **focus efforts on water treatment** (at water drawing points or at home) and hygiene practices, while recommending not defecating near water drawing points and, if possible, covering the excreta.

Nevertheless, depending on the situation, it will sometimes be possible to set up systems such as:

- **Bags, such as “peepoo bags”,** mentioned on the previous page - provided that a suitable collection system, transport method and

The situation can then quickly become dangerous and conducive to the spread of the epidemic.

Alternative systems such as raised structures with excreta collection in removable drums (see photo opposite) can then be used. The use of bags, as already mentioned above, may also be relevant.

disposal site are planned and that the population accepts this method.

- **Raised latrines with collection of excreta in drums**, which can be adapted in a flood-prone area or with a high water table - provided that logistical access is possible, that the population can have access to it and provide a system for emptying, transport and an appropriate storage or treatment site.

► *Surface water table*

In areas where the water table is shallow (less than 2 metres deep) at the time of the epidemic, conditions are similar to those that can be flooded. However, the risk is lower because there is a **filtering potential of the saturated soil**. The priority will therefore be to ensure that protection distances between existing latrines or latrines to be built and the points where they are drawn (wells, springs) are respected, and to make people aware of the importance of not defecating near them when no sanitation system exists.

3. POINTS OF ATTENTION

1

TAKING INTO ACCOUNT DIFFERENTIATED NEEDS

In each context, the needs and specificities of women, men, children and physically disabled or diminished persons will be taken into account to allow them secure and facilitated access.

Emergency latrines built to prevent a cholera epidemic will therefore also meet the safety and dignity needs of all sections of society.

2

HAND WASHING

These facilities should be equipped with hand-washing facilities and soap should be available to encourage hand washing at the exit of latrines.

3

MAINTENANCE OF SANITATION SYSTEMS

In camps, densely populated areas, it is essential to ensure adequate maintenance of sanitation infrastructures. The toilets are thus **kept clean and hygienic**, so as to avoid that they become factors of propagation.

In emergencies, latrine maintenance workers may be **compensated** because volunteering is often very difficult to set up in this type of context. They will be **equipped** (brush, squeegee, gloves, bucket) and maintenance products (bleach, 0.2% chlorine solution, soap). Latrines should be disinfected regularly with a chlorinated solution.

In addition to maintaining the latrines, they may be in charge of ensuring that there is water and soap available in the wash-hand basins.

4

EXCRETA DISPOSAL**Lime-washing**

Lime stabilises the sludge by blocking biological activity. Lime indeed makes it possible to raise the pH beyond 12, which has for consequence to block the activity of bacteria.

In densely population areas where there is open defecation, in parallel to the construction of latrines, care should be taken to **lime-wash the excreta present on the ground immediately**. Similarly, when the emergency latrines are almost full (50 cm below ground level), the latrine sludge should be limed before being covered with soil. It is necessary to count on average 3 kg of lime for 1000 L of sludge.

Reduction of excreta volume

In these same dense areas, where little space is available for digging new pits, “**EM**” (Effective Micro-organisms) can also be added to existing pits to reduce sludge volume and reduce bad smells and flies. This product is available in the form of powder (“Neobio” latrine range for example). However, as this product is quite expensive, it will only be used when there are no other alternatives.

Emptying

In the case of permanent or temporary latrines that can be emptied, every precaution must be taken to ensure that the emptying of pits is hygienic, i.e. by minimising the handling of excreta and thus health risks. The sludge is transported by vacuum truck, cart or tricycle depending on the context and the type of sludge (with or without water). Operators in charge of emptying should be trained and equipped. The sludge is disposed of in a designated area.

To reduce the contact between the persons in charge of the emptying and the feces, in addition to MANDATORY adapted equipment, manual diaphragm pumps can be used.



Whatever the excreta management system, special attention should be given to emptying latrines when necessary. Sludge should be collected and transported according to a strict protocol in order to avoid the spread of the epidemic and to protect the people in charge of this work. The disposal site for sludge is particularly important and must be a safe and equipped location for the proper storage of sludge.

5

IN CHOLERA TREATMENT CENTRES (CTC)

Excreta management in isolation centres or cholera treatment centres meets the basic principles of all sanitation systems for public places, to which must be added **the obligation of daily disinfection of latrines** and appropriate disposal of sludge once the pits are filled.

The standards are those recommended by Sphere for public places and institutions: **1 toilet for 20 patients**, and an adequate number for the personnel.



The Sphere Project, Standards on excreta disposal

MSF, *Public Health Engineering in Precarious Situations*, Chapter 3 - Safe excreta disposal, 2010

WEDC/WHO, Technical note 14 - Technical options for excreta disposal



4. MONITORING EXCRETA MANAGEMENT ACTIVITIES

The points to follow are:

- The toilets must be kept clean and hygienic (no traces of excrement on the slab, walls, door and handle)
 - ▶ Daily monitoring
- In public places with a high population density and frequent use of toilets, they must be disinfected every day
 - ▶ Daily monitoring
- Toilets must be accessible safely and easily to all persons
 - ▶ Regular monitoring in the form of discussion and survey with the population
- There must be a functional wash-hand basin at the exit of each toilet block
 - ▶ Daily monitoring
- Open defecation in areas of high density should be eliminated during the outbreak and there should be no defecation areas near water sources or catchment points.
 - ▶ Control monitoring by the teams of sensitisers
- The filling level of the pits must be checked systematically in order to avoid any overflow.
 - ▶ Monitoring at least on a weekly basis
- The emptying of the pits must be done according to the sanitary safety procedures indicated.
 - ▶ Control of the activity by the project teams



F - DISINFECTION

1. DISINFECTION OF SICK PEOPLES' HOMES

CHLORINE SPRAYING, A DEBATED ACTIVITY

In 2010, Prof. Sandy Cairncross of the London School of Hygiene & Tropical Medicine questioned this activity: *"No published study indicates that disinfecting houses [or latrines] is effective in preventing cholera. This is not surprising, as no major elements seem to point in this direction. Vibrio cholerae bacteria are very sensitive to desiccation (they die quickly on a dry surface) and infect the population orally (so unless you lick the floor or furniture, the risk of infection is minimal). [...] On the other hand, there is ample evidence of the importance of handwashing, food hygiene and excreta disposal in the fight against cholera"*.

According to the ACF Cholera handbook, pressurised chlorine spraying operations in homes or vehicles are no longer recommended because:

- There is **no evidence of the effectiveness** of these sprays performed in an exceptional manner.
- In general, the spraying team will not visit a contaminated home until several days after the onset of cholera. During this time however, other members of the family could already have been infected.
- Asymptomatic or convalescent members of a household may cause repeated contamination of other members.
- The spraying process can stigmatise a family and damage household property. These two disadvantages can be very dissuasive for households that will take a long time to seek treatment for family members.
- The process of spraying a household requires considerable resources and staff time could be used for more effective actions.

Although the efficacy of spraying chlorinated solutions in homes has not been proven in the literature, it does not have an identified negative impact either, apart from the cost it may represent. In addition, it has a number of interesting positive effects that field stakeholders have noted:

- it can limit potential panic in a neighbourhood or community by bringing in agents who will explain and reassure the population;
- it allows to go systematically to the patients' homes, to sensitise the family and neighbours, to diagnose the sanitary conditions, to reference

the exact geographical position of the dwelling in order to include it in a database of the origin of the cases.

A study on home disinfection in six countries was initiated by Tufts University in Boston. The general idea is to compare a "spray" group, with a "disinfection kit without home monitoring" group and a "disinfection kit with home monitoring" group. Pending the results of this study and where relevant, SI may propose this action as a complement to chlorination and awareness activities.

Implementation

The activity consists of **sending a team of disinfection agents to the home of the patient within a maximum of 12 hours** after he has been admitted in the CTC or after the case has been reported. The dedicated team, trained and equipped to carry out cleaning activities, carries out targeted disinfection:

- inside and around the affected house, targeting all traces of vomit and fresh feces;
- the latrine used by the affected household.

Each base must therefore find a system that allows to intervene within 12 hours. Interventions after 12 hours must be an exception.

If cases have been reported in a camp for displaced persons, special attention should be paid to the **systematic disinfection (spraying) of all sanitation facilities several times a day**. Coordination with health workers must therefore be seamless so that information is collected (the patient's place of origin) and transmitted to the agents in charge of spraying, to target the latrines closest to where the patient lives..

Composition of disinfection teams

Disinfection teams are composed of a **duo chlorine sprayer / hygiene sensitiser**, for two reasons:

- While chlorine sprayers are supposed, after spraying, to deliver some key hygiene messages to the family, this task is very often done in a botched manner, even though it is of capital importance for cutting the chain of transmission of the disease;
- A family recently “traumatised” by the arrival of cholera will be very receptive to awareness messages, which justifies adding a professional in this sector.

It is thus expected that the sensitiser carries out this work with the affected family and the immediate neighbourhood while his colleague does the complete disinfection of the house affected. **The person responsible for disinfecting dwellings must wear closed shoes, long clothing, gloves and a nose cover.**

Implementation steps

Reminder of concentrations used:

Use of different mother solutions	Hands, bedding, clothing, skin	Ground and feet	Latrines, excreta, vomit, corpses
Concentration	0.05% of active chlorine	0.2% of active chlorine	2% of active chlorine
HTP powder 70% active chlorine	Add 1 tablespoon in 20 litres of water Equivalent of 15 g of HTH / 20 L	Add 1 tablespoon in 5 litres of water Equivalent of 30 g of HTH / 10 L	Add 2 tablespoon in 1 litre of water Equivalent of 30 g of HTH / L

Table 9 - Use of different chlorinated solutions

1

The teams leave with 2 sprayers (one for a 2% solution and one for a 0.02% solution) and prepare the solutions on site. Allow 1.75 kg of chlorine per week per sprayer.



The sprayer used must be acid resistant (preferably HDPE). The tank has a capacity of 10L (min 5L, max 20L) and is preferably worn on the back. It is recommended to opt for homogeneous sprayers per intervention zone.

Do not mix disinfectants; if necessary, thoroughly clean the sprayer before introducing another disinfectant.

The pump is manually operated and the nozzle must be positioned on the "spray" nozzle and not the "full spray" nozzle. It is important to clean the nozzle after each use, using white vinegar for example. The sprayer is usually supplied with a repair / maintenance kit.

2

The procedure should begin with soaking all the patient's identifiable linen, sheets and mosquito net that have traces of vomit or excreta, in a 0.2% solution basin for 10 minutes; it should be dried in the sun.

3

Spray the 0.2% solution on the mattress stripped of its sheets, dishes and dry in the sun.

4

Spray the 2% solution on the floor, especially on traces of vomit or excreta.

5

Spray the 2% solution on the way to the latrine and spray the slab, door and walls, especially if there are traces.

6

At the beginning of the visit, give latex gloves to the person who receives you at the household level and let him/her tell you where to disinfect. At the end of the session, wash hands with a 0.2% solution diluted 10 times.

7

The sprayer agent / hygiene sensitiser team must also systematically take the GPS coordinates of each disinfected dwelling or at least indicate the address of the dwelling on a form/booklet.

8

All disinfection data must be carefully recorded.



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2. DISINFECTION IN CHOLERA TREATMENT CENTRES

In CTCs, it is recommended to **disinfect floors, walls and latrines** by spraying a 0.2% chlorine solution as well as people's **feet/shoes** at the entrance and exit of the centre, in addition to the foot baths.

The concentrations used to prepare chlorine stock solutions vary according to their use :

Use	Concentration of active chlorine
In CTCs to disinfect / sterilise: <ul style="list-style-type: none"> - fecal matter, - vomit, - corpses. 	2% solution
In CTCs to disinfect: <ul style="list-style-type: none"> - hands, skin, gloved hands, - clothing and bedding of patients [soak in chlorine solution for 30 minutes or boil for 5 minutes then dry in the sun], - medical equipment. 	0.05% solution

In endemic areas, all health facilities that may receive patients should therefore have a sufficient stock of chlorine to cover the needs during the first days of an epidemic.

Health workers should also be trained in the preparation and use of stock solutions.

3. DISINFECTION IN MARKETS

In markets, during epidemic periods, disinfecting agents equipped with sprayers containing a 0.02% chlorine solution, **walk around and raise awareness among merchants and customers.**

They invite people in the market to wash their containers if they have them. At each

disinfection, the sprayer recalls the key messages of cholera prevention and explains the role of water containers in the spread of cholera and how to keep them clean, but also the role of poorly washed or undercooked food.



G - WATER AND SANITATION IN A CTC



The construction of a Cholera Treatment Centre (CTC) can only be integrated into SI cholera control activities in exceptional cases, such as the **absence of a medical NGO capable of setting up a CTC** despite the onset of a cholera epidemic. The same is true for the construction of Cholera Treatment Units (CTU), although this can be more easily envisaged given the greater simplicity of these infrastructures (which will essentially include a tent, toilets and wash-hand basins, an entrance and exit foot bath at the CTU).

However, in both cases, **the management of these infrastructures and the medical care of patients is absolutely not the responsibility of the SI teams**. Thus, in the absence of a medical NGO, before building these infrastructures, it will be necessary to **ensure that the local health authorities will take charge of the patients and the management of the units**.

1. SCOPE OF ACTION

Drinking water

The quantity of drinking water to be provided is **60 litres per patient per day**. The means must therefore be found to ensure that this water is delivered to the CTC/CTU.

The water used must be chlorinated and have a minimum residual chlorine content of between 0.5 mg/l and 1 mg/l after 30 minutes contact time (at a water pH < 8). It will be necessary to prepare a stock solution dosed at 1% (15 g of HTH 70% per litre of water), renewed at the most every 2 days, and preserved in hermetic cans.

Sufficient water should be provided to clean floors, walls, toilets with chlorinated solutions at the concentrations indicated page 104.

Excreta management

In CTC/CTU, latrines (minimum 1/20 patients) should be provided for cholera patients only (there should also be separate latrines for the healthcare team).

It is indeed necessary in all cases to ensure the isolation of patients suffering from cholera.

Except in cases where there is a possibility of condemning full pits, it will often be necessary to provide a system for emptying, transporting and disposing of contaminated sludge.

Disinfection

Disinfection requires 2 kg HTH/10 patients/day. Hygiene in CTC is essential: everything that can be contaminated will be disinfected

with a chlorinated solution (floors, walls, beds, latrines, clothes, excreta, vomit, corpses...).

Training of hygiene agents and hygiene rules in a CTC/CTU

SI teams may be required to intervene in CTC/CTUs through the **training of hygienists** (disinfection activities, water quality control).

These hygienists are under the responsibility of the medical partners.





A certain number of rules must be followed to avoid any contamination from the care centre:

1. Control the entry and exit of patients, sick guards, health personnel, personnel in charge of hygiene:
 - Disinfect accompanying persons and means of transport
 - Disinfect feet, hands and objects of all persons entering and leaving the house
 - Respect a maximum of one sick guard per patient
 - External visit prohibited in a CTC/CTU
2. Prepare in advance the different chlorine solutions (0.05%, 0.2%, 1% and 2%) and make sure that the dosages are correct.
3. Guide the sick guards to the containers containing the different solutions, explaining their uses: drinking water, ORS, dishwashing water/linen.
4. Wash the centre 2 to 3 times a day (beds, floors, garbage).
5. Disinfect all the material of the patients and sick guards before their exit or referencing (clothing, bed covers, crockery, etc.). Burn pillows and mats, including those of sick guards.
6. Inform them about the patient's potential for transmission once healed and returned home so they can take the necessary preventive measures.
7. Treat the feces and vomit of patients (put 2 cm of 2% solution in the bottom of buckets under the pierced beds).
8. Manage the bodies of deceased persons according to the standard procedures in force.

2. SIZING A CTC

To size a CTC, the population at risk of cholera must be estimated. This estimation is based on the attack rate of previous years if known, otherwise the following attack rates can be used:

- 0.1% to 2% (depending on health conditions) in open rural areas;
- % to 5% (depending on sanitary conditions) in urban areas or closed camps.

In rural areas, a delay of 1.5 to 3 months can be expected before the epidemic reaches its peak. In urban areas or in closed situations, the peak of the epidemic usually occurs within 2 to 4 weeks after the epidemic begins.

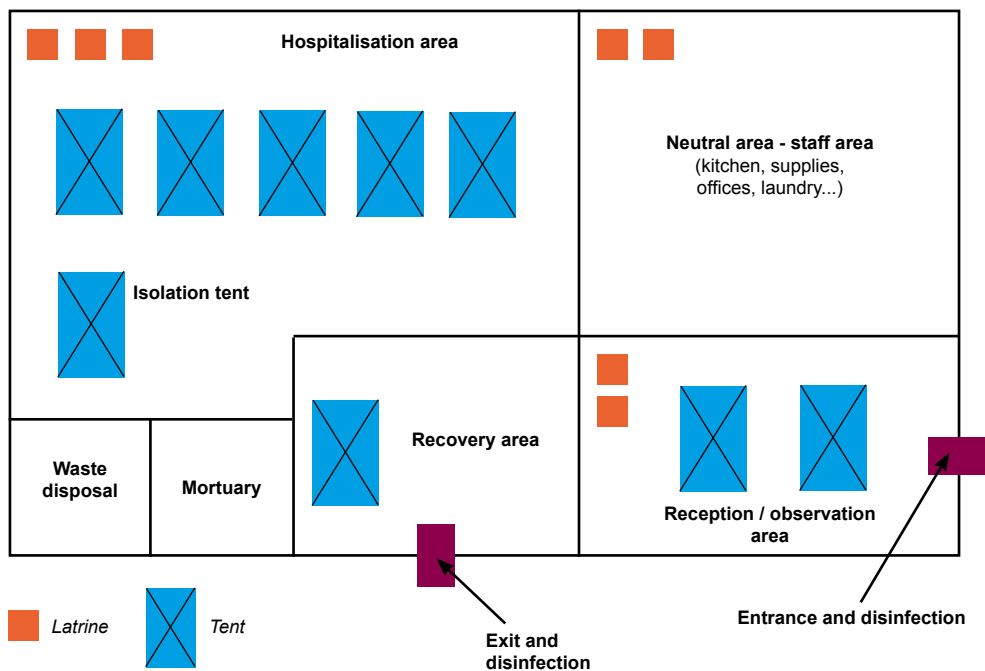
In rural areas, a delay of 1.5 to 3 months can be expected before the epidemic reaches its peak. In urban areas or in closed situations, the peak of the epidemic usually occurs within 2 to 4 weeks after the epidemic begins.

Organisation of a CTC

The CTC is divided into 4 zones (see map on following page):

- 1 reception area;
- 1 hospitalisation/isolation area;
- 1 recovery area;
- 1 neutral area (supplies, office, kitchen).

A fence should be constructed around the CTC to ensure patient isolation.



The management of corpses within CTCs/CTUs is the responsibility of the medical institution in charge of the structure.

Outside the CTC/CTU, it is often the responsibility of the Red Cross/Red Crescent or of health authorities. However, in some contexts, these stakeholders may be absent or lack the capacity to ensure the proper management of the remains. In this case, and only after discussion with the SI manager at HQ, it may be possible to consider taking charge of this aspect. The decision to intervene will be made according to the capabilities of the mission.

In other contexts, the support may be to assist the movement of vehicles that collect the corpses (fuel, vehicle rental, payment of drivers and agents), without any commitment on the handling of the latter.

RESOURCES

Action contre la Faim, Lutter contre le choléra ! Le rôle des secteurs EAH et SMPS dans la lutte contre le choléra (2013)

Global Task Force on Cholera Control, Ending cholera: a global roadmap to 2030 (2017)

Médecins sans Frontières, Public health engineering in precarious situations (2010)

Oxfam, Cholera outbreak guidelines: preparedness, prevention and control (2012)

Unicef, Cholera toolkit- main document (2013)

Unicef, Cholera toolkit

Key websites

Center for Disease Control and Prevention (CDC)

John Hopkins Glossary

Cholera platform for West and Central Africa



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