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Integrated chlorination campaign in Mogadishu

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SINCE THE CIVIL war in 1992, Mogadishu has been facing serious problems of water supply due to major damages of the central water supply system.

Consequently, the entire Mogadishu's population (approx. 900 000 pers) went back to shallow wells supply for drinking water and cleaning purposes. Consequently risk of epidemics increased considerably because of the poor quality of the sanitary environment and more specifically the contamination of the wells.

Starting from 1994, cholera has unfortunately been endemic in Somalia. The last outbreak in December 98 to July 1999 reported more than 10 000 cholera cases (source WHO).

To avoid cholera propagation humanitarian agencies started one-off wells disinfecting programmes using chlorine in large quantities.

Nevertheless a 1997 WHO cholera transmission study in Mogadishu stressed that wells are not the only source of cholera contamination. Poor water quality at household level is one of the main transmission factors. As an example, in 20 per cent of the cases studied, well and household water were contaminated and 40 per cent of household water was contaminated whereas the well was not. This study also pointed out that in 84 per cent of the cases studied, wells have less than the recommended 1mg/l of residual chlorine and 94 per cent of the households had less than the recommended 0.2 mg/l of residual chlorine.

This study showed that one-off disinfecting programmes using chlorine are non efficient in this particular environment of Mogadishu.

Starting from that observation the idea of chlorination at household level was discussed but rejected. The high number of households within the city was the major reason. Looking for an alternative humanitarian agencies has attempted over the two last years to set up a continuous chlorination system in order to get an appropriate amount of free residual chlorine in the wells or in the tanks. Using these new methodology permanent chlorination of most of the wells can be efficient during cholera outbreaks reducing risks. By this way during the last epidemic time ACTION contre la FAIM took in charge around 65 per cent of the existing wells used by the population.

To find an appropriate and accepted method for such continuous chlorination in hand dug wells many methods were experimented. ACTION contre la FAIM faced many difficulties especially concerning technical matters such as variation of residual free chlorine and social aspects such as acceptability from people in Mogadishu.

Finally a method was found taking into account all those constraints. It permits to chlorinated more than 600 wells and to assure appropriate level of residual free chlorine and satisfaction of the population.

This method is called "single pot" chlorination and works with locally made chlorine tablets and a specific design of pot. The main advantages are :

- Controlled diffusion and acceptable levels of residual chlorine (WHO recommendations)
- Involvement of the local population and acceptance
- Easy implementation and low cost
- Low maintenance and infrequent need for re supply of the chlorination system

Continuous chlorination through immersion of chlorine tablets.

It appears that the water supply currently available meets the needs of the population, and the main problem in Mogadishu is the quality of the water not the quantity. The poor quality can be attributed to many factors: proximity of latrines to water source, improper disposal of garbage, animals, and contaminated buckets and transportation vehicles (donkey carts).

Thus the need for systematic chlorination activities, we currently are chlorinating more than 600 wells in Mogadishu. One of the objectives is continually trying to improve the chlorination activities. To find an appropriate and accepted method for such continuous chlorination in hand dug wells many methods were experimented as showed below:

Traditional Method:

The traditional chlorination was adapted for a long time in Mogadishu. The mother solution concentration is 1 per cent of chlorine. The mother solution volume to apply is given according to the average water quality in Mogadishu. (cf figure 1a:Results on 173 wells in 1998 . Analysis method: DPD1 and colorimetric chart.)

Pierced recycle jerrycan:

From October to December '98, we tested a chlorination procedure, which utilises local materials and provides continuous slowly diffused chlorine for a period of 12-15 days. We used pierced recycled 5 liters oil jerrycan, with differing levels of gravel, sand, sand/chlorine mix, sand, and then gravel again. In January '99, we implemented this system in all wells that we chlorinate in Mogadishu. Since

the implementation, we have conducted 919 water analysis with Pool-tester and DPD n°1 tablets (cf figure 1b).

Immersion chlorine tablets:

For its 2000 campaign, AcF is using a continuous Chlorination technique directly draw from swimming pools chlorination techniques. Chlorine tablets (125 grams of HTH 75 per cent chlorine) are pressed locally with a manual press. These slow dissolution tablets are then inserted in pierced pipes. The pipes are immersed in the wells, tied to the surface with a rope. The chlorination teams visits the wells at least twice a week to ascertain the chlorine level and replace tablets. They also inform the population about the technique, as well as appointing a well manager among the community.

(Figure 1c: 98 water analysis with Pool-tester and DPD n°1 were conducted in January 2000).

Results:

As it can be seen from the graph, only 4 per cent of the wells tested had 0 per cent chlorine with the Chlorine tablets (fig c). This is an improvement of 27 per cent over last two years in which 31 per cent of the wells showed no trace of chlorine. This can be directly attributed to the last chlorination system which provides a simple slowly diffused continuous source of chlorine, replacing the old system, of once a day someone dumping a quantity of chlorine into the well which only provide chlorinated water for roughly a one hour period.

Yet, this system is far from perfect. Improvements and education is continually ongoing.

For a task as complex, it was crucial to develop monitoring and control tools so as to permanently readjust our technique to the reality of the epidemic. This strategic approach was made possible by involving the medical and health education teams in our Cholera program.

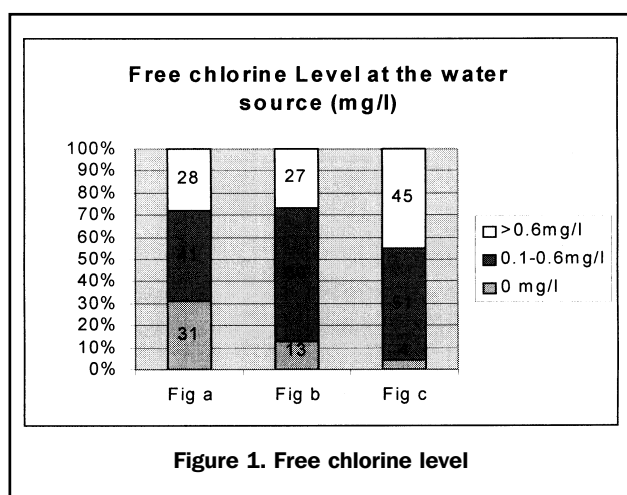


Figure 1. Free chlorine level

Hydro survey in cholera treatment centers (CTCs).

AcF has been active in cholera treatment during the epidemic through its management of CTC's (Cholera treatment Center) during outbreak periods. Al-Hijra CTC, already active in 1999, re-opened in 2000, and had accommodated a caseload of 965 patients by June 4, with a 1.76 per cent CFR (Case fatality Rate). Another CTC opened at the same date by MSF/Spain in the northern part of the city had accommodated a caseload of 1152 patients by June 2nd, with a 1.91 per cent CFR.

Since the epidemic started, the water and sanitation department has put in place a systematic follow up of cholera cases to determine the water source, i.e. the well, where contamination might have originated. This was done through the CTC's health teams. This information, quickly relayed to the chlorination teams, allows for fast intervention on the well and to readjust the chlorination level as needed, pending control test results. If geographical or security constraints prevent AcF from performing continuous chlorination, the well is then systematically cleaned and disinfected in order to prevent further contamination.

It is not always possible to optimise the chlorination levels for so many wells in an environment as complex as that offered by Mogadishu. That explains why this feed back control system greatly enhances prevention activities efficiency and pertinence. Furthermore, a comprehensive follow up of incriminated wells allows for a better understanding of the epidemic and of its propagation modes in the city. It also brings forth new data that might benefit to cholera prevention approaches.

Health education to prevent cholera

Chlorination obviously impacts the taste of water, and its acceptability within the population. This requires education and sensitisation campaigns aimed at underlining the importance of chlorination in cholera prevention. AcF has been carrying out health education programs in IDP camps since 1995. This explains why, in conjunction with involvement of chlorination teams in information campaigns among well users, communities now request chlorinated water.

AcF trained health educators hold regular sessions in IDP camps, during which they tackle public health issues such as prevention of water-related diseases, general hygiene, latrine utilisation, vaccination or malnutrition. Simple educational tools are used to channel the message, primarily aimed at mothers and children.

Around the wells, chlorinators explain the basic principles of chlorination and of the chlorination system. They try to make well owners aware of their responsibilities concerning water quality issues, by involving them in the renewal of chlorine tablets.

These activities guarantee a permanent link between AcF and the community and allow to rapidly target needs and priorities, as well as to monitor population movements.

Results and further developments

In spite of the efforts in chlorination, cholera has not significantly receded in Mogadishu since it reappeared in 1994. It even slightly increased in 2000 compared to 1999. However, AcF's intervention, centred around sanitation and sensitization has managed to considerably minimise the impact of the epidemic among the IDPs.

In addition, collaboration between medical and hydro teams discovered the large role played by water sellers and donkey carts in the transmission of the epidemic. Indeed, out of 980 cholera cases registered in the CTC by June 6th, 92 per cent of patients were purchasing water from one of these vendors in town. The real value of this finding remains to be established as the actual proportion of Mogadishu's population using donkey carts is still unknown. Several facts seem however to substantiate that hypothesis:

The IDP population, with scant resources, virtually never purchase water from donkey carts, and must often cover large distances to collect free water. That IDPs are little affected by cholera might also be related to that fact.

Water vendors use recycled petrol drums to carry water. This cancels out the benefits of preventive chlorination in wells, and puts family wells at further risk of contamination. Also, because of a lack of an opening, the inside of the containers cannot be cleaned on a regular basis.

Consequently, AcF's future interventions in cholera prevention and treatment will focus on improving the water distribution system in the city, most probably in collaboration with water vendors, estimated at around 3,000 to 6,000 in Mogadishu.

Conclusion

It is possible to posit that the complexity of the cholera epidemic in Mogadishu derives from its urban context. The breakdown of water and sanitation networks leads to an

increased utilisation of wells, thus fragilising the water resources by increasing the number of steps between source and consumer. The well chlorination techniques that AcF has developed in the last 5 years have managed to secure the wells, at least for direct and individual use. However, new actions must be developed to decrease family units exposure to contamination. Such actions must delve into the socio-economic fabric of Somali society so as to adjust to the traditional water distribution systems that have reappeared in Mogadishu since the Somali State collapsed. In the final analysis, political solutions to the present crisis must be actively sought, which would allow for the rehabilitation of the dilapidated hydro sanitary systems, an essential condition to the eradication of cholera in the capital.

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