GROUNDWATER POLLUTION IN SHANTYTOWNS OF COTONOU: WHICH STRATEGIES TO LIMIT WATERBORNE DISEASES RISKS?

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Background / Rationale

Cotonou is the most populated town of the coastal sedimentary basin of Benin and the most polluted, especially its shantytowns with 74 % of them located in unsuitable morisy zones. Most of inhabitants of these areas use water from wells of which the depth varies between 0.5 and 1.0 m and often located less than 5 m distance of septic tanks. Moreover, inadequate hygienic sanitation facilities reduce the self-purification capacity of water system and pollute groundwater. The deterioration of water quality explains the occurrence of diseases, such as bacillary dysentery, cholera, gastrointestinal infections and diarrhoea that affects poor health in the slums of Cotonou. Safe drinking water would be assured only by promoting adequate hygienic system and sustainable water source management.

Methods

The quality of water consumed is appreciated from the quality standards of WHO and depends on the environmental health. Analysis of physicochemical and bacteriological parameters of ten water samples is carried out in the National Laboratory of Water Quality in Benin. Chemical parameters are compared to the Maximal Allowable Concentration and the bacteriological parameters are compared to the Maximum Allowable Value. The sources of water pollution are evaluated through a direct observation on each area investigated and by analyzing the origin of all ions identified in water samples.

Conclusions

1. The keys determinants of groundwater pollution in the shantytowns of Cotonou are: underground flow between the lake Nokoué and the lagoon of Cotonou, in relationship with groundwater, is already affected by an organic pollution due to the activity of the city, creating huge environmental problems including waste management especially and uncontrolled sanitation in the shantytowns.

2. The keys determinants of groundwater pollution in Cotonou is its location in the lowest coastal sandy plain under the sea level, between the Atlantic ocean, lagoon of Cotonou and Lake Nokoué; porosity higher than 40% (Malik, 1993). High water temperature (25°C) accelerates microbial proliferation. Rainfall and temperature variability induce rapid decomposition of waste, from which faecal pollutants flow into surface-and groundwater water because of inadequate sanitation equipment.

3. Inadequate septic tanks located at less than 5 m from wells of which depth varies between 0.5 and 1.0 m are the key sources of groundwater pollution. WHO (2004) explains that where latrines and septic tanks are poorly sited, they can lead to contamination of drinking water sources with nitrate. But this is the real resilience context of the shantytowns of Cotonou where lack of town planning lead to permanent environmental pollution case.

According to WHO, prevention of microbial and chemical contamination of water sources is the first barrier against drinking water contamination of public health concern.

Discussion

The pathogenic microorganisms concentration are very high, compared to those observed in 1983 (GILG, 1983), in 1992 (Aissi, 1992) and in 1995 (Combani, 1995). Sagbohan (2003) shows that water of lake and lagoon in relationship with groundwater, is already affected by faecal pollution due to dissolved total solids (over 1999) and oxygen dissolved (2.75 mg/l to 7.5 mg/l). The key determinants of groundwater pollution in Cotonou is its location in the lowest coastal sandy plain under the sea level, between the Atlantic ocean, lagoon of Cotonou and Lake Nokoué; porosity higher than 40% (Malik, 1993). High water temperature (25°C) accelerates microbial proliferation. Rainfall and temperature variability induce rapid decomposition of waste, from which faecal pollutants flow into surface-and groundwater water because of inadequate sanitation equipment.