

African Journal of Environmental Science and Technology Vol. 7(3), pp. 87-92, March 2013  
Available online at <http://www.academicjournals.org/AJEST>  
DOI: 10.5897/AJEST12.058  
ISSN 1996-0786 ©2013 Academic Journals

Full Length Research Paper

## Effects of poor sanitation on public health: Case of Yopougon town (Abidjan)

Yapo Toussaint Wolfgang<sup>1,2\*</sup>, Mambo Veronique<sup>1</sup>, Yapo Ossey Bernard<sup>1</sup>,  
Seka M'bassiguié Arsène<sup>1</sup> and Houenou Pascal Valentin<sup>1</sup>

<sup>1</sup>Laboratory of Environmental Sciences, Research Group of Water Chemistry,  
University of Abobo-Adjamé (UAA), 02 BP 801 Abidjan 02, Côte d'Ivoire.

<sup>2</sup>National Institute of Public Hygiene (INHP), BPV 14 Abidjan, Côte d'Ivoire.

Accepted 7 January, 2013

Effects of poor environmental hygiene on population health were studied in the precarious living quarters of Doukoure, the village of Niangon-adjame and the viable living quarters of millionaire's in Yopougon town. This study included sanitation, water sources, as well as, population health. It appears that excreta management is from self-purification works (WC with septic tank) (60%), collective purification work (gutter storm water, sewer) (26%), anarchic connections (30%) and defecation in nature relatively less important (2%) for all living quarters visited. Furthermore, almost 90% of the populations have access to the drinking water, which is rather used. In Doukoure's living quarters and Niangon-Adjamé's village, public tap water (7%) and traditional wells (3%) are used for domestic needs. Data collected in 15 health centers in the town on 125 446 cases of morbidity, revealed that malaria is much contracted by populations with 58% cases against 14% for diarrhea and 28% for acute respiratory infections. Under-five children are much affected with 24% of the patients among which 43% were cases of the diarrheic diseases. Also, malaria and respiratory infections are more important during rainy seasons, in contrast to diarrheal diseases caused by poor hygiene of people.

**Key words:** Public health, malaria, diarrhea, respiratory infections, sanitation, risk.

### INTRODUCTION

Most large African cities are overcrowded, due to urban attraction. Little controlled urban growth leads to poor management of solid and liquid wastes produced by cities. This leads to many problems of sanitation. The sanitation in these cities is generally dominated by self purification works. They often repress wastewater that trickles down in living quarter streets emitting strong foul odors (Strauss et al., 2000). Moreover, water intended for consumption are very often contaminated because of drinking water connection with the sewage (Schwartzbrod, 1992). This fact can cause high health risks and environmental pathologies arising from it are

very important (OMS, 1992). They are mostly of diarrheal diseases (Carr, 2001). In addition, poor drainage of wastewater and stormwater leads to the proliferation of ponds that are habitats of mosquito vectors of various diseases including malaria (OMS, 1985). Africa south of the Sahara is the most concerned in the sense that the majority (90%) of malaria deaths occur there. In this part of the continent, it is now recognized that malaria is both a disease caused by poverty and a cause of poverty (OMS / RBM, 2001). Côte d'Ivoire is a country where malaria is endemic (WHO, 1985, 2000). According to the report on the progress of the National Program against Malaria (PNLP) of Côte d'Ivoire in 2003, malaria is transmitted throughout the year with an increase during the rainy season (Mémain, 2003). In this country, there is resistance of *Plasmodium falciparum* to chloroquine (Djaman et al., 2001).

\*Corresponding author. E-mail: [toussaintwolfgang@yahoo.fr](mailto:toussaintwolfgang@yahoo.fr).  
Tel: 00 225 08630945.

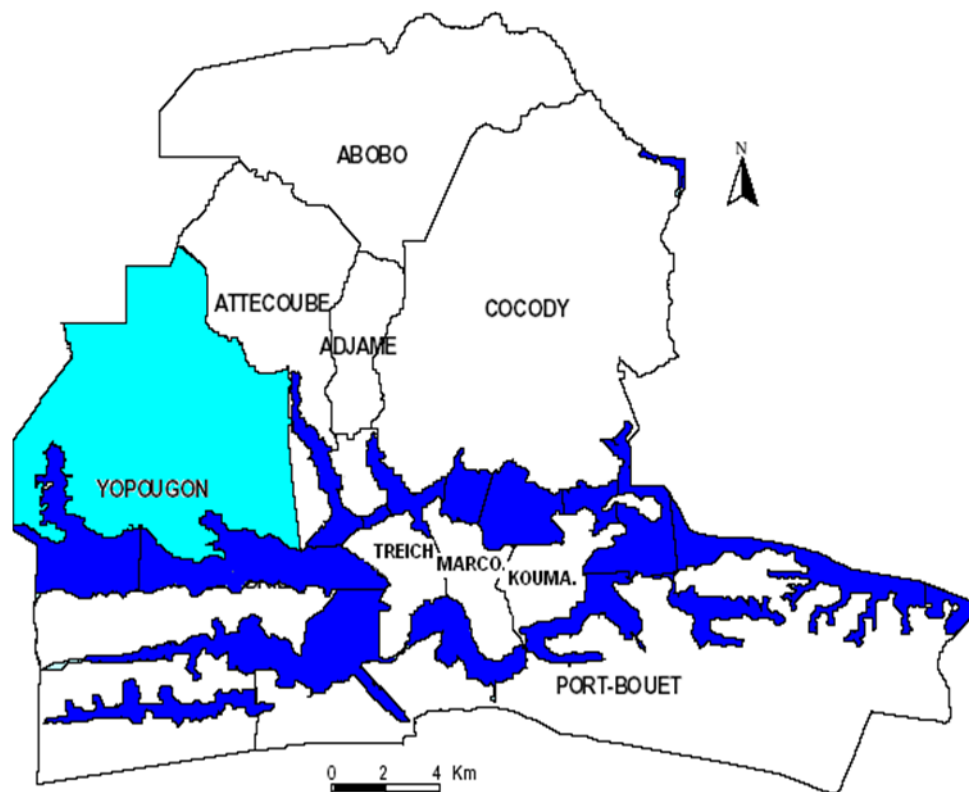


Figure 1. Map of Yopougon town.

These various pathologies are the result of many interactive phenomena between health and environmental hygiene highlight many health risks associated with poor hygiene (Hibberd et al., 1998) including vector-borne diseases and infections (Forget and Lebel, 2002).

In fact, poor quality waters, poor environmental sanitation (excreta management, drainage) and poor sanitation contribute much to deteriorating population health (Ezzati et al., 2005). Abidjan is not outside for these different problem types. Economic capital of Côte d'Ivoire, it is now a metropolis of nearly 3.6 million inhabitants. With an average annual growth rate of 3.2% between 2000 and 2005, Abidjan's population alone represents 43.8% of the urban population of Côte d'Ivoire and 19.7% of Ivorian population (United Nations, 2006). This strong growth of Abidjan's population has resulted in the production of solid and liquid waste, household as industrial. In the western part of Abidjan city, is located Yopougon town. In this town, urban wastewaters (domestic, storm water, industrial) are discharged into the lagoon through sewers and channel existing storm water drainage without prior treatment.

The objective of this work is thus, to establish a snapshot of Yopougon town in sanitation and mode of supply in drinking water in association with population health. Diseases investigated are including malaria, diarrheal diseases and acute respiratory infections.

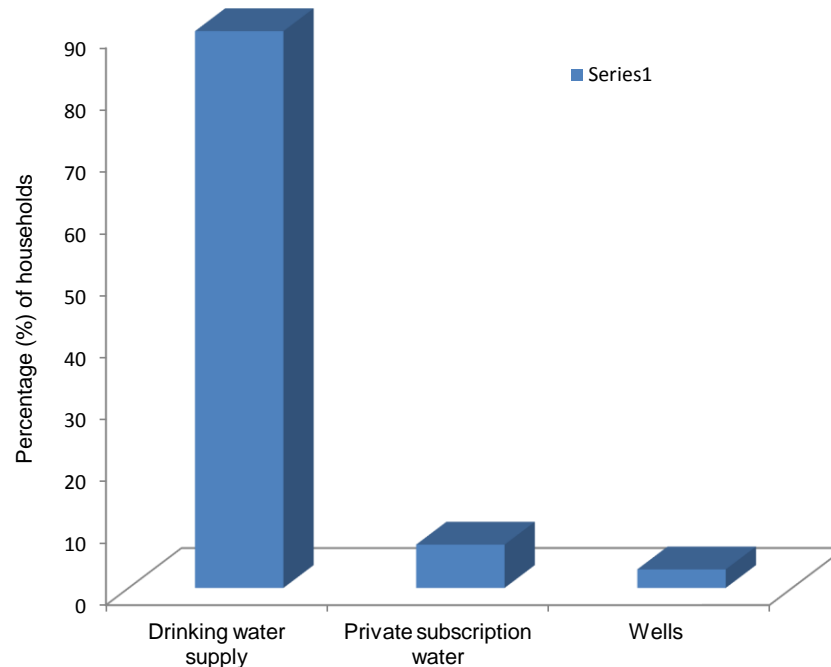
## MATERIALS AND METHODS

### Study site

The study was performed in Yopougon town (Figure 1). It has an area of approximately 85 km<sup>2</sup>. In 1998, its population was estimated at 708 155 inhabitants (National Institute of Statistics, 1998). Based on an average annual growth rate of Abidjan's population by 3.7% between 1995 and 2000 and 3.2% between 2000 and 2005 (United Nations, 2006), the population today is around 900 000 inhabitants. The town is bordered on the south by the Ebrié lagoon.

### Data collection

The study took place in precarious living quarters, a village lagoon and modern living quarters of Yopougon town. Selection of living quarters was done as part of an interdisciplinary approach to understanding global health problems in the town in relation to environment, sociology and health engineering. The investigation was performed from March to October 2008 using an investigation form. It was conducted with a team of investigators who run through the various living quarters of the town. Households responding to the questionnaires were the different samples. The number of households visited in different parts of Yopougon town are divided as follows: 30 in precarious living quarters (Doukouré) (30%), 30 in the village (Niangon Adjamé) (30%) and 40 in viable area (millionaire's living quarters) (40%). The questionnaires focused on sources of drinking water, the method of managing solid and liquid waste and population health. Moreover, sanitary data were collected in fifteen health centers. The information researched concerned the recurrent diseases including malaria, diarrheal diseases and acute respiratory infections. The data were collected by



**Figure 2.** Sources of drinking water supply.

the information system of management, which is the monthly statement of all the activities made in health centers. Concerning the division of the population in age, the classic range (0-4, 5-14, 15-29 and 30 years and more) used in medicine was selected.

## RESULTS

With an average of 10 persons per household, we have a size of 1 000 people. Data collected in health facilities, were from 15 health centers spread over the town with a size of 124 446 people with diseases such as malaria, diarrheal diseases and acute respiratory infections.

### Sources of population water supply

Drinking water from Water Supply Company in Côte d'Ivoire (SODECI), wells and public tap of SODECI were identified. It appears from our study that about 90% of investigated households used drinking water of SODECI. Contrariwise, water from public taps resold by individuals in Doukouré's living quarters (7%), as well as, wells of Niangon Adjame's village (3%) were used to lesser degrees (Figure 2); but it happened that water quality of SODECI was harmed by connection of wastewater with drinking water system.

### Sanitation

In different living quarters of the town, human excreta were evacuated either in self purification works, or in

collective purification works, or in nature (bush, edges of the lagoon).

It appears from our investigations that about 60% of households used self purification works. Defecation in nature was used too in the town (2%). Anarchic connections to the sewer system were observed especially in precarious living quarters (12%). Collective purification works systems were used in approximately 26% of cases (Figure 3). However, misuse of collective purification works (anarchic connections to the sewer system, dumping of domestic waste into the drains rainwater) lead to the fact that wastewaters were hardly drained. This causes the stagnation of sewage, proliferation of larval gites and strong emissions of foul odors.

### Prevalence rate of some diseases and health center attendance

The prevalence rate of malaria, diarrhea and acute respiratory infections of 124 446 people received into consultation in 15 health centers in the town indicates that among all these diseases, malaria diseases were much contracted by people with 58% of cases. After malaria, we have acute respiratory infections (ARI) with 28% of cases. Diarrheal diseases were the least contracted for entire population with 14% of cases. Moreover, we have noted that under-five children often contracted malaria with 69% of cases. Unlike the general population, diarrheal diseases were much contracted by under-five with 26% of cases. Acute respiratory infections

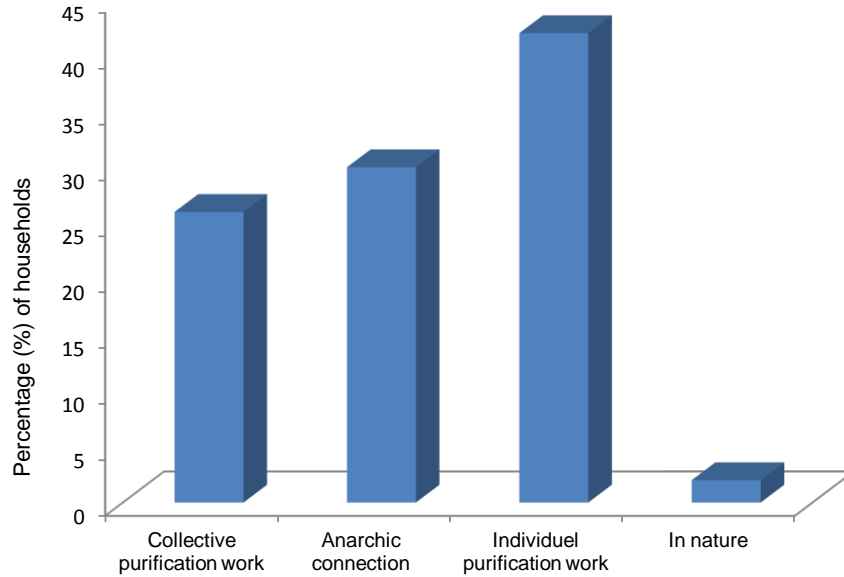


Figure 3. Management mode of wastewater.

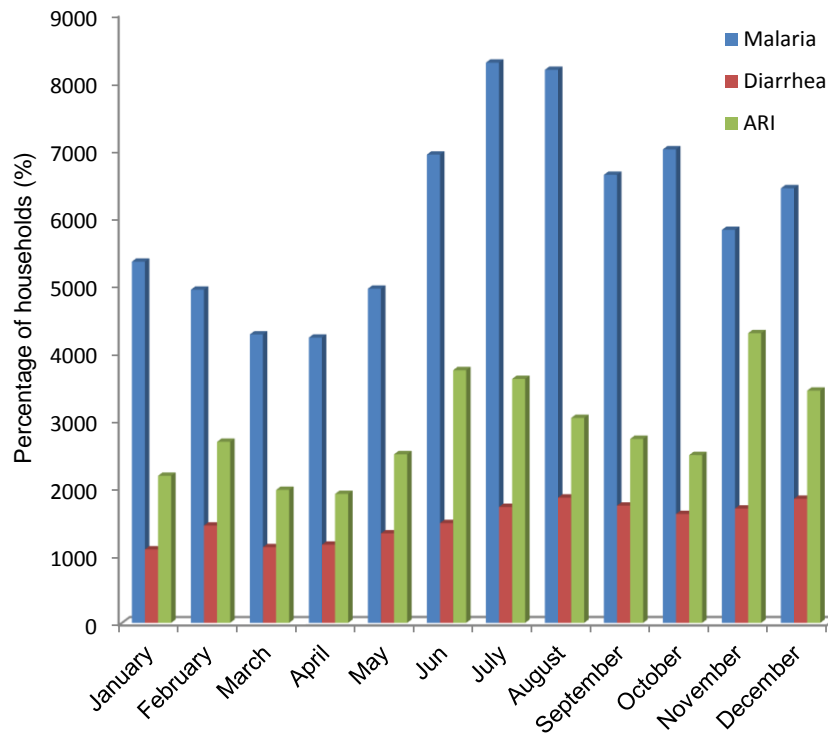


Figure 4. Evolution of pathologies in Yopougon town during the year 2006.

(ARI) come in last place with 5% of cases. Figure 4 showed the evolution of malaria, ARI and diarrheal diseases within the year. Malaria diseases were more raised during June, whereas, the ARI were much more concentrated in the period of February, July and November, respectively corresponding to dry and rainy

season unlike diarrheal diseases, which don't change too much during the year. First-line treatment, most households have opted for some treatments without consultation (self-medication) (68%) to the detriment of health facilities where the attendance rate is low (32%).

## DISCUSSION

This work uses an interdisciplinary approach in studying poor sanitation and health risks. It reveals that the accessibility of population with drinking water (that provided by SODECI) is very important in Abidjan city. According to the studies of Coulibaly et al. (2004), 99% of households of the municipality of Port - Bouet were connected to the networks of drinking water. This rate approaches that of our study in Yopougon town which is 90% self purification sanitation system. Excreta management is mainly (60%) using in Yopougon. This type of excreta management is found in the study of Coulibaly et al. (2004) in Port-Bouet town. Also, we should note that our work is consistent with the work of Kuitcha et al. (2008), which revealed that the self purification works are much used by Cameroonians. The lack of sanitation contributes much to the deteriorating health of populations (Dongo et al., 2008). Diarrheal diseases are caused by several parasites including *Salmonella* (most frequently occurred) and are located in unhealthy environments, lack of adequate modern sewerage system, or associated with poor environmental hygiene (Farthing, 2000). This situation is much more noticeable in most cities in developing countries where poor environmental and especially section of under five children are most affected by diarrheal diseases (Coulibaly et al., 2004). Our investigations lead to similar observations with a child morbidity by 26% compared to diarrheal diseases.

Moreover, the prevalence rate of malaria registered in health centers is more than twice that found by Dagnan et al. (2002), whose work, extended to the whole Yopougon give a rate of 23.3%. This rate is significantly higher than that found by Coulibaly et al. (46%) in the town of Port-Bouet. This could be explained by the stagnation of sewage into living quarters because of the self purification works due to the strong demographics of the city of Abidjan linked to the politico-military situation of 2002. Ultimately, the results obtained in relation to malaria are in line with rates in Côte d'Ivoire and in countries with endemic malaria transmission (OMS, 2001).

Concerning acute respiratory infections, our study shows that peaks are observed in the month of February, July and November. The peak in February coincides with the dry season while the months of July and November correspond to rainy seasons (large and small rainy season). Guedonon (1987), in Benin found that the IRA also experiences an upsurge during the hot and humid seasons. In terms of our work, the results show that the IRA of under-five children is around 5%. This rate is distinctly below 88% found in the work of Bakonde et al. (1998) in Togo. These results shows that the policies of health authorities in connection with the reduction of ARI through the expanded program on vaccination of under-five are very effective. Indeed, according to WHO

recommendations (1990), vaccination against pertussis and measles in particular is needed to reduce the prevalence of ARI.

In terms of therapeutic routes, our results show that over 60% of Yopougon's population practice self-medication. The studies of Bossart (2002) in Benin show the dominating role of the self-medication as therapeutic route. In fact, some medicinal plants used by the populations in the treatment of the malaria (*Cassia occidentalis*) are scientifically proved. Also, it is necessary to note that Guava is sometimes used to treat gastrointestinal pain and diarrhea. Clinical studies show the power of action of some substances extracted from the guava in the treatment of diarrheas (Lozoya et al., 2002). Besides, a study on 200 Indian mothers, whose children suffered from respiratory infections showed that 25% of the mothers used some honey to treat the cough of their children while 27% used of the ginger (Tona et al., 2004). But for Kouadio et al (2006), a treatment without prior consultation may be more expensive than treatment after diagnosis of a modern specialist. Thus, ignorance of households on the choice of a suitable therapeutic route appears to be an economic risk factor for household towards the pathologies.

Therefore, in this context of poverty, the development of a good policy of sanitation with the implication of all the factors (state and municipal authorities, communities) is necessary to improve people lives. The results of this study are therefore very interesting database for future actions in the town. They will plan and validate measures to remedy sanitation deficiencies and improve population health.

## Conclusion

Finally, sanitation situation in Yopougon town is very worrying. In different living quarters of the town, human excreta are disposed of either in sanitation facilities, or in collective purification works, or in nature. However, misuse of these facilities causes the stagnation of sewage in the streets of neighborhoods, with escape of strong foul odors and proliferation of larval gites. These are all problems that threaten the health and well-being.

In terms of drinking water, the populations surveyed use a lot of water of SODECI for domestic needs. Unlike the wells, they are used to lesser degrees. Regarding the health status of populations, recurrent illness in Yopougon includes malaria, diarrheal diseases and acute respiratory infections. The rates for malaria and respiratory infections are most important during the rainy season, in contrast to diarrheal diseases that are caused by poor hygiene and risk behaviors of populations.

Also it should be noted that under-five are affected by these pathologies especially malaria, which is much contracted by this section of the population. Sensitization on good hygiene practices and good policy of municipal

authorities for sanitation is essential to improve people lives. The results of this study will be particularly useful to health authorities and municipalities. The town can be used as tools to raise public awareness on good hygiene practices and sanitation.

## ACKNOWLEDGEMENTS

We thank officers of the National Institute of Public Health, Health District of Yopougon and students of the Master of Science and Technology of Water of the 2007-2008 session of the University of Abobo-Adjamé and those KIBIO Group for their important contribution to the success of this research.

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