

## THE IMPACT OF SEPTIC TANKS ON THE GROUNDWATER: SURVEY RESULTS IN A RURAL AREA OF MOROCCO, AFRICA

S. EL HALAS<sup>1</sup>, B. CHARAF<sup>1</sup>, M. OUHSSINE<sup>2</sup> AND B. HSI<sup>3</sup>

<sup>1</sup>Department of Applied Environment, University Hassan First, Settat, Morocco

<sup>2</sup>Department of Biology, University Ibn Tofail, Kenitra, Morocco

<sup>3</sup>Department of Economics and Management, University Mohammed Fifth, Rabat, Morocco

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### ABSTRACT

In order to deduce the impact of septic tanks on the water, the soil, the vegetal, animal and man, a survey was conducted at Sidi Ayache region in the province of Kenitra, Morocco. The purpose of this survey is the evaluation of the quality of the groundwater in the study area and to have through the testimony of the inhabitants, a return on the various uses of water wells. Four hundred and thirteen households were affected by this questionnaire. Preliminary results of the survey revealed that most people doubt the quality of well water. They claim that all diseases observed in the region could come from the poor quality of water wells having a bad taste and therefore not potable. It was also observed that in some households, there is no respect of distance between septic tanks and wells. There is even a household that has transformed the well to a septic tank. This behavior and others may cause adverse effects on the components of the environment. To confirm this hypothesis, we envisage achieving analysis of well water in the laboratory.

**KEY WORDS** : Investigation, Septic tanks, Groundwater, Wells, Kenitra, Morocco.

### INTRODUCTION

The health of human beings, especially in rural areas, has recently attracted the increased attention of academics as well as policy makers (Cairncross, and Feachem, 2018). On the first hand, some of this attention has focused on the cause of diseases (Prüss-Ustün, 2014). And on the other hand, there is the growing body of research on environmental impact (Kolsky, 1993). In particular, examining not only health problems, but also broader issues of septic tanks installed in the rural areas (Mallin, 2013).

Septic tanks are generally a source of contamination and pollution of the groundwater, therefore the contamination of the water wells (Reay, 2004).

In my rural area of study, located almost 12 kilometers from the city of Kenitra in Morocco, it was observed outbreaks of water-borne diseases, like diarrhea and other intestinal diseases. Although the region has no drinking water system, which lead the population to use well water for drinking.

Therefore, groundwater must be a major cause of these waterborne diseases.

### PURPOSE

In order to deduce the impact of septic tanks on the water, the soil, the vegetation, animal and man, an investigation was conducted at Sidi Ayache in the province of Kenitra.

The purpose of this survey was the evaluation of the quality of the groundwater in the study area.

### MATERIALS AND METHODS

**Study location.** "Sidi Ayache" is the rural area of study, located almost 70 kilometers from the capital Rabat in Morocco.

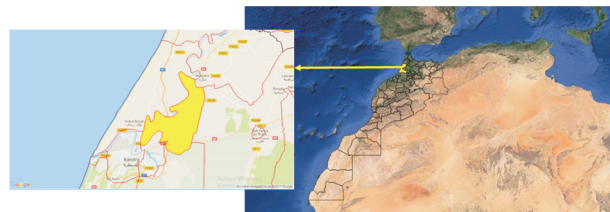


Fig. 1. Rural area of the study

**Survey.** A questionnaire was established to have, through the testimony of the inhabitants, a return on the quality of water wells. Four hundred and thirteen households were affected by this questionnaire. The purpose of the questionnaire is to obtain information on the harmful effects that can cause septic systems both on people's health as well as on other environmental components.

We also attempted to determine the expectations of the inhabitants of the study area concerning water supply, improvement of water-related services and construction of septic tanks with design standards in this region.

**RESULTS**

**Interviewer's gender.** The sample surveyed represents almost 58% men and 42% women.

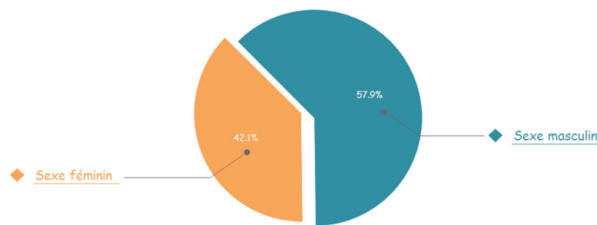


Fig. 2. Interviewer's gender

**Wells: covered/uncovered**

Almost 63% of the interviewees take care of their wells and cover them while about 37% do not.

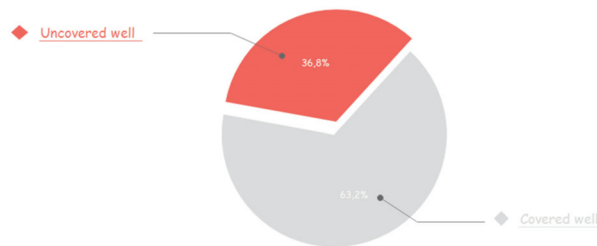


Fig. 3. Conditions of the wells

**Depth of the wells.**

The percentage of respondents who have a depth between 21-23m occupies almost 58%. Depth measurements between 18-20 and 24-26 share the rest of the circle.

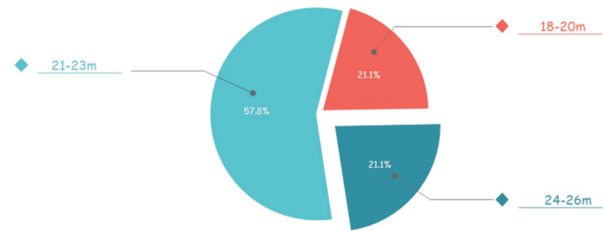


Fig. 4. Depth of the wells

**Construction type of septic tanks.** The majority of the septic tanks is built by rocks.

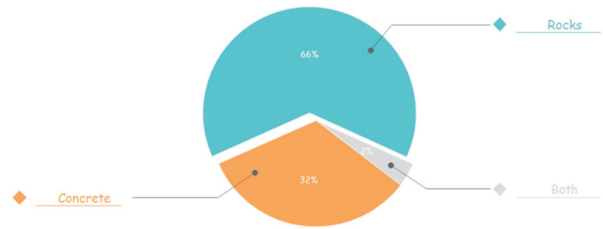


Fig. 5. Construction type of septic tanks

**Depth of septic tanks.** The majority of septic tanks has a depth between 3 and 5 meters.

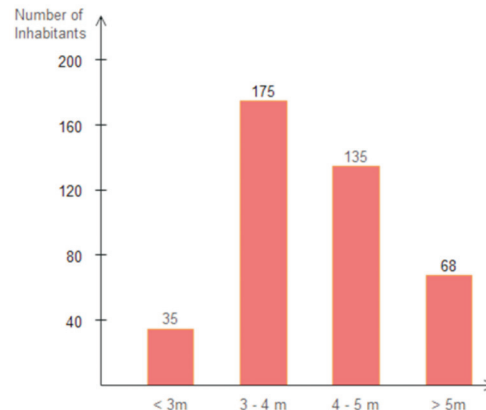


Fig. 6. Depth of septic tanks

**Distance between septic systems and wells.** Only 18% of residents leave a sufficient distance between the septic systems and wells which varies between 20 and 25m.

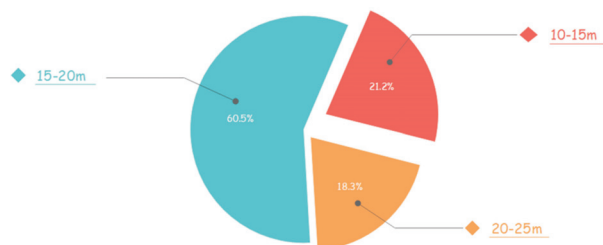


Fig. 7. Distance between septic systems and wells

**Appreciation of the water wells.** The majority of residents doubt of the quality of their well water if it is safe for drinking or not.

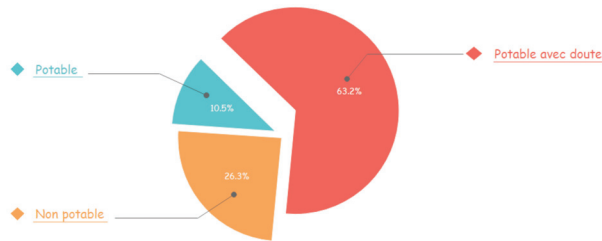


Fig. 8. Appreciation of the water wells

**Taste change of the water wells over time.** Most of residents noticed a change in the taste of the water wells. Almost 74% have noticed a change in the taste of the well while the quarter has nothing felt.

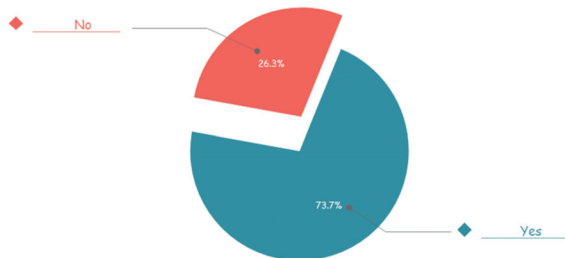


Fig. 9. Taste change of the water wells over time

**Existence of health problems.** People with health problems colonize the entire circle, only 19.5% said they don't have health problems.

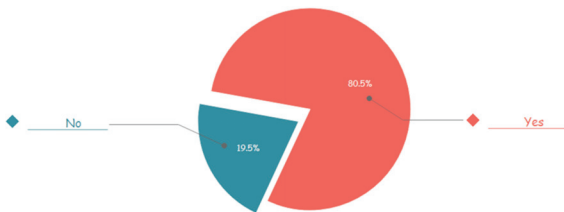


Fig. 10. Existence of health problems

**Health problems.** Among the most common diseases in the study area are diarrhea, fever and allergy.

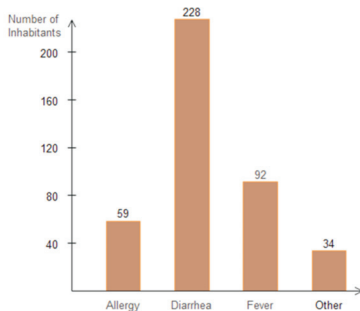


Fig. 11. Health problems

Diarrhea is the most repetitive.

**The cause of diseases.** The majority of individuals declare that the water wells can be a major cause of disease frequented.

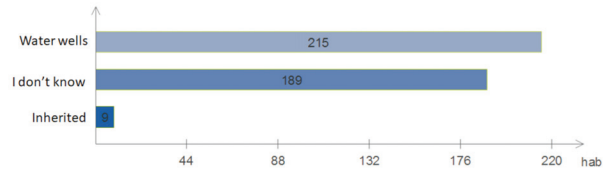


Fig. 12. Possible causes of diseases

**DISCUSSION**

- This survey was carried out in the framework of my research on the population in order to obtain opinions about their concerns, expectations and wishes to improve the whole services, namely the quality of the septic tanks in the region. 413 households were affected by this survey.
- The purpose of the survey is to obtain information on the harmful effects that can cause septic systems both on people's health as well as on other environmental components.
- Preliminary results of the survey revealed that most of residents doubt the quality of well water. They claim that all diseases observed in the region could come from the poor quality of water wells having a bad taste and therefore not potable.
- It was also observed that in some households, there is no respect of distance between septic tanks and wells. There is even households that has transformed the well into septic tank. This behaviour and others may cause adverse effects on the components of the environment.

**CONCLUSION**

Preliminary results of the survey revealed that most of residents people doubt the quality of well water.

They claim that all diseases observed in the region could come from the poor quality of water wells having a bad taste and therefore not potable.

It was also observed that in some households, there is no respect of distance between septic tanks and wells. There is even a household that has transformed the wells to a septic tank. This behaviour and others may cause adverse effects on the components of the previously mentioned environment.

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