A COMPARISON OF MICROBIAL CONTAMINATION LEVEL OF DRINKING WATER WITH WATER-RELATED DISEASES REPORTED TO PHD FOR LEZHA REGION

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Abstract

Microorganisms are present everywhere in our environment, in soil, air, food and water. Also called microbes, microorganisms are living organisms, generally observable only through a microscope. Our exposure to them causes harmless microbial flora to establish in our bodies, although some microbes are pathogens and can cause diseases. These diseases are considered waterborne if the pathogens are transmitted by water, to infect humans or animals that ingest the contaminated water. Diseases transmitted by water are primarily those found in the intestinal discharges of humans or animals. The presence of microbial contaminants in drinking water has plagued humans throughout history. Where adequate water treatment is not readily available, the impact on public health can be devastating. So we undertook a study to evaluate the level of microbial contamination of drinking water for Lezha Region and assess the impact on public health. This is a descriptive and analytic study, retrospective one. We have taken water samples from 10 monitoring points and the number of the samples for each of them in every month is 9 – 10 samples. There is a data collection for the water-related diseases and of the results of the drinking water microbiological analyses for the period of 2012. Study and analyzing all the data and comparing them in order to see the trend of the pollution level of the drinking water, and the number of cases for the water – related diseases. It has been analysed the collected data about the water related diseases like gastroenteritis, salmonellosis, shigelloses for 2012. It was resulted high levels of gastrointestinal diseases for this year, there were reported 584 cases on August with gastroenteritis not specified.

***Keywords*:** *water-related diseases, microbial contamination.*

Introduction

When one think of the 'pollution' of water we often think of chemical dumps or spills into water sources. However, more often the pollution of waters actually refers to the presence of microorganisms that originated from the intestinal tract of humans and other warm-blooded animals. Water pollution can also refer to the presence of compounds that promote the growth of the microbes. The remediation of polluted water, the removal of the potentially harmful microorganisms or the reduction of their numbers to acceptable levels, represents the purification of water. Microorganisms that reside in the intestinal tract find their way into fresh and marine water when faeces contaminate the water. Examples of bacteria that can pollute water in this way are *Escherichia coli*, *Salmonella*, *Shigella*, and *Vibrio cholera*. Warm-blooded animals other than humans can also contribute protozoan parasites to the water via their feces.[1]
The city of Lezha - District and the Prefecture Centre was founded in 385 BC. Lezha lays on the northwest of Albania, from the foothills of Shkodra in the north to the Bregu i Mates in the south, from the highlands of Puke-Mirdite in east and northeast to the Adriatic Sea in the west. It is located only 55 km from the capital of Albania[2].

Municipality of Lezha

Lezha is declared Archaeological Park, where is located the grave of our National Hero, Gjergj Kastrioti, the obelisk of Beselidhja and the Castle of Lezha. Migration during ’90 increased the population of the town[3].

The city of Lezha has an estimated population of around 30’000 and its neighbouring communes of Shëngjin and Balldren have 16’000 inhabitants. The city has an inadequate water supply and sewerage infrastructure. Nevertheless, the economic potential of Lezha is considerable in fish, food processing, and tourism and also due to strategic location of Shëngjin port between Albania and the neighbouring countries respectively: Montenegro and Kosovo[4]. So the Aim of this study is to evaluate the level of microbial contamination of drinking water for Lezha and assess the impact on public health.

Material and Methods

This is a descriptive and analytic study, retrospective one. There is a data collection for the water-related diseases and of the results of the drinking water microbiological analyses for the period of 2012.

Study and analyzing all the data and comparing them in order to see the trend of the pollution level of the drinking water, and the number of cases for the water – related diseases.

There is a collection of 1108 drinking water samples on 2012 as described at the table below:

Table 1. No of analyzed samples for microbiological contamination every month for 2012

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
No of Samples	94	101	87	87	103	79	86	117	61	107	96	90	1108

The collected drinking water samples were been analyzed at the Microbiology Laboratory of Lezha Primary Health Care Directory.

Table 2. No of analyzed samples for microbiological contam. for every monitoring point

2012	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
January	11	9	9	11	9	11	0	9	11	11	0	0	3	0	0
February	11	10	11	9	13	11	4	7	13	12	0	0	0	0	0
March	11	7	8	12	7	12	1	7	11	11	0	0	0	0	0
April	12	7	7	12	0	12	0	7	12	12	0	0	6	0	0
May	13	9	10	12	6	12	1	9	13	8	4	0	5	0	1
June	8	0	6	7	11	9	9	4	7	7	0	0	6	1	4
July	7	9	6	6	8	8	8	9	6	3	0	0	4	6	6
August	12	11	10	13	11	10	8	5	10	12	0	7	8	0	0
September	0	10	10	8	0	12	0	4	12	5	0	0	0	0	0
October	13	8	8	14	9	13	8	0	13	13	0	0	4	4	0
November	11	7	7	11	7	11	6	0	12	12	0	0	6	6	0
December	12	9	9	12	9	12	0	4	10	9	0	0	3	1	0
Total	121	96	101	127	90	133	45	65	130	115	4	7	45	18	11

Method of analyzing the samples and finding out the Coliforme contamination is via Multiple-Tube Fermentation Technique[5].We use 50 ml tubes and 10 ml tubes[6]. To detect and distinguish *E. coli* from bacteria coliforme we are based on lactose fermentation and gas release at 44^{o}C for *E. coli* and 37^{o}C for coliforme in appropriate growth.

To detect the number of colibacile[7] are used the tables (table 3) with MPN (Most Probable Numbers) index which give many combinations for different volume of water. If we have fermentation in 50 ml tube and in 3 tubes with 10 ml then MPN= 9 colibacile for 100 ml water.

Table 3. MPN indicator for the drinking water

Number of tubes resulted positive		MPN Indicator	Acceptable limits in 95 %	
1 tube with 50 ml	5 tubes with 10 ml		Minimal Limit	Maximal Limit
0	1	1	0.5	4
0	2	2	0.5	6
0	3	4	0.5	11
0	4	5	1.0	13
1	0	2	0.5	6
1	1	3	0.5	9
1	2	6	1.0	15
1	3	9	2.0	21
1	4	16	4.0	40

Results and Discussion

From data analysis the following resulted: for the period of January – December 2012 there were taken and analysed 1108 of drinking water samples in total as shown in the table 1;
From them resulted 294 samples contaminated with Coliforme Total on 2012 and with MPN >1 as it shown at the table below:

Table 3. No of analyzed samples resulted microbiologically contaminated for every month

2012	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
MPN=1	0	0	0	0	0	0	0	0	0	1	0	0
MPN=2	3	0	4	5	3	12	7	44	11	14	12	13
MPN=3	4	0	0	4	2	0	2	7	6	3	6	1
MPN=6	1	0	0	0	1	16	2	43	1	7	10	7
MPN=9	0	0	0	0	0	11	2	3	0	2	8	4
MPN=16	0	0	0	0	0	12	0	0	0	0	0	0

For drinking water MPN must be MPN = 0, but in fact during summer resulted MPN = 2 for 44 samples, MPN = 3 for 7 samples, MPN = 6 for 43 samples in August, MPN = 6 for 16 samples, MPN = 9 for 11 samples, MPN = 16 for 12 samples in June.

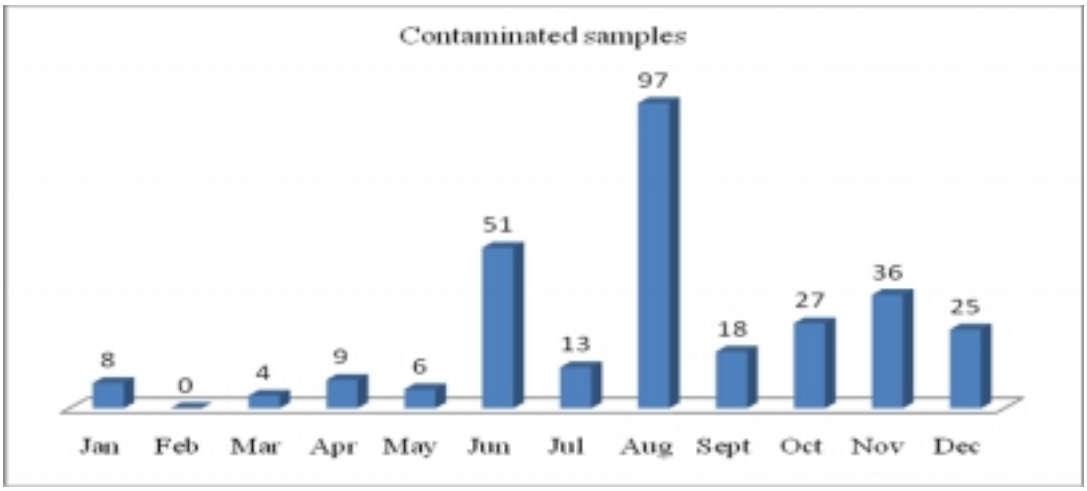

Chart 1. No of analyzed samples resulted microbiologically contaminated for every month

As it s shown at chart 1 June and August has been the months when it results the biggest number of the contaminated drinking water samples.

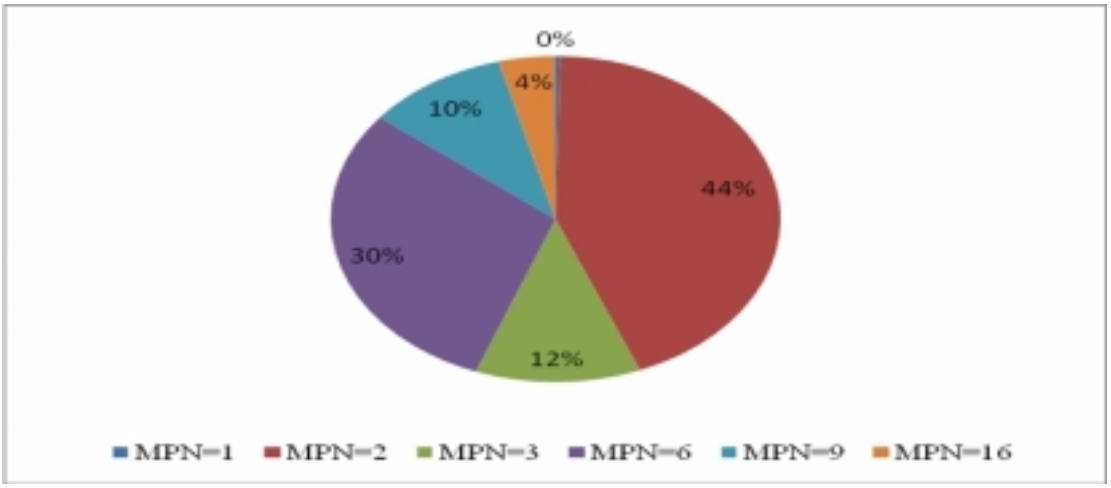

Chart 2. % of analyzed samples resulted microbiologically contaminated according to MPN

Making a detailed analyze of the contaminated samples it results that 44 % of them resulted with MPN = 2, 30% of them MPN=6, 12% MPN = 3, 10% MPN = 9 and 4% MPN = 16.

After the data collection from the registers in the Directory of Public Health of Lezha, about the cases of the water related diseases reported to this Directory, we analyze all the data corresponding to this group of diseases and to the period of January – December 2012.
Gastroenteritis not specified are reported 2148 cases for 2012, Shigellosis are 16 cases, Salmonella not specified 15 cases, and Viral Hepatitis not specified are reported 7 cases (chart 3).

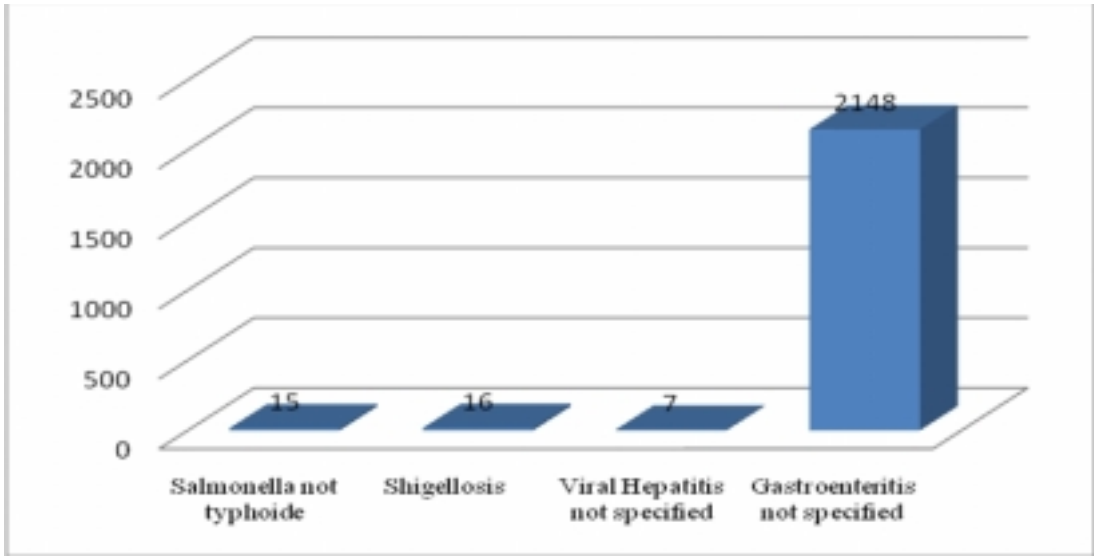

Chart 3. No of cases about water – related diseases on 2012

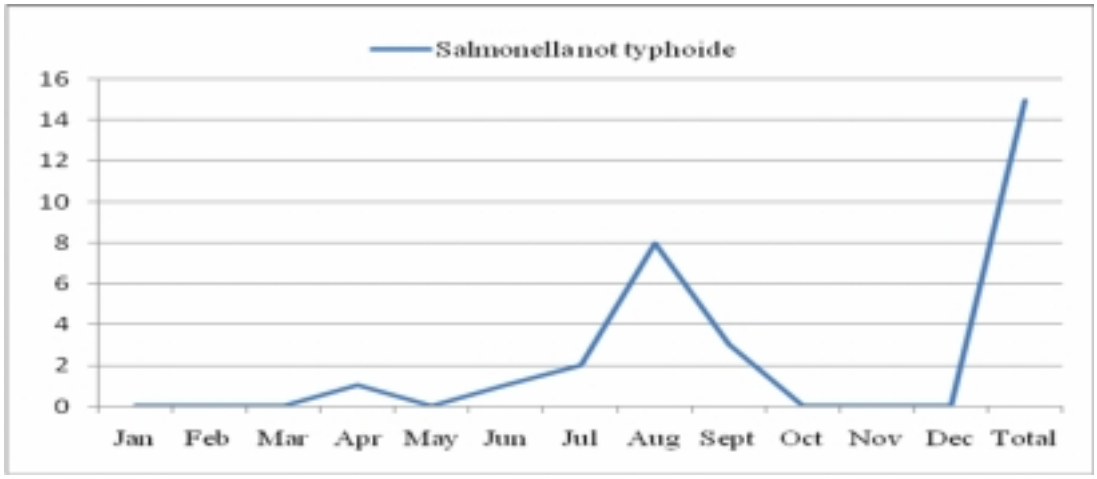

Chart 4. Prevalence of Salmonella not typhoid on 2012

The highest levels of the prevalence on salmonella not typhoid are on July, August and September.

Chart 5. Prevalence of Shigellosis

The highest levels of the prevalence on shigellosis are on March, May, and October.

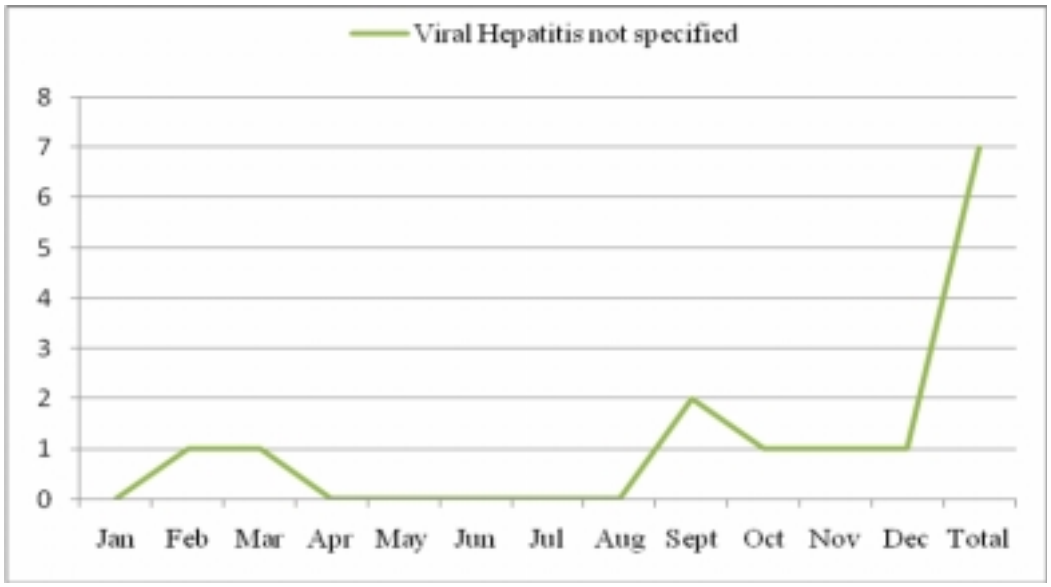

Chart 6. Prevalence of Viral Hepatitis not specified

The highest levels of the prevalence on Viral Hepatitis not specify are on February, March, August, September and October.

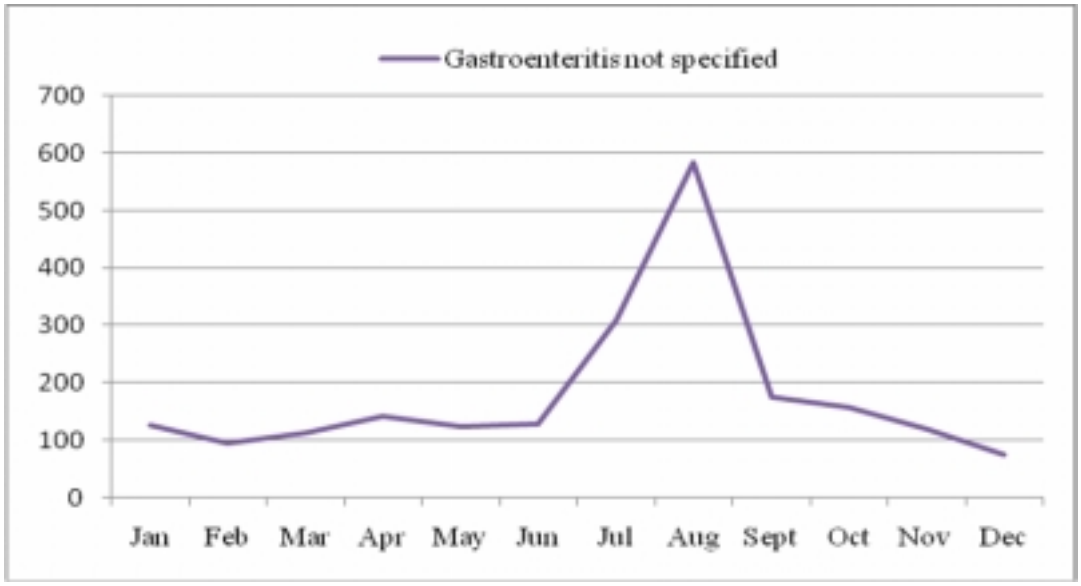

Chart 7. Prevalence of Gastroenteritis not specified

The highest levels of the prevalence on gastroenteritis not specified are on June, July, August and September.

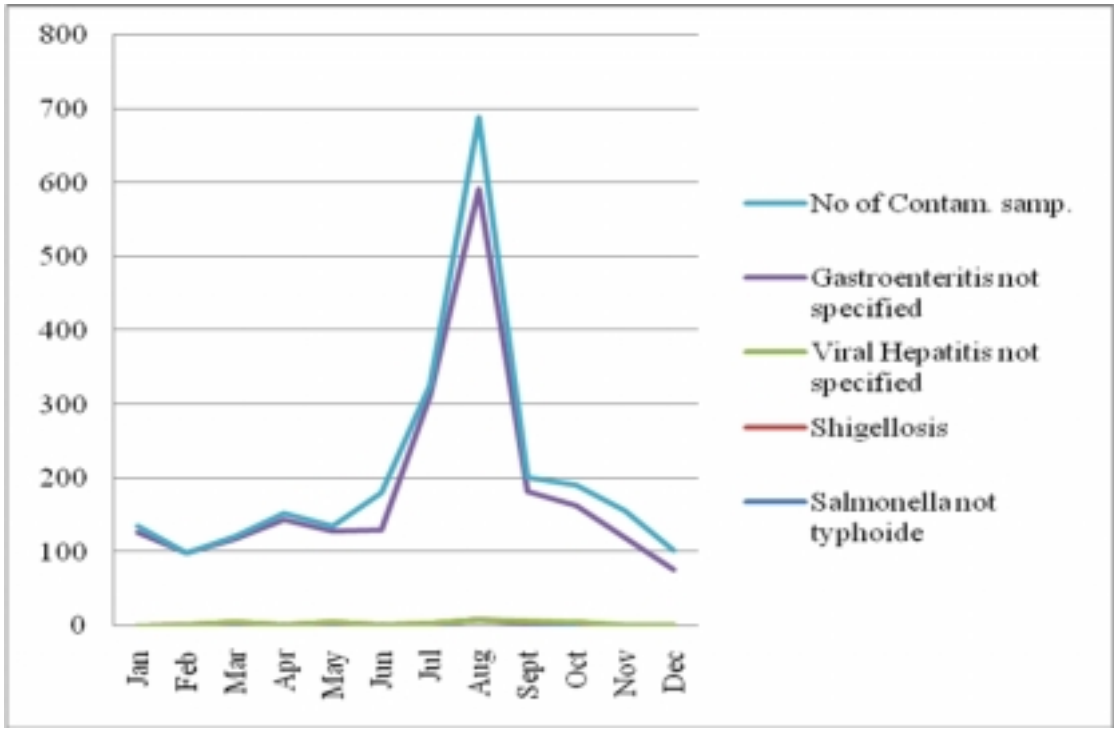

Chart 8. The correlation between the no of water drinking samples resulted contaminated and no of cases of the water related diseases.

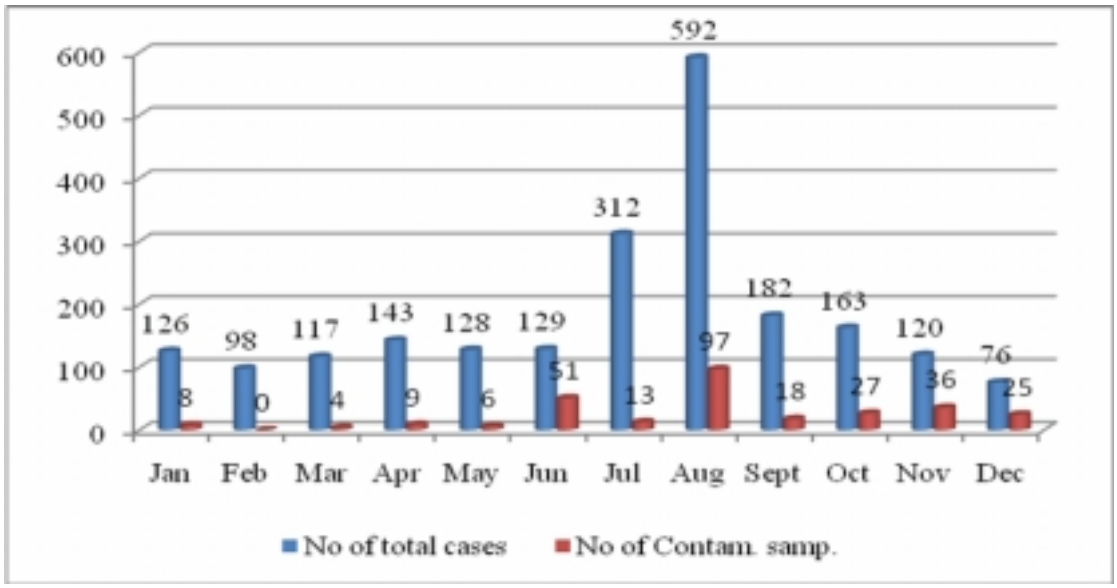

Chart 9. The correlation between the level of contamination and the prevalence of the water related diseases.

The above chart show us there is an accordance on the same months it resulted the highest level of the pollution of the drinking water consumed by the population during 2012, and the highest prevalence of the water relates diseases on 2012 too.

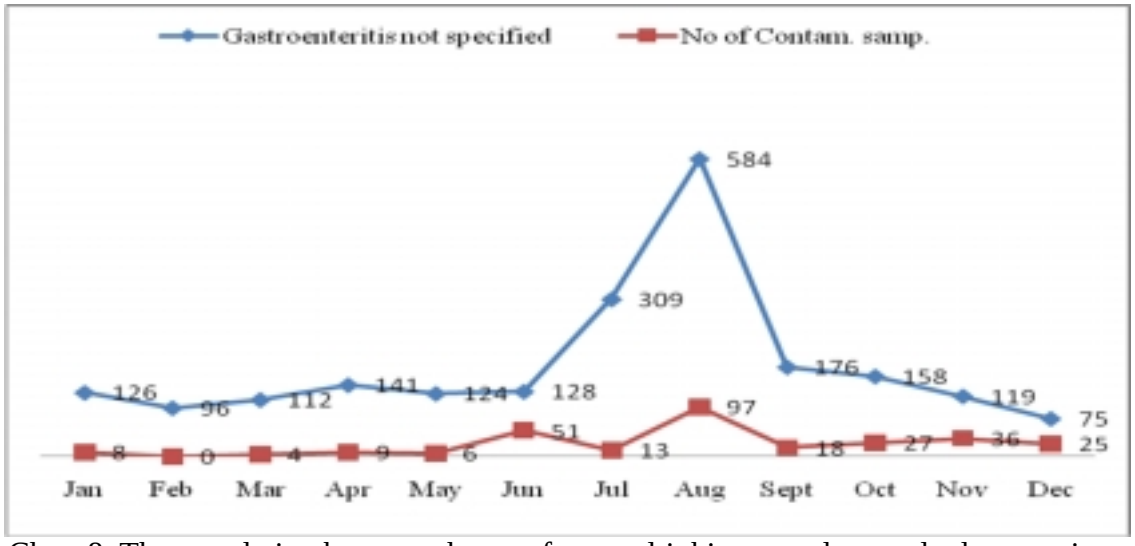

Chart 8. The correlation between the no of water drinking samples resulted contaminated and no of cases of gastroenteritis not specified.

It s obviously clear at this chart that on August it resulted the biggest number of the contaminated samples and the highest level of the prevalence of the gastroenteritis not specified.

Conclusions

1. June and August has been the months when it results the biggest number of the contaminated drinking water samples, respectively 51 and 97 contaminated samples.
2. 44 % of them resulted with MPN = 2, 30% of them MPN=6, 12% MPN = 3, 10% MPN = 9 and 4% MPN = 16.
3. The highest levels of the prevalence on salmonella not typhoid are on July, August and September.
4. The highest levels of the prevalence on shigellosis are on March, May, and October.
5. The highest levels of the prevalence on Viral Hepatitis not specify are on February, March, August, September and October.
6. The highest levels of the prevalence on gastroenteritis not specified are on June, July, August and September.
7. The highest level of the pollution of the drinking water consumed by the population during 2012, and the highest prevalence of the water relates diseases on 2012 it resulted on the same months.
8. Also is resulted the biggest number of the contaminated samples and the highest level of the prevalence of the gastroenteritis not specified on August.

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