

TRANSMISSION VECTOR OF E. COLI IN DIFFERENT AREAS OF THE CITY OF POTOSÍ AND ITS IMPACT ON THE SDGS OF THE 2030 AGENDA

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Abstract: E. coli is a bacterium that is commonly found in the intestinal tract of humans and animals, and can proliferate in different environments. Due to the demographic and geographical characteristics of the Potosí region, this bacterium can represent a danger to the inhabitants due to its spread. For this reason, it was proposed to evaluate the transmission mechanisms of E. coli in different areas of the city of Potosí, with the objective of observing its incidence on health and well-being, as part of the 17 Sustainable Development Goals (SDG) contemplated in the 2030 agenda of the United Nations program. To obtain evidence, a descriptive methodology was applied with a cross-sectional approach, which allowed us to observe the epidemiological situation in this region. The results show a worrying environmental health problem, considering that many areas of the city lack the necessary mechanisms for prevention and health promotion. Finally, the discussions and recommendations are presented in which actions are proposed to minimize and/or eradicate the spread of E. coli as a determining factor that affects the health and well-being of the population, seeking to improve sustainability in the field of health in the region.

Keyword: E. coli, pathotype, infections, health and well-being, SDGs

INTRODUCTION

The health situation in each region of the planet has different evaluation parameters where health promotion and prevention actions are taken into account, in the face of possible contamination risks that can harm the environment, with the proliferation of different bacteria and/or microorganisms that harm the health of the population, such as Escherichia coli (E. coli), which is an emerging microorganism that has been causing diseases

in humans at an increasing rate in the last 20 years. (1). The E. coli microorganism develops in poor sanitation conditions, such as the accumulation of garbage, stagnant water, public toilets with poor hygiene and poorly ventilated places, among others, public toilets with poor hygiene and poorly ventilated places, among the main. The effects that these bacteria can produce as pathogenic biota in humans influences the gastrointestinal tract, as well as the urinary tract, among other conditions (2). This situation leads to prioritizing various prevention and health promotion protocols against the influence of this microorganism, which can spread differently depending on the demographic conditions of each community. (3)

According to various scientific studies, E. coli proliferates in different environmental conditions, so much so that the character of the E. coli O157:H7 serotype that accumulates in meat is demonstrated, as well as other varieties of this microorganism are in use. foods like lettuce, brussels sprouts and public toilets (4). *Likewise, it is considered that E.coli is a producer of Shiga toxin which can proliferate in water with poor sanitation conditions* (5).

In this situation, it makes it possible to demonstrate a real problem in the Potosí region (6), it is considered that: the supply markets of this region are often observed with a large number of crowds of people where hygiene conditions are precarious due to that many of these subjects are in transit through the commercialization of food.

According to studies, they consider that:

The influence of this bacterium affects all age groups, causing infectious processes due to lack of hygiene when eating food, due to contact in bathrooms that are poorly cleaned. (7). The health consequences of E. coli can worsen, causing severe diarrhea in boys and girls due to pathotypes depending on the degree of virulence.

The pathotype, classified as a clinical syndrome with distinctive epidemiological and pathological features. (8) (9). These processes tend to occur frequently in the consumption of water of which not the entire population performs the action of purifying or cooking it to eliminate different pathogens that can become a regional problem, this is due to many factors such as the economic, where studies show that: the economy has made efforts to implement the use of technology to reduce water consumption in agriculture and increase coverage (10).

Likewise, it is necessary to consider that the region of this city of Potosí takes into account the mining contamination that impacts the service of these waters that become a danger to the environmental health of this region. Therefore, with these aspects indicated, it is considered that the greatest microbiological risks are associated with the ingestion of contaminated water, the accumulation of garbage, the commercialization of fruits, vegetables and other foods that are a vector for the spread of E.coli, which violate the epidemiology of the region (11). With these considerations, this document made a real diagnosis of the state in which the city of Potosí is located, with respect to the transmission of E.coli that are probably generated in different places of this city, contemplating the sustainable development objectives of the UNDP 2030 agenda (12). Taking into account that different studies show that there is the presence of E.coli of up to 2400 CFU/ml; in drinking water in the city of La Paz (13). In addition to taking into account the press releases that mention: the study of water quality and food safety in the Potosí region must be prioritized, due to the contamination that exists in the region.

MATERIALS AND METHODS

Under the methodological strategies developed in this research document, fundamental aspects are considered in the use of materials and laboratory procedures for the determination of the presence of E. coli by means of a microbiological analysis, whose procedure was developed by the laboratory of the Departmental Health Service (SEDES-Potosí), applying the different norms that are established at the national and international level, to find the level of the UFC/gr that is established as permissible; considering the presence of this bacterium in foods such as meat sold in supply centers, drinking water consumed by the population in the upper area of the city of Potosí and the health risks that can be found due to the presence of E. coli in the different public baths of this capital city. This way, the research presents an analysis of the descriptive type with a cross section, allowing to process and observe the real situation that exists as a risk in public health. Likewise, this presents a non-experimental design, because the data collection was obtained from the information collected in different points of the city of Potosí, contemplating the protocols and/or procedures established in the norm NB/512 and NB /32020.

RESULTS

Based on the sociodemographic conditions of the department of Potosí, as well as the epidemiological and public health aspects, this document developed a field analysis in order to demonstrate the current situation of the bacterial contamination problem in the different supply centers. Also, an in-depth analysis of the real situation of water consumption in the upper part of the City of Potosí (Pailaviri Zone) was obtained. The main aspects that generate debate around these results allow us to demonstrate the risk to environmental health to which a large part

of the population of Potosí is exposed. This situation is observed through the demographic and sociocultural analysis of the region, where there is a large presence of stray animals and a lack of education in the management of solid waste, which is deposited daily in different areas of the city, especially in the supply centers and public toilets, without adequate control by the public health authorities. In addition to the mining contamination that occurs in the region due to the daily exploitation, transport and commercialization of minerals, which represents another risk to public health, there are factors that can affect the proper functioning of the organism both directly and indirectly. Evidence from this context highlights the *Escherichia coli* (*E. coli*) problem, which arises as a consequence of the situation described above. Therefore, the previously mentioned methodological strategies allow us to describe a conjunctural situation caused by the negligence of the rulers, who do not emphasize the importance of addressing the problem of environmental health and the serious risks it implies for the population of this colonial city and traditional.

Thus, the Institute of the Faculty of Medicine of the UATF has established strategic alliances with institutions such as SEDES Potosí, the Health Network of the Municipality of Potosí and different social actors. These alliances allow the research work to obtain rigorous results from random sampling, with the aim of evidencing a common problem related to bacterial infections in this region. Therefore, the following graphs clearly show the presence of *E. coli* in different parts of the city.

The characteristics of the commercialization of meat in the supply centers of the city of Potosí, allows to demonstrate a weakness in the health control in the commercialization of this daily food for people. The cultural situation is one of the most important aspects that must be taken into account considering

that this type of food is not protected based on the norms that are established at the national level, due to this situation, the microbiological analysis laboratory allows to show that : The Farmer's Market concentrates a factor of 3.6×10^3 UFC/gr, in the Uyuni Market a result of 38×10^3 UFC/gr was obtained, also in the Central Market an index of 3.8×10^4 CFU/gr, diagnosed through the meat marketing sample based on the NB/32020 standard, considered as sources of bacterial propagation. Take into account that for a comparison with international health standards according to PAHO/WHO, these must not exceed the amount of 100 CFU/gr, these samples being a problem that can influence the health of the population, in addition; These values found are classified as type M, this refers to a health risk according to the marginal separation of food. Likewise, it is important to consider that the Chuquimia supply market of this capital city complies with the regulations for the sale of this vital food for man, therefore, in this market, people's income and output must be improved, evidence in which the agglomeration of these subjects can cause some bacterial vector transport.

The significant evidence of the observation reveals the worrisome state in which the main public toilets located in supply centers and adjacent to these, which receive a large number of population in transit, are located. Due to the physiological characteristics of people, it is important to consider the actions of the organism to carry out urination and bowel movements in appropriate places and with optimal hygiene and environmental health conditions. This situation, parameterized by environmental health regulatory norms, proves that the health regulations are not complied with, despite this, these public urinals that were the object of study are heavily used to carry out the different actions of metabolic waste. Thus, the evidence in

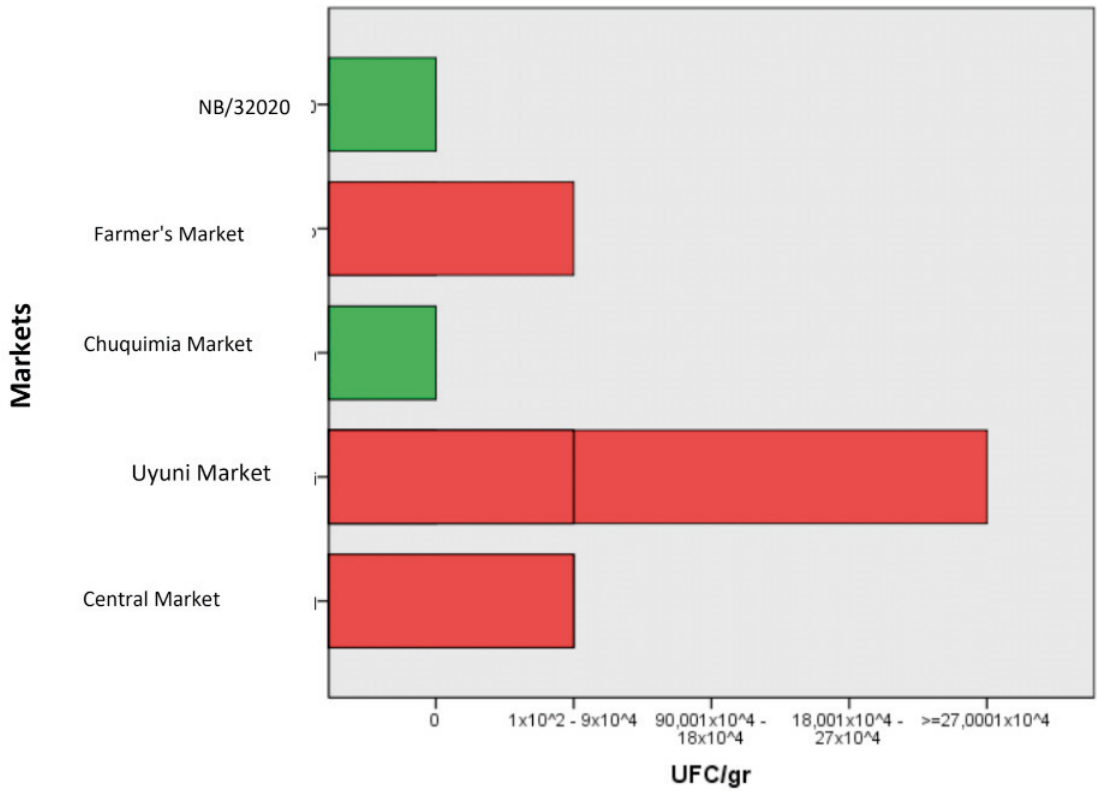


Figure 1: Incidence of E. coli in supply markets (meat marketing) City of Potosí management 2022.

Source: Results of the SEDES Microbiological Laboratory

- Potosí.

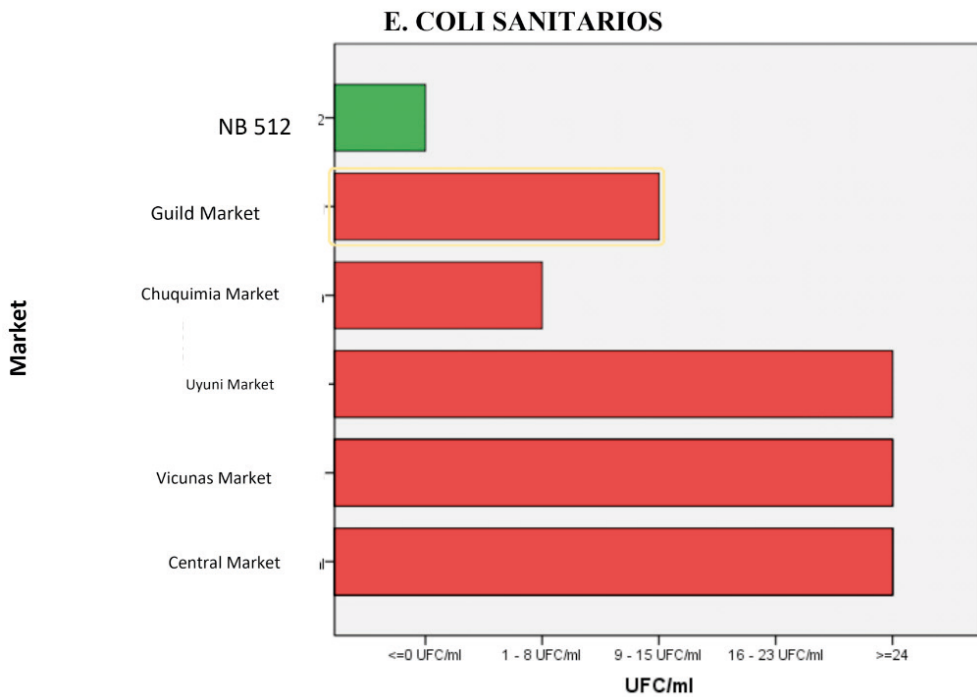


Figure 2: Analysis of the presence of E. coli in public toilets in the city of Potosí

Source: SEDES Microbiological Laboratory - Potosí

E. COLI CISTERNAS

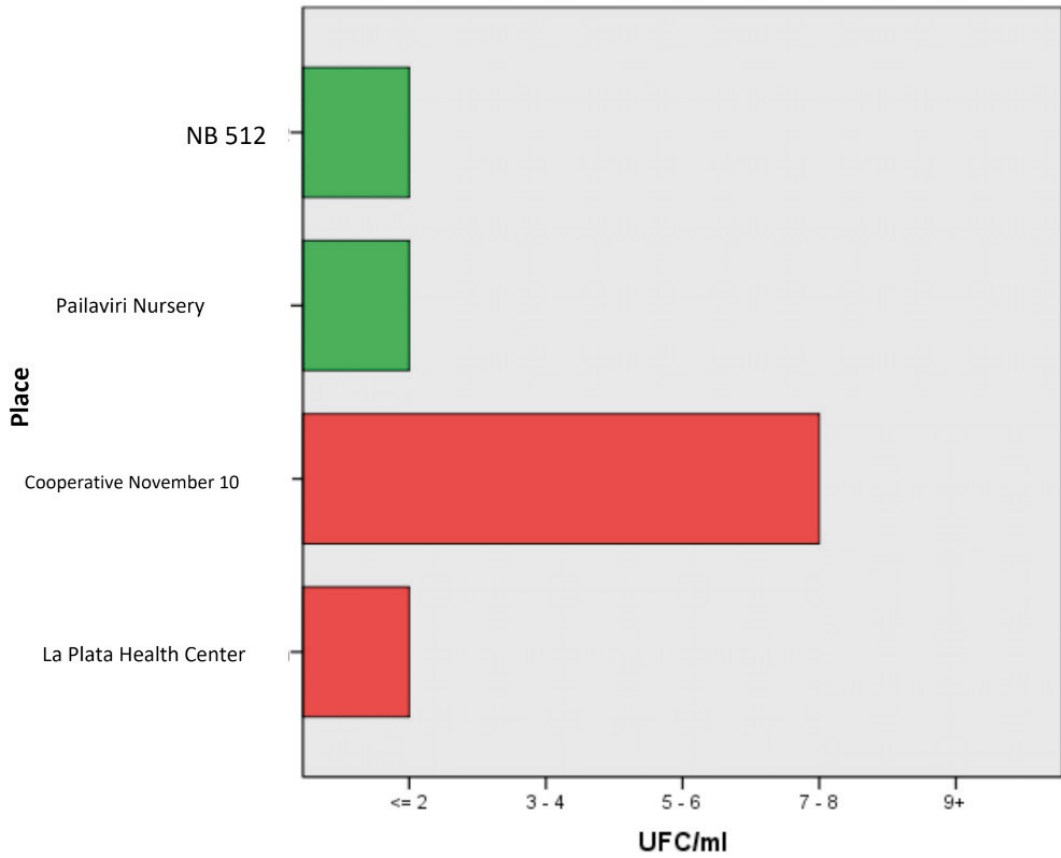


Figure 3: Analysis of the presence of E. coli in water supplied by cisterns in the city of Potosí

Source: SEDES Microbiology Laboratory – Potosí

figure 2 shows the positive factor incidences where there is the presence of *E. coli* within these urinals, considered a danger to people's health, these values allow us to question the cleaning and sterilization actions that must be executed in these public toilets, where a large part of the population in transit go.

This situation of the presence of *E. coli* is considered a high health risk, considering that this bacterium can trigger different infectious pathologies which can impair the proper functioning of the organism. In addition, it is important to mention that if this bacterial transmission reaches children, they have a high probability of being hospitalized where the health status of these subjects can be complicated, depending on the severity of the condition against this bacterium.

Likewise, the observations made in samples obtained from the water supply distributed by cisterns in the city of Potosí, specifically in the "Zona de Pailaviri", it was verified that said samples do not conform to the standards established by the health regulation NB512 for the Plurinational State of Bolivia. These adverse results could have detrimental consequences for the well-being and quality of life of the population that makes use of this service. Therefore, this non-compliance with the norm evidences the presence of *E. coli*, in the water ponds that are retained in different sources for the consumption and use of the people in this area. This way, the results of Figure 3 put a sector of the population at risk, considering that the high rates of *E. coli* are due to a lack of adequate cleaning of the source where the water is supplied.

CONCLUSIONS AND RECOMMENDATION

Based on the results found, the following aspects are concluded:

Within the commercialization of food that is carried out in the supply markets of the city

of Potosí, it is identified that of the total (100%) that exist in this capital city, the average 75% show the presence of *E. coli*. This is due to the lack of health promotion and prevention that must be carried out continuously in all supply centers as well as in public toilets, the latter being the place with the highest risk of vector transmission of *E. coli* bacteria.

It is also ignored that there is a decline in the use of sanitary measures by the general population, especially in children who are in use and/or in the vicinity of these places where the *E. coli* bacteria proliferate. This way, it is also evident that there is a decline and lack of preventive health policies issued by all the authorities in this region to face the possible effects that may develop in society as a whole due to this microorganism.

Likewise, regarding water consumption, it is identified that in the upper zone of the city of Potosí (Zona de Pailaviri), the incidence of *E. coli* exceeds the permissible limits established in local, national and international regulations, for which reason identifies that these microorganisms found can be a risk of damage to health, thus generating different discomforts in the body.

In an interview with Dr. Javier García Pari, medical chief of the Cerro de Plata Health Center, he mentioned the following aspect as: *"Due to the remote location of the "Cerro de Plata" health center, there is a difficulty in the provision and storage of the liquid element, which causes a health risk, because often the water remains at rest for more than a week, originating different microorganisms which can become, over time, a focus or point of infection of the E. coli bacteria."*

In relation to the public toilets in the city, a considerable percentage of them have latrines that, at the time of their acquisition, economy was prioritized over comfort, which contributes to the poor infrastructure of the toilets available to citizens. As a result, urinals

and toilets are often of poor quality and poorly sized. *E. coli* bacteria have adapted to living in unsanitary environments. Therefore, it is necessary to increase awareness and carry out regular checks in these places to reduce the spread of any type of fecal bacteria.

Based on SDG-3, which refers to the health and well-being of the population in the face of different events that can influence the society of the municipality of Potosí, different health policies must be carried out and implemented to minimize these epidemiological actions that place in a high risk to people's health, mainly that of boys and girls. Due to this situation, good health must be prioritized

in order to have a life expectancy without epidemiological risk, considering that our regional situation must be sustained based on appropriate health policies for the region.

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