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## ABSTRACT

In the last decade, the epidemiological characteristics of salmonellosis have changed, in particular, the incidence of human disease has increased, and salmonella infection of farm animals, birds and the environment has increased. The increasing epidemiological role of agricultural birds and industrial poultry products, the relationship between epizootic and epidemic processes require the restructuring of the existing system of epidemiological surveillance of salmonellosis under epizootic and epidemiological supervision. On the basis of the results of scientific research, epizootic-epidemiological supervision of salmonellosis has been developed, in relation to the conditions of Uzbekistan.

**Keywords:** Salmonella, epidemiology, prevention, epizootology, surveillance, zoonosis

## INTRODUCTION

Salmonellosis diseases, called “diseases of civilization” are so widespread that no country is currently facing the issue of their elimination, but only a reduction in the incidence rate [1]. Salmonella occupy a special place in a number of acute intestinal infections. Unlike dysentery, typhoid, escherichiosis, cholera, they are caused by microorganisms pathogenic in natural conditions for animals and humans. In nature there are two reservoirs of salmonella - animals and man [2, 3, 4]

Currently in Russia, as in many countries of the world, *Salmonella enterica* subsp - enteric serovar Enteritidis (*S. enteritidis*) holds the leading importance in the etiology of infection. Extensive studies on the characterization of salmonella populations have shown significant heterogeneity of most salmonella serovars and limited heterogeneity of *S. enteritidis*, as determined by the clonal nature of the population of this microbe [5]

The international system on epidemiological surveillance behind salmonellosis notes that in the last decade from 50 to 90% of outbreaks of the salmonellosis in the world caused by *S. Enteritidis*, and it is connected with the use of a bird, poultry products, especially eggs and its products (mayonnaise, mousses, etc.) [6].

An important part of the epidemiological surveillance system for salmonellosis is assigned to the mandatory component - epidemiological diagnostics aimed at determining the causes and conditions of sporadic and outbreak morbidity. At present, the introduction of integrated programmes for the collection, processing and analysis of information obtained through close inter-department cooperation on an ongoing basis contributes to improving the quality of epidemiological diagnosis; Application of modern methods of laboratory diagnostics based on molecular genetic methods of agent typing (PFGE, MLVA), etc.

One of the tasks of epidemiological diagnosis is to identify the prerequisites and precursors of the complication of the situation by salmonellosis. At least four main prerequisites for complicating the epidemiological situation can be identified for salmonellosis. One of them is related to the factors of the natural environment and represents a deterioration of the epizootic situation. Such changes can be captured only in close cooperation with the veterinary service, which performs epizootic monitoring, which allows to identify salmonellosis-disadvantaged livestock or poultry farms. [7].

The expansion of international trade in animals and animal products, feed, high concentration of animals in a limited area, environmental changes leading to new salmonella properties, the introduction of modern mass animal slaughter and processing technologies, the expansion of the catering network, are the main factors contributing to the spread of salmonellosis [8, 9, 10].

In the last decade, epidemiological features of salmonellosis have changed, in particular, the incidence of human disease has increased, and salmonella infection of farm animals, birds and the environment has been caused by *S. Enteritidis* [11, 12]. This has been facilitated by social changes in the life of the population, such as the broad development of private property, increased migration of the population, rapid development of the system of economic nutrition, etc [13, 14].

In the 1990s, as a result of political and economic reforms, Uzbekistan experienced significant changes in the system of production and sale of food, including poultry products. Most catering and trading businesses have moved into private ownership. At the same time, there was a reform of the sanitary and epidemiological service, accompanied by a sharp limitation of the frequency of inspections of controlled objects and the volume of microbiological research of environmental samples. These changes in the social life of society could not but have an impact on the epidemic and epizootic processes of salmonellosis [15].

On the basis of Presidential Decree № PD-5814 of 9 September 2019, another reform of the sanitary and epidemiological service took place, and the State Inspectorate of Sanitary and Epidemiological Supervision was established under the Cabinet of Ministers of the Republic of Uzbekistan and the Agency for Sanitary and Epidemiological Well-being under the Ministry of Health of the Republic of Uzbekistan.

In this situation, there is a need for theoretical justification of the system of measures to control and prevent salmonellosis infection taking into account the knowledge of modern peculiarities not only of epidemiology, but also of epizooto-logic of salmonellosis enteritidis. Meanwhile, the epizootic process of salmonellosis among farm animals and birds and its impact on the intensity, dynamics and structure of morbidity in settlements in Uzbekistan have not been largely studied.

Currently, the prevalence of bacterial diseases in livestock production worldwide is 16.2%, of which mixed bacterial diseases account for 10.9%. In developing and increasing the productivity of livestock, which is the main sector of agriculture, it is important to increase the number of livestock in farms and private farms, increase their productivity, obtain healthy livestock, properly care for it and protect against various diseases [16].

The increasing epidemiological role of farm animals, birds and industrial poultry products, the relationship between epizootic and epidemic processes, the changes in the sanitary and epidemiological service require the restructuring of the existing epidemiological surveillance system for salmonellosis [17].

## **METHODS**

The work uses official statistical materials on the incidence of salmonellosis of people and serotype variety of salmonella, isolated from animals and objects of the external environment over the last 26 years. The results of the epidemiological survey of 114 salmonellosis centers registered in the city of Tashkent have been studied. Also literary data and official instructional and methodological materials concerning epidemiological surveillance, preventive and anti-epidemic

measures in case of salmonellosis are analyzed. The method of epidemiological examination of foci, epidemiological analysis was applied: descriptive techniques of research (methods of observation, methods of study of spatial distribution of diseases, method of distribution of diseases over time, method of distribution of diseases among different populations, techniques of statistics), analytical methods of research (methods of formal logic, statistics methods, cohort research, retrospective research).

With the help of descriptive methods of epidemiological study, intensity, dynamics, clinical characteristic and disease structures - time, risk group of salmonellosis disease were revealed. With the help of analytical methods, the retrospective epidemiological analysis of the incidence of salmonellosis were carried out according to the official statistical reports of the Center of State Sanitary and Epidemiological Surveillance of the Republic of Uzbekistan. The scope of the studies is presented in Table № 1.

## RESULTS AND DISCUSSION

An epidemiological analysis of salmonellosis incidence in Uzbekistan revealed the following epidemiological features of the disease:

- Along with the increase in the number of circulating salmonella, in certain geographical areas there is the appearance of serotypes that have not previously met there and observed.

- Despite the increasing number of circulating salmonella, the bulk of diseases in Uzbekistan are caused by no more than 10-15 prevailing serotypes such as salmonella enteritidis, typhimurium, pullorum, heidelberg, derby, newport, infantis, mission, anatum, haifa and etc.

Currently *Salmonella enteritidis* (*Salmonella enteric* subsp. *enterica* serovar *enteritidis*), holds a leading role in the etiology of salmonellosis in Uzbekistan. Growth of morbidity is due to activation of epizootic process at enterprises of industrial poultry farming, products of which are mainly used in food production [7].

Salmonellosis infection in the territory of the Republic is characterized by seasonality, and a large incidence is recorded in the spring-summer period [11].

The intraannual dynamics of the incidence of salmonellosis does not have an obvious pattern, although the incidence rate increases slightly in summer. This seems to be due to the difficulties of preserving finished products (ready-made dishes) due to high temperature and trips for summer rest to places where it is difficult to ensure the safety of finished products. In summer, the number of food outbreaks is also increasing.

The epidemiological situation on salmonellosis in the Republic remains tense. Despite the tendency in recent years to reduce the incidence of acute intestinal infections, salmonellosis holds one of the leading positions in among these infections.

In Uzbekistan, the incidence of salmonellosis has tended to decline over the past 26 years (an intensive rate from 34.59 in 1991 to 2.3 in 2017), although there has been some variation in years (an intensive incidence of salmonellosis in 2004 of 4.6 and in 2007 of - 6.2) (Fig. 1).

Territorial distribution of diseases of salmonellosis differed by the pronounced contrast with the Tashkent city, Tashkent and Fergana regions being particularly marked out as extremely unfavorable in terms of the incidence of salmonellosis (Fig 2) [6].

Internal migration of the population, as well as the import of food from other regions, can have a direct impact on the incidence rate in a number of territories.

Growth of incidence of salmonellosis in Tashkent city, the Tashkent and Fergana regions, is also possible to explain with improvement of detection, diagnostics and registration of the patients with salmonellosis as in these territories bacteriological and serological diagnosis of salmonellosis is well adjusted [6].

In general, the serovar variety of salmonella is diverse in the Republic, and 19 serological variants of salmonella are distinguished from patients and carriers.

In recent years, the etiological structure of salmonellosis has been dominated in recent years by *S. enteritidis* and *S. typhimurium* serovars, which determined 80% of cases in humans.

This shows that in present *S. enteritidis* and *S. typhimurium* have not exhausted their epidemic potential, and therefore determine the special nature of the modern epidemic process of salmonellosis in Uzbekistan and require targeted development of preventive measures in the fight against salmonellosis.

In salmonellosis, the organization of joint supervision of the sanitary-veterinary and sanitary-epidemiological services is crucial. The Sanitary and Veterinary Service constantly monitors the incidence of salmonellosis, as well as the frequency and characteristic of the allocated salmonella from animals, and their feed.

Sanitary-epidemiological supervision provides monitoring of sanitary and epidemiological regime in public catering facilities, compliance with the technological regime of food products.

Results of sanitary-veterinary supervision of salmonellosis are the basis for carrying out measures (removal of contaminated products or products coming from unfavorable farms, carrying out measures in public catering facilities according to the established sanitary-hygienic

requirements, mandatory bacteriological examination of food products and all employees of public catering enterprises in case of food outbreaks).

Developing of a program of epizootic and epidemiological surveillance of salmonellosis, makes it possible to improve epidemiological surveillance of salmonellosis, which is necessary to control the evidence at the state and inter-state levels, and allows to carry out purposeful epidemiological diagnosis, testing and methodological support of preventive, as well as anti-epidemic measures on the basis of combined analysis of population morbidity and epizootic process of these infections among farm animals and birds.

The unfavorable epidemiological situation on salmonellosis requires the resolution of scientific issues. The main ones are the study of the epidemic process of salmonella and the possible influence on it of the variability of the biological properties of salmonella (virulent, sensitivity to antimicrobial drugs, and others.); Identification of factors determining change of etiological structure of salmonellosis and variability of biological properties of salmonella.

On the basis of the results of scientific research, the epizootic and epidemiological surveillance of salmonellosis, in relation to the conditions of Uzbekistan was developed. In formulating the general algorithm of a unified scheme of epidemiological surveillance of infectious diseases was used, in the formulation of the general algorithm of epizootic and epidemiological surveillance.

From an organizational point of view, the developed program of epizootic-epidemiological supervision of salmonellosis reflects management activities of the State Inspection of Sanitary and Epidemiological Supervision and the Agency for Sanitary and Epidemiological Well-being and Veterinary Service (Fig. 3).

## CONCLUSIONS

It is recommended to introduce the proposed program of epizootic and epidemiological supervision of salmonellosis into the activities of the State Inspectorate of Sanitary and Epidemiological Supervision and the Agency for Sanitary and Epidemiological Well-being and Sanitary and Veterinary Service of the Republic of Uzbekistan, which will contribute to reducing the incidence of salmonellosis.

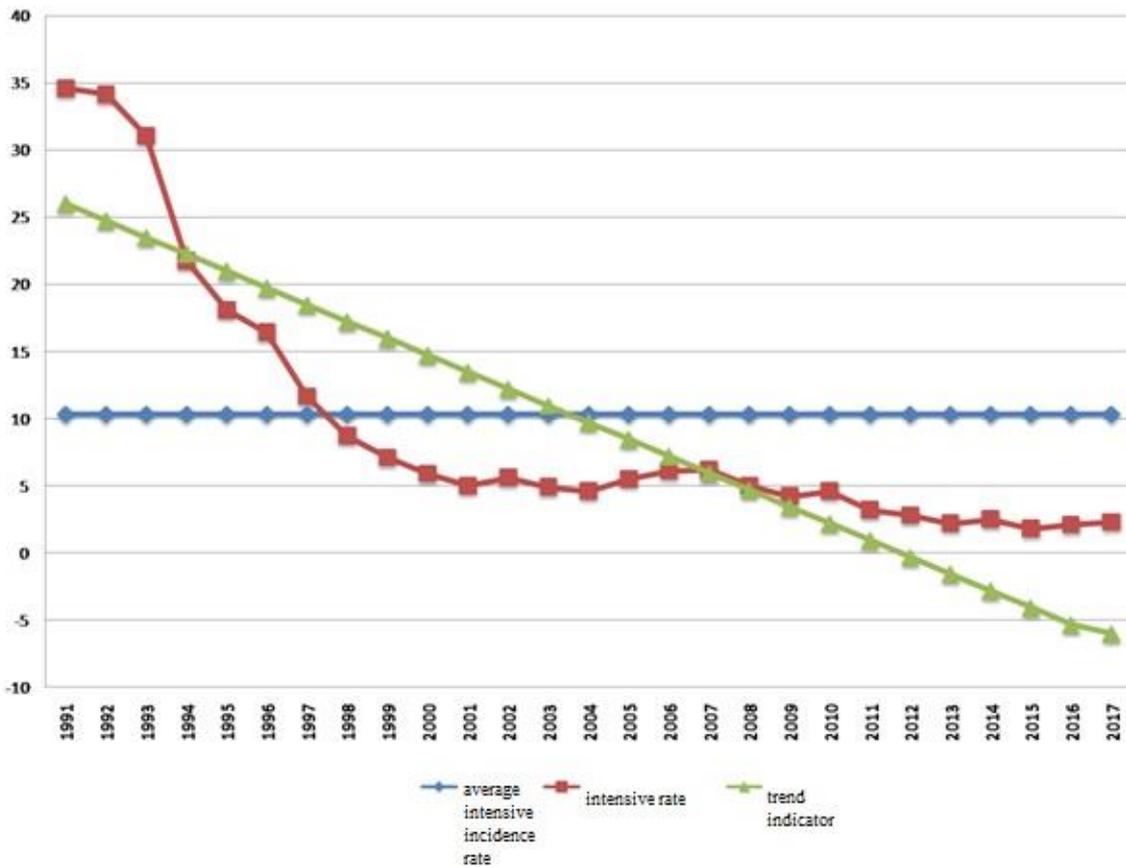


Fig 1. Long-term dynamics of salmonellosis incidence over the past 26 years (1991-2017)

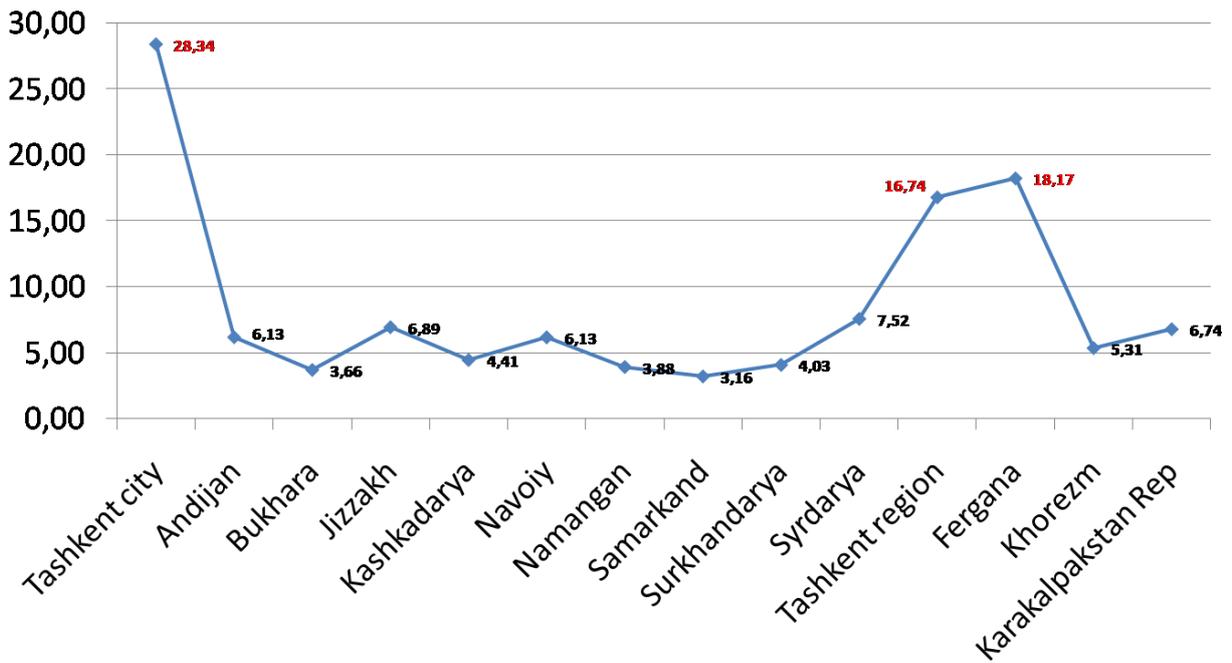


Fig 2. Territorial distribution of morbidity salmonellosis in the Republic of Uzbekistan (1991-2017)

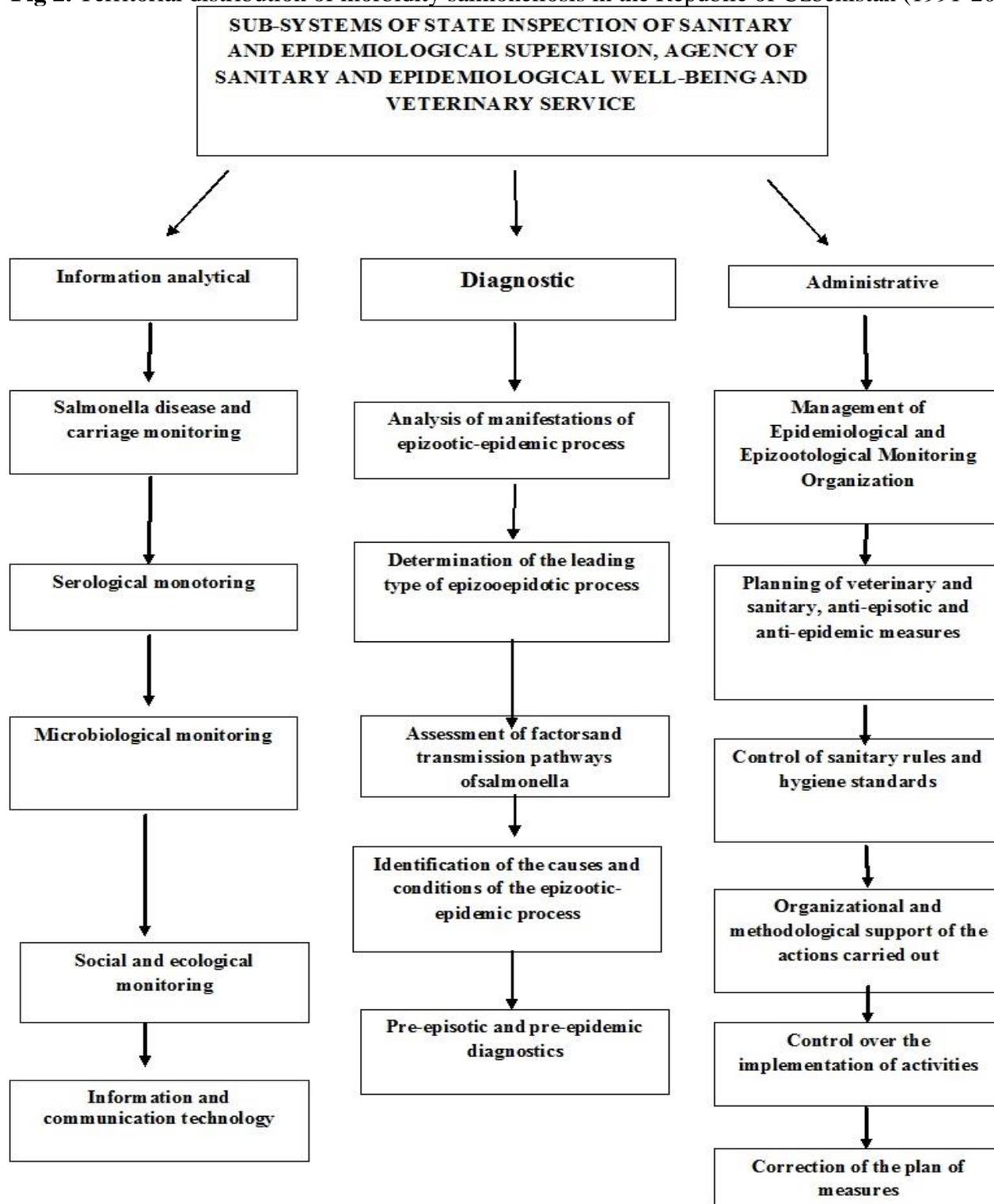


Fig 3. Epizootic-epidemiological supervision of salmonellosis

The volume of conducted researches

Table №1

№	Type of researches	Material volume
1	Retrospective epidemiological analysis of salmonellosis incidence in the Republic of Uzbekistan .	In 26 years (1991-2017)
2	Operational epidemiological analysis of salmonellosis incidence in the Republic of Uzbekistan .	In 2 years (2016-2017)
3	Epidemiological examination of salmonellosis infection sites	144

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