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Noise Map of the Territory Related to the Polyclinic №7 in Samarkand

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ABSTRACT: The article discusses how GIS is used in health protection applications, the nature of various diseases spread and their causes. On the basis of taken data from the city family polyclinic №7 in Samarkand for the last 3 years and measured noise in dB in several sections of its streets location, a noise map of a single section of Samarkand was created.

KEY WORDS: GIS, dislocation, map, health protection, spatial information, spatial situation, digital map, noise pollution, epidemiological situation.

I. INTRODUCTION

A map is the most common way of understanding spatial information [4]. Any actions of a surveyor and land planner to process measurements are to one degree or another related to the map.

The map is a source of information and greatly simplifies the daily activities not only land surveyors, but also ordinary citizens [1]. In the case of working with GIS, we are dealing with a digital map, or rather with its electronic representation on a computer screen.

In addition to the usual managing tasks basic analytical capabilities, GIS is used in health applications, for example, to determine the shortest path from the ambulance station to the patient, taking into account the current situation on the roads or when analyzing epidemiological situations: the nature of various diseases spread and their occurrence causes.

According to researchers, "noise pollution", which is now typical for large cities, reduces their inhabitants' life expectancy by 10-12 years. The negative impact on a person from the megalopolis noise is 36% more significant than from smoking tobacco, which shortens a person's life by an average 6-8 years [2].

Noise is random vibrations of various physical natures, characterized by the temporal and spectral structure complexity. From a physiological point of view, noise can be called any unwanted sound (simple or complex) that interferes with useful sounds perception (human speech, signals, etc.), disturbing the silence and having a harmful effect on humans [5].

II. MAIN PART

Noise has been found to be associated with irritation, stress, sleep disturbance and impaired cognitive function. In addition, epidemiological studies have shown that environmental noise is associated with an increased hypertension, myocardial infarction, heart failure and stroke incidence.

The human body reacts differently to different levels of noise. 70-90 dB noise level with prolonged exposure leads to the nervous system disease, and more than 100 dB - to hearing loss, up to deafness [6].

And also noise creates a significant load on the human nervous system, exerting a psychological effect on it. Noise can increase the stress hormones levels such as cortisol, adrenaline, and norepinephrine in the blood - even during sleep. The longer these hormones are present in the circulatory system, the more likely they are to lead to life-threatening physiological problems such as endothelial dysfunction and hypertension.

According to the World Health Organization (WHO) guidelines, cardiovascular disease can occur if a person is constantly exposed to 50 dB noise levels or higher at night, which is common in large cities. To get insomnia, 42 dB of noise is enough; just to get irritable - 35 dB (whisper sound). According to the WHO, thousands of people around the world die prematurely from cardiac disorders caused by long-term exposure to increased noise levels [3].



Under the noise influence from 85 - 90 dB, hearing sensitivity at high frequencies decreases. For a long time, a person complains of malaise. Symptoms are headache, dizziness, nausea, excessive irritability [8]. All this is the result of working in noisy conditions.

Under the strong noise influence, especially high-frequency noise, irreversible changes occur in the hearing organ. At high noise levels, the auditory sensitivity decreases after 1–2 years, at medium levels it is detected much later, after 5–10 years, that is, hearing loss occurs slowly, the disease develops gradually [7]. It is therefore especially important to take appropriate noise protection measures in advance. Nowadays, almost everyone who is exposed to noise at work is at risk of becoming deaf.

In recent years, the noise in Samarkand city has increased. This is not surprising, since the number of vehicles has increased, but the space remains the same. Next, we present data on the above diseases from the city family polyclinic №7 in Samarkand over the past 3 years and measure the noise in dB at several sections of its streets location, with mapping.

Table № 1.
The list of population diseases for 2017-2019

Acquired diseases / years		2017	2018	2019
1	Arterial hypertension	137	129	113
2	Myocardial infarction	1	2	0
3	Heart failure	22	27	25
4	Stroke	2	1	0
5	Endothelial dysfunction	12	8	10
6	Irritation	228	231	215
7	Stress	349	373	317
8	Sleep disturbance	447	393	398
9	Cognitive impairment	64	72	77
10	Acquired deafness	0	0	0

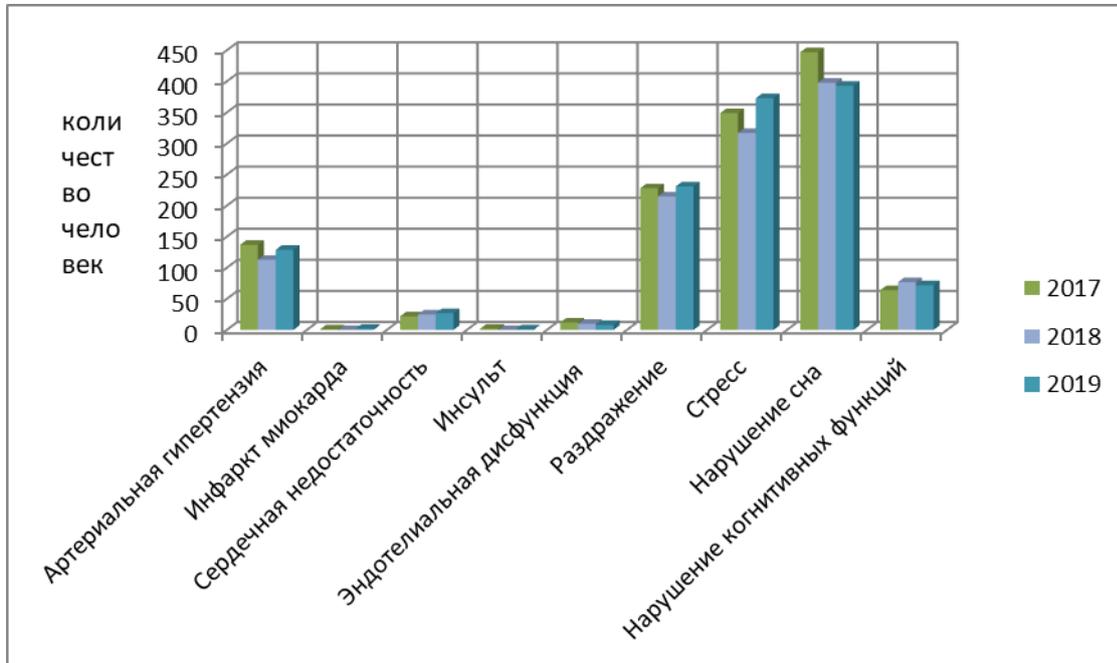


Fig.1 Acquired disease chart

Table №2.
Noise recording table (dB)

Audio recording address	night		day	
	min	max	min	max
SEC «ATLAS» (1)	42	76	44	79
Ambulance (2)	58	83	70	81
Microdistrict (7 polic) (3)	43	85	71	80
Turn (4)	63	84	72	82
HBP (rails) (5)	47	64	73	84
Sogdiana (rail) (6)	50	78	71	82

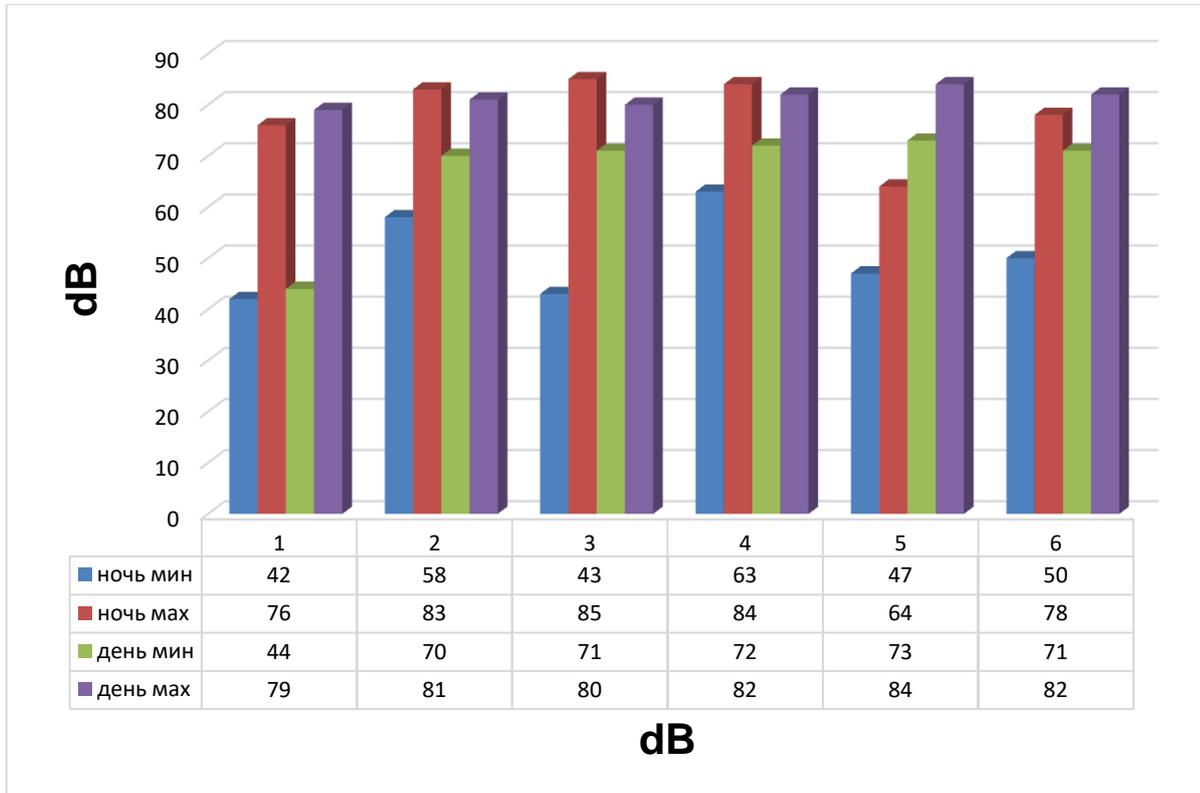


Fig.2 Night and day time noise recording diagram

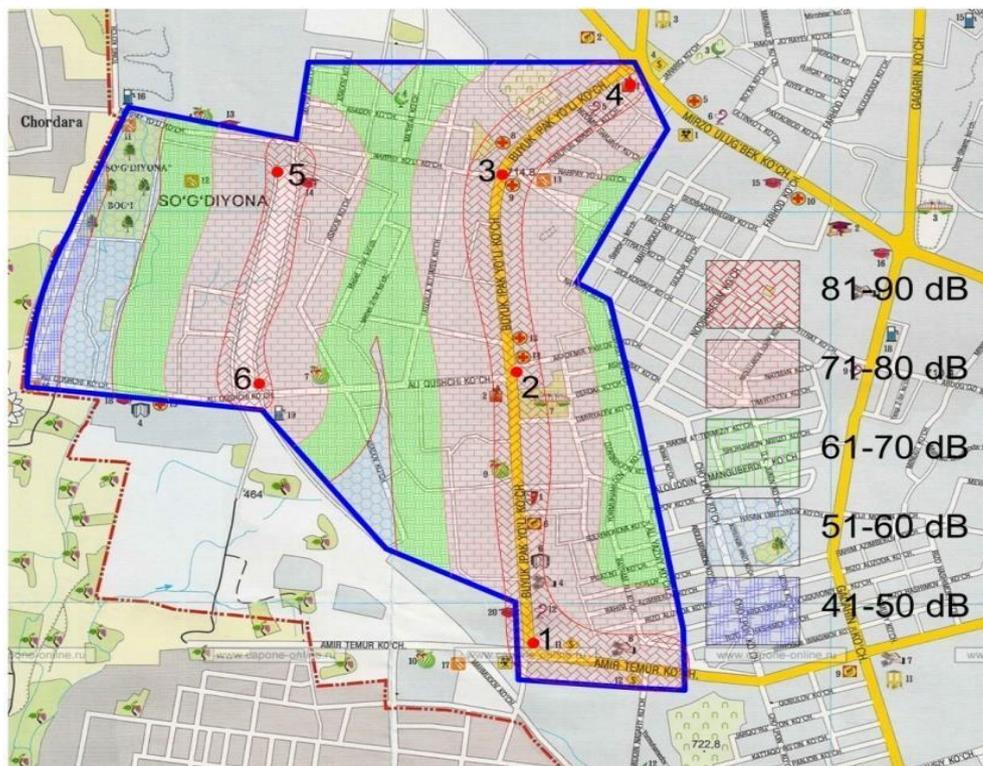


Fig. 3 Dislocation of polyclinic № 7 and its noise map



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In conclusion, we can say that in our time, noise maps are a necessity for choosing the most appropriate, effective and economical means of noise reduction, determining rational options for the residential and public buildings placement from the point of view noise protection, in accordance with the established noise standards for them. The noise map will also be useful for many ordinary city residents when choosing the most optimal and comfortable place for them to live.

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