

Sustainable Development in the Context of the Architecture of Environmental Friendly Medical Centers in Rural Areas (Case for Ukraine)

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Abstract. The study of ways to improve medical care in rural areas is relevant for many countries, including Ukraine, whose territory continues to be destroyed for five months (at the time of writing) due to Russian military aggression. The article is based on the results of research by various scientists, primarily related to the sustainable development of architecture and urban planning, as well as the author's research in recent years. The article's purpose is to search for new architectural forms of organizing medical care in rural settlements that would contribute to the influx of young people and the development of medicine. An analytical method, a review of information sources, a full-scale survey with photo fixation, a survey of rural residents, and conceptual and exploratory design as part of the educational process at the university were used. The result of the study is a proposal for the design of new types of buildings with two main functions ("work" + "housing").

1. Introduction

Access of people to medical care in rural areas is a problem for many countries, including Ukraine. This is due to various factors, including the state priority for developing medicine in large cities, the small number and low population density in rural areas, and the lack of funding opportunities. Urbanization has a particular and weighty influence, which contributes to the excessive growth of cities and the simultaneous "extinction" of villages and small towns. As a result, rural youth seek higher education in cities and no more extended plan to return to their places of origin. But we understand that for any country's normal and successful development, a balance must be found between urban and rural areas. The entire population of the country cannot live exclusively in cities! This will lead to various negative consequences, including degradation of agriculture, transport collapse, and increased emergence and spread of pandemics due to excessive population density in cities. But how do they motivate young people to return or move to the countryside? How do we provide the necessary medical care to rural residents? This article attempts to answer these questions.

The theoretical basis for the preparation of this article is research related to various issues of sustainable design, architecture, and urban planning. In particular, the latest articles by Rudolph-Cleff A. and co-authors [1–3], Shebek N., Timokhin V., Tretiak Y., Kolmakov I. and Olkhovets O. [4, 5],



Pleshkanovska A. [6–9], Kovalska G. and co-authors [10–12], Semerikov S. and co-authors [13–15], Linda S. and co-authors [16, 17], Chukharev S. and co-authors [18, 19], Dyomin M. [20, 21], Adeyeye K. and co-authors [22–30], Ivashko Yu. and co-authors [31], Chernyshev D. and co-authors [32, 33], Kovalchuk O. and co-authors [34–36]. Also, some of the author's preliminary studies related to this topic served as the basis of the article [37–46]. Issues related to the problems of environmental and sustainability were studied based on a study by I. M. Lami and B. Mecca [47].

The purpose of this article is to attempt to find a new way to develop medical care in rural areas from the point of view of the architectural aspect. The study is relevant in connection with the permanent state of this problem, which was especially aggravated after the start of Russia's military invasion of the territory of Ukraine. Because of the war, a significant territory of Ukraine is almost completely erased, destroyed, and scorched. This is the territory that is or was in occupation and the one on which shelling is periodically carried out. In Ukraine, the medical infrastructure suffered greatly. According to the data of the Ministry of Health of Ukraine, as of the end of June, rockets, and projectiles of the Russian occupiers damaged 628 objects of medical institutions and destroyed another 118 without the possibility of their further restoration [48]. Thus, already today, it is necessary to understand how it is possible to restore one of the most critical sectors of the life of a country destroyed by war. How do we build medicine in rural areas so that its new level of development becomes a "magnet" for young families? However, it should be noted that all the arguments and the proposed solution in this article are based on the normal situation. In contrast, the actual military situation does not provide an accurate and stable basis for solutions other than straightforward and temporary measures (mobile medical centers, tents, etc.). Thus, all the suggestions in this article can be applied in areas that are not directly a combat zone in the countryside of Ukraine or after the end of the active phase of the war.

2. Methods

To conduct this study, the following methods were used: analytical (analysis of the existing approach to providing access to medical services for residents of rural areas); review of information sources (government programs, reports, scientific articles, reports at conferences, etc.); field survey with photo fixation, interviewing rural residents, conceptual and search as part of the educational process at the university.

3. Results and Discussion

3.1. *Analysis of the architecture of medical institutions in rural areas of Ukraine (before the war)*

In most rural settlements of Ukraine, access to medical services is low. This conclusion was obtained based on the author's preliminary and more comprehensive study [49]. The main reasons for this are similar to other countries, which allows for universal results that will be useful in other regional contexts.

The main reasons include:

- The insufficient overall financing level in rural areas, particularly in the medical sector.
- Lack of modernization and reconstruction of the existing medical infrastructure with its gradual physical deterioration and unsuitability for use.
- Prescription and referral of residents of rural areas to receive medical care in enlarged medical centers and hospitals in nearby cities.
- A complex stereotype of the "unpopularity" of living in rural areas among young people is their unwillingness to return to the villages after receiving higher education.
- Low population density over long distances in rural areas.
- Lack of state, local or private funding and motivation programs that stimulate the influx of the young population into the countryside (including doctors and medical personnel).

As a result, those few medical institutions located in rural areas of Ukraine have an inappropriate appearance (Figure 1, Figure 2). In recent years, new medical centers have appeared in some

Ukrainian villages, which in most cases were designed and built as part of the personal initiatives of communities and patrons (Figure 3, Figure 4). But against the background of the total number of Ukrainian villages, this indicates isolated examples and not a pattern.



Figure 1. Ambulatory care clinic in the village of Bezlyudivka, Kharkiv region, Ukraine.



Figure 2. Family Outpatient Clinic of Tsiblivska Rural Medical District, Kyiv region, Ukraine.



Figure 3. Outpatient clinic for the general practice of family medicine in the village of Belogorodka, Kyiv region, Ukraine.



Figure 4. Outpatient clinic for the general practice of family medicine in the village of Schastlivoe, Boryspil district, Kyiv region, Ukraine.

3.2. *Medical infrastructure of rural areas in Ukraine at present (military) moment*

The war in Ukraine is a tragedy that destroys the lives, health, and the possibility of the everyday existence of about 42 million Ukrainians, as well as many other countries that are helping in every possible way. Now it is impossible to talk about the exact consequences and scale since active hostilities continue, and there is no way to predict anything. The only thing that can be stated for sure is that the Russian military is purposefully destroying the medical infrastructure in cities and rural areas. According to the data of the Ministry of Health of Ukraine, as of the end of June, rockets, and projectiles of the Russian occupiers damaged 628 objects of medical institutions and destroyed another 118, without the possibility of their further restoration (Figure 5, Figure 6) [48].



Figure 5. The destroyed hospital in Volnovas, Ukraine.



Figure 6. The maternity hospital in Mariupol after the airstrike, Ukraine.

3.3. *Proposals for the organization of medical care in rural areas*

The main idea is that for the attractiveness of the work of doctors and medical personnel in rural areas, it is necessary to design and build dual-functional facilities that combine "work" (medical care) + "housing". Let's talk about very compact villages with a small number of inhabitants. It is advisable to build a cottage for the residence of a doctor and his family on the ground floor. There should be an office for receiving patients and a small area for visitors (doctor's assistant area, guest toilet, waiting area). In the case of a large village or a cluster of several villages close to each other, it is proposed to design a small medical center for the work of 3-5 doctors and nurses. Close to the medical center, a residential building should adjoin, which will act as a "magnet", especially for young professionals who usually face the problem of providing housing for their families. This idea was implemented and illustrated as part of an educational conceptual design among students of the Faculty of Architecture of the Kyiv National University of Construction and Architecture (Figure 7, Figure 8).

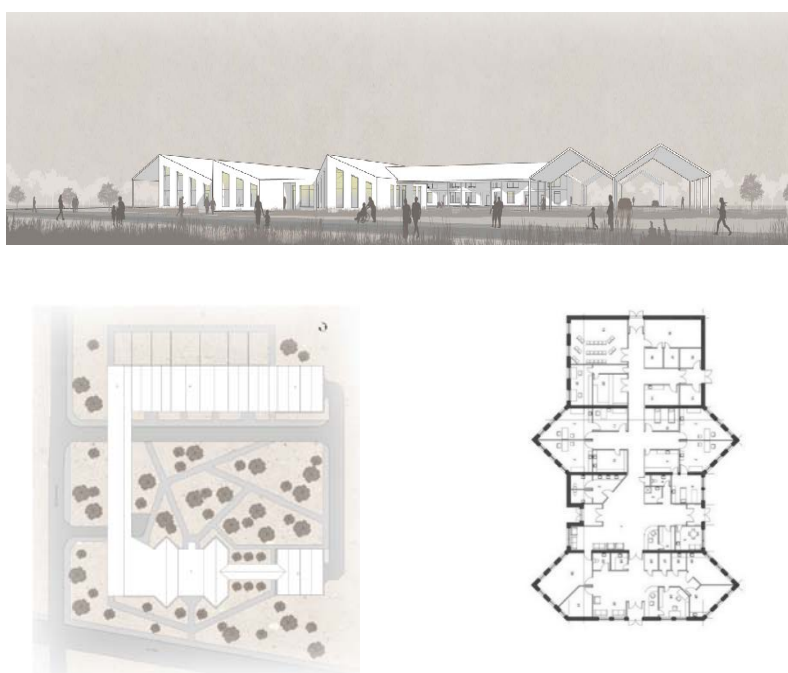


Figure 7. The Ambulatory clinic for family medicine for 25 visits per day in rural areas (the authors Maslovets O., prof. Bulakh I.).



Figure 8. The Ambulatory clinic for family medicine for 25 visits per day in rural areas (the authors Levitska M., prof. Bulakh I.).

A significant advantage of the ideas presented (as well as others that were not included as illustrations in this article) is the organization of various functional parts-buildings as a single

architectural ensemble, which provides convenient access for visitors and staff of the medical center and at the same time, there is the isolation of the residential block. In both examples, the connection of two functional units is proposed using a covered passage (for ease of use in the cold and rainy seasons). Also, special attention in the projects was paid to the improvement of the territory of the medical center, which is a kind of "visiting card," demonstrating an attentive attitude to nature and its conservation.

4. Conclusion

To develop medicine in rural areas, it is necessary to create conditions for comfortable living and work for young doctors, nurses, and their families. For this, it is proposed to design new types of two-function buildings: cottages (for small villages) and medical centers (for large villages or several villages located nearby), which combine "work" and "housing". Every rural community is interested in providing access to therapeutic medical care, and such local and compact proposals can be quite feasible. This proposal does not pretend to be an exclusive and unambiguous statement. Still, it is a preliminary presentation of a new Ukraine architectural form of organizing the sustainable development of medicine in rural areas, waiting for feedback from the international scientific community.

Acknowledgments

The author of the article thanks Prof. Dr.-Ing. Annette Rudolph-Cleff, the Department of Design and Urban Planning of the Faculty of Architecture, and fund "Ingenium" of the Darmstadt University of Technology for their support and assistance.

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