American Journal of Social and Humanitarian Research

Vol. 7 Issue 3 | **pp.** 142-152 | **ISSN:** 2690-9626
Available online @ https://globalresearchnetwork.us/index.php/ajshr

Article

Methodology for the Formation of a System of Clinical and Cost Groups in Phthisiological Institutions

Ermatov Zohid Shavkatovich*[1]

1. Ferghana State Technical University independent researcher
*Correspondence: zokhidermatov@gmail.com

Abstract: The article presents methodological and applied results of building a system of clinical cost groups based on the analysis of step-down costing in institutions of the phthisiological profile of the Republic of Uzbekistan. The study was carried out as part of the reform of healthcare financing and the transition to a payment model for a treated case in the context of the introduction of public health insurance. The analysis covered 59 institutions, including a pilot sample of 13 hospitals. Aggregated data from the UzASBO-2 accounting system, statistical reporting (form 066/y), as well as cost allocation parameters for responsibility centers were used. It was found that clinical costs account for an average of 72% of total costs, auxiliary costs — 18%, administrative costs — 10%, with pronounced variability between institutions. A statistically significant inverse relationship was found between the share of administrative costs and the volume of treated cases ($p = -0.72$; $p = 0.006$). The average cost of a case varies significantly depending on the form of tuberculosis and drug resistance: from 85 082 rubles. for HP-TB up to 211 085 rubles. in XDR-TB in adult patients. A model of 10 enlarged CCGs has been developed, reflecting the clinical and economic stratification of cases and allowing for the formation of a reasonable pricing system. The results obtained confirm the applicability of the step-down costing method for the formation of a financially stable payment model in a specialized phthisiological service.

Keywords: clinical and cost groups; healthcare financing; tuberculosis; step-down costing; economic analysis; state medical insurance; cost of the treated case; strategic procurement.

Citation: Shavkatovich E. Z. Econometric Model of the Methodology For The Formation Of A System Of Clinical And Cost Groups In Phthisiological Institutions. American Journal of Social and Humanitarian Research 2026, 7(3), 142-152

Received: 23rd Des 2026
Revised: 06th Jan 2026
Accepted: 13th Feb 2026
Published: 14rd Mar 2026

Copyright: © 2026 by the authors. Submitted for open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/)

Introduction

The One of the main tasks of healthcare reform in the Republic of Uzbekistan is the transition from the estimated principle of financing to a payment-for-results model based on an objective assessment of the medical services provided. As part of the phased implementation of the public health insurance system, it is planned to use strategic procurement and the formation of a system of clinical cost groups (KGG) for a reasonable and fair allocation of financial resources [1].

Effective implementation of CPG is impossible without reliable data on the cost structure of medical institutions. However, in conditions of limited resources and fragmented digitalization, the application of detailed bottom-up approaches is difficult. In such a situation, the most acceptable method is step-down costing, which allows calculating the unit cost of medical care based on aggregated administrative and financial data [2].

The stepwise cost estimation method is recognized as one of the most realistic and reproducible approaches to cost estimation in healthcare institutions, especially in

countries with limited resources. The methodology assumes a consistent allocation of indirect costs from administrative and support units to clinical ones, using logically sound criteria (for example, the number of staff, the area, the volume of services provided). This allows us to obtain reliable cost calculations based on aggregated data from institutions, without the need for individualized collection of microdata [3].

The results obtained using this methodology make it possible to determine the cost of a bed-day, a treated case, and many other units of medical care that are necessary for analytical study. This is critically important for building a fair payment model and the formation of a CG, especially in conditions of significant cost differences between institutions [4].

The technique acquires particular importance within the framework of the phthisiological service, which is characterized by a high duration of treatment, a multiplicity of clinical routes and a significant expenditure of resources. Under these conditions, the use of step-down costing makes it possible to obtain a reliable picture of cost allocation and ensure sustainable financing of institutions [5].

Literature Analysis

Clinical Cost Groups (DRG) are a mechanism that links the financing of medical institutions with clinical outcomes and resource expenditure. In scientific circles, this system is seen as a way to standardize medical services, ensure transparent financing and increase efficiency.

Internationally, this model was first developed by scientists from Yale University and implemented in the practice of the Centers for Medicare and Medicaid. Later, it became widely used in European countries [6].

In the US healthcare system, the DRG (Diagnosis Related Groups) mechanism has become a fundamental and well-established model for financing inpatient medical care [7]. This system is based on the principle of determining the average standard cost for each individual case. Clinical cases are grouped by diagnosis, additional complications, treatment methods used, and resource consumption.

Scientific research and practice show that the introduction of the DRG system has led to a number of positive economic and organizational results.:

- limiting unreasonable expenses and strengthening financial discipline in hospitals;
- efficient use of hospital beds by optimizing patient stays based on clinical protocols;
- creation of a system for monitoring the quality of medical services based on standardization of processes and comparison of results.

In addition, the DRG system promotes a competitive environment between hospitals and creates economic incentives for efficient use of resources. Since the amount of payment for services depends on a pre-set tariff, medical institutions strive to reduce costs while maintaining a high level of quality and effectiveness of treatment.

The US experience clearly demonstrates that the DRG system is not only a financial control mechanism, but also a comprehensive economic tool aimed at improving the quality of inpatient medical care and improving management efficiency.

In the early 2000s, Germany reformed the system of financing inpatient medical services based on clinical cost groups [8]. As a result, the national model of G-DRG (German Diagnosis Related Groups) was created, which is adapted taking into account the peculiarities of the German healthcare system and the international concept of DRG (Diagnosis Related Groups).

The G-DRG system takes into account a number of factors: clinical diagnosis, concomitant diseases, complications, medical interventions performed, and the amount of resources used [9,10]. Each case of hospitalization belongs to a specific clinical and

economic group, for which the average standard weight is calculated. The amount of the payment is determined based on this coefficient and the national base rate.

Scientific research highlights that the G-DRG system has achieved notable results in the following areas:

- ensuring economic transparency and financial responsibility in the activities of inpatient facilities;
- establishing a clear relationship between clinical protocols, standards of practice and the use of resources;
- improving the use of beds and reducing unnecessary length of stay;
- scientific justification of management decisions and the ability to compare costs in different clinical cases.

The German experience demonstrates that the successful implementation of the DRG system requires a high-level database, a standardized clinical coding system (based on ICD and OPS classifications) and an independent billing institute. Tariffs are regularly reviewed taking into account statistical data and real costs, which ensures dynamic flexibility and adaptability of the system.

Research confirms that the introduction of G-DRG has made it possible to stabilize costs in hospitals, improve management and use resources efficiently. However, some studies also suggest the need to provide adequate funding for complex clinical cases and improve risk adjustment mechanisms.

In general, the German G-DRG model has established itself as a scientifically sound and sustainable system for financing inpatient medical services that combines clinical standards and economic mechanisms. This experience can serve as a model for the formation of clinically expensive groups in phthisiological institutions.

According to the World Health Organization, the cost of tuberculosis treatment varies significantly depending on the country's level of development [11]. Scientific papers emphasize that both direct and indirect costs must be taken into account when assessing the cost of treatment [12, 13].

In recent years, the Republic of Uzbekistan has been actively implementing reforms aimed at improving health financing mechanisms [14]. The main objectives include improving the efficiency of using public funds, introducing results—based financing principles, and improving the quality of medical services [15, 16].

As part of these reforms, special attention is paid to the economic analysis of the activities of inpatient medical institutions, in particular, the phthisiological service. During this process, evidence-based financing models are being developed that will help improve the quality of services and increase their effectiveness.

Accurate and complete cost calculation in phthisiological institutions is an urgent scientific and practical task. Tuberculosis is a complex disease that requires long—term treatment, multicomponent chemotherapy, high-quality laboratory and instrumental diagnostic services, as well as strict infection control. This makes the structure of stationary expenses multicomponent and complex.

The traditional method of estimated financing does not always accurately reflect all the real costs in phthisiological institutions.

National scientific research pays special attention to the structural analysis of hospital costs. It examines how these costs are divided into administrative, support, and core clinical units [17]. Resource consumption is calculated for each of them, and the average cost per patient is determined. This approach allows you to compare the financial burden for different clinical cases and set tariffs.

It is important to note that the share of costs in the treatment of drug-resistant forms of tuberculosis (MDR-TB and CDR-TB) is significantly higher. This is due to the fact that

second-line drugs are used for such patients, long-term inpatient follow-up, additional laboratory monitoring and measures to eliminate complications are required. As a result, the total cost of treatment increases.

Domestic research has scientifically substantiated the need for a separate calculation of the cost of treatment of drug-resistant forms and the introduction of a differentiated approach to each patient. This means that when forming clinical and cost groups, it is necessary to take into account the degree of clinical complexity of the disease.

Research also focuses on the creation of funding models that rely on clinical protocols. These protocols establish standard volumes, duration, and resource requirements for treatment. If the funding mechanism is linked to these standards, it will help strengthen both clinical and economic discipline in medical institutions. As a result, it will be possible to optimize costs while maintaining the quality of medical services.

Thus, in the conditions of Uzbekistan, the need to switch to financing the activities of phthisiological institutions based on clinical and cost groups is justified by scientific research. At the same time, the priority methodological areas are a step-by-step analysis of inpatient costs, differentiated calculations for drug-resistant forms, and the development of financing mechanisms integrated into clinical protocols.

Research Methodology

The study was conducted as part of a pilot project to develop a system of clinical cost groups (CCG) in phthisiological institutions of the Republic of Uzbekistan, initiated by Decree of the President of the Republic of Uzbekistan dated January 20, 2023 No. PP-12 "On measures for the further development of the phthisiology and pulmonology service in 2023-2026." According to this act, it was planned to improve the phthisiological service, including improving financial stability and switching to new payment models for hospital services.

At the pilot stage, 13 specialized phthisiological institutions were covered. Subsequently, the study expanded to 59 institutions, which ensured representativeness in terms of levels of phthisiological care (regional, city, district). The sources were aggregated data from various systems, as well as the collection of certain parameters such as Financial and economic information from the UzASBO-2 automated accounting system, Statistical reporting (form 066/y, templates of the State Medical Insurance Fund (FGMS), Survey forms including quantitative data on personnel, area, types of services provided, Structure templates cost estimates developed by the Ministry of Health's working group on the Joint Learning Network (JLN) methodology.

All data was brought to a single format and passed expert verification before analysis. The institutions were divided into the following levels. 1. Administrative divisions (management, accounting, personnel department); 2. Auxiliary divisions (laboratory, laundry, X-ray, food department, etc.); 3. Clinical departments that directly provide medical care. This approach ensured the correct allocation of indirect costs based on objective indicators, which fully corresponded to the international methodology.

The costs were redistributed in three stages, according to the step-down costing algorithm. From administrative units to auxiliary units, from auxiliary units to clinical units, the distribution parameters included: area, number of staff, total number of bed days, services performed, etc. The calculations were performed in Excel and on its automated macros. Based on them, data was aggregated to calculate the cost of a bed-day and a treated case.

The work was carried out based on the decisions of the working group of the Ministry of Health. The patients' personal data was not used. The methodology was coordinated with experts from the Ministry of Health and the State Medical Insurance Fund (FGMS).

Results

The use of step-down cost allocation (step-down costing) allowed us to identify three enlarged categories of cost centers: clinical, auxiliary and administrative. Calculations have shown that clinical costs prevail in the structure of total expenses of phthisiological institutions — on average 72% of total costs. The share of support services was 18%, and administrative services — 10%. These results are shown in Figure 1.

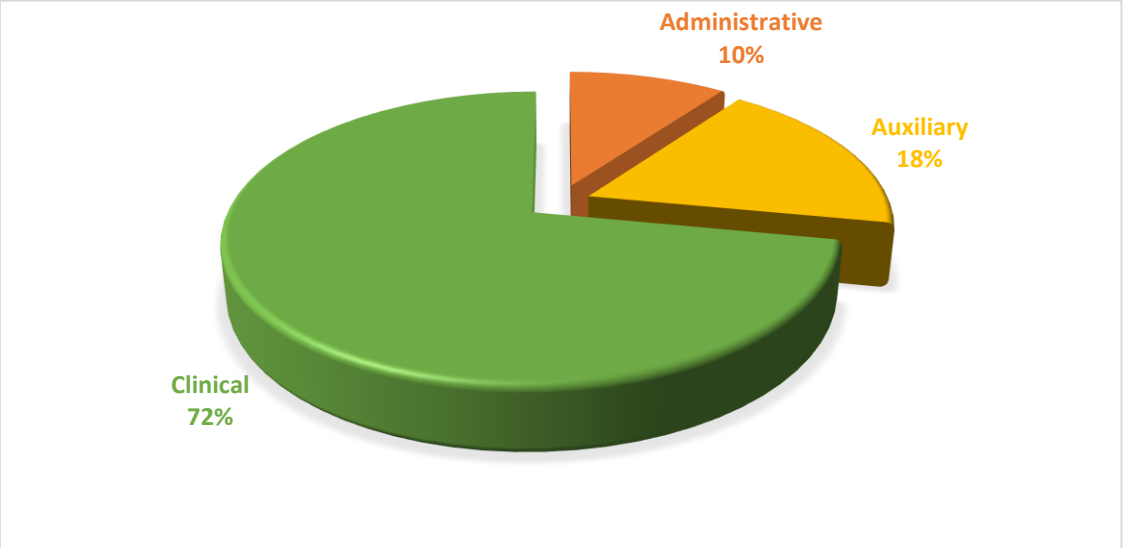

Figure 1. Average cost allocation structure in phthisiological institutions based on the results of the step-down cost allocation method.

At the same time, the percentage ratio between the categories of cost centers varied by institution (see table 1). In institutions with a high proportion of ancillary costs, as a rule, a lower proportion of clinical expenses was recorded, which reflects the specifics of the functioning of diagnostic units or research activities. Administrative costs are most pronounced in small institutions with limited clinical scope, which affected the correlation of administrative and management costs for clinical cases, thereby increasing costs in these institutions. This is clearly demonstrated by some institutions where the share of these costs reached 24.9-28.7%. Administrative costs proved to be most pronounced in institutions with limited clinical capacity, which is associated with the redistribution of fixed costs to fewer cases[18]. The calculation of the Spearman correlation confirmed the presence of a statistically significant inverse relationship between the share of administrative costs and the number of treated cases ($p = -0.72$; $p = 0.006$), which highlights the vulnerability of low-power institutions to an increase in unit administrative costs.

Table 1. Cost structure (%) by category of cost centers based on the results of using the step-down costing method.

№	Institution	The admin. expenses %	Auxiliary costs %	Clinic. expenses %
1	RSNPMTsFiP im. Sh. Alimova	9.6	20.6	69.8
2	FiP Clinic, Tashkent city	18.4	33.6	48.0
3	Regional Phthisiology Hospital Tashkent. Region.	12.0	21.5	66.5
4	Regional center of FiP Tash. Region.	13.0	16.9	70.1
5	RC FiP named after S. Sultanov	11.3	17.2	71.5

6	Regional center of the FP of Syrdarya region	12.9	23.2	63.9
7	RFB No2 RK.	7.4	18.4	74.2
8	Children's FTI sanatorium, Tashkent city	24.9	12.3	62.8
9	RFB No. 1 RK.	27.3	3.3	69.4
10	RFB No. 4 RK.	21.5	13.8	64.7
11	RFB No3 RK.	18.4	8.1	73.5
12	Obl. detsk. ftiz. hospital Tash. obl.	28.7	14.0	57.3
13	Tashkent City Children's FTI Hospital	16.3	9.9	73.8

*Note: The tables and figures use abbreviated names of medical institutions for brevity. Full names: RSNPMCFiP — Republican Specialized Scientific and Practical Medical Center of Phthisiology and Pulmonology named after Sh. Alimov; FiP Clinic, Tashkent — Clinic of Phthisiology and Pulmonology, Tashkent; ftiz region. hospital of the Tashk region — Regional phthisiological hospital of the Tashkent region; Regional Center of PhIP of the Tash region — Regional Center of Phthisiology and Pulmonology of the Tashkent region; RC of PhIP named after S. Sultanov — Republican Center of Phthisiology and Pulmonology named after S. Sultanov. Sultanova; Regional Center of the PhIP of the Syrdarya region — the Regional Center of Phthisiology and Pulmonology of the Syrdarya region; RFB No. 1-4 of the Republic of Kazakhstan — Republican Phthisiological Hospitals No. 1-4 of the Republic of Karakalpakstan; Detsk. ftiz. sanatorium Tashkent — Children's phthisiological sanatorium in Tashkent; Detsk region. ftiz. hospital of the Tash region — Regional children's phthisiological hospital of the Tashkent region; City of Detsk. ftiz. Tashkent Hospital is a city children's phthisiological hospital in Tashkent.

An analysis of the average cost (by institution) of one treated case revealed a significant difference between institutions — from 64.6 thousand rubles in the Regional Center of the FiP of the Tashkent region to 236.1 thousand rubles in the RFB No. 2 (RK). Lower values were observed in large hospitals with a high workload (for example, the Alimov Medical Center — 66.8 thousand rubles), while institutions with a limited number of cases demonstrated a higher cost (Fig. 2). An analysis of the average cost per treated case revealed significant differences between institutions with high and low workload: in large hospitals, the cost of a case was significantly lower. Statistical verification of the validity of the differences using the Kruskal–Wallis criterion confirmed this pattern ($p = 0.034$), which indicates the impact of the scale of activity on economic efficiency.

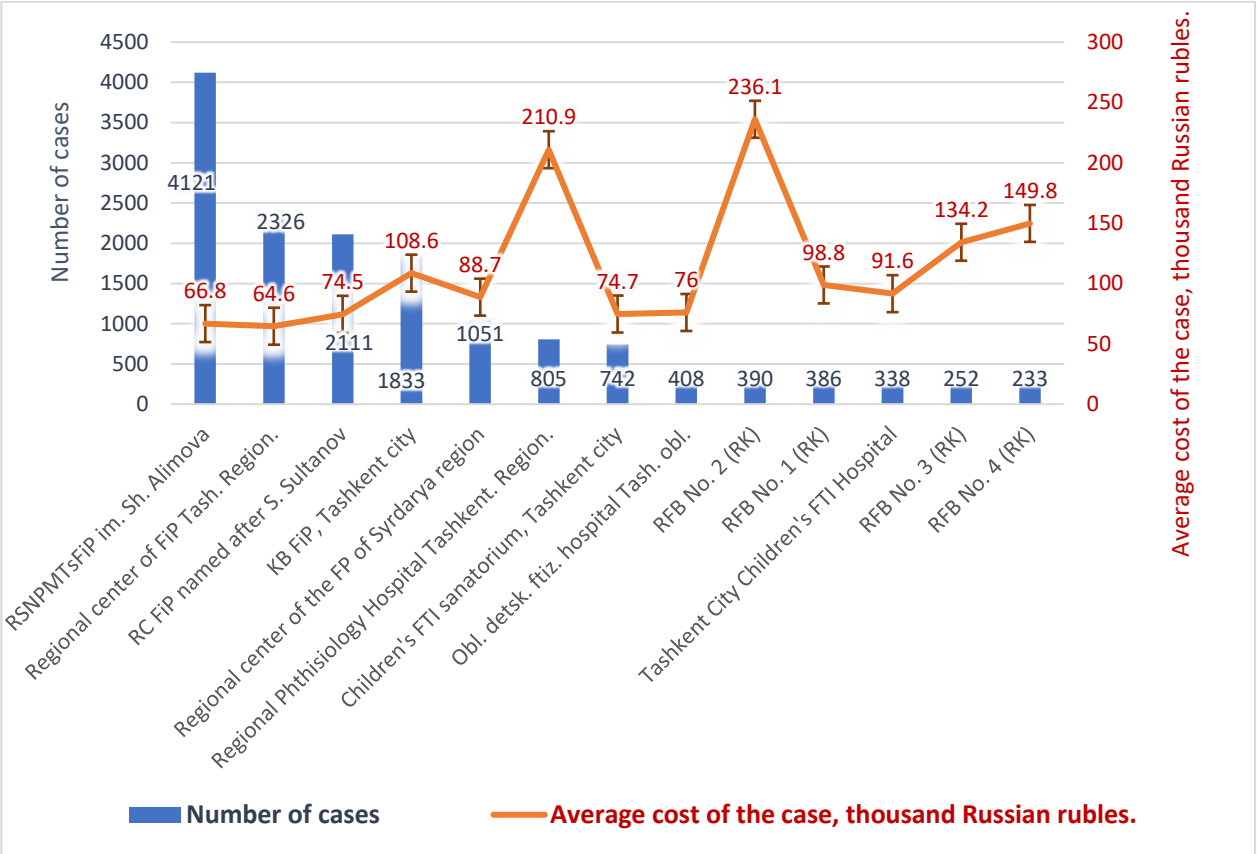

Figure 2. The number of treated cases and the average cost of the case (thousand rubles) by institutions.

An important area of analysis was the comparison of the costs of treating various forms of tuberculosis. It was found that the average cost of treatment for adult patients consistently increased from 85,082 rubles. for HP-TB up to 211 085 rubles. at XDR-TB. A similar trend was observed in children — from 103,693 rubles to 170,216 rubles. with HP-TB and PLU-TB, respectively (Fig. 3).

The statistical analysis revealed significant differences between the forms of tuberculosis ($p = 0.90$; $p = 0.037$ for both age groups), which confirms the need for clinical and economic stratification in the CCG system. There were no differences between adults and children with similar forms of the disease ($p = 0.84$). Additionally, in independent children's institutions, a high proportion of administrative costs was recorded with a limited number of treated cases, which led to an inflated cost per case in such institutions and, as a result, made it impractical to allocate children's cases to a separate category of CPG for the financial model at this stage.

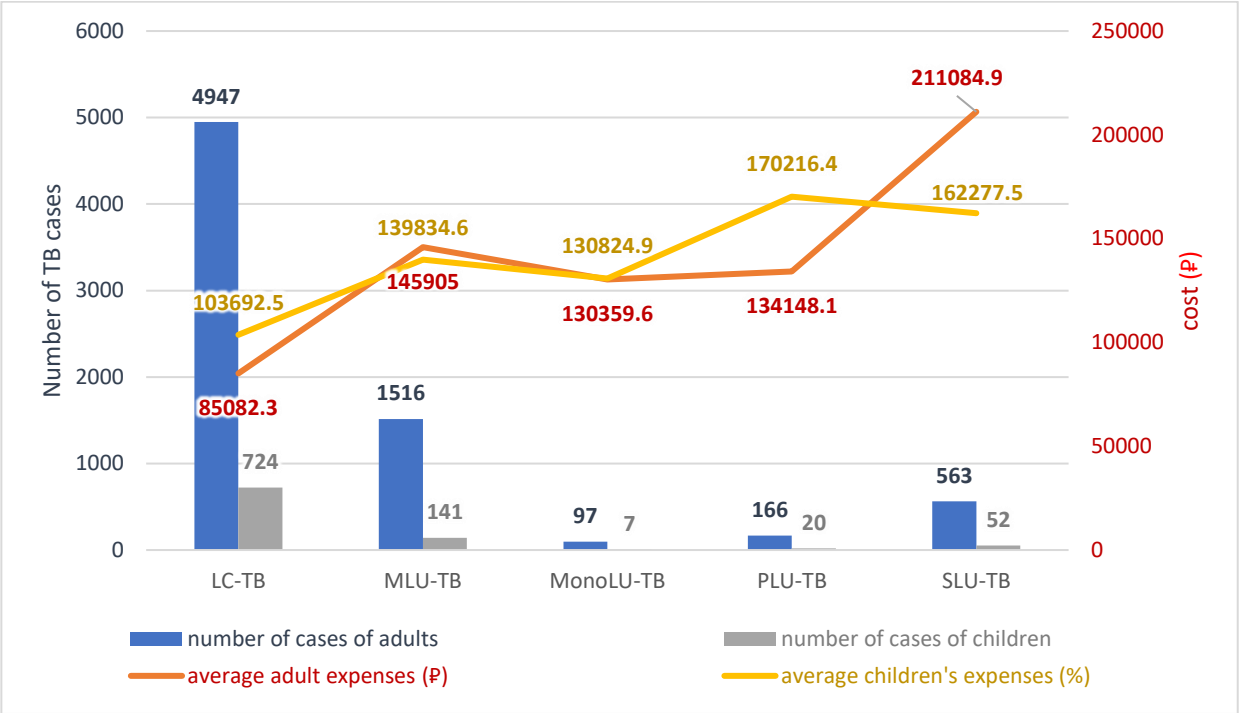

Figure 3. Average costs for treating adults and children with various forms of tuberculosis (in rubles).

At the end of the analysis, conditional cost modeling was carried out according to the developed groups of the clinical cost grouping (CLG) based on 10 categories reflecting the clinical nosology and drug resistance of the pathogen. Calculations showed a pronounced gradation of the average cost of a case, depending on the form of the disease, from 25,929 rubles. for pulmonological diagnoses without TB up to 171 571 rubles. for tuberculosis of the respiratory system with bacterial verification and drug resistance (LU). Significantly higher cost values were recorded in patients with LU forms, especially with miliary tuberculosis (103,186 rubles) and respiratory TB (171,571 rubles).

Separately, it is worth noting the high prevalence of categories with sensitive forms of TB, such as tuberculosis of the respiratory system with bacterial verification without resistance (1,976 cases) and clinically confirmed TB (2,194 cases), at moderate costs (90,936-92 121 rubles). This indicates a significant amount of system costs in the mass, but less expensive groups. The results obtained make it possible to substantiate a realistic grading of CCG for institutions of a phthisiological profile and demonstrate the potential of the model for implementation in the financing model (Fig.4).

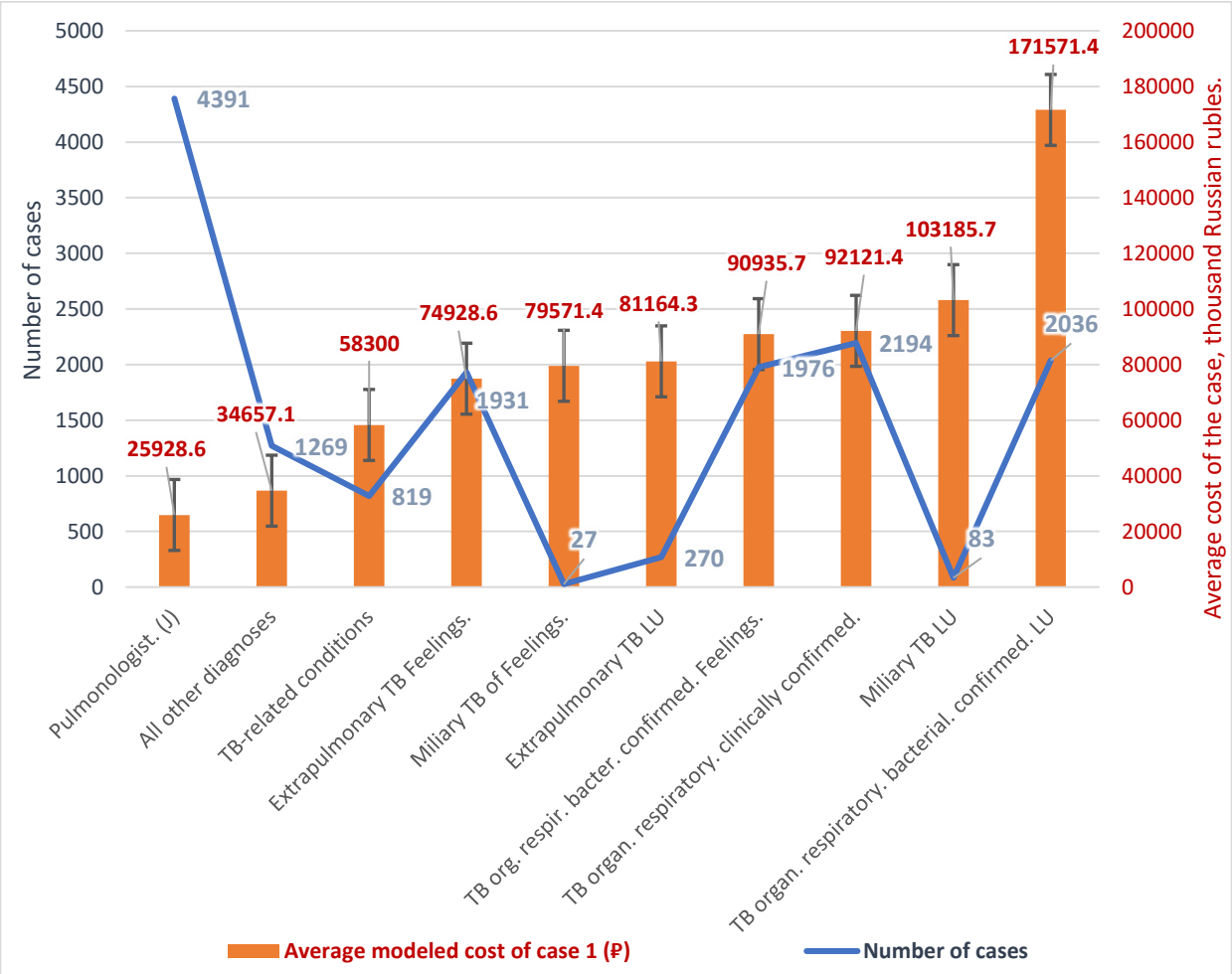

Figure 4. The modeled average cost of the case (in rubles) and the number of treated cases according to the proposed GCC.

Discussion

The results of this study showed that the step-down costing method can be successfully applied in phthisiological institutions of the Republic of Uzbekistan. This is especially relevant in the light of the ongoing reforms of the healthcare financing system and the introduction of a state health insurance model based on payment for medical services provided.

The key advantage of the step-down methodology lies in its ability to work with aggregated data from institutions, including accounting and statistical reporting. This allows the technique to be used even in the absence of individual microdata, which makes it particularly valuable.

As has been proven in a number of international studies, this technique provides an accurate assessment of the cost of medical services, helps identify sources of economic inefficiency, and serves as the basis for subsequent modeling of payment systems.

The results of the study demonstrated that there are significant differences in the structure and amount of costs between institutions. These differences are due to differences in clinical workload, organizational structure, and scope of activities. These differences are especially pronounced in low-power institutions, where administrative costs make up a significant part of the budget.

A key aspect of the study was the modeling of ten large clinical cost groups. These groups reflect international approaches to the implementation of payment systems for medical care related to diagnostics. The difference in the average cost between the groups

confirms the correctness of the stratification of cases by the level of resource intensity and serves as the basis for the development of further financial policy in the field of healthcare.

Conclusion

A study conducted in phthisiological institutions of the Republic of Uzbekistan has shown that the step-down costing method can be successfully applied in these conditions.

The application of this approach has made it possible to create a clear and reproducible cost calculation system at the level of individual institutions and clinical cost groups. At the same time, generalized, but rather detailed data on divisions and cost categories were used, which ensured the correct application of the step-down costing method for the formation of the KZG.

The analysis revealed significant differences in the unit cost of treated cases, which were related to the scale of facilities, cost structure, and clinical practice specifics. Statistical data processing has confirmed the significance of these differences and the validity of identifying clinically expensive groups depending on the forms of tuberculosis.

The developed model, consisting of 10 clinical diagnostic groups, provides the necessary differentiation in terms of resource costs and can become the basis for the introduction of a tariff-based payment system within the framework of the state medical insurance program. The results obtained are of great practical importance and can be used in the future when extending the reform to other medical institutions.

The methodological approach used in this study has demonstrated its analytical value and viability for application in management practice.

REFERENCES

[1] Ermatov Z.Sh., Kaliev M.T. Development of the state medical insurance system of the Republic of Uzbekistan: main stages, results and prospects // Financier's Information / Financial Worker's Handbook. - 2025. - No. - P. 63-74.

[2] Conteh L., Walker D. Cost and unit cost calculations using step-down accounting // Health Policy and Planning. – 2004. – Vol. 19, № 2. – P. 127–135. – DOI: 10.1093/heapol/czh015.

[3] Hendriks M.E., Kundu P., Boers A.C., et al. Step-by-step guideline for disease-specific costing studies in low- and middle-income countries: a mixed methodology // Global Health Action. – 2014. – Vol. 7. – Article ID: 23573. – DOI: 10.3402/gha.v7.23573.

[4] Goel H., Srivastava P.K., Garg C., Gupta A. Cost estimation tool for government hospitals and healthcare facility based on modified step down approach // 2014 IEEE International Advance Computing Conference (IACC). – 2014. – P. 17–23. – DOI: 10.1109/IADCC.2014.6779288.

[5] Stevens, R. A. (2017). Welfare medicine in America: A case study of Medicaid. Routledge.

[6] Perla, R. J., Pham, H., Gilfillan, R., Berwick, D. M., Baron, R. J., Lee, P., ... & Shrank, W. H. (2018). Government as innovation catalyst: lessons from the early center for Medicare and Medicaid innovation models. Health Affairs, 37(2), 213-221.

[7] Milstein, R., & Schreyögg, J. (2024). The end of an era? Activity-based funding based on diagnosis-related groups: a review of payment reforms in the inpatient sector in 10 high-income countries. Health Policy, 141, 104990.

[8] Wörz, M., & Busse, R. (2005). Analysing the impact of health-care system change in the EU member states–Germany. Health economics, 14(S1), S133-S149.

[9] Liu, Y., Wang, G., Qin, T. G., Kobayashi, S., Karako, T., & Song, P. (2024). Comparison of diagnosis-related groups (DRG)-based hospital payment system design and implementation strategies in different countries: the case of ischemic stroke. BioScience Trends, 18(1), 1-10.

[10] Ren, S., Yang, L., Du, J., He, M., & Shen, B. (2024). DRGKB: a knowledgebase of worldwide diagnosis-related groups' practices for comparison, evaluation and knowledge-guided application. Database, 2024, baae046.

[11] Mirzayev, F., Viney, K., Linh, N. N., Gonzalez-Angulo, L., Gegia, M., Jaramillo, E., ... & Kasaeva, T. (2021). World Health Organization recommendations on the treatment of drug-resistant tuberculosis, 2020 update. European Respiratory Journal, 57(6).

[12] Mennini, F. S., & Gitto, L. (2022). Approaches to estimating indirect costs in healthcare: motivations for choice. Journal of European Economy, 21(1), 17-45.

[13] Li, Y., & Jönsson, L. (2025). The health and economic burden of brain disorders: Consequences for investment in diagnosis, treatment, prevention and R&D. Cerebral Circulation-Cognition and Behavior, 8, 100377.

[14] Semenova, Y., Lim, L., Salpynov, Z., Gaipov, A., & Jakovljevic, M. (2024). Historical evolution of healthcare systems of post-soviet Russia, Belarus, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, and Azerbaijan: A scoping review. Heliyon, 10(8).

[15] Cho, M. J., & Haverkort, E. (2023). Out-of-pocket health care expenditures in Uzbekistan: Progress and reform priorities. In Rural Health-Investment, Research and Implications. IntechOpen.

[16] Mushasha, R., & El Bcheraoui, C. (2023). Comparative effectiveness of financing models in development assistance for health and the role of results-based funding approaches: a scoping review. Globalization and Health, 19(1), 39.

[17] Azizovna, A. Y. (2025). Improving Cost Accounting And Financial Analysis In Medical Clinics Of Uzbekistan. European Index Library of European International Journal of Pedagogics, 5(12), 15-17.

[18] All the figures and data in the table were obtained as a result of the author's research, and the calculations were made in Russian rubles.