СРПСКИ АРХИВ
ЗА ЦЕЛОКУПНО ЛЕКАРСТВО
SERBIAN ARCHIVES
OF MEDICINE

Address: 1 Kraljice Natalije Street, Belgrade 11000, Serbia
☏ +381 11 4092 776, Fax: +381 11 3348 653
E-mail: office@srpskiarhiv.rs, Web address: www.srpskiarhiv.rs

Paper Accepted* **ISSN Online 2406-0895**

Original Article / Оригинални рад

Irina Bocharova[1], Alexander Rymanov[2,♣]

COVID-related incentive payments to health care workers

Подстицајне исплате здравственим радницима у вези са ковидом

[1]Oryol State Agrarian University named after N.V. Parakhin, Oryol, Russia;
[2]Russian Presidential Academy of National Economy and Public Administration, Novosibirsk, Russia

Received: December 21, 2022
Revised: February 11, 2023
Accepted: February 28, 2023
Online First: March 3, 2023
DOI: https://doi.org/10.2298/SARH221221022B

♣Correspondence to:
Alexander RYMANOV
RANEPA Academy, Nizhegorodskaya ul., 6, Novosibirsk 630102, Russia
E mail: **rymanov-ay@ranepa.ru**

COVID-related incentive payments to health care workers

Подстицајне исплате здравственим радницима у вези са ковидом

SUMMARY

Introduction/Objective The study estimates the associations between the key pandemic indicators and the allocation of COVID-19 related bonus and welfare payments to Russian health care workers.

The aim was to estimate the association between the key pandemic indicators and the allocation of the COVID-19 related bonus and welfare payments to Russian health workers.

Methods The study uses regression analysis.

Results The study examines two consecutive types of COVID-19 related bonus payments: (1) incentive payments (in 2020) and (2) welfare payments (in 2020-2022). Concerning incentive payments (type 1), the study supports hypotheses regarding the association between the number of persons infected with COVID-19 in a relevant region and the actual/estimated amount of budget transfers to a relevant region for bonus payments to medical workers (a) for special working conditions and additional workload and (b) for performing particularly important work. As for welfare payments (type 2), the study supports hypotheses regarding the association between (1) COVID-19 cases, (2) COVID-19 recoveries, and (3) the fiscal year close-out and the amount of welfare payments.

Conclusion The main channel for financing payments to medical workers is a special welfare payment through the system of the Social Insurance Fund of the Russian Federation. This source exceeds the estimated total transfers and subsidies for similar purposes in 2020.

The study tests hypotheses regarding the association between the key pandemic indicators and the size of various types of budget transfers for bonus and welfare payments to medical workers.

Keywords: new coronavirus infection; welfare payment; doctors; nurses; junior medical staff

САЖЕТАК

Увод/Циљ Студија процењује утицај кључних индикатора пандемије на доделу бонуса везаних за ковид -19 руским здравственим радницима. Циљ је била процена утицаја кључних индикатора пандемије на доделу бонуса везаних за ковид 19 руским здравственим радницима.

Методе Студија користи регресивну анализу.

Резултати Студија испитује две узастопне врсте исплата бонуса везаних за ковид 19: (1) исплату подстицаја (у 2020. години) и (2) исплату социјалне помоћи (у 2020-2022. години). Што се тиче исплате подстицаја (типа 1), студија подржава хипотезе у вези са утицајем броја особа заражених ковид 19 у релевантном региону на стварни/процењени износ трансфера буџета у релевантан регион за исплату бонуса медицинским радницима (а) за посебне услове рада и додатно оптерећење и (б) за обављање посебно важних послова. Што се тиче исплате социјалне помоћи (типа 2), студија подржава хипотезе у вези са (1) ефектом случајева ковид 19, (2) ефектом опоравка ковид 19 и (3) ефектом фискалне године изблиза на износ исплате социјалне помоћи.

Закључак Главни канал за финансирање плаћања медицинским радницима су исплате у виду Специјалне исплате социјалне помоћи путем система Фонда за социјално осигурање Руске Федерације. Овај извор финансирања премашује процењени укупан износ трансфера и субвенција у 2020. години у сличне сврхе.

Студија тестира хипотезе у вези са утицајем броја људи заражених ковид 19 на све регионе на величину различитих врста буџетских трансфера за исплату бонуса медицинским радницима у 2020.

Кључне речи: нова инфекција коронавируса; исплата социјалне помоћи; лекари; медицинске сестре; млађе медицинско особље

INTRODUCTION

Incentives for health workers in connection with the spread of the new coronavirus infection COVID-19 has been provided by the Russian authorities almost from the first months of the pandemic.

The maximum peak number of medical workers involved in the fight against COVID-19 was 550 thousand people, including doctors – 156 thousand people, a middle medical staff – 318 thousand people, a junior medical staff – 76 thousand people [1].

Russian regulations regarding the allocation of transfers to medical workers describe the methods of allocation transfers to the regions. The regulatory framework in this area has already been partially updated: some of the regulations in force in 2020 have lost their force [2-3], other regulations, on the contrary, have either replaced or expanded the scope of regulation of the issue under consideration, or continue to be in force [4-5].

Academic papers reflect the issues under consideration.

Best practices for paying COVID-19 bonuses to healthcare workers

Williams et al. [6] review the measures taken by European countries to pay bonuses to health workers involved in countering COVID-19. Payments are made either in the form of a one-time bonus, or in the form of monthly bonus payments. Reed [7] compares the level of bonuses paid to health workers and concludes that in the UK, doctors are paid more and nurses are paid at the OECD average.

Besley et al [8] make policy recommendations to the UK government. They argue for the advisability of direct payments to health workers, dividing workers into those directly involved with the coronavirus and those not directly involved (GBP 1 000 and GBP 500 respectively). Adeyemo et al. [9] report on the results of interviews with 45 health workers in the U.S. The study contains both positive and negative reactions from workers to bonuses received for emergency working conditions during the pandemic. Kovaleva et al. [10] study the stimulating component of remuneration in the health care institution.

Giubilini and Savulescu [11] advocate ethical principles (autonomy, fairness, responsibility, and utility) for bonus payments to healthcare workers for their work during the pandemic.

Bonuses for nursing staff

Gray et al. [12] identified motivators for nurses in the process of providing health care during the pandemic. A survey of 110 nurses at the U.S. found that respondents were the least motivated by hazardous work bonuses. Bitencourt et al. [13] examine the role of nurses in counteracting pandemic in a philanthropic clinic in Brazil and point to the payment of incentive bonuses. Hersh [14], based on a survey of nurses at U.S. hospitals, assesses the negative impact of COVID-19 on their working conditions.

Rural and remote areas

Strasser and Strasser [15] express concern that rural communities have limited access to resources and health services amid the pandemic. They advocate the need to stimulate health workforce in rural and remote areas in the form of providing guaranteed income, housing, various compensation packages, payment of bonuses and retention payments. Shrestha & Kunwar [16] report that frontline health workers in Nepal have not received government-promised payments and compensations for working amid the pandemic. In private clinics, the situation is even worse: medical workers are forced to either accept a pay cut or quit.

Medical students' motivational statements

Astorp et al. [17] conducted a survey of medical students at one of the Danish universities. The study assesses the motivational statements for their involvement as emergency workers. The students ranked 'salary' as one of the last motivational statements (10th out of eleven motivational statements).

Local practices for financing payments to health workers

Sumin et al [18] consider the regulation of incentive, welfare and insurance payments to medical workers in the context of COVID-19. Kadyrov [19] considers the legal regulation of special welfare payments to medical personnel. Shalberkina [20], Gubina [21], Puzin et al. [22] consider the legal regulation of welfare support for medical workers during the period of new coronavirus infection. Kadyrov and Chililov [23] consider the issues of informatisation and information exchange in the process of supporting the implementation of welfare payments to medical workers in connection with COVID-19. Anisimova et al [24] consider the implementation of social benefits paid to employees of medical organisations and employees of social service organisations in connection with COVID-19.

Underpayment and late payment of incentive payments to medical personnel

In connection with complaints from medical personnel about problems in receiving incentive payments in 2020, the Accounts Chamber of the Russian Federation, together with the control and accounting bodies of the constituent entities of the Russian Federation, conducted unscheduled inspections in 2020 [25]. As a result of the inspections, underpayments of 330.6 million rubles ($4.49 million) to medical workers were identified.

The main indicators of disease incidence recorded by sectoral agencies and organisations are the number of COVID-19 cases, the mortality rate and others [26]. However, the use of these indicators in planning and allocating payments to health workers is somewhat difficult because they are not known in advance. The use of predictive statistical models (growth dynamics) that predict these indicators for planning and allocating incentive payments is also of little practical use, as these models have been (and continue to be) periodically reviewed and adjusted. In Russian practice, the historical level of average wages in a given region was used at the initial stage of planning the financing of payments to health care workers. As data become available on the current values of the COVID-19 indicators, retrospective estimates of the associations between these indicators (COVID-19 cases, recovering COVID-19 patients) and the volume of payments to health workers become possible. This study therefore aims to make such estimates.

METHODS

The study uses regression analysis in the field of health financing.

Allocations were set as a percentage of the average monthly salary in the region concerned (Table 1).

The study is based on an analysis of observational data on payments to health care workers related to the coronavirus pandemic. Official data on estimated and actual payments [2, 27-29] to health workers are used in the study.

Hypotheses to test

The study tests the following hypotheses (Table 2).

Hypothesis 1

H_1: the association between the number of people infected with COVID-19 in a relevant region in 2020 and the estimated amount of budget transfers to a relevant region for bonus payments to medical staff for special working conditions and additional workload in 2020 is statistically significant.

Hypothesis 2

H_2: the association between the number of persons infected with COVID-19 in a relevant region in 2020 and the actual amount of budget transfers to a relevant region for bonus payments to medical workers for special working conditions and additional workload in 2020 is statistically significant.

Hypothesis 3

H_3: the association between the number of persons infected with COVID-19 in a relevant region in 2020 and the estimated amount of budget transfers to a relevant region for bonus payments to medical workers for performing critical work in 2020 is statistically significant.

Hypothesis 4

H_4: the association between the number of persons infected with COVID-19 in a relevant region in 2020 and the actual amount of budget transfers to a relevant region for bonus payments to medical workers for performing critical work in 2020 is statistically significant.

Hypothesis 5

H_5: the association between the number of persons infected with COVID-19 in a relevant region in 2020 and the actual amount of budget transfers to a relevant region for bonus payments to medical workers (a) for special working conditions and additional workload and (b) for performing critical work in 2020 is statistically significant.

Hypothesis 6

H_6: the association between the number of persons infected with COVID-19 and the total volume of payments of the Special welfare payment to medical workers in the whole country in a given calendar month is statistically significant.

Hypothesis 7

H_7: the association between the number of persons recovered from COVID-19 and the total volume of payments of the Special welfare payment to medical workers in the whole country in a given calendar month is statistically significant.

Hypothesis 8

H_8: the association between the fiscal year close-out and the total volume of payments of the Special welfare payment to medical workers in the whole country in a given calendar month is statistically significant.

Hypotheses 1–5 test the association between key indicators of the pandemic and incentive payments, hypotheses 6-8 test the association between key indicators of the pandemic and welfare payments (Table 2). The study was approved by the ethics committee from the RANEPA Academy (No.4/EMP/22) and conducted following the Declaration of Helsinki.

RESULTS

Hypotheses testing

Consider testing hypotheses (Figure 1).

Hypothesis 1

To test this hypothesis, a quadratic regression model was used:

$$y = \beta_0 + \beta_1 x_1 + \beta_{11} x_{11}^2 + \epsilon \qquad (1)$$

where y is the share of the estimated amount of budget transfers to a relevant region for bonus payments to medical workers for special working conditions and additional workload in 2020, in the total amount of these transfers in the Russian Federation; x is the share of the number of people infected with COVID-19 in a relevant region in the total number of people infected with COVID-19 in the Russian Federation in 2020.

The fitted regression model is as follows:

$$y = -0.00482817 + 1.56884 x_1 - 0.11492\, x_{11}^2 \qquad (2)$$

The model as a whole is significant (Table 3).

Table 4 shows that 46% of the variability in the response variable is explained by the independent variable (Table 4, Figure 1).

The hypothesis H_1 is supported.

Hypothesis 2

To test this hypothesis, a quadratic regression model was used:

$$y = \beta_0 + \beta_1 x_1 + \beta_{11} x_{11}^2 + \epsilon \qquad (3)$$

where y is the share of the actual amount of budget transfers to a relevant region in the total amount of transfers in the Russian Federation, x is the share of the number of persons infected with COVID-19 in a relevant region in the total number of persons infected with COVID-19 in the Russian Federation in 2020.

The fitted regression model is as follows:

$$\mathrm{Ln}\, y = -1.39022 + 1.65447 x_1 - 0.16485\, x_{11}^2 \qquad (4)$$

In this model, both the independent variable and the model as a whole are significant (Table 5)

Table 6 shows that 52% of the variability in the response variable is explained by the independent variable.

The hypothesis H_2 is supported.

Hypothesis 3

To test this hypothesis, a quadratic regression model was used:

$$y = \beta_0 + \beta_1 x_1 + \beta_{11} x_{11}^2 + \epsilon \qquad (5)$$

where y is the share of the estimated amount of budget transfers to a relevant region for bonus payments to medical workers for performing critical work in 2020, in the total amount of these transfers in the Russian Federation; x is the share of the number of people infected with COVID-19 in a relevant region in the total number of people infected with COVID-19 in the Russian Federation in 2020.

The fitted regression model is as follows:

$$y = +0.14615 + 1.06664x_1 - 0.023904\, x_{11}^2 \quad (6)$$

In this model, both the independent variable and the model as a whole are significant (Table 7)

Table 8 shows that 90% of the variability in the response variable is explained by the independent variable (Table 8).

The hypothesis H_3 is supported.

Hypothesis 4

To test this hypothesis, a quadratic regression model was used:

$$y = \beta_0 + \beta_1 x_1 + \beta_{11} x_{11}^2 + \epsilon \quad (7)$$

where y characterizes the share of the actual amount of budget transfers to a relevant region for performing critical work, in the total amount of these transfers in the Russian Federation, x is the share of the number of persons infected with COVID-19 in a relevant region in the total number of persons infected with COVID-19 in the Russian Federation in 2020.

The fitted regression model is as follows:

$$y = +0.080773 + 1.14702x_1 - 0.027010x_{11}^2 \quad (8)$$

In this model, both the independent variable and the model as a whole are significant (Table 9).

Table 10 shows that 90% of the variability in the response variable is explained by the independent variable.

The hypothesis H_4 is supported.

Hypothesis 5

To test this hypothesis, a linear regression model was used:

$$y = \beta_0 + \beta_1 x_1 + \epsilon \quad (9)$$

where y characterizes the share of the actual amount of budget transfers to a relevant region (a) for special working conditions and additional workload and (b) for performing critical work, in the total amount of these transfers in the Russian Federation, x is the proportion of persons infected with COVID-19 in a relevant region in the total number of persons infected with COVID-19 in the Russian Federation in 2020.

The fitted regression model is as follows:

$$y = +0.23152 + 1.08314\, x_1 \qquad (10)$$

In this model, both the independent variable and the model as a whole are significant (Table 11).

Table 12 shows that 78% of the variability in the response variable is explained by the independent variable.

The hypothesis H_5 is supported.

Hypotheses H_6–H_8

To test H_6–H_8 hypotheses, a linear regression model is used:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_1 x_2 + \beta_5 x_2 x_3 + \beta_6 x_1 x_3 + \epsilon \qquad (11)$$

where y is the volume of payments of the Special welfare payment to medical workers in the Russian Federation as a whole in a given calendar month,

x_1 is the number of persons infected with COVID-19 in a given calendar month,

x_2 is the number of persons recovered from COVID-19 in a given calendar month,

x_3 is the indicator of the last two months of the fiscal year (the categorical variable describing the fiscal year close-out, $x_3 = 0$ or $x_3 = 1$),

x_1x_2 is the x_1x_2 interaction term,

x_2x_3 is the x_2x_3 interaction term,

x_1x_3 is the x_1x_3 interaction term.

The fitted regression model for the fiscal year close-out ($x_3 = 1$) is as follows:

$$y^3 = 284502 - 298.20371 \times x_1 + 80.33769 \times x_2 - 0.00276184 \times x_1 \times x_2 \qquad (12)$$

The fitted regression model for the fiscal year (except the months of close-out) ($x_3 = 0$) is as follows:

$$y^3 = 938.32682 + 2.78643 \times x_1 + 10.27625 \times x_2 - 0.00276184 \times x_1 \times x_2 \qquad (13)$$

The power response transformation is used.

In these models, independent variables and interaction terms are significant (Table 13).

Table 14 shows that 98% of the variability in the response variable is explained by independent variables.

The hypotheses H_6–H_8 are supported.

DISCUSSION

Inconsistent coverage of health workers with incentive payments in 2020 across regions

The Accounts Chamber of the Russian Federation [25] expresses concern about "significant disparities" (between regions) in the number of medical personnel receiving incentive payments. This is understandable, as the allocation of budget transfers is based on the number of people covered by compulsory health insurance in the respective region of the Russian Federation.

In the first months of the pandemic, in the conditions of insufficient information about the coronavirus itself, lack of time, lack of forecasts on the estimated number of cases in the relevant region of the Russian Federation, the use of this aggregate indicator was quite appropriate. The final recipients of incentive payments (medical workers) were set as a percentage of the average monthly salary in the relevant region of the Russian Federation according to the data for the previous year.

Bonus payments to Russian health care workers related to COVID-19 are consistent with general trends in the assignment of additional payments to health care workers for extraordinary working conditions in various countries [6]. National health care systems use both periodic and lump-sum payments to health care workers.

At the same time, this study examined two types of periodic payments to health care workers - earlier payments (incentive payments, 2020) and current payments (welfare payments, 2020-2022). The transformation of incentive payments into welfare payments was largely due to differences in their taxation and the more favorable tax status (for health care workers as their recipients) of welfare payments.

The results of this study confirm the association between the key pandemic indicators and the volume of incentive and welfare payments.

Remote territories of some countries during the pandemic (at least in the initial period of the pandemic) experienced some limitations in funding for health workers [15, 16]. This study used not only aggregate data at the national level, but also data from individual areas of the country, including remote areas. The findings on the existence of the association between the key indicators of the pandemic and the level of payments are also valid for the remote areas of Russia.

The Accounts Chamber of the Russian Federation [25] expresses concern regarding disproportions between regions in the number of medical workers who receive incentive payments. This is quite understandable, since the allocation of budget transfers was carried out based on the number of persons insured under compulsory medical insurance in the relevant region of the Russian Federation.

In the first months of the pandemic, in the conditions of insufficient information about the coronavirus itself, lack of time, lack of forecasts on the estimated number of cases in the relevant region of the Russian Federation, the use of this aggregate indicator was quite appropriate.

CONCLUSION

The study provides support for hypotheses regarding the association between the key pandemic indicators and the size of various types of budget transfers to cover bonuses and benefits paid to medical staff.

Conflict of interest: None declared.

REFERENCES

1. Ministry of Health of the Russian Federation. On the results of the work of the Ministry of Health of the Russian Federation in 2020 and tasks for 2021. 2021.
2. Resolution of the Government of the Russian Federation dated 02.04.2020 No. 415. (has lost its force).2020; http://pravo.gov.ru
3. Resolution of the Government of the Russian Federation dated 29.08.2020 No. 1312 (has lost its force). 2020; http://pravo.gov.ru
4. Decree of the President of the Russian Federation dated 06.05.2020 No. 313. "On the provision of additional insurance guarantees to certain categories of medical workers."2020; http://pravo.gov.ru
5. Resolution of the Government of the Russian Federation dated 30.10.2020 No. 1762.2020; http://pravo.gov.ru
6. Williams G A, Scarpetti G, Bezzina A, Vincenti K, Grech K, Kowalska-Bobko I, ... & Maier CB. Supporting their health. Eurohealth.2020;26(2). https://apps.who.int/iris/bitstream/handle/10665/336298/Eurohealth-26-2-58-62-eng.pdf
7. Reed S. Resuming health services during the Covid-19 pandemic What can the NHS learn from other countries?.2020; http://allcatsrgrey.org.uk/wp/download/health_services/resuming-health-services-web.pdf
8. Besley T, Jaravel X, Landais C, Reis R. Treasury Select Committee-call for evidence on Covid-19 financial package.2020; http://eprints.lse.ac.uk/104308/1/Besley_treasury_select_committee_call_for_evidence_published.pdf
9. Adeyemo OO, Tu S, Keene D. How to lead health care workers during unprecedented crises: A qualitative study of the COVID-19 pandemic in Connecticut, USA. PLoS ONE.2021;16(9): e0257423. https://doi.org/10.1371/journal.pone.0257423
10. Kovaleva IP, Shuliko EV, Strijak MS. The Russian characteristics of organization of motivational and stimulating systems of labor remuneration in non-state health care institutions. Problems of Social Hygiene, Public Health and History of Medicine, 2020;28(1):106-113. doi: 10.32687/0869-866X-2020-28-1-106-113
11. Giubilini A, Savulescu J. Stopping exploitation: Properly remunerating healthcare workers for risk in the COVID-19 pandemic. Bioethics.2021;May;35(4):372-379. doi: 10.1111/bioe.12845.
12. Gray K, Dorney P, Hoffman L, & Crawford A. Nurses' pandemic lives: A mixed-methods study of experiences during COVID-19. Appl Nurs Res.2021;60:151437. https://doi.org/10.1016/j.apnr.2021.151437
13. Bitencourt JVDOV, Meschial WC, Frizon G, Biffi P, Souza JBD, & Maestri E. Nurse's protagonism in structuring and managing a specific unit for Covid-19. Texto & Contexto-Enfermagem. 2020;29.
14. Hersh U. Underappreciated and undervalued: nurse dissatisfaction and the COVID-19 pandemic. In Handbook of research on transforming government, nonprofits, and healthcare in a post-pandemic era, IGI Global.2023;234-272.
15. Strasser R, Strasser S. Reimaging primary health care workforce in rural and underserved settings.2020; http://hdl.handle.net/10986/34906
16. Shrestha RM, Kunwar AR. COVID-19 impact on doctors and health workers. Orthodontic Journal of Nepal. 2020;10(2):2-5. https://doi.org/10.3126/ojn.v10i2.31060
17. Astorp MS, Sørensen GVB, Rasmussen S, Emmersen J, Erbs AW, & Andersen S. Support for mobilising medical students to join the COVID-19 pandemic emergency healthcare workforce: a cross-sectional questionnaire survey. BMJ open. 2020;10(9):e039082. https://bmjopen.bmj.com/content/10/9/e039082
18. Sumin SA, Yaroslavkin RA, Shapovalov KG. Current issues of occupational health and safety for anaesthesiologists and intensive care specialists under new coronavirus infection. Russian J Anaesthesiology and Reanimatology. 2021;(2):143-154. https://doi.org/10.17116/anaesthesiology2021021143
19. Kadyrov FN. Replacement of incentive payments for work with coronavirus infection COVID-19 with special welfare payments. Menedzher zdravoohraneniya.2020;(10):70-77.
20. Shalberkina MN. On the problems of implementing measures of social support for health workers during the COVID-19 pandemic. Courier of Kutafin Moscow State Law University (MSAL).2021;1(8):136-145. https://doi.org/10.17803/2311-5998.2021.84.8.136-145

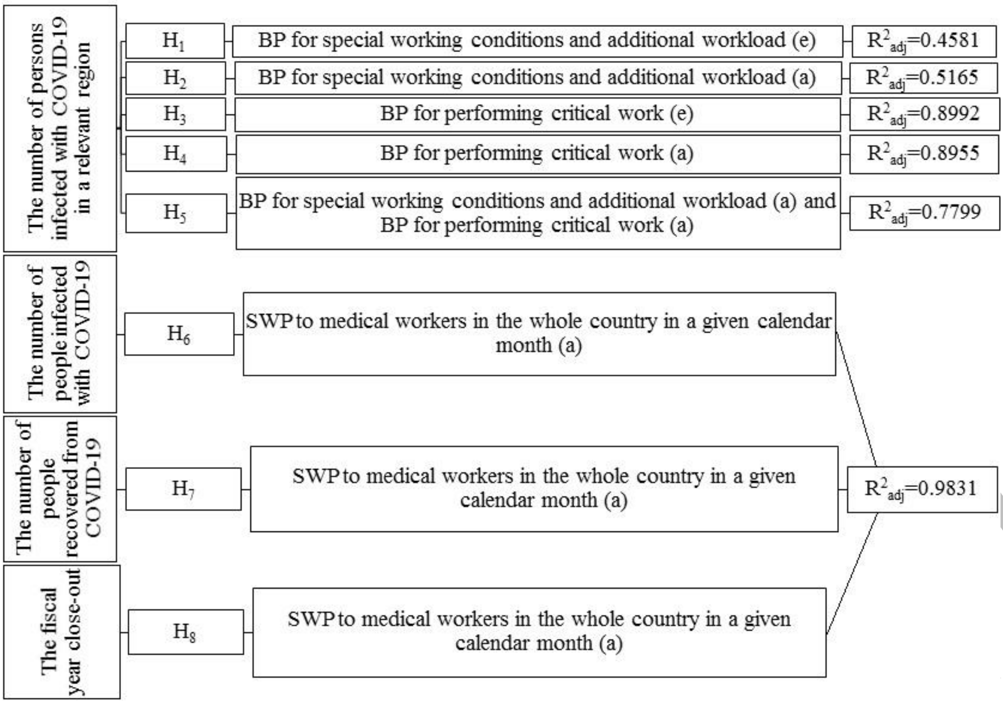
21. Gubina AN. The procedure for calculating and the amount of incentive payments to medical workers providing medical care to patients with COVID-19. In: Industrial Russia: yesterday, today and tomorrow. Ufa: Bulletin of science.2020:113-119.
22. Puzin SN, Memetov SS, Dedeneva IV, Khorkova OV. Legal basis of social guarantees for medical workers affected by coronavirus infection (COVID-19). Bulletin of the All-Russian Society of Specialists in Medical and Social Expertise, Rehabilitation and Rehabilitation Industry.2020;(3):20-30.
23. Kadyrov FN, Chililov AM. Information exchange system for the purpose of making special welfare payments to medical workers related to the treatment of coronavirus infection COVID-19. Information technologies for the physician.2020;(S5):86-90.
24. Anisimova LV, Reykhtman TV, Ivakhnenko LI. Certain aspects of the appointment of incentive payments to medical and other workers directly working with citizens who have been diagnosed with a new coronavirus infection COVID-19. In: Protection of human rights in the context of the spread of the novel coronavirus infection: theory and practice. Moscow:MSAL.2021:181-190.
25. Accounts Chamber of the Russian Federation. Report on the work of the healthcare and sports audit direction of the Accounts Chamber of the Russian Federation in 2020.2021. https://ach.gov.ru
26. WHO COVID-19 Dashboard. Geneva: World Health Organization, 2023. https://covid19.who.int/
27. Official information on coronavirus in Russia: Government of the Russian Federation, 2023. https://xn--80aesfpebagmfblc0a.xn--p1ai/
28. Ministry of Finance of the Russian Federation, Federal Treasury. Reports on the execution of the budgets of the subjects of the Russian Federation. Unified Portal of the Budgetary System of the Russian Federation "Electronic Budget."2022.https://budget.gov.ru/
29. Ministry of Finance of the Russian Federation, Federal Treasury. Budgets of State Extra-Budgetary Funds of the Russian Federation. Unified Portal of the Budgetary System of the Russian Federation "Electronic Budget".2022. https://budget.gov.ru/

Table 1. Budget transfers for incentive payments (expressed as a percentage of the average monthly salary)

Healthcare professionals	**Types of medical care**		
	Emergency medical care	**Primary health care**	**Specialized medical care in an inpatient setting**
Doctors	80	80	100
Middle medical staff	40	40	50
Junior medical staff	20	20	30

Table 2. Study hypotheses description

Hypotheses	Variables				
	Dependent				Independent
	Type of budget payment				
Bonus payments (2020)					
	Budget transfers to a relevant region for bonus payments to medical workers		Estimated or actual type of amount		
	for special working conditions and additional workload	for performing critical work	estimated	actual	
H_1	+		+		the number of persons infected with COVID-19 in a relevant region
H_2	+			+	
H_3		+	+		
H_4		+		+	
H_5	+	+		+	
Special welfare payment (SWP) (2020–2022)					
H_6	the total volume of payments of the SWP to medical workers in the whole country in a given calendar month			+	the number of people infected with COVID-19
H_7				+	the number of people recovered from COVID-19
H_8				+	the fiscal year close-out



BP – bonus payments; SWP – special welfare payment; e(a) – estimated (actual) type of amount

Figure 1. Hypotheses testing

Table 3. Analysis of variance

Source	Sum of squares	df	Mean square	F-value	p-value, Prob > F
Model	53.49	2	26.74	36.08	< 0.0001
x	2.3	1	2.3	3.1	0.0819
x^2	5.82	1	5.82	7.85	0.0063
Residual	60.03	81	0.74	-	-

Table 4. Summary of fit

R^2	0.4712
R^2 adj	0.4581
Adeq precision	32.248
Std. dev.	0.86
Mean	1.19

Table 5. Analysis of variance

Source	Sum of squares	df	Mean square	F-value	p-value, Prob > F
Model	34.24	2	17.12	45.34	< 0.0001
x	8.03	1	8.03	21.26	< 0.0001
x^2	11.97	1	11.97	31.71	< 0.0001
Residual	30.59	81	0.38		

Table 6. Summary of fit

R^2	0.5282
R^2 adj	0.5165
Adeq precision	35.487
Std. dev.	0.61
Mean	-0.20

Table 7. Analysis of variance

Source	Sum of squares	df	Mean square	F-value	p-value, Prob > F
Model	176.12	2	88.06	375.74	< 0.0001
x	134.82	1	134.82	575.3	< 0.0001
x^2	15.22	1	15.22	64.96	< 0.0001
Residual	19.22	82	0.23	-	-

Table 8. Summary of fit

R^2	0.9016
R^2 adj	0.8992
Adeq precision	127.737
Std. dev.	0.48
Mean	1.18

Table 9. Analysis of variance

Source	Sum of Squares	df	Mean Square	F-value	p-value, Prob > F
Model	183.61	2	91.81	361.01	< 0.0001
x	135.33	1	135.33	532.16	< 0.0001
x^2	19.44	1	19.44	76.43	< 0.0001
Residual	20.85	82	0.25	-	-

Table 10. Summary of fit

R^2	0.8980
R^2 adj	0.8955
Adeq precision	122.815
Std. dev.	0.5
Mean	1.18

Table 11. Analysis of variance

Source	Sum of Squares	df	Mean square	F-value	p-value, Prob > F
Model	88.81	1	88.81	295.15	< 0.0001
x	88.81	1	88.81	295.15	< 0.0001
Residual	24.67	82	0.30	-	-

Table 12. Summary of fit

R^2	0.7826
R^2 adj	0.7799
Adeq precision	97.853
Std. dev.	0.55
Mean	1.19

Table 13. Analysis of variance

Source	Sum of squares	df	Mean square	F-value	p-value, Prob > F
Model	16770000000	6	2795000000	184.69	< 0.0001
x_1	4133000000	1	4133000000	273.11	< 0.0001
x_2	365500000	1	365500000	24.15	0.0003
x_3	1705000000	1	1705000000	112.66	< 0.0001
x_1 x_2	88030000	1	88030000	5.82	0.0314
x_1 x_3	3973000000	1	3973000000	262.51	< 0.0001
x_2 x_3	311900000	1	311900000	20.61	0.0006
Residual	196800000	13	15130000	-	-
Cor total	16970000000	19	-	-	-

Table 14. Summary of fit.

R^2	0.9884
R^2 adj	0.9831
Adeq precision	49.171
Std. dev.	3890.36
Mean	17565.94