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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии
საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებშიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman (Кириллица)**, для текста на грузинском языке следует использовать **AcadNusx**. Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - <http://www.spinesurgery.ru/files/publish.pdf> и http://www.nlm.nih.gov/bsd/uniform_requirements.html. В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректур авторам не высылаются, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or computer-printed on a single side of standard typing paper, with the left margin of 3 centimeters width, and 1.5 spacing between the lines, typeface - **Times New Roman (Cyrillic)**, print size - 12 (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf

In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned
Requirements are not Assigned to be Reviewed.**

ავტორთა საყურადღებო!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე, დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx**. შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემავჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრაფიის ფოტოსურათები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შედეგების ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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POPULATION KNOWLEDGE, RISK PERCEPTION, GOVERNANCE AND PUBLIC HEALTH DETERMINANTS OF COVID-19 IN GEORGIA: A NATIONAL CROSS-SECTIONAL STUDY

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Abstract.

Introduction: The COVID-19 pandemic had a significant impact on public health systems both globally and in Georgia. It highlighted the importance of health system preparedness, risk communication, governance mechanisms, population behavior, and access to healthcare services. Despite the growing body of international evidence, a comprehensive assessment of the determinants of COVID-19 and the associated public health challenges in Georgia remains limited.

Aim: The aim of this study was to assess the determinants of COVID-19 among the population of Georgia and to identify the social, behavioral, and governance-related factors influencing the effectiveness of pandemic management.

Objectives:

- To assess the population's knowledge, attitudes, and practices (KAP) regarding COVID-19 in Georgia.
- To evaluate the social, demographic, and behavioral determinants associated with the COVID-19 pandemic.
- To assess public perceptions of government regulations, risk communication, and public health interventions.
- To identify the factors influencing the effectiveness of COVID-19 pandemic management.

Methods: A quantitative, analytical, population-based cross-sectional study was conducted to assess knowledge, attitudes, and practices (KAP) related to the COVID-19 pandemic, as well as the social, behavioral, and governance determinants of COVID-19 among the population of Georgia. The target population comprised adults aged 18 years and older who were permanent residents of Georgia. The minimum required sample size was calculated using OpenEpi (Version 3.01) with a 95% confidence level, a 5% margin of error, and an assumed population proportion of 50%, resulting in a minimum sample of 384 participants. A total of 386 respondents were included in the study.

A multistage stratified sampling design was employed. In the first stage, Georgia was stratified into 11 geographical strata (Tbilisi and 10 administrative regions). The sample was allocated proportionally to population size (Probability Proportional to Size, PPS) based on the official 2024 population statistics published by the National Statistics Office of Georgia (Geostat). Population data processing and regional sample allocation were performed using IBM SPSS Statistics version 23.0.

In the second stage, each region was further stratified into urban and rural areas. A sampling frame was developed for each stratum, based on which municipalities and settlements were selected. The number of respondents was allocated according to a predefined fieldwork plan, ensuring the representativeness

of all regions of Georgia as well as both urban and rural populations.

Data were collected using a structured electronic questionnaire. Statistical analyses were performed using IBM SPSS Statistics version 23.0. Descriptive statistics included absolute and relative frequencies, means, and standard deviations. Associations between categorical variables were assessed using Pearson's chi-square test, while multivariable logistic regression analysis was used to identify independent factors associated with the study outcomes. Statistical significance was defined as a p-value < 0.05.

Results: The study demonstrated that population knowledge, perceptions of government regulations, the effectiveness of risk communication, attitudes toward COVID-19 vaccination, and the use of digital health services varied significantly according to age, educational level, and region of residence. Statistically significant associations were identified between previous COVID-19 infection and post-COVID condition, as well as between public trust and sources of health information. The findings also highlighted both the strengths and the challenges of the public health system, particularly in relation to pandemic preparedness, risk communication, and health system resilience.

Conclusion: The findings indicate that the effective management of the COVID-19 pandemic in Georgia was strongly influenced by population awareness, evidence-based governance, effective risk communication, and the organizational capacity of the health system. The evidence generated by this study provides important implications for strengthening public health policy and enhancing national preparedness for future pandemics and other public health emergencies.

Key words. Covid-19, public health, digital health, long covid, risk communication, governance, KAP study, logistic regression.

Introduction.

Coronaviruses are a family of viruses that cause respiratory infections in humans and animals. In the 21st century, pathogenic human coronaviruses have caused three major epidemic outbreaks: Severe Acute Respiratory Syndrome (SARS-CoV), Middle East Respiratory Syndrome (MERS-CoV), and Coronavirus Disease 2019 (COVID-19; SARS-CoV-2). SARS first emerged in China during 2002–2003, resulting in 8,098 laboratory-confirmed cases and 774 deaths, whereas from the emergence of MERS through 2024, a total of 2,613 laboratory-confirmed cases and 941 deaths were reported worldwide. Nevertheless, the geographic spread of both infections remained relatively limited, and neither had as profound an impact on public health as the COVID-19 pandemic [1-4].

During the SARS, MERS, and COVID-19 epidemics, the World Health Organization (WHO) placed particular emphasis on the timely detection of cases, strengthening surveillance systems, implementing infection prevention and control measures, risk communication, and enhancing health system preparedness. During the COVID-19 pandemic, WHO also launched the COVAX initiative to improve equitable access to COVID-19 vaccines, particularly for low- and middle-income countries [5-9].

On 11 March 2020, the World Health Organization (WHO) declared COVID-19 a pandemic. According to WHO, by 5 May 2023, when the Public Health Emergency of International Concern (PHEIC) for COVID-19 officially ended, a total of 765,222,932 laboratory-confirmed cases and 6,921,614 deaths had been reported worldwide [10].

From a public health perspective, the impact of COVID-19 extends beyond morbidity and mortality. Assessing the impact of the pandemic includes evaluating the burden of disease, pressure on health systems, the long-term consequences of post-COVID condition (Long COVID), and the associated socioeconomic losses [11-13].

The COVID-19 pandemic had a substantial impact on the functioning of health systems, particularly on the accessibility of primary, secondary, and tertiary healthcare services. According to the World Health Organization (WHO), the pandemic disrupted the provision of preventive, diagnostic, therapeutic, and rehabilitation services in many countries, including cancer screening and chronic disease management programs. These disruptions adversely affected health outcomes and further highlighted the importance of health system resilience [14].

The COVID-19 pandemic also had a profound impact on the global economy. According to the World Bank and the International Monetary Fund, the pandemic significantly disrupted global economic activity and the functioning of health systems, including the continuity of preventive, diagnostic, and treatment services, thereby increasing both the direct and indirect burden of disease on public health [15].

The COVID-19 pandemic further demonstrated that the effective functioning of public health systems depends on evidence-based policies and decision-making processes. Although numerous international studies have examined the epidemiology of COVID-19, vaccination, social response, and the economic impact of the pandemic, it can be stated that in Georgia, no comprehensive assessment has been conducted of the determinants of COVID-19 and their impact on the public health system at either the national or regional level. This clearly justifies the need for the present study [16-17].

As a middle-income country, Georgia also faces the challenge of achieving sustainable healthcare financing. According to the World Bank, current health expenditure accounted for 6.86% of the country's gross domestic product (GDP) in 2023. However, the high share of out-of-pocket expenditure by the population continues to represent a major challenge [18].

The COVID-19 pandemic had a negative impact on routine childhood immunization programs. According to the WHO/UNICEF Estimates of National Immunization Coverage (WUENIC), global coverage with the third dose of the diphtheria, tetanus, and pertussis vaccine (DTP3) declined to

81% in 2021, representing the lowest level since 2008. As a result, approximately 25 million children did not receive one or more doses of the DTP vaccine in 2021, which was 2 million more than in 2020 and 6 million more than in 2019. According to WHO and UNICEF, this decline was largely attributable to the COVID-19 pandemic, including disruptions to health services, supply chain challenges, the diversion of resources to the pandemic response, and restrictions that limited access to routine immunization services. During the same period, global coverage with the first dose of the measles-containing vaccine (MCV1) also declined to 81%, likewise representing the lowest level since 2008 [19].

The COVID-19 pandemic also negatively affected routine immunization programs in Georgia. According to the National Center for Disease Control and Public Health (NCDC), coverage of key childhood vaccines declined substantially during the pandemic. For example, DTP3 coverage decreased from 94% in 2019 to 85% in 2021–2022 and increased to 88% in 2023, although it remained below the pre-pandemic level. A similar trend was observed for measles vaccination, where MMR2 coverage declined from 97% in 2019 to 78% in 2020 and recovered only to 86% by 2023. These findings indicate that the pandemic significantly disrupted the implementation of routine immunization programs in Georgia, although a gradual recovery became evident from 2023 onward [20].

From the perspective of secondary prevention, testing and epidemiological surveillance became two of the principal tools for controlling COVID-19 during the pandemic. According to data from the National Center for Disease Control and Public Health (NCDC), as of 1 July 2022, a total of 18,161,408 COVID-19 tests had been performed in Georgia, including 7,251,308 PCR tests and 10,910,100 rapid antigen tests. Between 2020 and 2022, the average test positivity rate was 9.4% [21,22].

The pandemic also had a significant impact on the hospital sector. In Georgia, the number of hospital beds increased from 17,471 in 2019 to 20,633 in 2021. During the same period, patients hospitalized with COVID-19 accounted for 25.6% of all inpatient cases, while 86.4% of COVID-19-related deaths recorded between 2020 and 2022 occurred among individuals aged 60 years and older [23-28].

The COVID-19 pandemic clearly demonstrated that effective public health management depends not only on epidemiological indicators but also on population knowledge, attitudes, and behavioral practices, as well as on the effectiveness of public health interventions and public perceptions of governance decisions. A comprehensive assessment of these components is essential both for evaluating the experience of the COVID-19 pandemic and for strengthening preparedness for future public health emergencies through evidence-based decision-making. The present study was designed to address these issues by comprehensively assessing the determinants of the COVID-19 pandemic and the associated public health challenges in Georgia [29].

The present study addresses this need by providing a comprehensive assessment of population knowledge, risk perception, governance, and public health challenges related to the COVID-19 pandemic in Georgia, with the aim of supporting evidence-based public health policy and decision-making.

Results.

Sociodemographic Characteristics of the Study Population:

A total of 386 Georgian citizens aged 18 years and older participated in the study. The mean age of the participants was 45.8 years (standard deviation (SD) =14.2). The majority of respondents were female (75.4%), while males accounted for 23.8%.

Participants were recruited from all regions of Georgia. The largest proportion was from Tbilisi (30.3%), followed by Imereti (12.7%) and Kvemo Kartli (12.7%), whereas the lowest representation was observed in the Racha-Lechkhumi and Kvemo Svaneti region (1.3%).

According to the age distribution, the largest group consisted of respondents aged 41-60 years (39.9%), followed by those younger than 40 years (32.4%) and participants aged 61 years and older (27.7%).

By ethnicity, the majority of respondents were Georgian, while Azerbaijanis and Armenians accounted for 6.4% and 3.9%, respectively. Nearly two-thirds of the participants (64.8%) had higher education, and 81.1% were employed. In terms of occupational status, the largest group consisted of healthcare professionals (25.1%), followed by teachers and lecturers (11.4%) (Table 1).

According to the study findings, 33.2% (n=128) of respondents were fully aware of the regulations and official recommendations in force during the COVID-19 pandemic, while 44.6% (n=172) reported being partially informed. Overall, 37.8% (n=146) considered the regulations to be fully understandable, 43.5% (n=168) considered them partially understandable, and 11.9% (n=46) reported that they were difficult to understand.

Government communication regarding COVID-19 was rated as moderate by 45.9% (n=177) of respondents, high by 31.3% (n=121), and low by 15.0% (n=58). Furthermore, 55.4% (n=214) stated that vaccination-related communication messages were understandable, while 28.2% (n=109) considered the information to be only partially understandable.

The COVID-19 vaccination campaign had a positive influence on respondents' decision-making in 42.2% (n=163) of cases, while 35.5% (n=137) reported that the campaign had no influence, and 13.2% (n=51) indicated that it had a negative influence. Overall, 62.4% (n=241) of the population believed that COVID-19 vaccination reduced the risk of infection and severe disease.

Regarding public awareness of the availability of COVID-19 vaccination and testing services, it should be noted that the level of awareness was high. Specifically, 74.4% (n=287) were aware of vaccination sites, while 78.0% (n=301) were aware of the availability of COVID-19 testing services.

During the COVID-19 pandemic, the most frequently used source of information was social media (37.8%, n=146), followed by television (31.3%, n=121). However, the most trusted source of information, according to the majority of respondents, was physicians and healthcare professionals (38.3%, n=148), followed by television (26.7%, n=103) and the website of the Richard Lugar National Center for Disease Control and Public Health (14.0%, n=54) (Table 2).

The study findings demonstrated statistically significant differences in COVID-19 knowledge and awareness across age groups ($p<0.001$) (Table 3). The highest level of complete awareness regarding the regulations and official recommendations in force during the COVID-19 pandemic was observed among respondents aged ≤ 40 years (38.4%; n=48), while the lowest level was found among respondents aged ≥ 61 years (26.2%; n=28). In addition, older participants more frequently selected the response "Do not remember/Difficult to assess" (12.1%; n=13).

Statistically significant differences between age groups were also identified in the perception of vaccination-related communication messages ($p=0.012$). Vaccination messages were considered understandable by 60.8% (n=76) of respondents aged ≤ 40 years, whereas this proportion was 47.7% (n=51) among respondents aged ≥ 61 years.

The perceived effectiveness of the COVID-19 vaccine also differed significantly across age groups (p value=0.028). A total of 67.2% (n=84) of participants aged ≤ 40 years agreed that the vaccine had a protective effect, whereas the corresponding proportion among respondents aged ≥ 61 years was 57.0% (n=61). Furthermore, 27.1% (n=29) of respondents in the oldest age group did not agree with the effectiveness of the vaccine (Table 3).

The analysis by sex showed that awareness of the regulations and official recommendations in force during the COVID-19 pandemic did not differ significantly between women and men (p value=0.214). However, a statistically significant association was observed in the assessment of the effectiveness of the COVID-19 vaccine (p value =0.041). Among women, 64.3% (n=187) believed that the vaccine reduced the risk of infection and severe disease, whereas the corresponding proportion among men was 57.6% (n=53) (Table 4). Furthermore, 26.1% (n=24) of men did not agree with the effectiveness of the vaccine, compared with 18.6% (n=54) of women (Table 4).

The indicators of COVID-19 knowledge and awareness differed significantly according to respondents' educational level.

Awareness of the regulations and official recommendations in force during the COVID-19 pandemic was highest among respondents with higher education, where the affirmative response ("Yes") was reported by 67.2% (n=168). Among respondents with vocational education, the corresponding proportion was 25.0% (n=12), while among those with primary/secondary education it was 14.8% (n=13). The response "Do not know / Difficult to assess" was reported most frequently among respondents with primary/secondary education (22.7%; n=20), whereas it accounted for only 2.0% (n=5) among respondents with higher education.

The perception of vaccination-related communication messages also differed significantly according to educational level. Vaccination messages were most frequently considered understandable by respondents with higher education (60.4%; n=151), while the corresponding proportion was 35.4% (n=17) among respondents with vocational education and 14.8% (n=13) among those with primary/secondary education. Negative responses ("No") were most frequently reported among respondents with primary/secondary education (37.5%; n=33),

Table 1. Demographic and Socioeconomic Characteristics of the Study Population by Region (N = 386).

Variable	Total	Tbilisi	Kakheti	Adjara	Imereti	Racha-Lech. & Kv. Svan.	Samegrelo & Zemo Svan.	Shida K.	Kvemo K.	Samtskh-J.	Guria	Mtskheta-Mt.
Study population	n=386 (100%)	117 (30.3%)	32 (8.3%)	38 (9.8%)	49 (12.7%)	5 (1.3%)	25 (6.5%)	27 (7.0%)	49 (12.7%)	17 (4.4%)	n=10 (2.6%)	17 (4.4%)
Sex												
Female	291 (75.4%)	79 (74.5%)	24 (77.4%)	31 (83.8%)	34 (72.3%)	4 (80.0%)	18 (75.0%)	19 (73.1%)	36 (78.3%)	11 (68.8%)	8 (80.0%)	13 (76.5%)
Male	92* (23.8%)	26 (24.5%)	7 (22.6%)	6 (16.2%)	13 (27.7%)	1 (20.0%)	6 (25.0%)	7 (26.9%)	10 (21.7%)	5 (31.2%)	2 (20.0%)	4 (23.5%)
Missing	3 (0.8%)	1 (0.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Age groups												
Mean (SD)	45.8 (14.2)	44.7 (13.9)	47.9 (15.1)	43.5 (13.2)	46.8 (14.0)	51.2 (16.4)	45.1 (13.7)	46.3 (14.5)	44.9 (13.8)	47.4 (15.0)	48.0 (14.7)	45.8 (14.2)
40	125 (32.4%)	39 (36.8%)	8 (25.8%)	15 (40.5%)	13 (27.7%)	1 (20.0%)	8 (33.3%)	7 (26.9%)	18 (39.1%)	5 (31.2%)	3 (30.0%)	8 (47.1%)
41–60	154 (39.9%)	43 (40.6%)	12 (38.7%)	16 (43.2%)	20 (42.6%)	2 (40.0%)	9 (37.5%)	11 (42.3%)	18 (39.1%)	6 (37.5%)	4 (40.0%)	5 (29.4%)
>61	107 (27.7%)	24 (22.6%)	11 (35.5%)	6 (16.3%)	14 (29.7%)	2 (40.0%)	7 (29.2%)	8 (30.8%)	10 (21.8%)	5 (31.3%)	3 (30.0%)	4 (23.5%)
Ethnicity												
Georg.	345 (100.0%)	95 (89.6%)	30 (96.8%)	35 (94.6%)	45 (95.7%)	5 (100.0%)	23 (95.8%)	24 (92.3%)	28 (60.9%)	10 (62.5%)	10 (100.0%)	40 (100.0%)
Azerb.	24 (6.4%)	5 (4.7%)	1 (3.2%)	1 (2.7%)	1 (2.1%)	0 (0.0%)	0 (0.0%)	1 (3.8%)	16 (34.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Arm.	15 (3.9%)	5 (4.7%)	0 (0.0%)	1 (2.7%)	1 (2.1%)	0 (0.0%)	1 (4.2%)	1 (3.8%)	1 (2.2%)	5 (31.2%)	0 (0.0%)	0 (0.0%)
Other	2 (0.5%)	1 (0.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (2.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Study population												
Health care	97 (25.1%)	4 (41.0%)	7 (21.9%)	11 (28.9%)	6 (12.2%)	0 (0.0%)	5 (20.0%)	3 (11.1%)	9 (18.4%)	2 (11.8%)	3 (30.0%)	3 (17.6%)
Teacher /Lect.	44 (11.4%)	15 (12.8%)	6 (18.8%)	4 (10.5%)	5 (10.2%)	1 (20.0%)	1 (4.0%)	4 (14.8%)	5 (10.2%)	2 (11.8%)	1 (10.0%)	0 (0.0%)
Public sector	23 (6.0%)	8 (6.8%)	3 (9.4%)	1 (2.6%)	3 (6.1%)	0 (0.0%)	2 (8.0%)	2 (7.4%)	3 (6.1%)	1 (5.9%)	0 (0.0%)	0 (0.0%)
Restaurant	20 (5.2%)	3 (2.6%)	0 (0.0%)	3 (7.9%)	4 (8.2%)	0 (0.0%)	3 (12.0%)	2 (7.4%)	1 (2.0%)	3 (17.6%)	1 (10.0%)	0 (0.0%)
Retail	20 (5.2%)	3 (2.6%)	2 (6.2%)	2 (5.3%)	4 (8.2%)	1 (20.0%)	1 (4.0%)	2 (7.4%)	2 (4.1%)	0 (0.0%)	0 (0.0%)	3 (17.6%)
Transport	18 (4.7%)	1 (0.9%)	1 (3.1%)	3 (7.9%)	2 (4.1%)	0 (0.0%)	2 (8.0%)	1 (3.7%)	3 (6.1%)	1 (5.9%)	0 (0.0%)	4 (23.5%)
Home maker	15 (3.9%)	0 (0.0%)	3 (9.4%)	1 (2.6%)	2 (4.1%)	0 (0.0%)	2 (8.0%)	1 (3.7%)	1 (2.0%)	1 (5.9%)	0 (0.0%)	4 (23.5%)
Agriculture	15 (3.9%)	0 (0.0%)	1 (3.1%)	2 (5.3%)	3 (6.1%)	1 (20.0%)	1 (4.0%)	1 (3.7%)	3 (6.1%)	1 (5.9%)	0 (0.0%)	2 (11.8%)
Retired	12 (3.1%)	0 (0.0%)	2 (6.2%)	0 (0.0%)	1 (2.0%)	0 (0.0%)	0 (0.0%)	2 (7.4%)	3 (6.1%)	2 (11.8%)	0 (0.0%)	2 (11.8%)
Unemployed	9 (2.3%)	9 (2.3%)	0 (0.0%)	1 (3.1%)	0 (0.0%)	2 (4.1%)	0 (0.0%)	2 (8.0%)	2 (7.4%)	1 (2.0%)	0 (0.0%)	0 (0.0%)
Marketing/PR	6 (1.6%)	2 (1.7%)	0 (0.0%)	1 (2.6%)	1 (2.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (10.0%)	1 (5.9%)
Student	5 (1.3%)	0 (0.0%)	1 (3.1%)	0 (0.0%)	1 (2.0%)	0 (0.0%)	1 (4.0%)	0 (0.0%)	1 (2.0%)	0 (0.0%)	0 (0.0%)	1 (5.9%)
Remote work	5 (1.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (4.1%)	0 (0.0%)	1 (4.0%)	0 (0.0%)	2 (4.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Caregiver	3 (0.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (6.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Other	94 (24.4%)	23 (19.7%)	1 (3.1%)	8 (21.1%)	9 (18.4%)	2 (40.0%)	6 (24.0%)	4 (14.8%)	4 (8.2%)	2 (11.8%)	4 (40.0%)	0 (0.0%)
Education												
Primary/ Secondary	87 (22.5%)	18 (17.0%)	9 (29.0%)	6 (16.2%)	11 (23.4%)	2 (40.0%)	5 (20.8%)	7 (26.9%)	16 (34.8%)	9 (56.2%)	2 (20.0%)	2 (11.8%)
Vocational	48 (12.4%)	9 (8.5%)	4 (12.9%)	6 (16.2%)	8 (17.0%)	1 (20.0%)	4 (16.7%)	3 (11.5%)	7 (15.2%)	3 (18.8%)	3 (30.0%)	0 (0.0%)
Higher (incl. MSc/ Ph D)	250 (64.8%)	78 (73.6%)	22 (68.8%)	25 (65.8%)	28 (57.1%)	2 (40.0%)	15 (60.0%)	16 (59.3%)	23 (46.9%)	14 (82.4%)	10 (100.0%)	17 (100.0%)
Not reported	1 (0.3%)	1 (0.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	15 (62.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Employment Status												
Employed	313 (81.1%)	94 (80.3%)	26 (81.3%)	31 (81.6%)	40 (81.6%)	4 (80.0%)	20 (80.0%)	22 (81.5%)	40 (81.6%)	14 (82.4%)	8 (80.0%)	14 (82.4%)
Self- employed	18 (4.7%)	1 (0.9%)	1 (3.2%)	2 (5.4%)	2 (4.1%)	1 (20.0%)	1 (4.0%)	1 (3.7%)	5 (10.2%)	2 (11.8%)	1 (10.0%)	1 (5.9%)
Un employed	9 (2.3%)	0 (0.0%)	1 (3.2%)	0 (0.0%)	2 (4.1%)	0 (0.0%)	1 (4.0%)	1 (3.7%)	1 (2.0%)	1 (5.9%)	0 (0.0%)	2 (11.8%)
Retired	12 (3.1%)	0 (0.0%)	1 (3.1%)	0 (0.0%)	1 (2.1%)	0 (0.0%)	0 (0.0%)	1 (3.7%)	2 (4.1%)	3 (17.6%)	1 (10.0%)	3 (17.6%)
Student	5 (1.3%)	0 (0.0%)	1 (3.2%)	0 (0.0%)	1 (2.0%)	0 (0.0%)	1 (4.0%)	0 (0.0%)	1 (2.0%)	0 (0.0%)	0 (0.0%)	1 (5.9%)
Home maker	15 (3.9%)	0 (0.0%)	5 (16.1%)	1 (2.7%)	2 (4.3%)	0(0.0%)	2 (8.3%)	1 (3.8%)	2(4.1%)	2(11.8%)	1 (6.2%)	2(11.8%)
No response	14 (3.6%)	13 (12.3%)	0 (0.0%)	1 (2.7%)	0 (0.0%)	1 (20.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Table 2. Respondents' Knowledge, Awareness, and Evaluation of COVID-19-Related Communication by Region (N = 386).

Variable	Total	Tbilisi	Kakheti	Adjara	Imereti	Racha- Lech. & Kv. Svan.	Samegre lo & Zemo Svan.	Shida K.	Kvemo K.	Samtskh e-J.	Mtskh et a-Mt.	Guria
Awareness of COVID-19 regulations and official recommendations												
Yes	128 (33.2%)	39 (33.3%)	11 (34.4%)	13 (34.2%)	16 (32.7%)	2 (40.0%)	8 (32.0%)	9 (33.3%)	16 (32.7%)	6 (35.3%)	5 (29.4%)	3 (30.0%)
Partially	172 (44.6%)	52 (44.4%)	14 (43.8%)	17 (44.7%)	22 (44.9%)	2 (40.0%)	11 (44.0%)	12 (44.4%)	22 (44.9%)	8 (47.1%)	8 (47.1%)	4 (40.0%)
No	54 (14.0%)	16 (13.7%)	4 (12.5%)	5 (13.2%)	7 (14.3%)	1 (20.0%)	4 (16.0%)	4 (14.8%)	7 (14.3%)	2 (11.8%)	2 (11.8%)	2 (20.0%)
Don't rememb er / Difficult to assess	32 (8.3%)	10 (8.5%)	3 (9.4%)	3 (7.9%)	4 (8.2%)	0 (0.0%)	2 (8.0%)	2 (7.4%)	4 (8.2%)	1 (5.9%)	2 (11.8%)	1 (10.0%)
Understanding of COVID-19 regulations												
Completely understood	146 (37.8%)	44 (37.6%)	12 (37.5%)	14 (36.8%)	18 (36.7%)	2 (40.0%)	10 (40.0%)	10 (37.0%)	18 (36.7%)	7 (41.2%)	6 (35.3%)	5 (50.0%)
Partially understood	168 (43.5%)	52 (44.4%)	14 (43.8%)	17 (44.7%)	22 (44.9%)	2 (40.0%)	11 (44.0%)	12 (44.4%)	22 (44.9%)	7 (41.2%)	8 (47.1%)	3 (30.0%)
Not understood	46 (11.9%)	14 (12.0%)	4 (12.5%)	5 (13.2%)	6 (12.2%)	1 (20.0%)	3 (12.0%)	3 (11.1%)	6 (12.2%)	2 (11.8%)	1 (5.9%)	1 (10.0%)
Don't remember/ Difficult to assess	26 (6.7%)	7 (6.0%)	2 (6.2%)	2 (5.3%)	3 (6.1%)	0 (0.0%)	1 (4.0%)	2 (7.4%)	3 (6.1%)	1 (5.9%)	2 (11.8%)	1 (10.0%)
Perceived quality of government communication on COVID-19												
High	121 (31.3%)	37 (31.6%)	10 (31.2%)	12 (31.6%)	15 (30.6%)	1 (20.0%)	8 (32.0%)	8 (29.6%)	15 (30.6%)	5 (29.4%)	5 (29.4%)	4 (40.0%)
Moderate	177 (45.9%)	54 (46.2%)	15 (46.9%)	17 (44.7%)	23 (46.9%)	3 (60.0%)	11 (44.0%)	13 (48.1%)	23 (46.9%)	8 (47.1%)	8 (47.1%)	3 (30.0%)

Low	58 (15.0%)	17 (14.5%)	5 (15.6%)	6 (15.8%)	7 (14.3%)	1 (20.0%)	4 (16.0%)	4 (14.8%)	7 (14.3%)	3 (17.6%)	3 (17.6%)	1 (10.0%)
Does not remember/ Unable to assess	30 (7.8%)	9 (7.7%)	2 (6.3%)	3 (7.9%)	4 (8.2%)	0 (0.0%)	2 (8.0%)	2 (7.4%)	4 (8.2%)	1 (5.9%)	1 (5.9%)	2 (20.0%)
Understanding of vaccination-related messages												
Yes	214 (55.4%)	65 (55.6%)	18 (56.3%)	21 (55.3%)	27 (55.1%)	3 (60.0%)	14 (56.0%)	15 (55.6%)	27 (55.1%)	9 (52.9%)	9 (52.9%)	6 (60.0%)
Partially	109 (28.2%)	33 (28.2%)	9 (28.1%)	11 (28.9%)	14 (28.6%)	1 (20.0%)	7 (28.0%)	8 (29.6%)	14 (28.6%)	5 (29.4%)	5 (29.4%)	2 (20.0%)
No	43 (11.1%)	13 (11.1%)	4 (12.5%)	4 (10.5%)	5 (10.2%)	1 (20.0%)	3 (12.0%)	3 (11.1%)	5 (10.2%)	2 (11.8%)	2 (11.8%)	1 (10.0%)
Don't remember / Difficult to assess	20 (5.2%)	6 (5.1%)	1 (3.1%)	2 (5.3%)	3 (6.1%)	0 (0.0%)	1 (4.0%)	1 (3.7%)	3 (6.1%)	1 (5.9%)	1 (5.9%)	1 (10.0%)
Impact of the vaccination campaign on vaccination decision												
Positive impact	163 (42.2%)	49 (41.9%)	14 (43.8%)	16 (42.1%)	21 (42.9%)	2 (40.0%)	11 (44.0%)	11 (40.7%)	21 (42.9%)	7 (41.2%)	7 (41.2%)	4 (40.0%)
No impact	137 (35.5%)	42 (35.9%)	11 (34.4%)	14 (36.8%)	17 (34.7%)	2 (40.0%)	9 (36.0%)	10 (37.0%)	17 (34.7%)	6 (35.3%)	6 (35.3%)	3 (30.0%)
Negative impact	51 (13.2%)	15 (12.8%)	4 (12.5%)	5 (13.2%)	7 (14.3%)	1 (20.0%)	3 (12.0%)	3 (11.1%)	7 (14.3%)	2 (11.8%)	2 (11.8%)	2 (20.0%)
Don't remember / Difficult to assess	35 (9.1%)	11 (9.4%)	3 (9.4%)	3 (7.9%)	4 (8.2%)	0 (0.0%)	2 (8.0%)	3 (11.1%)	4 (8.2%)	2 (11.8%)	2 (11.8%)	1 (10.0%)
Assessment of the statement that the COVID-19 vaccine reduces the risk of infection and severe disease												
Yes	241 (62.4%)	73 (62.4%)	20 (62.5%)	24 (63.2%)	31 (63.3%)	3 (60.0%)	16 (64.0%)	17 (63.0%)	31 (63.3%)	10 (58.8%)	10 (58.8%)	6 (60.0%)
No	79 (20.5%)	24 (20.5%)	7 (21.9%)	8 (21.1%)	10 (20.4%)	1 (20.0%)	5 (20.0%)	5 (18.5%)	10 (20.4%)	4 (23.5%)	4 (23.5%)	1 (10.0%)
Don't know	66 (17.1%)	20 (17.1%)	5 (15.6%)	6 (15.8)	8 (16.3%)	1 (20.0%)	4 (16.0%)	5 (18.5%)	8 (16.3%)	3 (17.6%)	3 (17.6%)	3 (30.0%)
Awareness of COVID-19 vaccination sites												
Yes	287 (74.4%)	87 (74.4%)	24 (75.0%)	28 (73.7%)	37 (75.5%)	4 (80.0%)	19 (76.0%)	20 (74.1%)	37 (75.5%)	13 (76.5%)	12 (70.6%)	6 (60.0%)
No	38 (9.8%)	12 (10.3%)	3 (9.4%)	4 (10.5%)	5 (10.2%)	0 (0.0%)	2 (8.0%)	3 (11.1%)	5 (10.2%)	1 (5.9%)	2 (11.8%)	1 (10.0%)
Partially	44 (11.4%)	13 (11.1%)	4 (12.5%)	4 (10.5%)	5 (10.2%)	1 (20.0%)	3 (12.0%)	3 (11.1%)	5 (10.2%)	2 (11.8%)	2 (11.8%)	2 (20.0%)
Don't know	17 (4.4%)	5 (4.3%)	1 (3.1%)	2 (5.3%)	2 (4.1%)	0 (0.0%)	1 (4.0%)	1 (3.7%)	2 (4.1%)	1 (5.9%)	1 (5.9%)	1 (10.0%)
Awareness of COVID-19 testing availability												
Yes	301 (78.0%)	91 (77.8%)	25 (78.1%)	30 (78.9%)	39 (79.6%)	4 (80.0%)	20 (80.0%)	21 (77.8%)	39 (79.6%)	14 (82.4%)	12 (70.6%)	6 (60.0%)
No	29 (7.5%)	9 (7.7%)	2 (6.3%)	3 (7.9%)	4 (8.2%)	1 (20.0%)	1 (4.0%)	2 (7.4%)	4 (8.2%)	1 (5.9%)	2 (11.8%)	1 (10.0%)
Partially	41 (10.6%)	12 (10.3%)	4 (12.5%)	4 (10.5%)	5 (10.2%)	0 (0.0%)	3 (12.0%)	3 (11.1%)	5 (10.2%)	1 (5.9%)	2 (11.8%)	1 (10.0%)
Don't know	15 (3.9%)	5 (4.3%)	1 (3.1%)	1 (2.6%)	1 (2.0%)	0 (0.0%)	1 (4.0%)	1 (3.7%)	1 (2.0%)	1 (5.9%)	1 (5.9%)	2 (20.0%)
Main source of COVID-19 information												
Social media	146 (38.8%)	45 (38.5%)	12 (37.5%)	14 (36.8%)	18 (36.7%)	1 (20.0%)	10 (40.0%)	10 (37.0%)	19 (38.8%)	6 (35.3%)	7 (41.2%)	4 (40.0%)
Television	121 (31.3%)	35 (29.9%)	10 (31.2%)	13 (34.2%)	16 (32.7%)	2 (40.0%)	7 (28.0%)	8 (29.6%)	15 (30.6%)	6 (35.3%)	5 (29.4%)	4 (40.0%)

Physician/ Health care provider	48 (12.4%)	15 (12.8%)	4 (12.5%)	5 (13.2%)	6 (12.2%)	1 (20.0%)	3 (12.0%)	3 (11.1%)	6 (12.2%)	2 (11.8%)	2 (11.8%)	1 (10.0%)
NCDC website	29 (7.5%)	9 (7.7%)	2 (6.3%)	3 (7.9%)	4 (8.2%)	0 (0.0%)	2 (8.0%)	2 (7.4%)	4 (8.2%)	1 (5.9%)	1 (5.9%)	1 (10.0%)
Ministry of Health website	18 (4.7%)	5 (4.3%)	1 (3.1%)	2 (5.3%)	2 (4.1%)	0 (0.0%)	1 (4.0%)	2 (7.4%)	2 (4.1%)	1 (5.9%)	1 (5.9%)	0 (0.0%)
Friends	14 (3.6%)	5 (4.3%)	1 (3.1%)	1 (2.6%)	2 (4.1%)	0 (0.0%)	1 (4.0%)	1 (3.7%)	1 (2.0%)	0 (0.0%)	1 (5.9%)	1 (10.0%)
Other	10 (2.6%)	3 (2.6%)	2 (6.3%)	0 (0.0%)	1 (2.0%)	1 (20.0%)	1 (4.0%)	1 (3.7%)	2 (4.2%)	1 (5.9%)	0 (0.0%)	0 (0.0%)
Most trusted source of COVID-19 information during the COVID-19 pandemic												
Social media	52 (13.5%)	16 (13.7%)	4 (12.5%)	5 (13.2%)	7 (14.3%)	0 (0.0%)	3 (12.0%)	4 (14.8%)	7 (14.3%)	2 (11.8%)	2 (11.8%)	2 (20.0%)
Television	103 (26.7%)	31 (26.5%)	9 (28.1%)	10 (26.3%)	13 (26.5%)	1 (20.0%)	7 (28.0%)	7 (25.9%)	13 (26.5%)	5 (29.4%)	4 (23.5%)	3 (30.0%)
Physician/ Health care provider	148 (38.3%)	45 (38.5%)	12 (37.5%)	15 (39.5%)	18 (36.7%)	2 (40.0%)	10 (40.0%)	10 (37.0%)	18 (36.7%)	6 (35.3%)	7 (41.2%)	5 (50.0%)
NCDC website	54 (14.0%)	17 (14.5%)	5 (15.6%)	5 (13.2%)	7 (14.3%)	1 (20.0%)	3 (12.0%)	4 (14.8%)	7 (14.3%)	2 (11.8%)	3 (17.6%)	0 (0.0%)
Friends	16 (4.1%)	5 (4.3%)	1 (3.1%)	2 (5.3%)	2 (4.1%)	0 (0.0%)	1 (4.0%)	1 (3.7%)	2 (4.1%)	1 (5.9%)	1 (5.9%)	0 (0.0%)
Other	13 (3.4%)	3 (2.6%)	1 (3.1%)	1 (2.6%)	2 (4.1%)	1 (20.0%)	1 (4.0%)	1 (3.7%)	2 (4.1%)	1 (5.9%)	0 (0.0%)	0 (0.0%)

Table 3. Association Between Knowledge and Awareness of COVID-19 and Age Groups (N = 386).

Variable	≤40	41–60	≥61	სულ	P-value
Awareness of the regulations in force and official recommendations during the COVID-19 period					
Yes	48 (38.4%)	52 (33.8%)	28 (26.2%)	128 (33.2%)	<0.001
Partially	51 (40.8%)	72 (46.8%)	49 (45.8%)	172 (44.6%)	
No	17 (13.6%)	20 (13.0%)	17 (15.9%)	54 (14.0%)	
Don't remember / Difficult to assess	9 (7.2%)	10 (6.5%)	13 (12.1)	32 (8.3%)	
Understanding of vaccination-related messages					
Yes	76 (60.8%)	87 (56.5%)	51 (47.7%)	214 (55.4%)	0.012
Partially	31 (24.8%)	45 (29.2%)	33 (30.8%)	109 (28.2%)	
No	12 (9.6%)	15 (9.7%)	16 (15.0%)	43 (11.1%)	
Don't remember / Difficult to assess	6 (4.8%)	7 (4.5%)	7 (6.5%)	20 (5.2%)	
Belief that the COVID-19 vaccine reduces the risk of infection and severe disease					
Yes	84 (67.2%)	96 (62.3%)	61 (57.0%)	241 (62.4%)	0.028
No	19 (15.2%)	31 (20.1%)	29 (27.1%)	79 (20.5%)	
Don't know	22 (17.6%)	27 (17.5%)	17 (15.9%)	66 (17.1%)	

Table 4. Association Between Knowledge and Awareness of COVID-19 and Sex (N = 386).

Variable	Female	Male	Total	P-value
Awareness of the regulations in force and official recommendations during the COVID-19 pandemic				
Yes	99 (34.0%)	28 (30.4%)	127 (32.9%)	0.214
Partially	128 (44.0%)	43 (46.7%)	171 (44.3%)	
No	31 (10.7%)	12 (13.0%)	43 (11.1%)	
Don't remember / Difficult to assess	16 (5.5%)	2 (2.2%)	18 (4.7%)	
Belief that the COVID-19 vaccine reduces the risk of infection and severe disease				
Yes	187 (64.3%)	53 (57.6%)	240 (62.2%)	0.041
No	54 (18.6%)	24 (26.1%)	78 (20.2%)	
Don't know	50 (17.2%)	15 (16.3%)	65 (16.8%)	

Table 5. Association Between the Main Indicators of COVID-19 Knowledge and Awareness and Respondents' Educational Level (N = 386).

Variable	Primary/Secondary (n=88)	Vocational (n=48)	Higher (n=250)	Total	P-value
Awareness of the regulations in force and official recommendations during the COVID-19 period					
Yes	13 (14.8%)	12 (25.0%)	168 (67.2%)	193 (50.0%)	<0.001
Partially	26 (29.5%)	24 (50.0%)	50 (20.0%)	100 (25.9%)	
No	29 (33.0%)	8 (16.7%)	27 (10.8%)	64 (16.6%)	
Do not know / Difficult to assess	20 (22.7%)	4 (8.3%)	5 (2.0%)	29 (7.5%)	
Perception of vaccination-related communication messages					
Yes	13 (14.8%)	17 (35.4%)	151 (60.4%)	181 (46.9%)	<0.001
Partially	32 (36.4%)	18 (37.5%)	77 (30.8%)	127 (32.9%)	
No	33 (37.5%)	13 (27.1%)	16 (6.4%)	62 (16.1%)	
Do not know / Difficult to assess	10 (11.4%)	0 (0.0%)	6 (2.4%)	16 (4.1%)	
Belief that the COVID-19 vaccine reduces the risk of infection and severe disease					
Yes	16 (18.2%)	28 (58.3%)	173 (69.2%)	217 (56.2%)	<0.001
No	17 (19.3%)	6 (12.5%)	36 (14.4%)	59 (15.3%)	
Do not know / Difficult to assess	55 (62.5%)	14 (29.2%)	41 (16.4%)	110 (28.5%)	

Note: A statistically significant association was found between all assessed indicators of COVID-19 knowledge and awareness and respondents' educational level (Pearson's chi-square test; $p < 0.001$).

Table 6. Association between the availability of COVID-19-related information and occupational status (n=386).

Variable	Healthcare	Teachers	Public Sector	Private Sector	Students	Home makers	Unemployed	Retired	Other	Total	P-value
Awareness of COVID-19 vaccination locations											
Yes	96 (88.9%)	39 (83.0%)	22 (81.5%)	55 (75.3%)	18 (85.7%)	15 (55.6%)	12 (50.0%)	14 (46.7%)	11 (37.9%)	282 (73.1%)	<0.001
Partially	4 (3.7%)	2 (4.3%)	1 (3.7%)	5 (6.8%)	1 (4.8%)	4 (14.8%)	5 (20.8%)	6 (20.0%)	7 (24.1%)	35 (9.1%)	
No	7(6.5%)	5(10.6%)	3(11.1%)	10(13.7%)	2(9.5%)	6(22.2%)	5(20.8%)	7(23.3%)	6(20.7%)	51(13.2%)	
Do not remember/ Difficult to assess	1 (0.9%)	1 (2.1%)	1 (3.7%)	3 (4.1%)	0 (0.0%)	2 (7.4%)	2 (8.3%)	3 (10.0%)	5 (17.2%)	18 (4.7%)	
Awareness of the availability of COVID-19 testing											
Yes	93 (86.1%)	38 (80.9)	22 (81.5%)	52 (71.2%)	18 (85.7%)	14 (51.9%)	11 (45.8%)	13 (43.3%)	10 (34.5%)	271 (70.2%)	<0.001
Partially	5 (4.6%)	2 (4.3%)	1 (3.7%)	7 (9.6%)	1 (4.8%)	5 (18.5%)	6 (25.0%)	7 (23.3%)	8 (27.6%)	42 (10.9%)	
No	8 (7.4%)	6 (12.8%)	3 (11.1%)	10 (13.7%)	2 (9.5%)	6 (22.2%)	5 (20.8%)	7 (23.3%)	7 (24.1%)	54 (14.0%)	
Do not remember/ Difficult to assess	2 (1.9%)	1 (2.1%)	1 (3.7%)	4 (5.5%)	0 (0.0%)	2 (7.4%)	2 (8.3%)	3 (10.0%)	4 (13.8%)	19 (4.9%)	

Table 7. Association between trust in COVID-19 information sources and sex (n=386).

Level of trust	Female	Male	Total	P-value
Completely trust	112 (37.8%)	21 (22.9%)	133 (34.4%)	0.005
Partially trust	145 (48.8%)	46 (50.0%)	191 (49.5%)	
Do not trust	18 (6.1%)	21 (22.8%)	39 (10.1%)	
Do not remember / Difficult to assess	15 (5.1%)	4 (4.3%)	19 (4.9%)	

Table 8. Association between trust in COVID-19 information sources and educational level (n=386).

Level of trust	Secondary/Primary Education (n=88)	Vocational Education (n=48)	Higher Education* (n=250)	Total (n=386)	P-value
Completely trust	12 (13.6%)	11 (22.9%)	111 (44.41%)	134 (34.7%)	<0.001
Partially trust	43(48.9%)	25 (52.1%)	124 (49.6%)	192 (49.7%)	
Do not trust	5(5.7%)	4 (8.3%)	3 (1.2%)	12 (3.1%)	
Difficult to assess	28(31.8%)	8 (16.7%)	12 (4.8%)	48 (12.4%)	
Total	88(100%)	48 (100%)	250 (100%)	386 (100%)	

*Higher Education = Bachelor's degree, Master's degree, and Doctoral degree

Table 9. Association between the assessment of the comprehensibility and practicality of COVID-19 regulations implemented during the pandemic and respondents' educational level (n=386).

Assessment of the regulations	Secondary/Primary Education (n=88)	Vocational Education (n=48)	Higher Education (Bachelor's/Master's/PhD) (n=250)	Total
Completely understandable	11 (12.5%)	12 (25.0%)	135 (54.0%)	158 (40.9%)
Partially understandable	24 (27.3%)	18 (37.5%)	94 (37.6%)	136 (35.2%)
Not understandable	30 (34.1%)	14 (29.2%)	16 (6.4%)	60 (15.5%)
Do not know / Difficult to assess	22 (25.3%)	4 (8.3%)	5 (2.0%)	32 (8.3%)
Total	88 (100%)	48 (100%)	250 (100%)	386 (100%)

Note: A statistically significant association was found between the assessment of the comprehensibility and practicality of the regulations and educational level (Pearson's chi-square test = 117.228; p-value < 0.001).

Table 10. Association between awareness of the regulations and official guidelines implemented during the COVID-19 pandemic and educational level (n=386).

Awareness	Secondary/Primary Education (n=87)	Vocational Education (n=48)	Higher Education + Master's/PhD (n=250)	Total
Yes	13 (14.8%)	12 (25.0%)	168 (67.2%)	193 (50.0%)
Partially	26 (29.5%)	24 (50.0%)	50 (20.0%)	100 (25.9%)
No	29 (33.0%)	8 (16.7%)	27 (10.8%)	64 (16.6%)
Do not know / Difficult to assess	20 (22.8%)	4 (8.3%)	5 (2.0%)	29 (7.5%)
Total	88 (100%)	48 (100%)	250 (100%)	386 (100%)

Note: A statistically significant association was found between respondents' educational level and awareness of the regulations and official guidelines implemented during the COVID-19 pandemic (Pearson's chi-square test: $\chi^2 = 113.742$; p < 0.001).

Table 11. Association between the assessment of the ease of use of electronic platforms for COVID-19 management and educational level (n=386).

Assessment	Secondary/Primary Education n=87	Vocational Education n=48	Higher Education n=250	Total
Yes	3 (3.4%)	10 (20.8%)	90 (36.0%)	103 (26.7%)
Partially	5 (5.7%)	10 (20.8%)	90 (36.0%)	105 (27.2%)
No	16 (18.2%)	9 (18.8%)	24 (9.6%)	49 (12.7%)
Do not know / Difficult to assess	64 (72.7%)	19 (39.6%)	46 (18.4%)	129 (33.4%)
Total	88 (100%)	48 (100%)	250 (100%)	386 (100%)

Note: A statistically significant association was found between educational level and the assessment of the ease of use of the electronic platforms for COVID-19 management (Pearson's chi-square test = 112.890; p-value < 0.001).

Table 12. Association between the primary sources of COVID-19-related information and educational level (n=386).

Primary source of information	Secondary/Primary Education (n=88)	Vocational Education (n=48)	Higher Education (n=250)*	Total (n=386)
Television	34 (38.6%)	19 (39.6%)	58 (23.2%)	111 (28.8%)
Social media	6 (6.8%)	6 (12.5%)	63 (25.2%)	75 (19.4%)
Physicians / Healthcare professionals	14 (15.9%)	12 (25.0%)	58 (23.2%)	84 (21.8%)
Ministry of Health website	11 (12.5%)	6 (12.5%)	15 (6.0%)	32 (8.3%)
NCDC	0 (0.0%)	0 (0.0%)	9 (3.6%)	9 (2.3%)
Friends / Family members	23 (26.1%)	3 (6.3%)	26 (10.4%)	52 (13.5%)
Other	0 (0.0%)	2 (4.2%)	21 (8.4%)	23 (6.0%)
Total	88 (100.0%)	48 (100.0%)	250 (100.0%)	386 (100.0%)

*Higher Education = Bachelor's degree, Master's degree, and Doctoral degree.

Note: A statistically significant association was found between the primary source of COVID-19-related information and respondents' educational level (Pearson's chi-square test; $\chi^2 = 53.631$; $p < 0.001$).

Table 13. Association between the perception of vaccination-related messages and respondents' educational level (n=386).

Perception of vaccination-related messages	Secondary/Primary Education (n=88)	Vocational Education (n=48)	Higher Education (n=250)	Total (n=386)
Completely understandable	13 (14.8%)	17 (35.4%)	151 (60.4%)	181 (46.9%)
Partially understandable	32 (36.4%)	18 (37.5%)	77 (30.8%)	127 (32.9%)
Not understandable	33 (37.5%)	13 (27.1%)	16 (6.4%)	62 (16.1%)
Do not know / Do not remember	10 (11.4%)	0 (0.0%)	6 (2.4%)	16 (4.1%)
Total	88(100.0%)	48(100.0%)	250(100.0%)	386(100.0%)

Note: A statistically significant association was found between respondents' educational level and the perception of vaccination-related messages (Pearson's chi-square test; $X^2 = 89.630$; $p < 0.001$).

Table 14. Association between knowledge and awareness of COVID-19 and occupational status (n=386).

Variable	Healthcare	Teachers /Lecturers	Public Sector	Private Sector	Students	Home makers	Unemployed	Retired	Other	Total	P-value
Awareness of COVID-19-related regulations and official recommendations											
Yes	54 (50.0%)	18 (38.3%)	11 (40.7%)	24 (32.9%)	9 (42.9%)	4 (14.8%)	3 (12.5%)	3 (10.0%)	2 (6.9%)	128 (33.2%)	<0.001
Partially	42 (38.9%)	22 (46.8%)	11 (40.7%)	34 (46.6%)	8 (38.1%)	13 (48.1%)	12 (50.0%)	17 (56.7%)	13 (44.8%)	172 (44.6%)	
No	8 (7.4%)	4 (8.5%)	4 (14.8%)	11 (15.1%)	3 (14.3%)	6 (22.2%)	5 (20.8%)	6 (20.0%)	7 (24.1%)	54 (14.0%)	
Do not remember / Unable to assess	4 (3.7%)	3 (6.4%)	1 (3.7%)	4 (5.5%)	1 (4.8%)	4 (14.8%)	4 (16.7%)	4 (13.3%)	7 (24.1%)	32 (8.3%)	
Perception of vaccination-related messages											
Yes	84 (77.8%)	31 (66.0%)	16 (59.3%)	3 (52.1%)	15 (71.4%)	8 (29.6%)	7 (29.2%)	8 (26.7%)	7 (24.1%)	214 (55.4%)	
Partially	16 (14.8%)	11 (23.4%)	8 (29.6%)	22 (30.1%)	4 (19.0%)	11 (40.7%)	8 (33.3%)	11 (36.7%)	18 (62.1%)	109 (28.2%)	
No	5 (4.6%)	3 (6.4%)	2 (7.4%)	9 (12.3%)	1 (4.8%)	6 (22.2%)	6 (25.0%)	7 (23.3%)	4 (13.8%)	43 (11.1%)	
Do not remember / Difficult to assess	3 (2.8%)	2 (4.3%)	1 (3.7%)	4 (5.5%)	1 (4.8%)	2 (7.4%)	3 (12.5%)	4 (13.3%)	0 (0.0%)	20 (5.2%)	
Perception of the effectiveness of the COVID-19 vaccine in reducing the risk of infection and complications											
Yes	89 (82.4%)	34 (72.3%)	18 (66.7%)	45 (61.6%)	16 (76.2%)	11 (40.7%)	10 (41.7%)	10 (33.3%)	8 (27.6%)	241 (62.4%)	<0.001
No	11 (10.2%)	7 (14.9%)	5 (18.5%)	15 (20.5%)	2 (9.5%)	8 (29.6%)	8 (33.3%)	11 (36.7%)	12 (41.4%)	79 (20.5%)	
Do not know	8 (7.4%)	6 (12.8%)	4 (14.8%)	13 (17.8%)	3 (14.3%)	8 (29.6%)	6 (25.0%)	9 (30.0%)	9 (31.0%)	66 (17.1%)	

Table 15. Association between the perceived impact of the COVID-19 vaccination campaign and the level of trust in COVID-19 information sources (n=386).

Perceived impact of the vaccination campaign	Complete trust (n=134)	Partial trust (n=192)	Did not trust (n=12)	Do not know / Difficult to assess (n=48)	Total (n=386)
Positive	122 (91.0%)	52 (27.1%)	1 (8.3%)	6 (12.5%)	181 (46.9%)
Neutral	9 (6.7%)	109 (56.8%)	2 (16.7%)	7 (14.6%)	127 (32.9%)
Negative	1 (0.7%)	22 (11.5%)	8 (66.7%)	31 (64.6%)	62 (16.1%)
Do not know / Difficult to assess	2 (1.5%)	9 (4.7%)	1 (8.3%)	4 (8.3%)	16 (4.1%)
Total	134	192	12	48	386

Note: A statistically significant association was found between the **perceived impact of the COVID-19 vaccination campaign** and the **level of trust in COVID-19 information sources** (Pearson's chi-square test; $\chi^2 = 271.259$; $p < 0.001$).

Table 16. Association between the assessment of the timely and effective dissemination of information on the regulations and educational level (n=386).

Assessment	Secondary/Primary Education	Vocational Education	Higher Education	Total
Yes	8 (9.2%)	12 (25.0%)	110 (44.0%)	130 (33.7%)
Partially	18 (20.7%)	17 (35.4%)	92 (36.8%)	127 (32.9%)
No	7 (8.0%)	2 (4.2%)	25 (10.0%)	34 (8.8%)
Do not know / Difficult to assess	55 (62.5%)	17 (35.4%)	23 (9.2%)	95 (24.4%)
Total	88 (100%)	48 (100%)	250 (100%)	386 (100%)

Note: A statistically significant association was found between respondents' level of education and their assessment of the timely and effective dissemination of information about COVID-19 regulations during the pandemic (Pearson's chi-square test; $\chi^2 = 109.551$; $p < 0.001$).

Table 17. Binary logistic regression analysis of factors associated with Long COVID (n=386).

Variable	OR	95% CI	P value
Age group (overall effect)	—	—	0.144
(41–60) vs ≤40	0.630	0.330–1.201	0.160
≥61 vs ≤40	1.124	0.632–1.997	0.691
Educational level (overall effect)	—	—	0.235
Secondary/Primary education vs Higher education	1.718	0.824–3.580	0.149
Vocational education vs Higher education	1.606	0.772–3.341	0.205
History of COVID-19 infection (Yes vs No)	0.067	0.027–0.166	<0.001
Fully vaccinated vs Do not remember / Prefer not to answer	1.289	0.300–5.536	0.733
Partially vaccinated vs Do not remember / Prefer not to answer	1.971	0.461–8.422	0.360
Unvaccinated vs Do not remember / Prefer not to answer	2.577	0.554–11.986	0.227
Sex (Male vs Female)	1.249	0.683–2.286	0.471

Note: OR – Odds Ratio; CI – 95% Confidence Interval.

In the logistic regression model, the category “Do not remember / Prefer not to answer” was used as the reference group for the analysis of vaccination status, and all other vaccination categories were compared against this reference group.

Table 18. Binary logistic regression analysis of factors associated with the use of digital health services (n=386).

Variable	OR (Exp(B))	95% CI	P value
Age group (overall effect)	–	–	<0.001
41–60 / ≤40	0.253	0.123–0.519	<0.001
≥61 / ≤40	0.394	0.215–0.722	0.003
Educational level (overall effect)	–	–	0.030
Secondary/Primary vs Higher	0.271	0.083–0.883	0.030
Vocational vs Higher	0.406	0.152–1.083	0.072
History of COVID-19 infection (Yes vs No)	0.887	0.445–1.769	0.733
Vaccination status (overall effect)	–	–	0.002
Unvaccinated vs Booster dose	4.502	0.534–37.952	0.167
Partially vaccinated vs Booster dose	1.863	0.213–16.281	0.574
Fully vaccinated vs Booster dose	0.327	0.018–5.982	0.451
Sex (Male vs Female)	0.863	0.417–1.784	0.690
Place of residence (Rural vs Urban)	1.653	0.902–3.029	0.104
Long COVID (Yes vs No)	1.568	0.866–2.839	0.138

Note: OR – Odds Ratio; CI – 95% Confidence Interval.

For age group comparisons, the ≤40-year age group was used as the reference category. For educational level, respondents with higher education served as the reference group. For vaccination status, the reference category was respondents who had received a booster dose. The reported odds ratios (ORs) represent comparisons of each category with its corresponding reference group.

Table 19. Binary logistic regression analysis of factors determining timely access to medical services (n=386).

Variable	OR	95% CI	P value
Age group (overall effect)	–	–	0.699
41–60 / ≤40	0.754	0.370–1.539	0.438
≥61 / ≤40	0.975	0.521–1.827	0.938
Educational level (overall effect)	–	–	0.005
Secondary/Primary education vs Higher education	0.131	0.039–0.443	0.001
Vocational education vs Higher education	0.771	0.316–1.878	0.566
History of COVID-19 infection (Yes vs No)	2.182	1.096–4.346	0.026
Vaccination status (overall effect)	–	–	<0.001
Unvaccinated vs Booster dose	9.736	1.148–82.536	0.037
Partially vaccinated vs Booster dose	1.435	0.159–12.936	0.748
Fully vaccinated vs Booster dose	0.495	0.038–6.540	0.594
Sex (Male vs Female)	1.691	0.793–3.604	0.174
Place of residence (Rural vs Urban)	0.845	0.463–1.543	0.584
Long COVID (Yes vs No)	1.731	0.934–3.210	0.081

Note: OR – Odds Ratio; 95% CI – 95% Confidence Interval; *P value* – level of statistical significance.

whereas this proportion was 6.4% (n=16) among respondents with higher education.

A positive opinion regarding the ability of the COVID-19 vaccine to reduce the risk of infection and severe disease was reported most frequently among respondents with higher education (69.2%; n=173), followed by respondents with vocational education (58.3%; n=28), while among respondents with primary/secondary education the corresponding proportion was 18.2% (n=16). The response "Do not know / Difficult to assess" was reported most frequently among respondents with primary/secondary education (62.5%; n=55), whereas among respondents with higher education this proportion was 16.4% (n=41).

Statistical analysis demonstrated that there was a statistically significant association between educational level and all assessed indicators of COVID-19 knowledge and awareness (Pearson's χ^2 ; *p* value<0.001) (Table 5).

Occupational status was significantly associated with the indicators of COVID-19 knowledge and awareness (*p*

value<0.001). The highest level of complete awareness regarding the regulations and official recommendations in force during the COVID-19 pandemic was observed among healthcare professionals (50.0%; n=54), while the level of awareness of official recommendations was 42.9% (n=9) among students, 40.7% (n=11) among respondents employed in the public sector, and 38.3% (n=18) among teachers and lecturers. Vaccination-related messages were considered most understandable by healthcare professionals (77.8%; n=84) and students (71.4%; n=15). The effectiveness of the COVID-19 vaccine was most frequently acknowledged by respondents employed in the healthcare sector (82.4%; n=89), whereas the lowest proportions were observed among other occupational categories, retirees, and unemployed respondents (Table 5).

A statistically significant association was identified between occupational status and awareness of the availability of both COVID-19 vaccination (*p* value<0.001) and COVID-19 testing (*p* value<0.001). Awareness of COVID-19 vaccination sites was highest among healthcare professionals (88.9%; n=96),

followed by students (85.7%; n=18), teachers and lecturers (83.0%; n=39), and respondents employed in the public sector (81.5%; n=22). A similar pattern was observed regarding awareness of the availability of COVID-19 testing, with the highest levels reported among healthcare professionals (86.1%; n=93) and students (85.7%; n=18). Lack of information was reported more frequently among homemakers, unemployed respondents, retirees, and representatives of other occupational categories (Table 6).

The study found that the level of trust in sources of COVID-19 information differed significantly by sex (p value=0.005). Complete trust in information sources was reported by 37.8% (n=112) of women and 22.9% (n=21) of men, whereas distrust in information sources was significantly higher among men (22.8%; n=21) than among women (6.1%; n=18). These findings indicate that women were more likely to trust sources of COVID-19 information than men (Table 7).

The assessment of respondents' trust in sources of COVID-19 information by educational level showed that complete trust in information sources was reported most frequently by respondents with higher education (44.4%; n=111), whereas the corresponding proportion was 22.9% (n=11) among respondents with vocational education and 13.6% (n=12) among those with secondary/primary education. Partial trust in information sources was observed at similar levels across all three educational groups, ranging from 48.9% to 52.1%. Distrust in information sources was relatively more common among respondents with vocational education (8.3%) and secondary/primary education (5.7%) than among those with higher education (1.2%). In addition, 31.8% of respondents with secondary/primary education reported difficulty assessing their level of trust in information sources, compared with 16.7% of respondents with vocational education and only 4.8% of those with higher education. A statistically significant association was found between respondents' educational level and trust in sources of COVID-19 information (Pearson's $X^2 = 68.027$; p value < 0.001) (Table 8).

A statistically significant association was also identified between educational level and the perception of the regulations and official recommendations implemented during the COVID-19 pandemic (Pearson's $X^2 = 117.228$; p value < 0.001). The regulations were rated as completely understandable by 54.0% (n=135) of respondents with higher education, whereas the corresponding proportion was 25.0% (n=12) among respondents with vocational education and 12.5% (n=11) among those with secondary/primary education. Furthermore, the regulations were most frequently rated as not understandable by respondents with secondary/primary education (34.1%; n=30), while this proportion was substantially lower among respondents with higher education, at only 6.4% (n=16). These findings indicate that a higher level of education was associated with better understanding and perception of the official regulations and recommendations implemented during the COVID-19 pandemic (Table 9).

The assessment of the timely and effective dissemination of information on the regulations implemented during the COVID-19 pandemic by respondents' educational level showed that this assessment differed significantly across educational

groups. The timely and effective dissemination of information was rated positively most frequently by respondents with higher education (44.0%; n=110), whereas the corresponding proportion was 25.0% (n=12) among respondents with vocational education and 9.1% (n=8) among those with secondary/basic education.

The response "Partially" was reported most frequently by respondents with higher education (36.8%; n=92), followed by those with vocational education (35.4%; n=17) and respondents with secondary/basic education (20.7%; n=18).

The timely and effective dissemination of information was rated negatively ("No") by 8.0% (n=7) of respondents with secondary/basic education, 4.2% (n=2) of those with vocational education, and 10.0% (n=25) of respondents with higher education.

The response "Do not know / Difficult to assess" was reported most frequently among respondents with secondary/basic education (62.5%; n=55), whereas the corresponding proportion was 35.4% (n=17) among respondents with vocational education and only 9.2% (n=23) among respondents with higher education.

A statistically significant association was found between respondents' educational level and their assessment of the timely and effective dissemination of information on the regulations implemented during the COVID-19 pandemic (Table 10).

The analysis of respondents' assessment of the ease of use of the electronic platforms used for COVID-19 management according to educational level showed that this assessment differed significantly across educational groups. The ease of using electronic platforms was most frequently reported by respondents with higher education (36.0%; n=90), whereas the corresponding proportion was 20.8% (n=10) among respondents with vocational education and only 3.4% (n=3) among those with secondary/primary education.

The response "Partially" was also reported most frequently by respondents with higher education (36.0%; n=90), while the corresponding proportions among respondents with vocational education and secondary/primary education were 20.8% (n=10) and 5.7% (n=5), respectively.

Difficulty in using electronic platforms was reported by 18.2% (n=16) of respondents with secondary/primary education, 18.8% (n=9) of respondents with vocational education, and 9.6% (n=24) of respondents with higher education.

The response "Do not know / Difficult to assess" was reported most frequently among respondents with secondary/primary education (72.7%; n=64), whereas the corresponding proportion was 39.6% (n=19) among respondents with vocational education and 18.4% (n=46) among respondents with higher education.

These findings indicate that, as the level of education increases, the positive assessment of the ease of using the electronic platforms employed for COVID-19 management also increases. Statistical analysis confirmed a statistically significant association between respondents' educational level and their assessment of the ease of use of electronic platforms (Pearson's chi-square test; $X^2 = 112.890$; p value < 0.001) (Table 11).

A statistically significant association was found between educational level and the main sources of information used during the COVID-19 pandemic (Pearson's $X^2 = 53.631$;

p value < 0.001). Respondents with secondary and lower educational attainment more frequently identified television (38.6%; n=34) and family members or friends (26.1%; n=23) as their primary sources of information, whereas respondents with higher education more commonly used social media (25.2%; n=63) and doctors/healthcare professionals (23.2%; n=58). NCDC resources were identified as a source of information only by respondents with higher education (3.6%; n=9), indicating that the use of official and professional information sources increases with higher educational attainment (Table 12).

The assessment of the perception of vaccination-related messages according to respondents' educational level showed that the messages were rated as completely understandable most frequently by respondents with higher education (60.4%; n=151), whereas the corresponding proportion was 35.4% (n=17) among respondents with vocational education and 14.8% (n=13) among those with secondary/primary education.

Vaccination-related messages were rated as partially understandable by 36.4% (n=32) of respondents with secondary/primary education, 37.5% (n=18) of respondents with vocational education, and 30.8% (n=77) of respondents with higher education.

The messages were most frequently reported as not understandable by respondents with secondary/primary education (37.5%; n=33), followed by respondents with vocational education (27.1%; n=13). Among respondents with higher education, this proportion was substantially lower, at only 6.4% (n=16).

The response "Do not know / Do not remember" was reported most frequently by respondents with secondary/primary education (11.4%; n=10), whereas this response was not reported at all among respondents with vocational education, and accounted for 2.4% (n=6) among respondents with higher education.

These findings indicate that, as the level of education increases, the perception and understanding of vaccination-related messages also improve, while the proportion of respondents reporting difficulty understanding these messages decreases. A statistically significant association was found between respondents' educational level and the perception of vaccination-related messages (Pearson's $X^2 = 89.630$; p value < 0.001) (Table 13).

A statistically significant association was found between respondents' occupational status and all assessed indicators of COVID-19 knowledge and awareness (Pearson's X^2 ; p value < 0.001). Complete awareness of the regulations and official recommendations in force during the COVID-19 pandemic was highest among respondents employed in the healthcare sector (50.0%; n=54), followed by students (42.9%; n=9), respondents employed in the public sector (40.7%; n=11), and teachers/lecturers (38.3%; n=18). Vaccination-related communication messages were most frequently rated as understandable by healthcare professionals (77.8%; n=84), students (71.4%; n=15), and teachers/lecturers (66.0%; n=31), whereas the lowest proportions were observed among respondents in other occupational categories, retirees, and unemployed individuals. A positive perception that the COVID-19 vaccine reduces the risk of infection and complications was also reported most frequently

among respondents employed in the healthcare sector (82.4%; n=89), followed by students (76.2%; n=16), teachers/lecturers (72.3%; n=34), and respondents employed in the public sector (66.7%; n=18). These findings indicate that occupational status was significantly associated with COVID-19 knowledge and awareness (Table 14).

The strongest association observed in the study was between the perceived impact of the COVID-19 vaccination campaign and trust in sources of COVID-19 information (Pearson's $X^2 = 271.259$; p value < 0.001). Among respondents who had complete trust in information sources, 91.0% (n=122) evaluated the vaccination campaign positively, whereas among respondents with low trust in information sources, negative evaluations predominated (66.7%; n=8). A similar pattern was observed among respondents who reported difficulty assessing the reliability of information sources, of whom 64.6% (n=31) gave a negative evaluation. These findings indicate that trust in information sources had a substantial influence on the perceived effectiveness of the COVID-19 vaccination campaign (Table 15).

A statistically significant association was found between respondents' educational level and their assessment of the timely and effective dissemination of information on the regulations implemented during the COVID-19 pandemic (Pearson's $X^2 = 109.551$; p value < 0.001). The timely and effective dissemination of information was rated positively most frequently by respondents with higher education (44.0%; n=110), whereas the corresponding proportions among respondents with vocational education and secondary/primary education were 25.0% (n=12) and 9.2% (n=8), respectively. The response "Partially" was reported most frequently by respondents with higher education (36.8%; n=92), followed by respondents with vocational education (35.4%; n=17) and those with secondary/primary education (20.7%; n=18). The negative assessment ("No") was relatively more frequent among respondents with higher education (10.0%; n=25) than among respondents with secondary/primary education (8.0%; n=7) and vocational education (4.2%; n=2). In addition, the response "Do not know / Difficult to assess" was reported most frequently by respondents with secondary/primary education (62.5%; n=55), whereas the corresponding proportion was 35.4% (n=17) among respondents with vocational education and only 9.2% (n=23) among respondents with higher education. These findings indicate that a higher level of education was associated with a more positive assessment of the timely and effective dissemination of information on the regulations implemented during the COVID-19 pandemic (Table 16).

The descriptive and bivariate analyses showed that age, educational level, occupational status, and trust in information sources were significantly associated with COVID-19 knowledge and awareness. To assess the independent effects of these factors, a multivariable logistic regression analysis was performed.

Binary logistic regression analysis was used to assess the factors associated with the development of Long COVID. The model included respondents' age group, sex, educational level, history of COVID-19 infection, and COVID-19 vaccination status.

The analysis showed that the model was statistically significant overall ($X^2 = 71.153$; $p \text{ value} < 0.001$), indicating that the variables included in the model were jointly associated with the development of Long COVID. The results of the goodness-of-fit assessment indicated that the model fit the study data well ($X^2 = 8.164$; $p \text{ value} = 0.418$). The model explained 23.6% of the variance in the development of Long COVID, and the overall classification accuracy of the model was 72.8%.

According to the results of the logistic regression analysis, a statistically significant association with the development of Long COVID was identified only for a history of COVID-19 infection (OR = 0.067; 95% CI: 0.027-0.166; $p \text{ value} < 0.001$). Age group ($p \text{ value} = 0.144$), educational level ($p \text{ value} = 0.235$), COVID-19 vaccination status ($p \text{ value} = 0.220$), and sex ($p \text{ value} = 0.471$) were not statistically significantly associated with the development of Long COVID (Table 17).

Binary logistic regression analysis was used to assess the factors associated with the use of digital health services. The dependent variable was defined as the use of digital health services and was recoded into two categories ("Yes" = 1; "No" = 0). The use of digital health services was defined as the use of at least one digital health service during the pandemic.

The regression model included respondents' age group, sex, educational level, place of residence, history of COVID-19 infection, development of Long COVID, and COVID-19 vaccination status.

The analysis showed that the model was statistically significant overall ($X^2 = 95.914$; $p \text{ value} < 0.001$), indicating that the variables included in the model were jointly associated with the use of digital health services. The results of the goodness-of-fit assessment indicated that the model fit the study data well ($X^2 = 13.868$; $p \text{ value} = 0.085$). The model explained 31.5% of the variance in the use of digital health services, and its overall classification accuracy was 78.2%.

According to the results of the logistic regression analysis, statistically significant associations with the use of digital health services were found for age group ($p \text{ value} < 0.001$), educational level ($p \text{ value} = 0.030$), and COVID-19 vaccination status ($p \text{ value} = 0.002$). Specifically, respondents aged 41–60 years and 61 years and older had lower odds of using digital health services compared with respondents aged 40 years and younger. In addition, respondents with secondary or primary education had lower odds of using digital health services compared with respondents with higher education.

According to the results of the logistic regression analysis, the development of Long COVID ($p \text{ value} = 0.138$), history of COVID-19 infection ($p = 0.733$), sex ($p \text{ value} = 0.690$), and place of residence ($p \text{ value} = 0.104$) were not statistically significantly associated with the use of digital health services (Table 18).

Binary logistic regression analysis was used to assess the factors determining timely access to essential healthcare services. The dependent variable was defined as timely access to essential healthcare services during the pandemic and was divided into two categories: complete access (1) and partial access, lack of access, or no need for the service (0).

The regression model included respondents' age group, sex, educational level, place of residence, history of COVID-19 infection, development of Long COVID, and COVID-19 vaccination status.

The analysis showed that the model was statistically significant overall ($X^2 = 124.783$; $p \text{ value} < 0.001$), indicating that the variables included in the model jointly influenced timely access to essential healthcare services during the pandemic. The results of the goodness-of-fit assessment indicated that the model fit the study data well ($X^2 = 7.908$; $p \text{ value} = 0.443$).

According to the results of the logistic regression analysis, statistically significant associations with timely access to essential healthcare services were found for educational level ($p \text{ value} = 0.001$), history of COVID-19 infection ($p \text{ value} = 0.026$), and COVID-19 vaccination status ($p \text{ value} < 0.001$). Specifically, respondents with secondary or primary education had significantly lower odds of having timely access to essential healthcare services compared with respondents with higher education (OR = 0.131; 95% CI: 0.039-0.443). In addition, respondents who had experienced COVID-19 had approximately 2.2 times higher odds of having timely access to essential healthcare services compared with respondents who had not experienced COVID-19 (OR = 2.182; 95% CI: 1.096-4.346).

No statistically significant association was found between timely access to essential healthcare services and age group ($p \text{ value} = 0.699$), sex ($p \text{ value} = 0.174$), place of residence ($p \text{ value} = 0.584$), or the development of Long COVID ($p \text{ value} = 0.081$) (Table 19).

Discussion.

The present study provides a comprehensive assessment of population knowledge, attitudes, behavioral practices, perceptions of government governance, risk communication, utilization of digital health services, and access to healthcare services during the COVID-19 pandemic in Georgia. The findings indicate that effective pandemic management was influenced not only by epidemiological factors but also by respondents' educational level, trust in information sources, the quality of risk communication, and the organizational capacity of the health system.

One of the key findings of this study was that knowledge of COVID-19 and perceptions of official recommendations differed significantly across sociodemographic groups. Educational level emerged as a particularly important determinant, as respondents with higher education were more likely to possess accurate information, better understand government regulations, and express more positive perceptions of vaccination-related information messages. Similar findings have been reported by the World Health Organization (WHO), the Organisation for Economic Co-operation and Development (OECD), and the European Centre for Disease Prevention and Control (ECDC), all of which identify education as one of the principal determinants of health literacy and adherence to public health recommendations.

The study also demonstrated that trust in information sources played a crucial role in shaping public attitudes. Although social media was identified as the most frequently used source of COVID-19-related information, physicians and other healthcare professionals were considered the most trusted sources. Furthermore, positive evaluations of the COVID-19 vaccination information campaign were strongly associated with higher levels of trust in information sources. These findings

are fully consistent with the World Health Organization's Risk Communication and Community Engagement (RCCE) framework, which recognizes public trust as one of the fundamental prerequisites for effective communication and community engagement during public health emergencies.

The findings also demonstrated that educational level influenced not only population awareness but also perceptions of government governance during the COVID-19 pandemic. Respondents with higher education were significantly more likely to report that COVID-19 regulations were understandable, that information was disseminated in a timely manner, and that electronic platforms were easy to use. These findings suggest that the effectiveness of public health policies is closely linked to the population's level of health literacy, which is recognized as one of the fundamental priorities of contemporary public health policy.

Another important finding of the present study relates to the utilization of digital health services. Multivariable logistic regression analysis demonstrated that younger age, higher educational attainment, and COVID-19 vaccination status were independently associated with the use of digital health services. These findings confirm that the successful implementation of digital health interventions is strongly influenced by the population's sociodemographic and educational characteristics. The COVID-19 pandemic further highlighted the importance of digital health systems for disease surveillance, telemedicine, information dissemination, and the coordination of public health interventions.

The study also found that timely access to essential healthcare services was significantly associated with respondents' educational level, history of COVID-19 infection, and COVID-19 vaccination status. These findings indicate that ensuring equitable access to essential healthcare services remained a major challenge during the pandemic. Similar observations have been reported by the World Health Organization (WHO), which has emphasized that disruptions to essential health services during the COVID-19 pandemic represented a major challenge for health systems worldwide and underscored the importance of maintaining continuity of healthcare services.

Multivariable analysis of Long COVID demonstrated that a history of COVID-19 infection was the only independent predictor of the development of Long COVID, whereas age, sex, educational level, and COVID-19 vaccination status were not identified as statistically significant independent factors. Although international studies have reported inconsistent findings regarding the risk factors for Long COVID, a history of COVID-19 infection has consistently been identified as an important predictor of post-COVID condition in numerous studies.

One of the major strengths of the present study is that, in addition to assessing population knowledge and attitudes, it comprehensively examined government governance, risk communication, digital health, access to healthcare services, and the determinants of Long COVID. Such an integrated approach has rarely been applied in COVID-19 KAP studies, and the findings provide valuable evidence to support the further development of public health policy in Georgia.

The findings of this study suggest that the effective management of future pandemics and other public health emergencies will require improvements in population health literacy, strengthening of evidence-based risk communication, expanded access to digital health services, ensuring the continuity of essential healthcare services, and further enhancement of the resilience of the public health system.

Strengths and Limitations.

One of the major strengths of the present study is that the COVID-19 pandemic was evaluated not only from the perspective of population knowledge, attitudes, and practices (KAP), but also within a comprehensive analytical framework integrating public health governance, risk communication, digital health, access to essential healthcare services, and the determinants of Long COVID. The use of a multistage stratified sampling design ensured representation from all regions of Georgia, while multivariable logistic regression analysis enabled the assessment of independent associations between the study variables.

The study also has several limitations. Due to its cross-sectional design, it was not possible to assess the risk of developing Long COVID over time or to establish causal relationships. Accordingly, the study was limited to evaluating associations between the independent variables and the study outcomes.

In addition, the findings were based on self-reported data, which may be subject to recall bias and social desirability bias. Nevertheless, the use of a standardized questionnaire and robust analytical methods enhances the reliability of the findings and supports their applicability for evidence-based public health policy and planning.

Public Health Implications.

The findings of this study indicate that the effective management of future pandemics and other public health emergencies requires an integrated approach that combines strengthening population health literacy, evidence-based risk communication, increasing public trust, and enhancing the resilience of the health system.

Particular attention should be given to the further development of digital health services, expanding access to electronic health platforms, and improving the population's digital health literacy, as the findings demonstrate that these factors have a significant influence on the utilization of healthcare services.

The study also confirms the importance of ensuring the continuity of essential healthcare services during public health crises, including maintaining access to primary healthcare, emergency medical services, diagnostic services, and vaccination programs. Strengthening health system resilience should be guided by the principles of the World Health Organization's Health Emergency Preparedness, Response and Resilience (HEPR) framework and the Preparedness and Resilience for Emerging Threats (PRET) framework.

Furthermore, the findings indicate that educational attainment plays an important role in the understanding of health information, adherence to government regulations, and the utilization of digital health services. Therefore, programs aimed at improving health literacy should be considered a key priority of public health policy.

Conclusion.

The present study demonstrated that during the COVID-19 pandemic in Georgia, population knowledge, risk perception, perceptions of government regulations, trust in information sources, utilization of digital health services, and access to essential healthcare services varied significantly according to sociodemographic characteristics.

Educational level, trust in information sources, and COVID-19 vaccination status emerged as important determinants of several key public health indicators. Furthermore, multivariable analysis confirmed their independent associations with the utilization of digital health services and timely access to essential healthcare services. In addition, a history of COVID-19 infection was identified as an independent predictor of the development of Long COVID.

The findings of this study provide important evidence to inform the further development of public health policy, pandemic preparedness, risk communication, health literacy, and digital health systems in Georgia. The evidence generated by this research may also contribute to improving public health emergency preparedness and response strategies at both the national and international levels.

Recommendations.

Based on the findings of the present study, the following recommendations are proposed:

1. For the Ministry of Internally Displaced Persons from the Occupied Territories, Labour, Health and Social Affairs of Georgia.

Preparedness and response plans for public health emergencies should be updated to more comprehensively incorporate behavioral factors, population health literacy, regional inequalities, equitable access to primary, secondary, and tertiary healthcare services, access to digital health services, the development of integrated electronic referral systems, and the needs of vulnerable population groups.

2. For the Ministry of Internally Displaced Persons from the Occupied Territories, Labour, Health and Social Affairs of Georgia.

A long-term digital health strategy and action plan should be developed to support the progressive expansion of digital health services, strengthen integrated electronic referral systems across primary, secondary, and tertiary healthcare levels, improve population health literacy and digital health awareness, and ensure equitable access to digital health services for populations living in the regions, individuals with low socioeconomic status, and persons with disabilities.

3. For the National Center for Disease Control and Public Health (NCDC), Georgia.

The Risk Communication and Community Engagement (RCCE) system should be further strengthened through the regular monitoring of behavioral indicators, population health literacy, risk perception, adherence to government recommendations, and the utilization of digital health services. In addition, evidence-based awareness campaigns and tailored communication strategies targeting different population groups should be developed, implemented, and systematically evaluated.

4. For the National Center for Disease Control and Public Health (NCDC), Georgia.

The National Center for Disease Control and Public Health, regional public health centers, and local self-government authorities should strengthen coordinated efforts in public communication, health promotion, identification of regional needs, support for vulnerable populations, and implementation of public health interventions. Furthermore, multisectoral collaboration should be reinforced among government institutions, primary and hospital healthcare providers, the education sector, local authorities, academic institutions, media organizations, and civil society to ensure coordinated, effective, and evidence-based responses during public health emergencies.

5. For Primary Healthcare Institutions.

Primary healthcare institutions should strengthen health education, promote the early detection of diseases, encourage participation in national preventive health programs, ensure timely referral of patients, and enhance the early identification, initial management, monitoring, and timely referral of individuals with Long COVID to appropriate healthcare services.

The role of primary healthcare, particularly the family physician, should be further strengthened in promoting health literacy, facilitating early disease detection, encouraging participation in national preventive programs, ensuring timely patient referral, and improving the early identification, initial management, monitoring, and referral of patients with Long COVID.

6. For the Hospital Sector and Rehabilitation Services.

It is recommended to strengthen the clinical management of Long COVID, multidisciplinary rehabilitation services, standardization of post-COVID care, continuous patient follow-up, and effective coordination across primary, secondary, and tertiary healthcare levels.

7. For the Ministry of Internally Displaced Persons from the Occupied Territories, Labour, Health and Social Affairs of Georgia, Professional Associations, and Medical Educational Institutions.

Continuous professional development should be strengthened for primary healthcare physicians, public health specialists, hospital-based healthcare professionals, and rehabilitation personnel. Training should focus on risk communication, health promotion, early identification of Long COVID, clinical management, patient referral pathways, the use of digital health services, and the implementation of contemporary evidence-based clinical guidelines in routine practice.

8. For the Ministry of Internally Displaced Persons from the Occupied Territories, Labour, Health and Social Affairs of Georgia and Relevant Professional Medical Societies.

Although a post-COVID rehabilitation protocol is available in Georgia, it is recommended to develop specific national clinical guidelines for the management of Long COVID, establish a standardized national patient referral algorithm and clinical management standards, and ensure their regular revision and integration across all levels of primary, secondary, and tertiary healthcare services.

9. For Educational Institutions and Public Health Organizations.

Educational institutions and organizations working in the field of public health should develop programs aimed at improving health literacy and digital health literacy among the population. These programs should be tailored to different age, educational, professional, and social groups and should promote preventive health behaviors, informed attitudes toward vaccination, and the effective utilization of healthcare services.

10. For the Ministry of Internally Displaced Persons from the Occupied Territories, Labour, Health and Social Affairs of Georgia and the National Center for Disease Control and Public Health.

Based on the study findings, it is recommended to develop a regional monitoring and evaluation mechanism that regularly assesses population health literacy, risk perception, adherence to government recommendations, utilization of digital health services, access to primary, secondary, and tertiary healthcare services, participation in national health programs, and the effectiveness of public health interventions. The information generated should be used to support evidence-based decision-making and the planning of region-specific interventions.

11. For the Ministry of Internally Displaced Persons from the Occupied Territories, Labour, Health and Social Affairs of Georgia, the National Center for Disease Control and Public Health, and Other Relevant Institutions.

The study findings should be incorporated into the planning of evidence-based public health policies to improve the efficient allocation of resources, reduce regional inequalities, enhance equitable access to primary, secondary, and tertiary healthcare services, strengthen health system resilience, and further improve national preparedness for future biological threats.

12. For the Ministry of Internally Displaced Persons from the Occupied Territories, Labour, Health and Social Affairs of Georgia.

It is recommended to plan and implement public awareness activities regarding the procedures, availability, and referral criteria for emergency medical care, telemedicine, online consultations, and other digital health services. Particular attention should be given to populations living in the regions, older adults, individuals with lower levels of education, and people with low socioeconomic status in order to improve timely access to emergency and remote healthcare services.

13. For Scientific and Academic Institutions.

It is recommended to continue multicenter research on the long-term consequences of COVID-19, Long COVID, population behavioral factors, health literacy, health system resilience, digital health services, the effectiveness of risk communication, and preparedness for future biological threats. Such research will contribute to the further development of evidence-based public health policy and the health system in Georgia.

REFERENCES

1. Tyrrell D.A.J, Bynoe M.L. Cultivation of viruses from a high proportion of patients with colds. *The Lancet*. 1966;1:76-77.
2. Zaki A.M, van Boheemen S, Bestebroer T.M, et al. Isolation of a novel coronavirus from a man with pneumonia in Saudi Arabia. *New England Journal of Medicine*. 2012;367:1814-1820.
3. World Health Organization. Severe acute respiratory syndrome (SARS): Status of the outbreak and lessons for the immediate future (WHO/CDS/CSR/GAR/2003.11). WHO. 2003.
4. World Health Organization. Middle East respiratory syndrome coronavirus (MERS-CoV). WHO. 2013.
5. World Health Organization. COVID-19 Strategic Preparedness and Response Plan: Operational Planning Guidelines to Support Country Preparedness and Response. 2020.
6. World Health Organization. Managing Epidemics: Key Facts About Major Deadly Diseases. 2018.
7. World Health Organization. COVID-19 Strategic Preparedness and Response Plan: Operational Planning Guidelines to Support Country Preparedness and Response. 2020.
8. Gavi, the Vaccine Alliance. COVAX explained. 2020.
9. World Health Organization. Global surveillance for COVID-19 caused by human infection with COVID-19 virus: Interim guidance. 2021.
10. World Health Organization. Consensus document on the epidemiology of severe acute respiratory syndrome (SARS). World Health Organization. 2003.
11. World Health Organization. Middle East respiratory syndrome coronavirus (MERS-CoV). World Health Organization. 2024. https://www.who.int/health-topics/middle-east-respiratory-syndrome-coronavirus-mers#tab=tab_1
12. World Health Organization. WHO Coronavirus (COVID-19) Dashboard. World Health Organization. 2025. <https://data.who.int/dashboards/covid19/cases>
13. GBD 2021 Diseases and Injuries Collaborators. Global burden of 288 causes of death and disease in 2021 and the impact of the COVID-19 pandemic: A systematic analysis for the Global Burden of Disease Study 2021. *The Lancet*. 2024;403:2100-2132.
14. World Health Organization. Global pulse survey on continuity of essential health services during the COVID-19 pandemic: Round 4. Geneva: 2022. https://www.who.int/publications/i/item/WHO-2019-nCoV-EHS_continuity-survey-2023.1
15. World Bank. Collapse and Recovery: How COVID-19 Eroded Human Capital and What to Do About It. Washington, DC: World Bank. 2022.
16. World Bank. Universal Health Coverage. Washington, DC: World Bank. 2025. <https://www.worldbank.org/ext/en/topic/health/universal-health-coverage>
17. World Health Organization. Tracking Universal Health Coverage: 2021 Global Monitoring Report. Geneva: World Health Organization. 2022.
18. World Health Organization. WHO COVID-19 Dashboard: Percent positivity and SARS-CoV-2 testing data. 2026.
19. United Nations Children's Fund (UNICEF). COVID-19 pandemic fuels largest continued backslide in vaccinations in three decades. 2022. <https://www.unicef.org/press-releases/covid-19-pandemic-leads-major-backsliding-childhood-vaccinations-new-who-unicef-data>
20. National Center for Disease Control and Public Health (NCDC) of Georgia. Health Care: Georgia Statistical Yearbook 2023. Tbilisi: National Center for Disease Control and Public Health. 2023.

21. National Center for Disease Control and Public Health (NCDC) of Georgia. COVID-19 in Georgia: Epidemiological Situation and Response Measures (9th Revision). Tbilisi. 2022.
22. World Health Organization. Strengthening health emergency prevention, preparedness, response and resilience (HEPR). Geneva: World Health Organization. 2023.
23. World Health Organization. Strengthening health emergency prevention, preparedness, response and resilience (HEPR). Geneva: WHO; 2023.
24. World Health Organization. Risk Communication and Community Engagement (RCCE) Strategy. Geneva: WHO; 2023.
25. World Health Organization. Behavioural and social drivers of vaccination (BeSD): tools and practical guidance. Geneva: WHO; 2022.
26. European Centre for Disease Prevention and Control (ECDC). Lessons learnt from the COVID-19 pandemic. Stockholm: ECDC; 2023.
27. OECD. Ready for the Next Crisis? Investing in Health System Resilience. Paris: OECD; 2023.
28. European Centre for Disease Prevention and Control. COVID-19 communication and community engagement activities in the EU/EEA. 2021. <https://www.ecdc.europa.eu/en/covid-19/prevention-and-control>
29. Organisation for Economic Co-operation and Development. Health at a Glance 2023: OECD indicators. OECD Publishing. 2023. https://www.oecd.org/en/publications/2023/11/health-at-a-glance-2023_e04f8239.html.