



# Determining the digital maturity index for assessing population health

UDC 314.7:614.49:007



PhD, Associate Professor **O.V. Astafeva**<sup>1</sup>

**O.A. Borodina**<sup>1</sup>

**L.V. Perednih**<sup>1</sup>

PhD, Associate Professor **S.A. Ulyanova**<sup>1</sup>

<sup>1</sup>Financial University under the Government of the Russian Federation, Moscow

Corresponding author: astafeva86@mail.ru

Received by the editorial office on 12.07.2025

## Abstract

**Objective of the study** is to provide a theoretical justification for the digital maturity index of the population in physical health management as an indicator of the demand for digital tools in maintaining a healthy lifestyle.

**Methods and structure of the study.** A comprehensive approach was applied, including comparative analysis, analysis and synthesis methods, and modelling.

**Results and conclusions.** The Digital Maturity Index for Managing Physical Health (DMIMPH) is a metric tool that quantifies the degree of integration of digital technologies into the management of human physical health based on the monitoring and assessment of biological parameters. DMIMPH allows assessing the level of digital maturity of the population using modern devices, health monitoring systems, and data exchange technologies. In this article, digital maturity is understood as the level of awareness, efficiency, and interest of a person in using modern technologies and technical devices.

According to the authors, the digitalisation of health is the process of introducing and applying technologies and technical means into the daily life of an individual for the independent analysis, monitoring and control of health and physical condition. The article presents the main components of the human health digitalisation index, its calculation formula and a comparison with traditional health assessment scales, such as SF-36 and the Human Health Index (HHI). It is assumed that a high level of DMIMPH will, over time, contribute to the development of the accessibility and effectiveness of preventive medicine and telemedicine.

Research into the Digital Maturity Index of Population Health Management (DMIMPH) opens up promising avenues for analysing the role of digital tools in modern medicine, as well as for developing new approaches to the digital maturity of patients in the context of telemedicine and preventive medicine.

**Keywords:** healthy lifestyle, digitalisation, digital maturity index of the population in physical health management (DMIMPH), digital technologies, public health.

**Introduction.** In recent years, digital technologies have been actively introduced into all spheres of society [4]. As is well known, the health of the nation is the most important strategic resource of any country, on which the competitiveness of the workforce, labour productivity, the state of the national economy and the sustainable development of society and the state depend [1]. Physical health requires not only a traditional approach to assessment, but also the introduction of new metrics that take into account the impact of digitalisation. In this regard, it is important to develop tools that allow for a quantitative assessment of the level of use of digital tools for analysing and monitoring human health and to identify the degree of influence of digital technologies on the healthcare system.

**Objective of the study** is to provide a theoretical justification for the digital maturity index of the population in physical health management as an indicator of the demand for digital tools in maintaining a healthy lifestyle.

**Methods and structure of the study.** A comprehensive approach was applied, including comparative analysis, analysis and synthesis methods, and modelling.

**Results of the study and discussion.** Various indices are currently used to assess the level of development of medicine (Figure 1).

However, the intensive development of digital technologies and the availability of information about health status contribute to the emergence of a new scientific and practical task: the development of a quantitative tool for assessing the level of digital maturity.

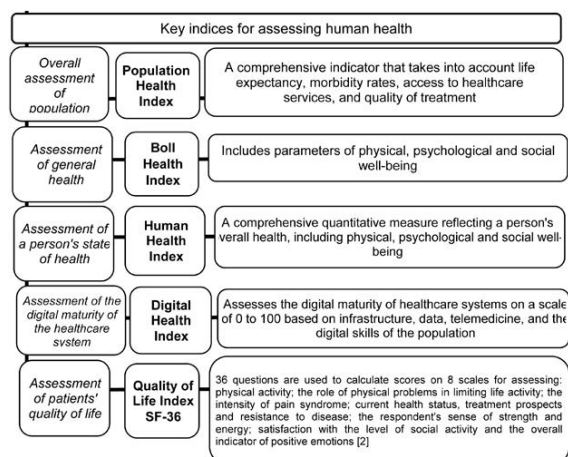


Figure 1. Main indices for assessing human health  
(Source: compiled by the authors)

ity of the population and monitoring human physical health through interaction with digital tools.

The weighted components of the Digital Maturity Index for Population in Physical Health Management (DMIMPH) will be two groups of factors that influence the level of digital maturity of individuals.

1. Government influence, including the following components: electronic medical records, telemedicine consultations, the EMIAS application<sup>1</sup>.

2. Personal initiative involves a number of components: the availability and number of wearable devices (fitness trackers, smart watches, glucometers, heart rate monitors).

The calculation of the Digital Maturity Index for Population in Physical Health Management (DMIMPH) can be represented as a formula that combines all components, taking into account their weight and level of development:

$$DMIMPH = \sum_{i=1}^N \left( \frac{V_i \cdot N_i}{100} \right) \quad (1)$$

where  $V_i$  – is the weight coefficient of the component (totalling 10),

$N_i$  – is the value on a scale from 0 to 100 for each component,

$N$  – is the number of components characterising the digitisation of health.

<sup>1</sup> emias.info

Each component has a weighting factor  $V_i$ , where the sum of all  $V_i = 10$  (i.e. the maximum total DMIMPH score will be 10). First, it is necessary to determine the weighted value for each component  $i$ , then, the results obtained are summed up and the final DMIMPH is determined in the range from 0 to 10. A value from 0 to 10 is a generalised quantitative assessment; the closer the indicator is to 10, the higher the level of digitalisation of human health (Table 1).

\*The authors support the view expressed in the report 'A New Digital Tool for Personalised Health Management in the 4P Medicine Model' by D.S. Yankevich, A.V. Martushev-Poklad from the Prof. I.V. Pryanikov Federal Scientific and Clinical Centre for Resuscitation and Rehabilitation, on the inappropriateness of using digital tools and services in complicated cases of age-related diseases<sup>2</sup>.

Let us assume that during the survey of one respondent, it was revealed that the person had used three components of modern digital technologies in relation to traditional health management methods during the year, namely 80/20 for the use of wearable devices, 70/30 for telemedicine consultations, and 90/10 for the use of digital medical records (Table 2).

In this case, we obtain the following:

$$HHDI = (4 \times 80 / 100) + (3 \times 70 / 100) + (3 \times 90 / 100) = 3,2 + 2,1 + 2,7 = 8,0$$

A score of 8.0 indicates a high level of digital maturity in the respondent's health.

Thus, the Digital Maturity Index for Population in Physical Health Management (DMIMPH) shows the level of a person's involvement in using digital technologies to manage and monitor their health.

To determine the difference between the Human Health Index (HHI) and the Digital Maturity Index of the Population in Physical Health Management (DMIMPH), let us consider their key characteristics (Table 3).

The Human Health Index (HHI) is a comprehensive quantitative measure that reflects an individual's over-

<sup>2</sup> [https://mrik-fmba.ru/images/pages/Nauka/Kongress%202/Vil-lizij%201/Prezentacii/Ankevich\\_Novyyj%20cifrovoj%20instrument.pdf?ysclid=mcun4awj1s511793128](https://mrik-fmba.ru/images/pages/Nauka/Kongress%202/Vil-lizij%201/Prezentacii/Ankevich_Novyyj%20cifrovoj%20instrument.pdf?ysclid=mcun4awj1s511793128)

Table 1. Description of DMIMPH levels

HHDI level	Description	Результат
Low level	Minimal use of digital tools to maintain personal health*	0-3
Medium level	Use of basic technologies, but without a systematic approach	4-6
High level	Active use of digital solutions for self-monitoring and maintaining health	7 – 8
Very high level	Full integration of digital technologies into everyday health care practices	9-10

(Source: compiled by the authors)



Table 2. Example of DMIMPH index assessment (based on one respondent)

Component	Vi (weight)	Ni (rating from 0–100)
Use of wearable devices	4	80
Telemedicine consultations	3	70
Digital medical records	3	90

Table 3. Distinctive characteristics of the human health index and the digital maturity index of the population in physical health management

Characteristics	Purpose of Human Health Index (HHI)	Purpose of Digital Maturity Index for Managing Physical Health (DMIMPH)
Objective	Assessment of human health	Assessment of the level of health digitisation
Focus	General health	Degree of physical connectivity
Methodology	Based on questionnaires, statistics, mortality and morbidity rates	Based on device specifications, level of automation and data quality
Measurements	Health	Integration of health data based on the use of technical devices
Scope	Diagnosis, prevention, government policy	Digital healthcare, telemedicine, IoB technologies

(Source: compiled by the authors)

all health status and takes into account their physical health, mental well-being, nutrition, morbidity, life expectancy, quality of healthcare, and social conditions [3]. The index is widely used in epidemiological studies and is used for comparative analysis of the health status of the population at the regional and national levels.

Despite their different purposes, the HHI and DMIMPH indices should be viewed as complementary tools that, when used together, will provide a more complete picture of the current state of the population's health and its readiness for the digital transformation of the healthcare system. An increase in the DMIMPH level can contribute to an improvement in the HHI through early detection of pathologies, increased accessibility of biometric information, and a stronger focus on conscious prevention in health management. However, there may also be situations where a high degree of digital integration (high DMIMPH) is not accompanied by an improvement in actual health status (low HHI), or vice versa – a person has a good level of health but has virtually no interaction with digital technologies.

**Conclusions.** The combination of traditional health assessment indices with new digital integration metrics allows for more accurate diagnosis of the public health status of the population and the formation of public policy strategies aimed at strengthening sovereignty through human resource development. Digitalisation in healthcare and everyday life encourages citizens to take an active role in managing their own health, which strengthens the preventive focus

of medicine and improves overall quality of life. At the same time, DMIMPH serves as a relevant tool for assessing the digital maturity of the population and its readiness to implement new technologies in the practice of healthy lifestyles.

The proposed methodology can be used to assess the level of digital maturity not only of an individual, but also of a family, city, region and country as a whole.

### References

1. Astafeva O.V., Kuznetsov D.S., Lysenko N.A., Romanov S.A. Srovnitelnyy analiz razvitiya chelovecheskogo kapitala v rossiyskikh i zarubezhnykh kompaniyah. Regionalnaya ekonomika: teoriya i praktika. 2022. V. 20. No. 8. Pp. 1549-1566.
2. Amirdzhanova V.N., Goryachev D.V., Korshunov N.I., Rebrov A.P., Sorotskaya V.N. Populyatsionnye pokazateli kachestva zhizni po oprosniku SF-36 (rezultaty mnogotsentrovogo issledovaniya kachestva zhizni «MIRAZH»). Nauchno-prakticheskaya revmatologiya. 2008. No. 46(1). Pp. 36-48. DOI: 10.14412/1995-4484-2008-852.
3. Bolla E., Kalman Ya. Indeks zdorovya cheloveka: metodologiya i primeneniye. Zhurnal sotsialnoy i klinicheskoy meditsiny. 2021. No. 3. Pp. 45-52.
4. Shipkova O.T., Eliseeva E.N., Kuzmina A.A., Ulyanova S.A. Tsifrovaya ekonomika: uchebnik. Moskva: Obshchestvo s ogranichennoy otvetstvennostyu «Rusayns», 2024. 146 p. ISBN: 978-5-466-07893-0. EDN: RDUOVA.