Ekaterina Vetrova[1]**, Daria Vasianina**[2]**, Ivan Mityushnikov**[3]
Faculty of Economics of Lomonosov Moscow State University,
1 Leninskie Gory, building 46, Russian Federation, 119991, Moscow
https://www.econ.msu.ru

THE INFLUENCE OF ELDERLY PEOPLE' SOCIALIZATION ON THEIR PERCEPTION OF HEALTHCARE SERVICES QUALITY

Abstract. The state of the health care system is an important characteristic of the country's social and economic development, but the results of surveys can not demonstrate an objective result. The respondents are influenced by a number of factors, including their level of socialization, in assessing healthcare services. In the article, we consider the hypothesis that communication with relatives and neighborhood significantly increases the relative pessimism of the subjective evaluation of healthcare services by the elderly. In order to reduce the incompatibility of subjective assessments of respondents, the anchoring vignette method is used.

Keywords: ageing, demography, healthcare, aging, socialization of the elderly, family, private intergenerational transfers, vignettes

JEL codes: I130, I120

1. Introduction

The importance of an effective health care system can not be overemphasized. However, getting an accurate assessment of the quality of healthcare services is a difficult task. It is necessary to take into account the availability and effectiveness of medical services at the same time. [Johansson, 1996]. Patients attach great importance to the quality of medical services, are willing to visit not the nearest medical institutions and pay for their quality [Akin, Hutchinson 1999; Choi et al., 2004]. To create the most patient-oriented system, it is critically important to measure the patients' perception of the quality of care and to understand what it is determined by. A large number of factors associated with and not related to

---

[1] Vetrova Ekaterina, undergraduate student, the Faculty of Economics of Lomonosov Moscow State University. E-mail: e.tailwind@mail.ru

[2] Daria Vasianina, undergraduate student, the Faculty of Economics of Lomonosov Moscow State University

[3] Ivan Mityushnikov, undergraduate student, the Faculty of Economics of Lomonosov Moscow State University

the provision of specific medical services affect the assessment of the healthcare services of the patient. Scientists have been dealing with this problem for over a decade, but it does not lose its relevance due to the constant need to improve the healthcare system. Most often, such studies are conducted by interviewing patients. Respondents are usually invited to assess the healthcare system by one scale or another. However, this assessment is subjective, since each patient perceives the proposed scale in his own way depending on personal characteristics and characteristics of the environment.

At the moment, the healthcare system in Russia remains insufficiently targeted and adapted for the elderly, while they become the main consumers of medical services as the population ages. It is the elderly, especially those living alone, who often need outside help, and as a result, there is a demand for medical services, which is partly covered by the healthcare system, and the rest is borne by relatives [Prokofieva, Mironova, 2015].

In this paper, the issue of comparability of subjective estimates of medical services by elderly people is studied. Why do respondents tend to give more optimistic or pessimistic assessments of health services? What affects the patients' perception of the quality of these services?

To assess the degree of deviation of subjective estimates from the objective ones for each respondent, we use the Vignettes Approach method. For today this method is practically not applied in researches in Russia. In this work, we aim to not only investigate the influence of factors determining the perception of healthcare services by elderly people, but also to find out how the socialization of the elderly, that is, their communication with children, relatives and friends, shifts their subjective assessment of medical services. In the modern world, due to the instability of marriages and other trends in the formation of the family, the role of intergenerational transfers has increased especially [Swartz, 2009]. We assume that the maintenance of informal social ties with close people and the provision of the necessary care on their part increases the demands of the elderly for the healthcare system. Intergenerational transfers can replace elementary formal assistance for them, which means they expect improved quality of services from the healthcare system.

2. Literature review

When thinking about caring for elderly members of a household, it is common to think of two types of assistance: informal, provided by children and other relatives and friends, and formal, carried out by professional nurses and social workers. A study by Adrian Kalwij et al showed that 30% of informal assistance to elderly Europeans (over 65 years old) is provided by friends and relatives [Kalwij et al., 2014]. The authors detailed classification by separating informal help from relatives (other family members, excluding children) and friends

(including neighbors). The main conclusion of the article is that older people in need of help appreciate not only the support of children and the formal work of medical personnel, but also the help of other relatives and friends. It was also found out that those elderly people who can not rely on children for one reason or another need not only more assistance from social workers. They also expect more communication from friends and relatives. Thus, medical services can not completely replace informal human connections and help, which means that not only such objective factors as the qualification of the doctor and the availability of necessary medications will affect the evaluation of healthcare services by the elderly, but also the human attitude of the staff, and the availability of assistance from relatives.

The issue of examining patients' opinions about the health care system is not new. This is confirmed by, for example, an article [Sofaer, Firminger, 2005], the authors of which analyzed a considerable number of surveys that examined people's attitudes to healthcare services. The most important factors are the attitude of personnel [Larrabee, Bolden, 2001; Ngo-Metzger et al., 2003], the quality of technical equipment and services [Jun et al, 1998; Anderson et al., 2001], and the arrangement of hospitals and polyclinics [Stichler, Weiss, 2000]. Evaluations are also made up of the patient's expectations of assistance and feelings from the actual visit [Ross et al., 1994; Kravitz, 1996]. The complexity of research on this topic is that the representations and expectations are different for all patients and can change after a visit to the clinic. The perception of the quality of services can be unstable over time, that is, patients will respond differently about reception immediately after it and after a few weeks [Jackson et al., 2001]. According to the results of the research, the patient's demographic characteristics, for example, gender and age, also influence the evaluation of the healthcare services by the patient (e.g. older respondents give on average higher scores), one's health and illnesses which bother him/her (higher ratings are given by those who possess a relatively better health condition).

It is interesting to know whether only the technical characteristics of medical and preventive institutions influence the evaluation of health services, or "external" factors that occur outside hospital walls, also play an important role. Data from earlier studies show, for example, that informal care for the elderly from their children is a substitute for formal care at home. [Van Houtven, Norton, 2004; Bonsang, 2008; Bolin et al., 2008; Lee et al.,2012] investigated the impact of informal family care on formal care for the elderly in Korea and found that informal family assistance, intergenerational transfers can to some extent replace formal health services, however, only for some groups of older people. For example, intergenerational transfers are a substitute for formal care for people with diabetes, high blood pressure and mental illness. In addition, with age, the help of relatives becomes more important for the elderly. In assessing the perception of the healthcare system by the elderly, it is necessary to take into

account factors that affect the need for health services. According to the results of the article [Lee et al., 2012], one can say that such factors include, among others, assistance from relatives and the presence of some chronic diseases. It is also necessary to take into account the age of respondents and their mental health.

In addition, such characteristics of the respondents as age and education influence their perceptions of health, the need for healthcare, and hence, probably, perception of medical services [Grol-Prokopczyk et al., 2011]. According to the research of Hoeck, Van der Heyden et al., older people may have different attitudes to their health, which means different demands on the healthcare system depending on the level of income [Hoeck et al., 2014]. To test this hypothesis on the data for Russia, this study included a pension variable for each respondent.

3. Data

The research is based on the results of the World Health Organization (WHO) Study on Global Ageing and Adult Health-2007/10, Wave 1, This survey was conducted in Russia in 2007-2010, adults over 18 years of age were interviewed with an emphasis on population over 50 years. The data is not publicly available, but they are available on request at WHO. The sample is representative of the country, it was built on the basis of the results of the 2002 All-Russia Population Census and WHO's 2003 survey on federal districts and regions of Russia. From the survey, only subjects with a low population density (less than 0.2% of the total population of the country) were excluded. Of the 7,200 suitable households, 4644 were visited, of which 1407 participated in the survey. In total, 1000 respondents in the age group of 18-49 and 5000 respondents over 50 years participated in the survey. Both urban and rural residents were interviewed. The questionnaires are quite extensive and cover many important aspects of life: social and economic characteristics of the respondent, work activity, health status, healthcare services, social connections, satisfaction with the standard of living, as well as household management, family income and expenses, intrafamily and external transfers.

Individual data (individual questionnaires) and household data were used for the study. Two sets of data were linked to the ID of the household. The questions were renamed, some of the variables were converted to binary ones from discrete ones (Table 1). The sample is limited both by age — we were interested in persons of retirement age (for women, the lower limit is 55 years, the age of the men examined is 60+), and by type of respondent household — only elderly people live in the studied households. We also used only observations that do not have omissions or vague responses in the variables of interest to us. As a result, 850 observations were left in the sample. Data quality (no errors or omissions of answers that are coded as 98, 99 or -8) is indicated by descriptive statistics (Table 1). The exact formulations of the questions from the questionnaire used in the study are given in the Appendix, Table 1.

Table 1. Description of the variables used in the study

Variable	Variable type	Average	Median	Minimum	Maximum
Deviation of estimate *	Quantitative	2.3	2.6	-3.6	7
School**	Binary	0.6	1	0	1
Postgraduate education**	Binary	0.0	0	0	1
Angina pectoris	Binary	0.4	0	0	1
Asthma	Binary	0.0	0	0	1
Depression	Binary	0.0	0	0	1
Cataract	Binary	0.2	0	0	1
Family assistance	Binary	0.3	0	0	1
Time with family	Hours per week	1.2	0	0	70
Pension	Rubles per month	6608.4	5050	0	50000
Age	Years	71.5	71	55	99
Age^ 2	Years squared	5173.5	5041	3025	9801
Public events	Discrete 1 — never 5 — daily	1.3	1	1	5
Meetings with community leaders	Discrete 1 — never 5 — daily	1.2	1	1	5
Activity outside the home	Discrete 1 — I would like to go out more often 2 — generally satisfied with how often one goes out into the street 3 — I would not want to go out more often	1.7	2	1	3

* The 'Deviation of the estimate' variable shows the difference between the assessment of the healthcare services by the respondent himself and the estimate adjusted by the vignettes. The assessment is obtained using the respondents' answers to the question about the level of the healthcare system (discrete variable: 1 - completely satisfied with the system, 5 - completely dissatisfied) and answers to vignettes - how the respondent assesses the healthcare system in the described hypothetical situations (discrete variable, the same 5-point scale).

** The variables 'School' and 'Postgraduate School' are arranged so that, if the respondent received a full secondary education or graduated from the postgraduate program, the corresponding variable is equal to 1, and in the opposite case to zero. The remaining levels of education are not considered, since they do not have a significant impact on the rejection of healthcare assessment by the respondent.

4. Models

Since the main goal of our research is to identify factors that affect the perception of health services by older people, it is first of all necessary to assess this perception. The respondents are offered to evaluate healthcare services on a five-point scale. However, a number of factors influence the patient's perception, such as one's environment, physical and psychological state. A more prosperous person has high demands on the healthcare system, while other people need minimal attendance. To obtain a single scale and the comparability of individual estimates, we use the vignette method. It will enable comparing the assessments of different respondents, correcting them by taking into account the personal perception of the healthcare system and the quality of medical care. The first part of our model is assessment of the degree of subjectivity of respondents' answers using the vignette method.

Nonparametric method of vignettes

The first step that must be taken to obtain the dependent variable is to compare the subjective scales of the respondents when answering the question about satisfaction with medical services. For this purpose the method of "Anchoring Vignettes" [Wand et al., 2011] was chosen. The essence of the method is that the respondents' answers are adjusted depending on their answers to the "vignettes". Vignette is a small story describing the situation of an abstract person, after reading which, in our case, the respondent was to assess how satisfied he is with the medical care of the character of the story. According to the model, respondents should relate to the experience of hypothetical people as if it were their own experience. Then, using these vignettes as "anchors" or "gold standard", we correct the respondents' answers. The correctness of the survey results is ensured by the order of the questions: Vignettes in the questionnaire are placed before the question of the respondent's own condition, which prepares him for a more deliberate assessment [Hopkins, King, 2010].

Below are some examples of vignettes:

[Robert] broke his arm. The doctor told him about various options for its fixation and after that drew blood for analysis. [Robert] did not know why he needed to give blood and was nervous until the doctor explained the reason for having to take the test. How do you assess the extent of Robert's involvement in the decision to treat him?

[Stan] broke his leg. He took an hour to get to the nearest hospital. He was hurt, but he had to wait for the surgeon for an hour, and he was operated on the next

day. How do you estimate the amount of time that Stan spent before he received medical help?

There are two approaches to using vignettes: parametric and nonparametric. Parametric enables including answers to vignettes with certain coefficients in the regression of respondents' assessment of healthcare services. Thus, the answers to vignettes with a certain weight will explain the shift in the respondents' assessment relative to the objective. The nonparametric method enables correcting the estimate by translating the answers into a new scale with account to the vignettes [King, Wand, 2007]. Since the research task is to bring subjective scales of assessments of different people to a single, unified one, we first use a nonparametric approach. Below we shall give its description.

The answer to the question about medical care for the i-th respondent will be denoted as y_i. His answer to the first vignette is z_{i1}, the second one is z_{i2}, and so on. To bring respondents' answers to a single scale, function C_i (1) is introduced. This makes it possible to operate not by assessing respondents who may be overstated or underreported, but by assessing the level of healthcare in relation to the cases common to all respondents described in vignettes. So if the respondent tends to overestimate the ratings, he will overstate them in the case of vignettes, and function C_i will lead all the answers to their location relative to the vignettes.

$$C_i = \begin{cases} 1, y_i < z_{i1} \\ 2, y_i = z_{i1} \\ 3, z_{i1} < y_i < z_{i2} \\ ... \\ 2n-1, y_i > z_{in} \end{cases}$$

$$(1)$$

In total, 7 vignettes were used in the survey. In this case, the vignettes should be ranked in order of "deterioration" of the situation, that is, the answer to the first vignette is expected "very good", and the last one — "very bad". The exact wording of the SAGE vignette issues is given in the Appendix, Table 2.

Now it is necessary to choose which of the 7 vignettes to include in the analysis. To do this, let's use the vignette ranking function included in the used anchors package in the R environment. The ranking is carried out in order to arrange the vignettes in the order in which they were placed by the majority of the respondents, and at the same time exclude those of them whose answers are similar. The more respondents place the vignettes in the intended order, the more relevant the final score will be.

The initial table of the frequency of a sequence of vignettes is given in Table 3 in the Appendix. The first column shows the order of the ranking of the vignettes. For example, in the second line "7,{1,2,3,4,5,6}" means that the majority

of respondents evaluate the case described in vignette 7 as the best, putting it first. The third line (7.5, {2,3,6}, {1,4}) means the following ranking by popularity of vignettes by the respondents: 7 is the best case, followed by 5, followed by 2, 3 or 6 in different sequences and the worst situation is 1 or 4.

Table 2 shows the proportion in which one vignette occurs before the other.

Table 2. The percentage of cases when the selected vignette under number i is less than the vignette at number j (the i-th vignettes in rows, j-th — in columns).

	<1	<2	<3	<4	<5	<6	<7
1	NA	0.05	0.098	0.213	0.021	0.093	0.008
2	0.451	NA	0.238	0.486	0.087	0.247	0.055
3	0.466	0.22	NA	0.491	0.08	0.274	0.057
4	0.191	0.08	0.088	NA	0.024	0.085	0.025
5	0.686	0.47	0.457	0.687	NA	0.506	0.142
6	0.424	0.174	0.208	0.421	0.054	NA	0.044
7	0.751	0.615	0.608	0.764	0.413	0.644	NA

After the analysis, we selected 4 vignettes in the following order — vign7, vign5, vign6, vign1.

Thus, the number of observations without disruption of the natural order was 528. The final distribution table is shown below (Table 3).

Table 3. The percentage of cases when the selected vignette under number i is less than the vignette at number j (the i-th vignettes in rows, j-th — in columns).

	<7	<5	<6	<1
7	NA	0.413	0.644	0.756
5	0.142	NA	0.506	0.686
6	0.044	0.054	NA	0.424
1	0.008	0.021	0.093	NA

Then we introduce function C_i, which sets the rank for the respondent's answer, formula (2).

$$C_i = \begin{cases} 1, y_i < z_{i7} \\ 2, y_i = z_{i7} \\ 3, z_{i7} < y_i < z_{i5} \\ \ldots \\ 9, y_i > z_{i1} \end{cases} \qquad (2)$$

For the set of vignettes obtained, we calculate the value of the function for each respondent.

However, since for some respondents this function is determined ambiguously (for those who have placed the vignettes in a different order), we denote the interval in which all suitable values of the function C_i fall for them. Next, we assign to each such interval a rank that will minimize the entropy of the arrangement of the vignettes within each group. That is, for such answers we will find the rank in which the respondents' answers are most similar to the answers in this interval. Table 4 in the Appendix contains ranks for intervals that minimize entropy from the data under study. The values obtained are some objective scale, which in future will be used to compare respondents' answers by bringing their subjective scales to a single unified one.

The last step is to transfer the ranks to the scores given to the single scale, and to calculate the difference between them and the respondents' answers. To do this, let's multiply the answers by 9/5 (the number of ranks / the number of possible estimates), and then subtract the obtained ranks, that is, unified estimates from them. The variable obtained shows how much the respondent's score is lower or higher than the unified, that is, the amount of deviation (positive or negative) of the subjective evaluation from the objective.

Parametric method of vignettes

As a rule, the nonparametric method of vignettes is used together with the parametric method. Let's verify with the help of parametric analysis the hypothesis about the significant influence of time spent with the family on shifting estimates of the healthcare system to the elderly.

The difference between the parametric method and the nonparametric method lies in the additional hypothesis that people distort the health assessment not only due to their own bias, but also because of the discrete scale it proposes. Initially, the level of health is expressed by a number on a continuous scale. When respondents report their estimates of this level, there are two types of distortions. The first is the subjective perception of the health system, which was mentioned earlier. The second kind of distortion is that respondents are asked to express their assessment on a discrete scale. Since initially the perception of the level of health takes place on a continuous scale, as well as its objective value, people have to make a continuous assessment to a discrete scale. This is the second distortion [Wand et al., 2011].

Thus, for each respondent there are critical values that allow bringing continuous estimates to the scale. If the respondent's score falls between two critical values, he reports a discrete estimate corresponding to this interval [King, Wand, 2007].

In a survey conducted by SAGE, respondents needed to assess the level of the healthcare system on a five-point scale. Thus, respondents have 4 critical values (cut1, cut2, cut3, cut4). (Fig.1)
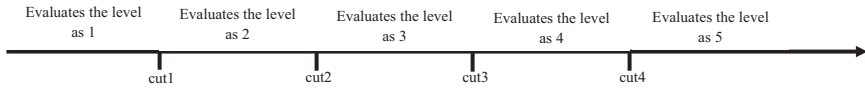
Figure 1. Scheme of correlation of continuous perception of the level of the healthcare system by the respondent with his answers on a discrete scale.

The results of the parametric analysis of the data studied in the article are given in the Appendix, Table 5. Each of the four regressions at the beginning of the table provides an opportunity to calculate individual critical values obtained by substituting personal responses and variable values into regression. Variables whose name begins with cut1 enter the regression of the first critical value, cut2 — the second, and so on.

The parametric method requires more objective indicators for analysis, therefore part of the explanatory variables differs from those included in the regression of the nonparametric method : some individual characteristics are replaced by the indicators of the respondents' region of residence: per capita income in the region, the average number of hospital beds per capita, and so on.[1] According to the analysis conducted with the help of the parametric vignette method, the time spent with the family, turned out especially significant for low ratings. When an elderly person chooses between "not satisfied with the healthcare system" and "not at all satisfied with the healthcare system," the importance of family support is greatest. The results show that the more time relatives assist an elderly person, the more he/she is inclined to assess the level of the health system at the lowest score ("5" on the SAGE scale is "not at all satisfied with the healthcare system"). Respondents who have access to a good, in their opinion, healthcare system, do not change their opinion about it depending on the assistance of relatives. Also note that age is significant in each of the four regressions, but it affects the dependent variable with different signs, depending on the number of the critical value. Thus, the main results of the parametric method confirm the earlier findings about the impact of the care of relatives on assessments of the health care system by older people.

5. The results of assessing the impact of social factors on the perception of healthcare services

In this paper, we will dwell in detail on the results of the nonparametric method of vignettes, as more illustrative ones. To answer the main question of our study, we construct a regression of the obtained estimates of the deviations of respondents' answers to a number of social and physical indicators of the

---

[1] The data for the regions are calculated on the basis of corresponding Rosstat indicators for the period 2007-2010.

respondents, which are identified with reference to past studies. We assume that if the satisfaction of the elderly person under the influence of communication with the family increases, then his demands for the healthcare system are overstated.

Most researchers considering healthcare service assessments use probit models in their work. However, in this paper, the deviation of the health services assessment given by each respondent from the one calculated on a unified scale is considered, which is closer to the evaluation of the impact of informal assistance from relatives on the need of the elderly in the formal one. To the chosen dependent variable, binary choice models are not applicable, hypothesis testing showed that the Least Squares Method describes the data most correctly. When constructing the models, the linear least squares method, as well as a variant with the addition of logarithms, were estimated. The Ramsey test shows that the most successful specification is the linear least-squares method. To test the stability of the model, several sets of variables were evaluated. The results are shown in Table 4.

Table 4. Least Squares Method models that assess the deviation of the self-assessment of healthcare system respondents from the most objective (Deviation estimates). In the models, robust estimates of standard errors (with a correction for heteroscedasticity), variant HC1, were used.

Regressor	Model 1	Model 2	Model 3
Time with family	0.02 **	0.02 **	0.02 **
	(0.009)	(0.009)	(0.008)
Logarithm of the Pensions variable	0.05		0.05
	(0.075)	–	(0.075)
Age	0.07 ***	0.08 ***	0.06 ***
	(0.021)	(0.011)	(0.021)
Age^ 2	−0.0005 ***	−0.0005 ***	−0.0005 ***
	(0.000)	(0.000)	(0.000)
Angina pectoris	0.15	0.14	0.14
	(0.103)	(0.102)	(0.103)
Asthma	−0.41 *	−0.43 *	−0.44 *
	(0.249)	(0.240)	(0.245)
Depression	0.40	0.52 *	0.42
	(0.280)	(0.283)	(0.281)
Cataract	−0.21 *	−0.20 *	−0.21 *
	(0.125)	(0.124)	(0.125)
Public events	0.16	—	0.16
	(0.099)		(0.098)
Meetings with community leaders	−0.31 ***	−0.20 **	−0.31 ***
	(0.114)	(0.101)	(0.114)
Activity outside the home	−0.15	−0.14	−0.14
	(0.104)	(0.102)	(0.104)

Regressor	Model 1	Model 2	Model 3
School	0.21 *	0.21 **	0.20 *
	(0.107)	(0.105)	(0.106)
Postgraduate education	−0.78 ***	−0.78 ***	−0.77 ***
	(0.106)	(0.097)	(0.103)
Family assistance	−0.08	−0.07	—
	(0.124)	(0.124)	
R^2	0.724	0.722	0.724
R^2_{adj}	0.719	0.718	0.719
n	825	850	825
Ramsey test	0.878	0.911	0.78

(* — the variable is significant at a 10% level, ** — significant at 5%, *** — significant at a 1% level)

By results of the regressions it can be said that the model is quite stable (R^2 in all variants is at the level of 0.72), the coefficients vary insignificantly. The Ramsey test shows that the model specification is correct (p-value> 0.5). All three equations are significant at a 1% level of significance.

As expected, socialization does have a significant impact on the deviation of subjective assessments of older people. With all the specifications, social activity is significant (meetings with community representatives are significant at a 1% significance level). At the same time, communication with others leads to a deterioration in the perception of health (since the scale of health assessment is from 1 — very good to 5 — very bad). The help time is included in the regression with a positive small coefficient (slightly worsens the perception). In addition, some chronic diseases have also proved significant, in particular, the perception of medical services worsens the presence of depression, which is expected. The level of education was also significant. The presence of post-graduate education in the respondent improves his/her perception of the level of medical services. Age and square of age are significant, the older the person, the sooner he is inclined to give a pessimistic assessment.

6. Conclusions

In this study, we identified factors that affect the evaluation of health services by the elderly, and also assessed the impact of informal care by family and friends on the evaluation of health services. Socialization of the elderly person has a significant influence on the deviation of his/her subjective evaluation from the objective. The assessment of healthcare services on average is lower, with other things being equal for respondents supported by their friends and relatives, helping them cope with the difficulties that arise. This means that more socialized people tend to give worse assessment of the healthcare system. We believe that this is due

to higher requirements for the services of older people who are used to caring from the family and friends. The analysis confirmed our initial hypothesis: patients who receive more care at home expect better quality of care in healthcare facilities, which explains the pessimism of healthcare system assessments.

The analysis showed that the perception of healthcare services is influenced by factors such as the age of the respondent, education, the presence of certain specific chronic diseases. Age has a negative impact on the assessments of respondents. The older the person, the worse he assesses the medical services provided and is more demanding of them. If the respondent has a postgraduate education, the deviation of his own estimate from the corresponding assessment according to the given single scale will be significantly less. Older people who graduated from the postgraduate course present, on average, lower requirements for medical services. Chronic diseases, especially asthma and depression, have a significant impact on the subjectivity of the perception of the healthcare system. The presence of depression leads to a deterioration in assessments, while the presence of asthma improves the perception of services. The difference in the sign of influence can be associated with the specificity of particular diseases. So, depression differs by a pessimistic view on all that is happening, including the quality of healthcare services. In turn, asthma is a fairly common disease, and the availability of known methods of medical care for people with this disease can positively affect their perception of the healthcare system.

According to the results of our study, it can be concluded that to obtain the most comparable assessments of the healthcare system, it is necessary to take into account not only the assessments themselves, but also some issues related to the socialization of people, their communication with relatives. The very study of the effectiveness of the system based on the results of interviews is justified, since it allows simultaneously tracking the availability and effectiveness of medical services. With the use of additional amendments to the social activity of respondents using vignettes, it is possible to identify the objective level of healthcare services and ways to improve patient satisfaction.

References

1. Prokofieva L. M., Mironova A. A. 2015. The role of inter-family exchange in the system of material support and care for the elderly in modern Russia. *Demographic Review*. 2(3): 69-86, eISSN: 2409−2274. (in Russian)
2. Akin J. S, Hutchinson P. 1999. Health-care facility choice and the phenomenon of bypassing. In Health Policy Plan 1999. 14 (2): 135−151, DOI: 10.1093/heapol/14.2.135
3. Anderson R. T., Barbara A. M., Weisman C., Scholle S. H., Binko J. et al. 2001. A qualitative analysis of women's satisfaction with primary care from a panel of focus groups in the national centers of excellence in women's health. *Journal of Womens Health & Gender-Based Medicine*. 10(7): 637−647. DOI:10.1089/15246090152563515

4. Bolin K., Lindgren B., Lundborg P. 2008. Informal and formal care among single-living elderly in Europe. *Health Economics*. 17: 393−409, DOI: 10.1002/hec.1275

5. Bonsang E. 2008. Does informal care from children to their elderly parents substitute for formal care in Europe? *Journal of Health Economics*. 1: 143−154. DOI: 10.1016/j.jhealeco.2008.09.002

6. Choi K. S, Cho W. H, Lee S, Lee H, Kim C. 2004. The relationships among quality, value, satisfaction and behavioral intention in health care provider choice: a South Korean study. *Journal of Business Research*. 57(8): 913−921. DOI: 10.1016/S0148-2963(02)00293-X

7. Grol-Prokopczyk H., et al. 2011. Using Anchoring Vignettes to Assess Group Differences in General Self-Rated Health. *Journal of Health and Social Behavior*. 52(2): 246−261. DOI: www.jstor.org/stable/23033247

8. Hoeck S., Van der Heyden J., Geerts J., Van Hal G. 2014. Preventive Care Use among the Belgian Population: Does Socio-Economic Status Matter? *International Journal of Environmental Research and Public Health*. 11: 355−372. DOI: 10.3390/ijerph110100355Elderly

9. Hopkins D. J., King G. 2010. Improving anchoring vignettes designing surveys to correct interpersonal incomparability. *The Public Opinion Quarterly*. 74(2): 201−222. DOI: www.jstor.org/stable/40660640.

10. Jackson J. L., Chamberlin J., Kroenke K. 2001. Predictors of patient satisfaction. Social Science & Medicine. 52(4): 609−620, DOI: 10.1016/S0277−9536(00)00164−7

11. Johansson S. R. 1996. Doing 'Health' Research in an Unhealthy Research Environment. *Health Transition Review*. 6: 371−384. DOI: www.jstor.org/stable/40652269

12. Jun M., Peterson R., Zsidisin G. 1998. The identification and measurement of quality in health care: focus group interview results. *Health Care Management Review*. 23(4): 81−97, DOI: 10.1097/00004010−199810000−00007

13. Kalwij A., Pasini G., Wu M. 2014. Home care for the elderly: the role of relatives, friends and neighbors, *Review of Economics of the Household*. 12(2): 379−404. DOI: 10.1007/s11150−012−9159−4

14. King G., Wand J. 2007. Comparing Incomparable Survey Responses: Evaluating and Selecting Anchoring Vignettes. *Political Analysis*. 15(1): 46−66. DOI: www.jstor.org/stable/25791877.

15. Kravitz R. 1996. Patients' expectations for medical care: an expanded formulation based on review of the literature. *Medical Care Research and Review*. 53(1): 3−27. DOI: 10.1177/107755879605300101

16. Larrabee J.H., Bolden L.V. 2001. Defining patient-perceived quality of nursing care. *Journal of Nursing Care Quality*. 16: 34−60. DOI: 10.1097/00001786-200110000−00005

17. Lee M.J., Kim Y.S. 2012. Zero-inflated endogenous count in censored model: effect of informal family care on formal health care. *Health Economics*. 21(9) :1119−1133. DOI: 10.1002/hec.2822.

18. Ngo−Metzger Q., Massagli M. P., Clarridge B. R., Manocchia M., Davis R. B., et al. 2003. Linguistic and cultural barriers to care: perspectives of Chinese and Vietnamese immigrants. *Journal of Geneneal Internal Medicine*. 18(1): 44−52. DOI: 10.1046/j.1525−1497.2003.20205.x

19. Ross C, Frommelt G, Hazelwood L, Chang R. 1994. The role of expectations in patient satisfaction with medical care. In Cooper P. (Ed.) Health Care Marketing: A Foundation for Managed Quality. Pp. 55−69. ISSN: 07373252

20. Sofaer S, Firminger K. 2005. Patient perceptions of the quality of health services, *Annual Review of Public Health*. 26: 513−559. DOI: 10.1146/annurev.publhealth.25.050503.153958

21. Stichler J. F., Weiss M. E. 2000. Through the eye of the beholder: multiple perspectives on quality in women's health care. *Quality Management in Health Care*. 8(4): 1−13 DOI: 10.1097/00001786−200104000−00009

22. Swartz T. 2009. Intergenerational Family Relations in Adulthood: Patterns, Variations, and Implications in the Contemporary United States. *Annual Review of Sociology*. 35: 191−212. http://www.jstor.org/stable/27800075

23. van Houtven C. H., Norton E. C. 2004. Informal care and health care use of older adults, *Journal of Health Economics*. 23(6): 1159−1180, DOI: 10.1016/j.jhealeco.2004.04.008

24. Wand J., King G., Lau O. 2011. Anchors: Software for Anchoring Vignette Data. *Journal of Statistical Software*. 42(3) DOI: 10.18637/jss.v042.i03

Appendix

Table 1. Survey questions of the World Health Organization (WHO) Study on Global Ageing and Adult Health–2007/10, Wave 1, used in the article.

Variable	Question in the questionnaire	Answer Variants
Healthcare assessment	Q5053 In general, how satisfied are you with how the health care services are run in your country [in your area] – are you very satisfied, satisfied, neither satisfied nor dissatisfied, fairly dissatisfied, or very dissatisfied?	1 Very satisfied 2 Satisfied 3 Neither satisfied nor dissatisfied 4 Dissatisfied 5 Very Dissatisfied
Education	Q1016 What is the highest level of education that you have completed?	1 Less than primary school 2 Primary school completed 3 Secondary school completed 4 High school (or equivalent) completed 5 Collage/pre-university/university completed 6 Post graduate degree completed
Angina pectoris	Q4014 Have you ever been diagnosed with angina or angina pectoris (a heart disease)?	1 Yes 2 No
Asthma	Q4033 Have you ever been diagnosed with asthma (an allergic respiratory disease)?	1 Yes 2 No
Depression	Q4040 Have you ever been diagnosed with depression?	1 Yes 2 No
Cataract	Q4062 In the last 5 years, were you diagnosed with a cataract in one or both of your eyes (a cloudiness in the lens of the eye)?	1 Yes 2 No 8 Don't know
Family assistance	Q0601 In the last 12 months, has anyone in the household received any financial or in-kind support from your family (children, siblings or parents) and relatives (other kin) who do not live with you?	1 Yes 2 No 8 Don't know

Variable	Question in the questionnaire	Answer Variants
Time with family	Q0602c. Doing household chores or activities (meal preparation, shopping, cleaning, laundry), providing care or transportation (help getting around outside the home)? INTERVIEWER: This DOES NOT include paid or hired help.	Average hours per week
Pension	Please tell me from which of these sources members of your household receive income: State old-age (veteran's/civil service) pension, contributory pension fund, provident fund or social security benefit?	a 1 Yes, weekly 2 Yes, monthly 3 Yes, yearly 4 No 8 DK b Can you estimate an approximate total amount of income for the household over the last [week/month/year — time period circled in Column A]?
Age	Q1011 How old are you now?	Age in years
Public events	Q6001 How often in the last 12 months have you attended any public meeting in which there was discussion of local or school affairs?	1 Never 2 Once or twice per year 3 Once or twice per month 4 Once or twice per week 5 Daily
Meetings with community leaders	Q6002 How often in the last 12 months have you met personally with someone you consider to be a community leader?	1 Never 2 Once or twice per year 3 Once or twice per month 4 Once or twice per week 5 Daily
Activity outside the home	Q6010 Would you like to go out more often or are you satisfied with how much you get out of the house?	1 Would like to go out more often 2 Satisfied with frequency of going out 3 Would NOT like to go out more often

Table 2. Survey questions of the World Health Organization (WHO) Study on Global Ageing and Adult Health–2007/10, Wave 1, used in the article (Vignettes).

Vignette number	Question in the questionnaire	Answer variants
Vign1	Q5046 [Stan] broke his leg. It took an hour to be driven to the nearest hospital. He was in pain but had to wait an hour for the surgeon and was only operated on the next day. How would you rate the amount of time [Stan] waited before being attended to?	1 Very good 2 Good 3 Moderate 4 Bad 5 Very bad
Vign2	Q5047 [Patricia] went to a crowded clinic. No-one greeted her. She waited for 30 minutes when a nurse called for her for an examination behind a screen that separated the waiting area from the examination area. How would you rate [Patricia's] experience of being greeted and talked to respectfully?	1 Very good 2 Good 3 Moderate 4 Bad 5 Very bad
Vign3	Q5048 [Mario] has been told that he has epilepsy and that he needs to take medication. The doctor has very briefly explained what the condition is. He is very busy and there is a queue of patients waiting to see him. Mario would like to know more about what he has, but feels that there is no time to ask questions. The doctor says goodbye to Mario, and Mario leaves the office. How would you rate [Mario's] experience of how clearly health care providers explained things to him?	1 Very good 2 Good 3 Moderate 4 Bad 5 Very bad
Vign4	Q5049 [José] shared a hospital room with four other persons. There was a toilet for his ward located along the outside corridor. The room was cleaned once a week, was occasionally dusty, and had only 1 or 2 chairs for visitors. How would you rate the cleanliness of [José's] room inside the facility and provision for toilets?	1 Very good 2 Good 3 Moderate 4 Bad 5 Very bad
Vign5	Q5050 When the clinic is not busy. [Mamadou] can choose which doctor he sees. But most often it is busy and then he gets sent to whoever is free. How would you rate [Mamadou's] freedom to choose his health care provider?	1 Very good 2 Good 3 Moderate 4 Bad 5 Very bad

Vignette number	Question in the questionnaire	Answer variants	Violations
Vign6	Q5051 [Alouine] has his consultation behind a screen separating the consultation area from the waiting area. He has to speak very quietly to avoid other people hearing his conversation. How would you rate the way the health services ensured. [Alouine] could talk privately to the health care providers?	1 Very good 2 Good 3 Moderate 4 Bad 5 Very bad	
Vign7	Q5052 [Robert] had a broken arm. The doctor explained different ways of fixing it and then ordered some blood tests. [Robert] didn't know why he needed blood tests and was worried until the doctor explained what they were for. How would you rate [Robert's] experience of being involved in making decisions about his health care or treatment?	1 Very good 2 Good 3 Moderate 4 Bad 5 Very bad	

Table 3. Top 10 ordered sets of vignettes (out of 310 possible sets).

	Frequency	Share	Exact matches	Violations
{1,2,3,4,5,6,7}	51	0.06	1	0
7,{1,2,3,4,5,6}	30	0.04	2	6
7,5,{2,3,6},{1,4}	21	0.02	4	14
5,{1,2,3,4,6,7}	19	0.02	2	4
7,{2,3,5,6},{1,4}	18	0.02	3	12
7,{3,5,6},{1,2,4}	17	0.02	3	14
{5,7},{1,2,3,4,6}	16	0.02	2	9
{1,2,3,5,6,7},4	15	0.02	2	3
{2,3,5,6,7},{1,4}	14	0.02	2	8
{2,5,7},{1,3,4,6}	14	0.02	2	8

Table 4. The optimal corrected values for the C-scale intervals.

Cs	to	Ce	N	Share	Minimal entropy
1	to	1	283	0.33	1
2	to	2	135	0.16	2
3	to	3	51	0.06	3
4	to	4	31	0.04	4
5	to	5	7	0.01	5
6	to	6	10	0.01	6
7	to	7	7	0.01	7
8	to	8	21	0.03	8
9	to	9	19	0.02	9
1	to	4	41	0.05	2
1	to	5	3	0.00	2
1	to	6	12	0.01	2
1	to	7	2	0.00	2
1	to	8	5	0.01	2
2	to	4	73	0.09	2
2	to	5	2	0.00	2
2	to	6	38	0.05	2
2	to	7	3	0.00	2
2	to	8	36	0.04	2
2	to	9	1	0.00	2
3	to	6	2	0.00	6
3	to	7	1	0.00	6
3	to	8	2	0.00	6
4	to	6	23	0.03	6
4	to	7	2	0.00	6
4	to	8	11	0.01	6
4	to	9	3	0.00	6
5	to	8	1	0.00	6
5	to	9	1	0.00	6
6	to	8	19	0.02	6
6	to	9	5	0.01	6

Table 5. Parametric models of vignettes that assess the dependence of self-assessment of the level of the healthcare system by respondents.

	Model 1	Model 2	Model 3
cut1.invariable	−8.00 (5.42)	−0.68 (5.94)	8.73 (2.59)
cut 1.Beds per capita	−331.14 *** (93.92)	−300.14 *** (96.76)	−359.08 *** (94.2)
cut1.Income of the region	7.19 * (3.94)	7.11 * (3.95)	—
cut 1.Family assistance.	−4.63 (7.07)	−4.67 (7.08)	—
cut1.Time with family	−0.04 (0.16)	−0.03 (0.16)	−0.04 (0.17)
cut1. Age	1.83 ** (0.84)	1.79 ** (0.84)	1.64 * (0.84)
cut1.Operations per capita	1.82 (2.38)	1.34 (2.43)	0.29 (2.39)
cut1.Lives in the countryside	−0.02 (0.21)	0.06 (0.2)	−0.08 (0.18)
cut1. Share of urban residents in the region	0.35 (1.21)	0.2 (1.24)	−0.96 (1.08)
cut1.Cancer diseases	0.37 (0.29)	0.39 (0.31)	0.39 (0.3)
cut1.Infant mortality.	0.06 (0.05)	0.06 (0.05)	0.01 (0.04)
cut2.invariable	6.54 (5.5)	6.47 (5.51)	0.6 (1.06)
cut2.Beds per capita	212.47 ** (95.06)	195.91 ** (95.98)	235.38 ** (93.21)
cut2.Income of the region	−4.36 (3.99)	−4.27 (4.01)	—
cut 2.Family assistance.	4.89 (7.08)	4.84 (7.08)	—
cut2.Time with family	−0.04 (0.16)	−0.04 (0.16)	−0.03 (0.17)
cut2. Age	−0.48 (0.85)	−0.43 (0.86)	−0.37 (0.85)
cut2.Operations per capita	−3.34 (2.43)	−3.14 (2.48)	−2.77 (2.45)
cut2.Lives in the countryside	0.01 (0.20)	−0.02 (0.2)	0.07 (0.19)

	Model 1	Model 2	Model 3
cut2. Share of urban residents in the region	−0.27 (1.22)	−0.12 (1.24)	0.55 (1.08)
cut2. Cancer diseases	−0.15 (0.29)	−0.16 (0.3)	−0.13 (0.29)
cut2.Infant mortality.	−0.09 * (0.05)	−0.09 * (0.05)	−0.06 (0.04)
cut3.invariable	1.95 (2.05)	2.16 (2.06)	1.3 *** (0.39)
cut3.Beds per capita	131.27 *** (29.17)	121.88 *** (30.31)	127.34 *** (27.6)
cut3.Income of the region	−0.53 (1.51)	−0.63 (1.52)	—
cut3.Family assistance	−0.88 * (0.47)	−0.81 * (0.49)	—
cut3.Time with family	0.08 (0.06)	0.07 (0.06)	0.07 (0.06)
cut3. Age	−1.00 *** (0.34)	−1 *** (0.34)	−0.94 *** (0.34)
cut3.Operations per capita	7.65 *** (1.02)	7.81 *** (1.03)	7.96 *** (0.99)
cut3.Lives in the countryside	0.21 ** (0.087)	0.18 ** (0.08)	0.19 ** (0.08)
cut3.The share of urban residents in the region	−0.3 (0.43)	−0.3 (0.43)	−0.21 (0.34)
cut2. Cancer diseases	−0.55 *** (0.10)	−0.55 *** (0.11)	−0.56 *** (0.11)
cut3.Infant mortality.	−0.02 (0.02)	−0.02 (0.02)	−0.02 (0.02)
cut4.invariable	−1.72 (1.94)	−1.76 (1.96)	−0.66 * (0.37)
cut4.Beds per capita	85.64 *** (25.48)	82.98 *** (25.82)	82.01 *** (24.29)
cut1.Income of the region	0.8 (1.46)	0.85 (1.47)	—
cut 3.Family assistance.	−0.05 (0.43)	−0.02 (0.44)	—
cut4.Time with family	−0.13 *** (0.04)	−0.13 *** (0.05)	−0.13 *** (0.05)
cut4. Age	0.5 (0.31)	0.49 (0.32)	0.47 (0.31)

	Model 1	Model 2	Model 3
cut4.Operations per capita	−1.81 *	−1.71 *	−1.72 *
	(1.01)	(1.01)	(0.98)
cut4.Lives in the countryside	0.21 **	0.19 **	0.18 **
	(0.08)	(0.08)	(0.08)
cut4.Share of urban residents in the region	1.16 ***	1.18 ***	1.04 ***
	(0.39)	(0.4)	(0.32)
cut4. Cancer diseases	0.08	0.08	0.07
	(0.0967)	(0.1)	(0.1)
cut4.Infant mortality.	0.05 ***	0.05 ***	0.05 ***
	(0.02)	(0.02)	(0.02)
sigma.random.effect	1	1	1
sigma.self	1	1	1
sigma.vign1	0.90 ***	0.91 ***	0.91 ***
	(0.05)	(0.05)	(0.05)
sigma.vign6	0.94 ***	0.94 ***	0.95 ***
	(0.05)	(0.05)	(0.05)
sigma.vign7	1.23 ***	1.24 ***	1.23 ***
	(0.05)	(0.05)	(0.05)
sigma.vign2	0.89 ***	0.89 ***	0.9 ***
	(0.04)	(0.04)	(0.04)
sigma.vign3	0.93 ***	0.93 ***	0.93 ***
	(0.04)	(0.05)	(0.05)
sigma.vign4	1.04 ***	1.05 ***	1.05 ***
	(0.06)	(0.06)	(0.06)
theta.vign1	3.91 ***	11.31 ***	11.08 ***
	(0.38)	(2.44)	(2.4)
theta.vign6	3.29 ***	10.69 ***	10.46 ***
	(0.38)	(2.44)	(2.4)
theta.vign7	1.91 ***	9.31 ***	9.07 ***
	(0.37)	(2.44)	(2.39)
theta.vign2	3.14 ***	10.54 ***	10.31 ***
	(0.38)	(2.44)	(2.4)
theta.vign3	3.18 ***	10.58 ***	10.35 ***
	(0.38)	(2.44)	(2.4)
theta.vign4	3.97 ***	11.38 ***	11.14 ***
	(0.38)	(2.45)	(2.4)
beta.High confidentiality	0.17	0.22	—
	(0.16)	(0.16)	
beta.Medium level of confidentiality	0.59 ***	0.64 ***	0.46 ***
	(0.15)	(0.15)	(0.08)

	Model 1	Model 2	Model 3
beta.Low level of confidentiality	1.18 *** (0.28)	1.26 *** (0.28)	1.05 *** (0.25)
beta.Very low level of confidentiality	0.48 (0.80)	0.51 (0.81)	—
beta.Did not receive medical care when applying	0.84 *** (0.3)	0.83 *** (0.3)	0.83 *** (0.3)
beta. Share of urban residents in the region	2.19 *** (0.5)	1.45 ** (0.6)	1.63 *** (0.58)
beta.Lives in the countryside	−0.16 (0.14)	—	—
beta.Receptions	−0.08 ** (0.03)	−0.1 *** (0.03)	−0.12 *** (0.03)
beta.self-evaluation of health	0.15 *** (0.06)	0.15 *** (0.06)	0.16 *** (0.06)
beta.Life expectancy	—	0.09 *** (0.03)	0.08 *** (0.03)
cut4.Nucological diseases	—	0.33 * (0.2)	0.31 (0.2)
beta.Beds per capita	—	149.41 *** (56.13)	152.61 *** (55.95)
-Log-likelihood of CHOPIT	6071.104	6066.809	6077.868

(* — the variable is significant at a 10% level, ** — significant at 5%, *** — significant at a 1% level)

Table 6. Description of the variables used in Table 5.

Variable name	Variable type	Average	Median	Minimum	Maximum
High confidentiality	Binary	0.4	0	0	1
Medium level of confidentiality	Binary	0.56	1	0	1
Low level of confidentiality	Binary	0.03	0	0	1
Very low level of confidentiality	Binary	0.02	0	0	1
I did not get medical help when I applied	Binary	0.02	0	0	1
Share of urban residents in the region	Share from 0 to 1	0.7	0.7	0.4	1
Live in the countryside	Binary	0.14	0	0	1
Receptions	Items per capita	9.6	9.7	5.4	14.1
Self-evaluation of health	Discrete 1 — Very good health 5 — Very poor health.	3.4	3	1	9
Beds per capita	Quantity per capita	$9,7*10^3$	$9,6*10^3$	$5*10^3$	$12,3*10^3$
Per capita operations	Quantity per capita	0.1	0.11	0.00	0.15
Oncological diseases	Promille	2.05	2.12	0.52	2.75
Infant Mortality	Promille	7.92	8.00	4.55	16.43
Life expectancy	Years	69	69.2	64.4	75