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The disutility of waiting time.

Evidence from the Public Primary Health Care Service in Andalucía

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The disutility of waiting time: Evidence from a Public Primary Health Care Service

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ABSTRACT

The purpose of this paper is to investigate the relationship between satisfaction with waiting times in a Public Primary Health Care Service and a host of individual variables as well as market determinants. Since waiting time is imposing an opportunity cost on individuals, we model how agents derive different levels of utility and thus report degrees of satisfaction accounting for differences on opportunity cost components. The empirical research draws upon data from the 2002 *Survey for Improving Patient Satisfaction with the Health Care Service in Andalucía*. Ordered probit models are used to estimate different indirect utility functions specifications for the whole sample, as well as for men and women sub-samples and different age categories. Results suggest that there is evidence to support the existence of different behavior within both sex and age groups and that provided healthcare characteristics also shape utility and satisfaction.

JEL classification: I11, I18

Key words: Disutility/Utility, waiting times, primary health care, socio-economic factors.

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The disutility of waiting time: Evidence from a Public Primary Health Care Service

1. Introduction

Among other organizational possibilities, public health care systems may decide to provide universal, free health coverage. If this is the case, it induces the most expensive alternative for the health care sector in a given public budget. In addition, since public health care systems are personal public services, users become the center of the system, not being mere passive agents, but having a voice in the evaluation of policies. Thus, both the significant size of the health care sector and the rise of consumerism within it [1] are important facts to call for a better understanding of its functioning. Satisfaction studies arise as valuable instruments to assess the quality of the health care sector and to provide feedback for health care professionals and policymakers [2,3,4,5,6].

When measuring global patient's satisfaction, different dimensions are put forward in an attempt to disaggregate the aspects playing a role in the relation between users and the health care sector (providers). Professional competence, human characteristics, quality of care, information provided, and organizational issues are some of the attributes or aspects to be assessed [7,8,9,10,11]. Assuming that a person can identify each of them as a source of the global quality and can assess a given level of satisfaction for each of them, satisfaction with waiting times arises as an important "mediator" towards establishing global patient's satisfaction with a particular health care service.

Waiting times can be seen as the first individual's decision to access medical care. In a universal, free health care system, medical care is necessarily allocated by time. This waiting of patients imposes an opportunity cost on those in the queue in the form of wasted time [12] (for waiting times in health services see [13,14,15,16]). Although it may seem arbitrarily chosen, we believe that satisfaction with waiting time is related to the first contact between patients and providers making sense to study it in

the first place, in an attempt to build an indicator for “global” satisfaction with a particular health care service. Moreover, evidence reported in [17] brings light on the relevance of waiting time in the perceived quality for patients. While nearly all evaluated elements (25 out of 32) have more than 75% satisfied users, when considering satisfaction with waiting time, just 38% of all users are satisfied, being the worst valued element of all those being surveyed. Nevertheless, organizational characteristics (in which category, waiting time is included), turn out to have the second highest Pratt’s Importance Index (32%) just beaten by human resources characteristics in the framework of their proposed “global satisfaction explanatory model”.

Imagine two patients that wait the same amount of time to receive primary health care, and that we observe they provide very different answers to the question of how satisfied they are with the time elapsed between the moment they arrived and the moment they were helped. In first place, we can think on different market conditions (supply side factors) that would influence the circumstances under which each agent has waited (for instance, agent 1 could have a previous appointment for that day and time, whereas agent 2 could have arrived, got a number, and waited in a queue to be helped). However, even after controlling for these supply side factors, personal heterogeneity may still dramatically determine differences in valuation, as time is a personal resource having a different shadow price for each agent.

The aim of this paper then is to explore, propose and estimate a model to study individual’s satisfaction with waiting times (level of disutility) in a primary non-emergency public health care service. As the level of satisfaction with waiting times is dramatically determined by the opportunity cost of each individual, we study the effect of individuals’ socio-economic characteristics, as well as market/system determinants on measurements of satisfaction with waiting times, which, in turn, should influence the individual’s “global” satisfaction with the health care service.

The topic of patient’s disutility of waiting time has been very rarely accounted for in previous works. First, these studies have concentrated on waiting lists for elective surgery implying that the time elapsed since the patient joins the list and is actually cared is long. Second, different approaches have been proposed in the literature in order to determine the disutility of waiting time and thus demand for health care.

Propper´s stated preferences approach derives on agents' Willingness-to Pay (WTP) measure in order to reduce their waiting time (using contingent valuation method)[16]. Deacon and Sonsteile or Martin and Smith use discrete choice models to infer from observed behavior of agents that decide whether to wait for a free good or service or to pay for one for which they do not have to wait [12,18]. Further, Yeung *et al.* (in press) combine the two previous approaches to gain insights on the demand and guarantee consistency of the findings by a positive association between patient stated preferences (WTP) and private treatment choice [19].

We use an alternative approach. In our survey we can capture the satisfaction derived from waiting times as well as other variables that will allow us to propose a model of how each agent constructs the disutility from waiting conditioned on personal and market characteristics. By means of an ordered variable, individuals are asked to assign a satisfaction assessment to their waiting times. This approach relies on the grounds of subjective well-being analysis [20,21], which assumes that people are able to evaluate their level of well-being (happiness) with regard to circumstances and comparisons to other persons, past experience and expectations of the future [22,23] providing meaningful responses which are mutually comparable among individuals at least at ordinal level [24].

In Section 2 below a simple theoretical model that is the basis of the empirical analysis is presented. In Section 3, a description of satisfaction with waiting times and its correlates (hypotheses) is provided and in Section 4 the data and empirical specification are described. Section 5 reports the results and the paper ends with some concluding remarks in Section 6.

2. Theoretical Model

The importance of time as a determinant of demand or, more properly, the value of the utility of time spent in an activity was suggested by Becker and de Serpa [25,26]. Its application to the demand for medical care came along with the work of authors such a Leveson, Holtman, and Acton [14,27,28]. In our approach we assume individuals derive utility over two commodities according to the following utility function:

$$U_i = U[Z_{1i}, Z_{2i}] \tag{1}$$

where U_i is the utility of individual *i* (*i*=1,…,N), Z_{1i} is the health status of individual *i* (being in good health) and Z_{2i} is the rest of needs for individual *i*. Both $\frac{\partial U_i}{\partial Z_{1i}}$ and $\frac{\partial U_i}{\partial Z_{2i}}$ are positive.

Consider a sick patient that has to improve her health status through some investment, namely going to primary doctor. In this decision, she has to spend some time. We consider that the only resource needed is waiting-time since primary care is free in the Health Care Service under study.

Given that the price of the visit is zero at point of demand, there will exist a rationing mechanism in the form of waiting-times: patients will have to wait in a physical queue.

Health status is thus produced according to the following health production function:

$$Z_{1i} = f\left(t_{hi}; C_i, S_i\right) \tag{2}$$

where t_{hi} is "waiting-time" for health care. The marginal productivity of waiting-time, $\frac{\partial Z_{1i}}{\partial t_{hi}} = f_{t_{hi}}$, is shaped by two types of characteristics: C_i is a vector of health-care system conditions, and S_i is a vector of personal characteristics (both socio-demographic and socio-economic).

The rest of needs are assumed to be satisfied by the mere consumption of a market good x_i, purchased at an unitary price:

$$Z_{2i} = x_i \tag{3}$$

Individual direct utility has to be maximized subject to both time and budget constraints. Total time available for our agent has to be split between waiting-time and other activities, namely working time. This working time includes market-labor as well as leisure and home activities. To simplify, given that we will not have a suitable measure of individual leisure in our survey, we consider that market-labor time (t_{wi}) is the only alternative to idle waiting-time (t_{hi}). Assuming this simplification:

$$T = 1 = t_{wi} + t_{hi} \tag{4}$$

Taking into consideration the normalization of the price of the market good; the individual spends her income available (I_i) derived from non-earned income, I_{ni}, and labor earning, wt_{wi}.

$$x_i = I_i = I_{ni} + wt_{wi} \tag{5}$$

The previous formulation of optimal decision-making can be rewritten in terms of the individual indirect utility function,

$$V_i = V(Z_{1i}, x_i, w, I_n) \tag{6}$$

that rearranging terms:

$$V_i = V(t_{hi}, x_i, w, I_{ni}, C_i, S_i) \tag{7}$$

This last indirect utility function will allow the model to be solved for utility of a given value of waiting-time in terms of all exogenous parameters.

Further, equation (7) provides the basis of a number of testable hypotheses concerning the effect of individual, as well as market characteristics on the individual's level of disutility with waiting times in the primary non-emergency public health care service.

3. Satisfaction with waiting times and its correlates: Hypotheses.

When searching for determinants of individual's satisfaction with waiting times, perceived waiting-time arises as a straightforward candidate. We expect a negative relation between perceived/reported waiting-time (t_{hi}) and satisfaction (SWT_i) since individuals join and remain in a queue to gain access to the good or service, and that waiting imposes an opportunity cost in the form of waiting/wasted time causing a disutility on individuals. Descriptive empirical results support this idea as Table 1 shows how individuals tend to be more satisfied with their waiting times the shorter they report they have to wait for primary non-emergency health care. The variable "perceived waiting-time" was originally collected as a continuous variable however research undertaken by Brañas-Garza, *et al.* [29] shows that people discretize time when

judging it. They go further to illustrate that for the whole sample of waiting times ranging from 0 to 300 minutes, the optimal scale is based on the number 5. However, when attention is restricted to sub-samples starting on different multiples of 5, they find that the size of the optimal base increases in the sequence 15-30-60. Thus, for intervals of time shorter than 15 minutes, the optimal base is 5, whereas for intervals of time between 15 minutes and one hour, the optimal scale increases to 15 minutes. Larger periods of time reveal a scale of 30 and 60 minutes. Reported waiting-time is dealt then as a discrete variable following the intervals proposed by Brañas-Garza *et al.*

---- insert Table 1 around here ----

However, the relationship between satisfaction with waiting time and reported waiting-time is also affected by other variables that capture mainly individual's opportunity cost heterogeneity. It is expected then that individual's level of satisfaction with waiting times may be dependent upon a number of socio-demographic and socio-economic characteristics.

Although the research on health economics provides little guidance on testable hypotheses for individual's satisfaction with waiting times we can gather some results from the literature on individual's general satisfaction in an attempt to provide a sensible framework for testing. In doing so, perhaps individual's age is one of the most influential factors on general satisfaction with primary care. There is significant amount of research that suggests that older people tend to be generally more satisfied with health care than do younger ones [6,30,31,32,33,34,35], although some authors appear to be skeptical about this [36]. In addition, evidence from our data suggests that age affects time judgment [37]. Assuming the effect of the perception of time on, at least, different satisfaction values, and potentially on the opportunity cost of waiting, the effect of age deserves further attention.

In addition, reviewing the literature on general satisfaction, there seems to be no general significant trend on the effect of sex [34,38,39,40]. However, when individual time judgment is considered, women, in particular, are observed to over-report time to a greater degree than men [37,41]. This is likely to influence the opportunity cost of waiting therefore affecting satisfaction with waiting time. Further,

several studies have found greater general satisfaction to be marginally significantly associated with being married [30,31,34,36], though larger family size has been associated with less satisfaction [30]. The presence of family responsibilities/ties is likely to increase the opportunity cost of waiting for primary medical care and therefore to decrease the utility of time spent waiting (more dissatisfied). Thus, a gender dummy variable together with variables indicating whether the individual is married or not, and the household type, are also introduced into the regression.

Little work has examined possible associations between health status and satisfaction (as an approximation for psychological status/level of distress). Research by Hopton *et al.* suggests the association in complex [40]. They conclude that particular dimensions of distress influence specific dimensions of satisfaction, and theories that people experiencing psychological distress are more likely to be generally dissatisfied with health care are too simplistic. A dummy variable indicating the health status of the individual the previous year is introduced into the regression in an attempt to bring further light into the issue.

Individual's socio-economic variables are represented with dummies for education attainment and occupation. Hall and Dornan found greater satisfaction to be significantly associated with less education [34]. However, they also viewed social status as having "nearly significant relation" with satisfaction although in opposite direction to education. In terms of satisfaction with waiting times, we expect higher education levels and social status (measured as occupational status) to increase the opportunity cost of waiting (the cost of forgone earnings increased) providing greater dissatisfaction.

Finally, although individual characteristics ("demand side" factors) seem clear determinants of individual's satisfaction with waiting times, we have to take a look at "supply side" factors in order to determine how the service is provided and how excess demand is imposing a rationing device whose cost is imputed to/supported by demanders in the form of waiting/wasted time. If patients were received on the basis of "served as arrive", this would impose greater costs on the supplier side and doctors would enjoy idle time. Since this is not the case in our data, in order to efficiently allocate doctors' time a filter mechanism is set by two types of arrangements: (1) The

appointment system: patients previously request an appointment for a set time and date; (2) The number system: patients arrive at the health center and “wait in line” until they are attended. In this case, entry is strictly on a first come, first serve basis. A dummy variable is included in the regression to study the effect of this filter mechanism.

Other supply side related variables include patient density ratio (number of patients/number of physicians), size of habitat and type of center. As encountered by Carlsen and Grytten we expect an increase in the number of patients per physician to increase patient dissatisfaction with waiting times [42]. For two agents with identical waiting times, the fact of being cared in a center with higher density is likely to make people less satisfied with that time as perceived excess demand may be operating as a negative factor. Lastly, type of center and size of residence are also likely to influence the degree of satisfaction with waiting times. We expect the presence of consulting rooms and part-time consulting rooms to increase satisfaction with waiting times among patients fulfilling the main target of the Health System Strategic Plan in Andalucía of providing as personal and close care as possible [43]. In contrast, residence in medium sized towns (20,000 to 100,000 inhabitants) is likely to decrease the level of general satisfaction and quite likely the level of satisfaction with waiting times as services delivered in this places are sometimes far from those claimed to be fair by their residents. Dummy variables are introduced to control for this regional differences.

Table 2 details the definitions of all the explanatory variables used in the regressions, reports their means and standard errors, as well as the joint Wald tests (p-values in column 4) that the level of average satisfaction with waiting times is identical among the different sub-sample considered.

---- insert Table 2 around here ----

4. Data and empirical specification

The data is derived from the *Survey for Improving Patient Satisfaction* in Andalucía. This consists of an individual survey conducted by the Institute of Advanced Social Studies (CSIC) in Spain with funding from the Department of Health of the Andalucian Regional Government of a representative sample of approximately 20.000 individuals for 2002. The target population is all users of the region's public primary non-emergency health care service. They were personally interviewed after receiving medical care in the primary non-emergency medical public centers. Each individual is asked questions regarding the quality of service, user satisfaction with treatment received by health care professionals, amenities, etc.

From this data a sample[1] was drawn of individuals who were questionnaire respondent aged 14 to 95 in 2003 and that provided complete information. We wanted to ensure we had only those individuals who answer the questionnaire themselves to better link individual's satisfaction with waiting-time and personal characteristics. By doing so, we have eliminated most of those receiving pediatrician care (below 14 years of aged) and other who were not able to answer the questions themselves. The final sample consisted of 15.815 individuals.

Given equation (7), we can not observe the indirect utility that a particular agent has reached under her surveyed conditions, and more precisely, we cannot observe the objective utility derived from that particular waiting time. . Instead, we get a measure of her satisfaction with waiting time (SWT_i) allowing three possible ranked answers to choose the level that is closer to her utility (SWT_i). We use a subjective question, which asks individuals how much they think they have been waiting for medical care. There is strong evidence implying that answers to subjective satisfaction questions are meaningful, that individuals are able and willing to answer such questions, and that responses are interpersonally comparable. Thus, subjective questions can be used to study, what are the factors that determine satisfaction [44,45,46,] providing interesting and plausible results. In this question individuals rated their personal satisfaction with waiting on a three-point scale, 1=quite a lot/a lot, 2=not too much, not too little, 3=little, very little) thus providing three levels of utility under the

[1] The sample is drawn using a stratified, multi-stage design using probability sampling. The principal stratification of the sample takes place by health districts, basic health zone (ZBS), and health centers. Primary sampling units were selected in different ways depending upon the relevant size of the health center.

assumption of full comparability of utility functions. Since *SWT* is an ordered categorical variable, we estimate the usual Ordered Probit model [47]. We further assume linear dependence between the latent variable V_i and x_i, β and ε_i, and that $\varepsilon \approx N(0,1)$ [48].

The real axis is divided in intervals $(-\infty, \mu_1], \ldots, (\mu_6, \infty)$, such that the latent variable *V* $\in (\mu_k, \mu_{k+1}]$ if *SWT* = *k*.

5. Results

The next stage of the analysis examines the factors that affect individual satisfaction with waiting times using an ordered probit framework. The estimation results of the satisfaction with waiting times of primary health care patients are presented in Table 3 for the whole sample[2] (p-values reported in column 2). As expected, greater satisfaction with waiting times is associated with having lower perceived waiting-time for receiving primary health care. This is in line with our idea that wasted time is causing a disutility on patients. In addition, it provides further evidence on the consistency of answers to subjective satisfaction questions in the sense that they are meaningful and that individuals are able and willing to answer such questions. Notwithstanding, results show that the relationship between reported waiting-time and satisfaction with waiting times is affected by other variables that capture mainly opportunity cost heterogeneity.

---- insert Table 3 around here ----

Accordingly, results on the effect of socio-demographic and socio-economic variables confirm our prior expectations. Greater satisfaction with waiting times is associated with men, older people, people with better health the previous year and those having lower level of education. Moreover, patients are also more satisfied with

[2] The effects of the sampling design used by our survey data and in particular, the clustering, stratification and unequal selection probabilities, means that for analysis it cannot be assumed that the sample is drawn from independent and identical distributions. If the assumption of a randomly drawn sample were valid, estimation of equation (9) could use the standard maximum likelihood estimator for the ordered probit model. However, the complex sample design means that these equations must be estimated using a pseudo–maximum likelihood estimator otherwise the Type I error rates would be substantially above their nominal level α. While the estimates of the parameters β generated are therefore not efficient, they are consistent and the estimator of the associated covariance matrix is robust [49].

waiting if they have potentially less family ties/responsibilities (i.e. they live alone or with their parents). In contrast, individuals are significantly more dissatisfied with waiting if they are working (higher occupational status) as they have a greater opportunity cost for their wasted time.

This specification also includes market related variables. After controlling for socio-demographic and socio-economic variables, market characteristics also have a say on individual's satisfaction with waiting times. To begin with, patients are significantly more satisfied with their waiting times if they previously request an appointment for a set time and date than if they arrive at the health center and "wait in line" until they are attended. Further, we also find that an increase in the number of patients per doctor leads to greater dissatisfaction with waiting times. These results indicate that the appointment system, as well as the ratio patients/physicians are both significantly important tools to ensure satisfactory access to care. The type of center has also a significant influence on the level of individual satisfaction with waiting times as patients attending consulting room are significantly more satisfied than those attending health centers. Unexpectedly, people in non-reorganized health centers are significantly more satisfied with their waiting times than those in reorganized ones. We understand this is due to the small sample size for this category (1,81%) as a result of a changing scenario where non-reorganized health centers are called to disappear shortly (in fact there will be none for the 2004 Survey).

Lastly, concentrating on the effect of place of residence size, the estimated parameters on the habitat dummies indicate that, other things equal and consistent with our hypothesis of greater dissatisfaction among small town residents, individuals living in small size towns (5.001-100.000 inhabitants) are significantly more dissatisfied than those living in larger cities (>100.001 inhabitants) whereas no significant results can be reported with respect to rural patients (<=5.000 inhabitants).

Satisfaction with waiting times and Gender

Since our approach to patient's satisfaction with waiting times relies on the opportunity cost of wasted time waiting on the physician office, there is a reason to think that gender plays an important role on the determinants of that opportunity cost and the

extend to which these operate building the individual utility function. Empirical research shows weak significant evidence (93% significance level) that the mean satisfaction with waiting times for men is greater than that for women. Further, the estimated parameter on the gender dummy for the ordered probit indicates that, other things equal, men are significantly more satisfied with their waiting times than women. Therefore, even after controlling for other characteristics, the gender difference remains. Thus, a different behavior between these two groups is expected. Results on the ordered probit for individual satisfaction with waiting times by gender are reported in Table 4.

---- insert Table 4 around here ----

Once we disaggregate by gender, results show that age, health status and the patient density ratio significantly affect female level of satisfaction with waiting time whereas these variables are not significant for men building their utility. Thus, older and healthier women are significantly more satisfied waiting for primary care, and their satisfaction significantly decreases as the patient density ratio rises. In contrast, socio-economic variables, namely education and occupational status significantly affect male satisfaction with waiting times, with no empirical significant evidence for women. There is weak evidence (91% significance level) that working men are more dissatisfied. Equally, men with primary education as opposed to those with no studies are weakly (94% significance level) more dissatisfied. No significant results are reported for other education levels. Further, household type seems to affect differently to men and women since men living alone are significantly more satisfied with their waiting as opposed to those living in a nuclear family. However, for women, living with parents reports significantly greater satisfaction than living in a nuclear family.

These results support the hypothesis previously stated that men build their utility in the grounds of socio-economic characteristics; whereas for women socio-demographic characteristics rule.

Satisfaction with waiting times and Age

Another issue of interest in the context of this research is whether the determinants of satisfaction with waiting times for primary health care, and the valuation individuals

make of that time, are age specific. Descriptive and regression results provide significant evidence for it; therefore, we propose three different satisfaction functions for the three different age groups. Results are reported on Table 5 for young (<=30), middle age (31-60) and elderly (>60) patients.

---- insert Table 5 around here ----

In general, perceived time affects equally to all the three groups, however when considering socio-demographic characteristics gender significantly affects to the young and middle age groups. For elderly patients, other things equal, men and women seem equally satisfied with their waiting times. Household type do not seem to significantly affect neither the middle age nor the elderly group, however it is interesting to see how young patients either living alone of with their parents are significantly more satisfied than if living in a nuclear family. This result for the young age group is in line to prior expectations related to the presence of family ties/responsibilities.

Although being in good health provides greater satisfaction with waiting in all three groups, the result is only statistically significant for young patients revealing that the wasted time even if sick provides greater disutility to this group.

The effect of the level of education appears only weakly significant for the middle age group, reporting more dissatisfaction (only at 92% significance level) if having secondary education as opposed to no studies. For occupational status, and as expected we find some weak significant evidence that young patients (94% significance level) and middle age ones (92% significance level) are less satisfied if working stating the importance of forgone earnings.

Once again, market related characteristics affect differently to all three groups. Only middle age and elderly patients are significantly more satisfied if they have previously requested an appointment for a set time and date. Furthermore, the patient density ratio seems extremely important for the middle-age group as they are significantly more dissatisfied the larger the ratio. However for the elderly only when this ratio gets too high (>7.000 patients per physician) they manifest significant greater dissatisfaction. On the other side, young patient do not seem affected by this characteristic, maybe due to their lack of experience attending primary health care services. Type of center does not seem to significantly affect middle age or elderly

patients; only young patients are significantly more satisfied if attending a consulting room or a part-time consulting room as opposed to a health center. Finally place of residence does not affect the elderly, while living in rural areas or small towns provides significant greater disutility to middle age patients and only young small town dwellers are significantly more dissatisfied.

6. Conclusions

This paper has explored individual's satisfaction with waiting times (level of disutility) in the primary non-emergency public health care service in Andalucía, analyzing the impact of certain socio-demographic, as well as socio-economic and market characteristics. Using a theoretical model for the utility of time we estimated a model of individual satisfaction with waiting times using the *Survey for Improving Patient Satisfaction in Andalucía*.

Overall, results suggest that socio-demographic, as well as socio-economic and market characteristics significantly impact individual's satisfaction with waiting time in the expected direction, however there seem to exist a clear age and gender component. Thus, when the sample is divided by gender we observed how women's satisfaction with waiting times is clearly more affected by socio-demographic (age and health status) characteristics as well as the patient density ratio, whereas for men socio-economic characteristics are the key factor.

Furthermore, the study shows that the determinants of individual's satisfaction with waiting times significantly differ by age. For elderly people, it is difficult to find significant determinants of individual satisfaction other than perceived waiting time or whether they have previously requested an appointment for a set time and date. However, middle-age patients are a much richer group as they seem significantly affected by both socio-economic and market characteristics.

Our results indicate that the Andalucian government can influence the level of individual satisfaction with waiting times by acting on some of the market

characteristics considered. Since providing as personal and close care as possible is stated as the main target of the Health System Strategic Plan in Andalucía, efforts should be made towards ensuring that the different type of centers successfully satisfy patients' demands (special emphasis on health centers). Equally, establishing a universal system of appointment for a set time and date is also likely to increase individual satisfaction with waiting times and her perception of the system organization. Finally regional measures should also be put in place, particularly in small size towns to guarantee that services delivered in these places suit residents' needs. These government measures are likely to ensure and increase in overall individual satisfaction.

One last policy consideration regards the patient's health status. We found that good health patients are significantly more satisfied. It might be interesting to have a look to those who report being in bad health the previous year (we could say these are chronically ill patients) and to study routing or re-routing them towards specialized primary care since they are more likely to be chronic users of the system.

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Table 1

Frequencies and counts of measures of satisfaction with waiting times and actually "perceived" waiting time (retrospective time judgement)

	Retrospective time judgement									
Satisfaction with waiting time	**< 5 min**	**6 - 10 min**	**11-15 min**	**16-30 min**	**31-45 min**	**46-60 min**	**61-90 min**	**> 90 min**	**No response**	**TOTAL**
Little	6.19	8.66	8.70	28.57	12.33	16.72	6.26	7.35	5.22	100
	(180)	(265)	(282)	(932)	(435)	(556)	(203)	(249)	(172)	(3274)
Not little, nor much	12.39	17.91	17.35	29.85	6.84	5.39	1.23	1.14	7.90	100
	(671)	(964)	(969)	(1711)	(388)	(320)	(79)	(75)	(440)	(5617)
Much	22.45	23.13	17.06	18.16	2.56	1.60	0.36	0.33	14.34	100
	(1497)	(1649)	(1197)	(1322)	(190)	(130)	(32)	(27)	(880)	(6924)
TOTAL	15.50	18.24	15.37	24.42	6.13	6.14	1.92	2.11	10.17	100
	(2348)	(2878)	(2448)	(3965)	(1013)	(1006)	(314)	(351)	(1492)	(15815)

Pearson Uncorrected chi2(18) = 3844.5419 (p-value= 0.0000)

Note: Counts are in brackets

Table 2
Sample Statistics

Variables	%	Std. error	P6* Mean	Hypothesis being tested *P6(.): mean of the dependent variable for that subgroup*	Adjusted Wald test p-value
Perceived Waiting Times					
time1 – reported ≤ 5 min	0.1549	0.0031	2.5532		
time2 – 6-10 minutes	0.1823	0.0033	2.4578	H^0:*P6(time1)= P6(time2)*	0.0000
time3 – 11-15 minutes	0.1537	0.0031	2.3682	H^0:*P6(time2)= P6(time3)*	0.0000
time4 – 16-30 minutes	0.2441	0.0036	2.0777	H^0:*P6(time3)= P6(time4)*	0.0000
time5 – 31-45 minutes	0.0612	0.0020	1.7537	H^0:*P6(time4)= P6(time5)*	0.0000
time6 – 46-60 minutes	0.0614	0.0021	1.5331	H^0:*P6(time5)= P6(time6)*	0.0000
time7 - 61-90 minutes	0.0192	0.0011	1.3875	H^0:*P6(time6)= P6(time7)*	0.0011
time8- reported > 90 min	0.0210	0.0012	1.3221	H^0:*P6(time7)= P6(time8)*	0.1985
time9 – non response	0.1016	0.0025	2.5123		
Age					
age1 - ≤30 years	0.2015	0.0035	2.1444	H^0:*P6(age1)= P6(age2)*	0.0002
age2 – 31-60 years	0.4194	0.0043	2.2165	H^0:*P6(age2)= P6(age3)*	0.0000
age3 - >60 years	0.3790	0.0023	2.2827	H^0:*P6(age3)= P6(age1)*	0.0000
Sex					
male	0.3854	0.0042	2.2428		
female			2.2172	H^0:*P6(male)= P6(female)*	0.0700
Marital Status					
married	0.6442	0.0042	2.2363		
msoth – other marital status	0.3555	0.0042	2.2102	H^0:*P6(married)=P6(msoth)*	0.0717
Household Type					
living alone	0.0972	0.0026	2.2774		
living with couple	0.2185	0.0036	2.2597		
nuclear family	0.4997	0.0044	2.1990		
living with parents	0.0825	0.0024	2.2727		
other household types	0.1019	0.0026	2.2096		
Health Status					
bad health status last year	0.3402	0.0041	2.2136		
good health status last year	0.6580	0.0041	2.2339	H^0:*P6(bad)= P6(good)*	0.1581
Education					
no education	0.3483	0.0039	2.2680		
primary schooling	0.4245	0.0042	2.2048	H^0:*P6(no_edu)= P6(prim)*	0.0000
secondary education	0.1526	0.0032	2.1743	H^0:*P6(prim)= P6(second)*	0.1704
university level	0.0670	0.0022	2.2696	H^0:*P6(second)= P6(univ)*	0.0059
Occupational Status					
working	0.2960	0.0040	2.1820		
unemployed	0.0550	0.0020	2.1309		
student	0.0371	0.0016	2.1986		
retired	0.1633	0.0032	2.2771		
housewife	0.4071	0.0043	2.2575		
Scheduling					
appointment	0.7463	0.0032	2.2657		
number	0.2536	0.0032	2.1132	H^0:*P6(appoint)=P6(numb)*	0.0000
Patient density ratio					
ratio_1 - ≤5.000 patients/doctor	0.1128	0.0024	2.2153		
ratio_2 – 5.001-6.000 patient/dr.	0.2823	0.0023	2.2309	H^0:*P6(ratio_1)=P6(ratio_2)*	0.6700
ratio_3 – 6.001-7000 patients/dr.	0.3911	0.0019	2.2267	H^0:*P6(ratio_2)=P6(ratio_3)*	0.7982
ratio_4 - >7.000 patients/dr.	0.2137	0.0015	2.2153	H^0:*P6(ratio_3)=6(ratio_4)*	0.5371
Type of centre					
hc – health centre	0.7449	0.0015	2.2233		
cr – consulting room	0.2077	0.0024	2.2185	H^0:*P6(hc)= P6(cr)*	0.7597
pt – part-time consulting room	0.0291	0.0021	2.2361	H^0:*P6(hc)= P6(pt)*	0.8264
nore – no-reorganised health c.	0.0181	0.0008	2.4643	H^0:*P6(hc)= P6(nore)*	0.0000
Habitat					
rural - ≤5.000 inhabitants	0.0777	0.0021	2.2022	H^0:*P6(rural)= P6(nonrur)*	0.9903
nonrur – 5.001-100.000	0.5649	0.0021	2.2019	H^0:*P6(nonrur)=P6(urban)*	0.0000
urban - >100.000	0.3572	0.0015	2.2722	H^0:*P6(urban)= P6(rural)*	0.025

***P6 =** It is the dependent variable which measures satisfaction with waiting times as a three-point categorical measure of individuals' satisfaction with time spent in the queue (little (1), not too much not too little (2), much (3)).

Table 3
Ordered probit regression: individual's satisfaction with waiting times – all sample

Variables	$\hat{\beta}$	p-value
Perceived Waiting Times		
time1	2.0203	0.000
time2	1.8293	0.000
time3	1.6777	0.000
time4	1.2420	0.000
time5	0.7701	0.000
time6	0.4105	0.000
time7	0.1252	0.263
time9	1.9255	0.000
Socio-demographic Characteristics		
age1	-0.1471	0.001
age2	-0.0470	0.133
male	0.0889	0.001
married	0.0392	0.264
living alone	0.1177	0.016
living with couple	0.0443	0.149
living with parents	0.1319	0.007
other household types	0.0075	0.837
good health status last year	0.0389	0.085
Socio-economic Characteristics		
primary schooling	-0.0447	0.101
secondary education	-0.0658	0.093
university level	0.0364	0.472
working	-0.0704	0.035
unemployed	-0.0650	0.202
student	0.0451	0.504
retired	-0.0759	0.045
Market Characteristics		
appointment	0.0951	0.000
ratio_2	-0.0801	0.038
ratio_3	-0.0862	0.024
ratio_4	-0.0621	0.134
cr	0.0929	0.001
pt	0.0860	0.288
nore	0.2585	0.011
rural	-0.0686	0.184
nonrur	-0.0990	0.000
$\hat{\gamma}_1$	0.5532	0.000
$\hat{\gamma}_2$	1.6449	0.000
Sample size (N)	15815	
F	70.64	

Omitted categories: **time8, age3, female, msoth, nuclear family, bad health status last year, no education, housewife, number, ratio_1, hc, urban.**

Table 4
Ordered probit regression: individual's satisfaction with waiting times: Effects of gender

	Male sub-sample		Female sub-sample	
Variables	$\hat{\beta}_{MALE}$	**p-value**	$\hat{\beta}_{FEMALE}$	**p-value**
Perceived Waiting Times				
time1	1.9900	0.000	2.0456	0.000
time2	1.8035	0.000	1.8517	0.000
time3	1.6367	0.000	1.7116	0.000
time4	1.2412	0.000	1.2487	0.000
time5	0.7053	0.000	0.8169	0.000
time6	0.4457	0.002	0.3948	0.001
time7	0.0560	0.747	0.1687	0.256
time9	1.9620	0.000	1.9112	0.000
Socio-demographic Characteristics				
age1	-0.0441	0.584	-0.1871	0.001
age2	0.0726	0.187	-0.1055	0.007
married	0.0856	0.142	0.0298	0.512
living alone	0.1719	0.046	0.0854	0.157
living with couple	0.0306	0.511	0.0504	0.217
living with parents	0.0504	0.541	0.1598	0.008
other household types	-0.0169	0.791	0.0189	0.676
good health status last year	-0.0011	0.975	0.0697	0.015
Socio-economic Characteristics				
primary schooling	-0.0826	0.062	-0.0186	0.595
secondary education	-0.0836	0.176	-0.0535	0.294
university level	-0.0055	0.942	0.0644	0.346
Working	-0.1346	0.094	-0.0587	0.143
Unemployed	-0.0112	0.918	-0.1069	0.077
Student	0.0893	0.458	0.0018	0.983
Retired	-0.0747	0.305	-0.0795	0.270
Market Characteristics				
appointment	0.0801	0.041	0.1040	0.002
ratio_2	-0.0717	0.230	-0.0856	0.077
ratio_3	-0.0482	0.412	-0.1096	0.023
ratio_4	0.0155	0.811	-0.1133	0.029
cr	0.1137	0.009	0.0796	0.035
pt	0.1069	0.317	0.0731	0.435
nore	0.4243	0.011	0.1642	0.208
rural	-0.0181	0.819	-0.0959	0.125
nonrur	-0.1028	0.010	-0.0946	0.002
$\hat{\gamma}_1$	0.4872	0.004	0.5511	0.000
$\hat{\gamma}_2$	1.5959	0.000	1.6349	0.000
Sample Size (N)	6168		9647	
F	28.18		44.96	

Omitted categories: **time8, age3, msoth, nuclear family, bad health status last year, no education, housewife, number, ratio_1, hc, urban.**

Table 5
Ordered probit regression: individual's satisfaction with waiting times: Effects of age

	Young		Middle-age		Elderly	
Variables	$\hat{\beta}$	**p-value**	$\hat{\beta}$	**p-value**	$\hat{\beta}$	**p-value**
Perceived Waiting Times						
time1	2.2511	0.000	2.0552	0.000	1.8596	0.000
time2	1.9721	0.000	1.8358	0.000	1.7715	0.000
time3	1.7963	0.000	1.7122	0.000	1.6126	0.000
time4	1.3657	0.000	1.2292	0.000	1.2134	0.000
time5	0.8559	0.000	0.7730	0.000	0.7286	0.000
time6	0.3602	0.109	0.4492	0.002	0.4412	0.003
time7	0.2164	0.415	0.1882	0.303	0.0044	0.979
time9	2.3107	0.000	1.8613	0.000	1.8347	0.000
Socio-demographic Characteristics						
male	0.1022	0.050	0.1306	0.002	0.0073	0.891
married	0.1022	0.116	-0.0341	0.574	-0.0678	0.359
living alone	0.3635	0.060	0.0138	0.879	-0.0031	0.971
living with couple	0.1282	0.163	0.0543	0.333	0.0107	0.807
living with parents	0.3283	0.000	-0.0144	0.861	-0.0131	0.888
other household types	-0.0213	0.786	-0.0633	0.249	-0.0032	0.966
good health status last year	0.1279	0.054	0.0224	0.521	0.0405	0.226
Socio-economic Characteristics						
primary schooling	-0.1559	0.229	-0.0166	0.680	-0.0430	0.295
secondary education	-0.1517	0.257	-0.0908	0.098	0.0932	0.405
university level	-0.0035	0.981	-0.0001	0.998	-0.0722	0.542
working	-0.1370	0.067	-0.0760	0.087	0.0043	0.965
unemployed	-0.1275	0.150	-0.0625	0.390	0.2070	0.286
student	0.0186	0.835	0.4980	0.374	0.8203	0.232
retired	-0.4213	0.108	0.0008	0.991	-0.0311	0.575
Market Characteristics						
appointment	0.0440	0.439	0.0877	0.032	0.1318	0.001
ratio_2	-0.0258	0.754	-0.1136	0.055	-0.0684	0.235
ratio_3	-0.0460	0.571	-0.1230	0.038	-0.0600	0.297
ratio_4	0.1469	0.107	-0.1114	0.085	-0.1207	0.052
cr	0.2336	0.000	0.0726	0.113	0.0446	0.317
pt	0.2418	0.089	0.0638	0.561	0.0397	0.713
nore	0.2718	0.186	0.2722	0.087	0.2455	0.172
rural	-0.1784	0.104	0.1615	0.035	0.0945	0.185
nonrur	-0.1319	0.017	-0.2044	0.000	0.0493	0.226
$\hat{\gamma}_1$	0.9410	0.000	0.4530	0.003	0.3971	0.019
$\hat{\gamma}_2$	1.9263	0.000	1.4997	0.000	1.6182	0.000
Sample Size (N)	3109		6499		6207	
F	19.22		31.2		25.18	

Omitted categories: **time8, female, msoth, nuclear family, bad health status last year, no education, housewife, number, ratio_1, hc, urban.**