

Original Research Article

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Determinants of hospital waiting time for outpatient care in India: how demographic characteristics, hospital ownership, and ambulance arrival affect waiting time

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ABSTRACT

Background: Waiting time in hospital outpatient clinics affects patient satisfaction, access to care, health outcomes, trust, willingness to return and hospital revenue. Only a few studies have explored length and variability of waiting times among patients. This study is an attempt to understand factors affecting waiting time experienced by patients in outpatient clinics.

Methods: For this study, data were collected in 2012 from 830 patients seeking care from outpatient clinics located in 30 randomly selected hospitals in the district of Nellore, India. Linear regression and logistic regression models have been used to identify the effect of various determinants on hospital waiting times.

Results: The average waiting time in government hospitals was 20.3 minutes compared to 15.5 minutes in private hospitals and 39.71 minutes in voluntary hospitals. Waiting time of men was about six minutes lower than women. After controlling for other patient related and hospital related factors, median wait time was 19% lower for male patients compared to females. Length of waiting declines with patient's age. Patients arriving by ambulance waited 64% less than patients not arriving by ambulance but this pattern was not valid for public hospitals.

Conclusions: Significant gender bias was present in all facility-types implying that policy and legal interventions would be required. For-profit hospitals had lower waiting time of patients to ensure higher demand for their services by the economically better-off sections of the population. The results highlight the importance of lowering the waiting time in public sector hospitals, especially for patients arriving in ambulances.

Keywords: Waiting times, Linear regression, Arrival by ambulance, Hospital ownership

INTRODUCTION

Waiting time is the amount of time a patient has to wait in a clinic or hospital before being seen by clinical personnel.¹ Healthcare organizations that aim to improve quality must focus on their waiting times.² Waiting time in clinics and hospitals is an important factor leading to patient dissatisfaction and creating discomfort for the patient. This condition seems to exist around the world. A

report of the Institute of Medicine says that patients must be seen within 30 minutes after their arrival to a hospital/clinic.³ This is not the case in most developing countries, where patients experience an average waiting time of 2- 4 hours before seeing a doctor.⁴⁻⁶ Even developed countries are having trouble dealing with this issue.⁷ The duration of waiting times seems to vary between countries and also among different regions of the same country. In the US, the average waiting time was

around 60 minutes in Atlanta, while in Michigan the average waiting time was approximately 188 minutes.⁸ In some countries with more public hospitals, like the UK and Canada, waiting times seem to be a major concern.^{9,10} Waiting times are considered to be significant barriers for people's access to care.⁹ Studies show that waiting in the hospital is agonizing, frustrating, and demoralizing, and also leads to an increase in expenses for the patient. Clinic waiting time is considered to be one of the most important aspects of patient satisfaction.¹¹ Customer satisfaction, which is a key indicator of service delivery in a hospital, seems to be related to waiting time.¹²

Dangerous consequences may occur due to long waiting times, such as the worsening of a health condition, a decrease in the quality of life for the person, and death.¹³ Studies note that an individual's capacity to wait for treatment without experiencing any dangerous effects should be taken into account when deciding the waiting times for patients.¹⁴ Long waiting lists also seem to affect the mental health of patients, leading to depression, psychological distress, and anxiety disorders.^{15,16} Longer waiting times are associated with an increase in the level of discomfort experienced by the patient.^{12,17} Waiting times not only affect the level of patient satisfaction but also the willingness to return to the hospital.^{18,19}

Reducing patient waiting times is also important for maintaining the business of hospitals. Studies indicate that waiting times erode the value that is derived as a result of treating the patient.²⁰ Studies show that the experience of the patient in a hospital determines their willingness to return to that hospital; this includes both the medical care they received as well as non-medical service aspects, which include waiting times.²¹⁻²³ Waiting times seem to be an independent factor and also an exclusive risk factor for the assessment of patient dissatisfaction.²⁴ In countries with both public and private hospitals, longer waits in public hospitals compel patients to move to private hospitals for treatment.²⁵

Studies show that patients who were given expected waiting times were more satisfied than those who were not. This factor further affects patient trust in an institution as well as their views about the service of the staff and responsiveness of the hospital.²⁶ Waiting lists are also used as a way to ration health services in case there are limited available resources. Studies also show that waiting lines create stress not only to the patient but also to the physician who is treating the patient.²⁷ It is also interesting to note that patient waiting times can be attributed to the doctor, the patient, or the hospital appointment system.²⁷

Waiting time also serves as an indicator for horizontal equity and managerial effectiveness of the provision of health services.²⁸ Thus it is vital to determine whether waiting lines have any relationship to the ethnicity of the population or other characteristics such as age and sex to find out whether there has been equity in the access to

health services. Some studies show that socioeconomic factors are important determinants for the wait time for a required health service.²⁹ Women in all the different age groups are found to have longer waiting times when compared to men.³⁰ Although some studies did not show any difference between ethnic groups in patient waiting time, it would be useful to further investigate this possibility in our study.²⁸ Other studies showed that waiting times for some surgeries such as renal surgeries have been significantly lengthened for minority ethnic groups, women, and people with lower education and socio-economic status.³¹⁻³³ We wish to ascertain whether this situation is the same for patients visiting outpatient departments as well. Various factors such as age of the patient, type of hospital, method of arrival of the patient (i.e., walk-in, ambulance) and insurance status affect waiting times.³⁴

Considering the importance of waiting times as a measure of quality, equity, patient satisfaction, and access to health services, it is vital for us to study the various determinants of waiting times such as demographic characteristics (age, sex, and ethnicity) to find out whether there are disparities based on demographic features. Other determinants such as the nature of the ownership of hospitals and patient arrival by ambulance are also studied to find out whether waiting time changes based on these facility level determinants.

METHODS

Primary data was collected from the patients visiting the outpatient department of health facilities in Nellore District, India. The time period of the study was May 2012 to September 2012. The health facilities were randomly selected for the study. All the patients who visited the outpatient department of the various health facilities in the district were studied. A total of 830 patients were studied using a predesigned and pretested questionnaire. Permission was obtained by the health officials from the Individual Institutional Ethics Committee/ Institutional Review Board and the District Health Department for the different healthcare facilities before the study commenced. The study, which focuses on the determinants of hospital waiting time, uses a linear regression model, logistic regression, and regression studying polynomial, interaction functions as well as transformations to investigate the determinants of hospital waiting time such as demographic characteristics like age, sex, and race, and the effect of the type of hospital ownership and arrival to the hospital. We wanted to study the impact of the independent variables like age, sex, race, arrival by ambulance, and ownership of the hospital on the dependent variable, waiting time. The dependent variable in this model is continuous, thus Ordinary Least Squares (OLS) regression is used for the initial models. In the first three models specified below, the Analysis of Covariance (ANOCOVA) model is used with the independent variables containing both the numerical and the dummy variables. Normality has been

checked for the continuous data for waiting time. The best method to make the data normal has been researched. With the appropriate transformation being done, the data has been made normal to satisfy the assumptions of OLS. The residuals were predicted and checked for heteroscedasticity, which has been corrected or cured. Multicollinearity among the independent variables has been checked.

RESULTS

We tested and evaluated the association between the characteristics of patients (sex, race, age) and other characteristics such as arrival by ambulance and ownership of the hospital with the waiting time

experienced by the patients. Analysis was done to assess whether the independent variables were associated with the dependent variable (waiting time). Statistical significance was assessed at the 5%, 1%, and 0.1% significance levels. The data set contains 830 observations of the study that took place between May 2012 and September 2012 in India. The descriptive characteristics of continuous waiting time and age variables have a mean of 33.4 minutes and 36.02 years respectively as described in Table 1. The descriptive characteristics of the dummy variables, namely sex, race, arrival by ambulance, and hospital ownership, are given in Tables 2–4. 4 models of regressions analysis were used and the results are discussed.

Table 1: Summary statistics of continuous variables.

Variable	Observation	Mean	Std. dev.	Minimum	Maximum
Waiting time	830	33.37229	52.20249	1	730
Age	830	36.02169	22.73404	1	94

Table 2: Cross tabulation of hospital ownership and arrival by ambulance.

Ownership	Arrival by ambulance		Total
	No	Yes	
Government	77	84	161
Proprietary	76	12	88
Voluntary non-profit	493	88	581
Total	646	184	830

Table 3: Cross tabulation of sex and ethnicity.

Sex	Ethnicity			Total
	Malayalee	Tamil	Telugu	
Female	9	63	379	451
Male	6	46	327	379
Total	15	109	706	830

Table 4: Descriptive statistics of dummy variables.

Age category	Frequency	Percentage (%)	Cumulative percentage (%)
Sex			
Female	451	54.34	54.34
Male	379	45.66	100.00
Ethnicity			
Malayalee	15	1.81	1.81
Tamil	109	13.13	14.94
Telugu	706	85.06	100.00
Ambulance arrival			
Yes	646	77.83	77.83
No	184	22.17	100.00
Hospital ownership			
Government, non-federal	161	19.40	19.40
Proprietary	88	10.60	30.00
Voluntary, non-profit	581	70.00	100.00

Table 5: Model 1- multiple regression model.

Variables	Coefficient	P value
Age	-0.1681645*	0.041
Arrival by ambulance	-13.58417***	0.000
Proprietary	-23.44807***	0.000
Government, non-federal	-14.82139***	0.000
Ethnicity Malayalee	-16.40474***	0.000
Constant	48.09881***	0.000

Note: * p<0.05, **p<0.01, *** p<0.001

In Model 1 (Table 5), a multiple regression model assuming linearity and without any transformations were used. For every year increase in age, the waiting time decreases by 0.16 minutes on average, holding other variables constant. Being of Malayalee ethnicity decreases the waiting time by 16.40 minutes on average, compared to that of other races, holding other variables constant. Using a government owned, non-federal health facility decreases the waiting time by 14.82 minutes on average, compared to people using other types of facilities, holding other variables constant. Using a proprietary owned health facility decreases waiting time by 23.44 minutes on average, compared to other facilities, holding other variables constant. Arrival by ambulance decreases the waiting time by 13.58417 minutes on average, compared to people who do not arrive by ambulance, holding other variables constant.

Table 6: Model 2 - regression model with polynomial and interaction functions.

Variables	Coefficient	P value
Arrival by ambulance	-20.95313***	0.000
Proprietary	-24.52323***	0.000
Government, non-federal	-19.55298***	0.000
Ethnicity Malayalee	-15.37663***	0.000
Interaction between ambulance arrival and government owned	14.63223***	0.002
Constant	43.20722***	0.000

Note: *p<0.05, **p<0.01, ***p<0.001.

In Model 2 (Table 6), a regression model with polynomial and interaction functions are used. Arrival by ambulance decreases the waiting time by 20.95 minutes on average, compared with those who do not arrive by ambulance, holding other variables constant. Using a government owned, non-federal health facility decreases the waiting time by 19.55 minutes on average, compared to people using other health facilities, holding other variables constant. Using a proprietary owned health facility decreases waiting time by 24.52 minutes on average, compared to people using other types of facilities, holding other variables constant. Being a Malayalee decreases the waiting time by 15.37663 minutes on average, compared to being a member of another race, holding other variables constant. People

who arrive by ambulance to a government owned facility will wait 24.84 minutes less on average, when compared to people not arriving by ambulance in other health facilities, holding other variables constant.

Table 7: Model 3 - regression model with interaction and log transformations.

Variables	Coefficient	P value
Gender	-0.2090173***	0.008
Arrival by Ambulance	-1.035254***	0.000
Proprietary	-0.9005406***	0.000
Government, non-federal	-0.0202192	0.883
Interaction between ambulance arrival and government owned	0.7349084***	0.001
Constant	3.171588***	0.000

Note: *p<0.05, **p<0.01, ***p<0.001.

The model 3 (Table 7) used a regression model with interaction and log transformation functions. The median waiting time for male patients is 18.86% shorter than that of female patients, holding other variables constant. The median waiting time for patients who arrive by ambulance is 64% shorter than patients who do not arrive by ambulance, holding other variables constant. The median waiting time of patients using a proprietary owned hospital is 59% shorter compared to patients using other types of hospitals, holding other variables constant. The median waiting time of patients using a government owned hospital is 2% shorter compared to patients using other types of hospitals, holding other variables constant. Patients who arrive by ambulance to a government owned health facility wait 2.08 times longer than people who do not arrive in ambulance to other types of health facilities, holding other variables constant.

Table 8: Model 4 - logistic regression model.

Variables	Coefficient	Odds ratio	P value
Arrival by Ambulance	1.049854***	2.857233	0.000
Proprietary	1.393226***	0.5687373	0.000
Government, non-federal	-0.5643366***	4.027823	0.005
Constant	-0.2112421*	0.8095781	0.017

Note: *p<0.05, **p<0.01, ***p<0.001.

Table 9: Logistic model for waiting time—other characteristics.

Characteristics	Value (%)
Sensitivity	42.08
Specificity	79.85
Positive predictive value	68.46
Negative predictive value	57.02
Correctly classified (using estat STATA command)	60.60

In Model 4 (Table 8 and 9), a logistic regression model was used. The patients who arrive in an ambulance are 2.86 times more likely to wait longer than 365.5 minutes compared to people who do not arrive by ambulance, holding other variables constant. Patients who visit proprietary hospitals are 0.5 times less likely to wait more than 365.5 minutes, compared to people visiting other

hospitals, holding other variables constant. Patients who visit government owned hospitals are 4.03 times more likely to wait more than 365.5 minutes compared to people visiting other hospitals, holding other variables constant. The model is classified to 60.60%, which shows that it is a good model for predicting waiting time.

Table 10: Comparison between the four models: significant variables and coefficients.

Variables	Model 1	Model 2	Model 3	Model 4	Odds Ratio
	Coefficient	Coefficient	Coefficient	Coefficient	
Age	-0.1681645*	-	-	-	-
Sex	-	-	-0.2090173***	-	-
Ethnicity Malayalee	-16.40474***	-15.37663***	-	-	-
Arrival by ambulance	-13.58417***	-20.95313***	-1.035254***	1.049854***	2.857
Proprietary	-23.44807***	-24.52323***	-0.9005406***	1.393226***	0.568
Government, non-federal	-14.82139***	-19.55298***	-0.0202192	-0.5643366***	4.027
Interaction between Amb. arrival and Govt. owned	-	14.63223***	0.7349084***	-	-
Constant	48.09881***	43.20722***	3.171588***	-0.2112421*	0.809

Note: *p<0.05, **p<0.01, ***p<0.001.

Finally, we compared the results from the four models together to highlight the significant variables and coefficients as shown in Table 10. As we look at the comparison between the above models, we find that arrival by ambulance, proprietary hospital ownership, and government owned hospitals have a significant effect on the waiting time of patients across all the models. Age is significant in the linear regression model, and it becomes insignificant when the polynomial and interaction model is calculated. The interaction term is significant in models 2 and 3, and the ethnicity Malayalee variable is significant in models 1 and 2.

DISCUSSION

Our study found the following by using models 1 – 3. The waiting time of older patients is shorter when compared to that of younger patients, which shows that the health facilities have been sensitive to the needs of the elderly in terms of faster initiation of care. Being of Malayalee ethnicity leads to waiting less time, possibly because of their socio-economic status, or this may be due to other reasons that require further study. Profit proprietary hospitals have shorter waiting times compared to other hospitals, possibly because the private ownership of the hospitals makes them more sensitive to the waiting times for patients. Government hospitals have a longer waiting time than profit proprietary hospitals, followed by the non-profit hospitals, which have the longest waiting time. Further studies may be required to study non-profit hospitals and their effect on waiting times, since our study shows that non-profit hospitals are the least sensitive to the needs of the patient due to their lengthy waiting times. Our study also shows that people who arrive by ambulance have shorter waiting times than people who do not arrive by ambulance. The reason for this could possibly be that people who arrive by

ambulance have serious health problems and are seen by a physician faster than other patients. People who arrive in an ambulance to government owned health facilities have longer waiting times compared to others; this may be due to the fact that most of the ambulances that are operated by the government health facilities may be poor. One of our final models also shows that males have shorter waiting times compared to females. This may be that due to the misogynist culture of India; where men are given preference everywhere, women have longer waiting times. Our study findings are consistent with that of the findings of Ray AA, which shows that women have longer waiting times than men.³⁰ However, the findings of our logistic regression model (Model 4) are only consistent with the other models in the findings of reduced waiting time in proprietary hospitals compared to other hospitals.

CONCLUSION

An important policy consideration that arises following our study is that people of the ethnicity with a higher economic status experience shorter waiting times, therefore certain changes need to be brought about in the health system that help ensure all races have equal access to care. It is seen that privately owned proprietary hospitals have the shortest waiting times and non-profit hospitals have the longest waiting times. This shows that people who cannot afford to go to the privately owned hospitals must wait longer to get care. Policy interventions by the government to provide equal access in the private facilities or to decrease the waiting time in the non-profit hospitals are needed. Another important area is the shorter waiting time for men, which shows gender discrimination in India. Government policies to give equal or preferential access to women in hospitals would help to solve the longer waiting times for women.

Government facilities should shorten the waiting time for people arriving by ambulance. This may mean that they need to have more emergency medical personnel or physicians and transport patients from the outpatient department to the emergency department faster.

Limitations

In this study multiple models that produced significant results were considered. The majority of the numbers of variables that are significant were common to many models. Yet, there may have been variables that were significant in only one or two models. But those variables have also been considered for the explanation of the model since the underlying theory supports its inclusion. Further research studies need to be carried out to explain some of the determinants completely.

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