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# Statistical Analysis of Patients Waiting Time in Accessing Health Care Services in Ghana: A Case Study of University of Cape Coast Hospital

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Abstract

Delayed access to health care in terms of diagnosis and treatment has unforeseen health and cost implications on the patients and the public health system in general. Thus, the study examines patients' waiting time in accessing health care services. The study employs a convenience sampling technique in collecting data from a sample of 350 Outpatients using a questionnaire. The main analytic tools used in the study are the paired sample t-test, binary logistic regression and SmartPLS structural equation modelling. Results from the study show that the actual waiting times of patients are generally higher than the expected times. Furthermore, the probability of a patient's waiting time being rated as unacceptable is affected by the Day of attendance, Arrival time of patients, Large number of patients or long queue, Long registration time, Type of diagnosis, and Type of treatment sought. Finally, the study also establishes that there is no relationship between socio-demographic characteristics and unacceptable waiting time, as well as no relationship between hospital factors and unacceptable waiting time. Additionally, the study shows that unacceptable waiting time does not have any influence on overall patients' satisfaction. However, a strong positive relationship between process factors and unacceptable waiting time was established. The study recommends that there is the need for health care policy formulators to adopt more efficient strategies, like use of computer modelling to help assign appointment time to patients, so as to significantly reduce the time patients spend waiting at the hospitals.

*Keywords:* Simulation, Diagnosis, Socio-Demographic Characteristics, Modelling, Sampling Technique, Patients' Satisfaction, Logistic Regression

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## 1.0 Introduction

### *1.1 Background*

Lengthy average wait time is among the most prevalent challenges affecting most healthcare organizations (British Columbia Medical Association, 2006), and before that, Eilers (2004) reported that long waiting time is a grave issue for most patients and is perceived as a core aspect of patient satisfaction. While the issue of waiting time is universally accepted to be of significance in the long chain of health care delivery process, its importance was further shown by a report in which good service delivery was highlighted to be a pivotal element in any health care system and thus a crucial component to the achievement of health-related sustainable development goal three which aimed to ensure healthy lives and promote the well-being of all at all ages (World Health Organization, 2014). Thus, to attain comprehensive health coverage so that everyone has access to quality and affordable healthcare services, there is a need for swiftness in the healthcare delivery process, along with other factors such as social determinants of health.

Empirical evaluations on the subject revealed that patients spend a lot more time in health care facilities waiting for doctors and other allied healthcare professionals to provide services (Musinguzi, 2013). Untimely access to health services is believed to have a detrimental effect on health conditions due to gaps in diagnosis and treatment (Kenagy et al., 1999), which could lead to unintended financial consequences for patients and the healthcare system (Mesfin, et al., 2010). Long waiting queues are symptomatic of inefficiency in hospital services, and unfortunately, this is often the case in many public hospitals in Ghana and other developing countries (Afrane & Appah, 2014). Based on prior studies (Oche & Adamu, 2013), the problem with long waiting time in a hospital is that the patient's waiting time affects the usage of health services, and thus resulting in some patients regarding these delays as a hindrance to eventually receiving services and keeping patients waiting needlessly can also be a source of stress for both patients and physicians.

Waiting time is an input of the opportunity cost of own time input in the household's production function (Grossman, 1972; Acton 1975), and because of this, increments in waiting time can lead to a significant reduction in demand and motivate consumers to seek alternative health care (Blundell & Windmeijer, 2000; Ofili & Ofovwe, 2005). In their view, Camacho *et al.* (2006) indicated that the lengthy amount of time patients waits to receive health care services is a source of dissatisfaction. However, reduced waiting time may lead to increased patient satisfaction and greater willingness to repeat visits. Furthermore, Sørup and Jacobsen (2013) opined that there is a strong relationship between waiting time and patient satisfaction. Thus, suggesting that patients who usually experience a high level of discomfort with unacceptable waiting time with their patronizing the services of a health care provider. Similarly, Anderson *et al.* (2007), on the other hand, contended that waiting times affect the overall patient satisfaction, including willingness to see the provider again and recommend the provider to others. Thus, it is against this background that this study sought to examine waiting time in Ghanaian Hospitals from the perspective of patients' expected waiting time and the actual time spent, with a view towards establishing the relationship between client waiting time experienced and the factors associated with patient waiting time.

Some studies on the topic of waiting time in Ghana have yielded mixed findings and may not be valid or reliable enough to be generalized on the entire population as a result of the methodologies adopted and the population of interest, for instance, a study which examined the waiting time and women's satisfaction at an antenatal clinic in Ghana concluded that waiting time at antenatal clinics was about $6.5 \pm 2$ hours, and about 68% of women were found to have rated the waiting time as being too long, and almost 48% expressed dissatisfaction at the time spent (Donkor & Obed, 2012), moreover it appears there is little or no studies that evaluated waiting time in Ghanaian hospitals from the perspective of Cape Coast's University Hospital. Just like most major Hospitals in Ghana, the University of Cape Coast Hospital receives a large number of healthcare seekers on a daily basis, and this generally results in considerable waiting times. In response to this, this paper examines whether there is a difference between the actual and expected waiting times of patients; identifies factors that significantly affect the probability of patients' waiting time being rated as unacceptable; examine the relationship socio-

demographic characteristics, clinical factors, process factors and hospital factor have with unacceptable waiting time and how unacceptable waiting time affects the overall satisfaction of patients. Furthermore, the need for this study puts on added significance when it is contextualized that the majority of those patronizing this hospital are likely to be students who are constrained by time. It therefore becomes necessary to have an empirical evaluation of the waiting time in this particular hospital, as doing so would serve as a basis on which prospective health care seekers, patients, and students especially can plan for their visits to the hospital, in addition, this study would serve as a platform on which hospital management can better manage the operations of the institution.

## 2.0 Methodology

*2.1 Study Design*

This study adopted an explanatory research design with a quantitative approach. An explanatory design, also known as a causal research design is used in trying to interface ideas or variables while keeping in mind the end goal of investigating cause and impacts (Creswell *et al*., 2003). The adoption of this procedure was deemed suitable for this study due to the stated aims of this research in particular, the evaluation of the relationship between the clients waiting time experienced and the associated factors calls for establishing a causal relationship which can be best achieved with the implementation of an explanatory plan. This design as indicated, investigates the relationship between factors utilizing statistical analysis.

*2.2 Study Population*

The target population for the study encompassed the outpatient department (OPD) clients patronizing health care services in Ghanaian hospitals with the University of Cape Coast Hospital chosen purposively for this study. Estimates of the required subjects in this study were calculated using the Freud and William's formula. The adoption of this sample size determination technique was due to the infinite nature of the subjects under consideration.

*2.3 Data Description*

Cross-sectional data was collected for this study; the data was taken from clients of the outpatient department of the University of Cape Coast Hospital within the period of December 2019 to February 2020. In order to improve content validity, the factors that have been found to affect patients waiting time and other variables in this study were based on constructs and surveys developed from previous studies. Socio-demographic factors and Clinical factors were measured using items derived from Musinguzi, (2013) while the items used to measure Process factors and Hospital factors were derived from (Musinguzi, 2013; Wanyenze, et al. 2010). Furthermore, unacceptable wait time factors were measured with items derived from (Hill, & Joonas, 2005; Willoughby *et al*., 2010) while overall patient satisfaction factors were measured with items derived from (Bleustein *et al*., 2014; Alrasheedi *et al*., 2019). The items have been rephrased to depict the context of patients waiting time and the research environment. These measurement items are measured using a 5-point Likert scale anchored between 1 (strongly disagreed) and 5 (strongly agreed). Thus, a primary data source was utilized, and the principal data collection instrument was a structured questionnaire.

*2.4 Definition of Factors*

*Clinical Factors*

CF1 = Type of referral
CF2 = Severity of illness
CF3 = Type of diagnoses
CF4 = Type of treatment sought
CF5 = Lack of adequate medical equipment

*Process Factors*

PF1 = Day of attendance
PF2 = Patients vital checking
PF3 = Insufficient number of staff available
PF4 = Large number of patients (long queue)

PF5 = Number of service points
PF6 = Long registration time
PF7 = Arrival time of patients
PF8 = Long consultation time
PF9 = Retrieval of patient records

*Hospital Factors*

HF1 = Facility design
HF2 = Long distance between sections
HF3 = Lack of adequate amenities
HF4 = Hospital norms and standards
HF5 = Distance from homes

*Unacceptable Waiting Time*

WT1 = Unacceptable waiting time has a financial repercussion
WT2 = Unacceptable waiting time affects the likelihood of not recommending this care provider to others
WT3 = Unacceptable waiting time affects the patients assessment of service quality negatively
WT4 = Unacceptable waiting time lead to negative overt actions by the patient, including switching to another medical service provider.
WT5 = Unacceptable waiting time negatively affects patients' assessment overall satisfaction with the service

*Patient Satisfaction*

LS1 = The hospital provide services at the promised time.
LS2 = The hospital personnel handle a problem in a very good and timely way.
LS3 = The hospital's personnel provide timely and regular information when services will be performed
LS4 = This hospital's employees instill confidence in me.
LS5 = I am satisfied with the convenience of location of the hospital.

*2.5 Ethical Consideration*

The Head of the Department of Statistics, University of Cape Coast, Ghana, granted ethical approval and clearance for the researchers to appropriately request authorization and consent from hospital management and respondents respectively. In addition, researchers assured respondents of utter and total adherence to ethical principles, including anonymity and confidentiality of respondents' information.

*2.6 Inclusion and Exclusion Criterion*

Outpatient department (OPD) clients patronizing healthcare services of the University of Cape Coast Hospital were included in the study, whiles inpatient department clients were excluded from this study.

*2.7 Sample Size*

In order to determine the optimal sample size, the Cochran (1977) formula was used to estimate the sample size at a 95% level of confidence and an error of 5% (Cochran, 1977).

The Cochran formula is thus given as:

$$n = \frac{Z_{\alpha/2}(pq)}{e^2}$$

Where:

$n$ = sample size

$Z$ = standard score based on a confidence level

$\alpha/2$ = significance level (2-tailed)

$p$ = expected variability in the population

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$$q = 1 - p$$

As suggested, assuming the estimated proportion of the characteristic present in the population is 80%, then $p$=80% (Nnenna *et al*., 2016). Therefore, a 20% probability of OPD patients that did not patronize the hospital during the study period was assumed. Hence, given:

$$p = 80\% = 0.8$$
$$q = 20\% = 0.2$$

Thus

$$n = \frac{(1.96)^2 \times (0.8 \times 0.2)}{(0.05)^2}$$
$$n = \frac{(1.96)^2 \times (0.16)}{0.0025}$$
$$n = \frac{0.614656}{0.0025} = 245.86 \approx 246$$

A total of 246 OPD patients were therefore required for this study. As the population is infinite, anything less than 246 may bias the data as well as the results. Thus, OPD patients greater or equivalent ($\geq$) 246 can also be chosen for this study. As a result, a total of 350 people were chosen from the target population.

**3.0 Results**

The data was analyzed using Statistical Package for Social Sciences (SPSS) version 23 and SmartPLS. A paired sample *t*-test was used to examine if there is a difference actual and expected waiting times of patients, whiles a binary logistic regression was used to identify factors that significantly affect the probability of patients' waiting time being rated as unacceptable and PLS structural equation modelling was used in examining the structural relationship socio-demographic characteristics, clinical factors, process, and hospital factors have with unacceptable waiting time leading to overall patients' satisfaction.

In this section, exploratory and inferential methods are used to presents results and discussions of findings based on the objectives of the study. In what follows, a presentation of the results of socio-demographic characteristics of patients is done.

**Table 1:** *Gender of Respondents*

| | Frequency | Percent |
|---|---|---|
| Male | 171 | 48.9 |
| Female | 179 | 51.1 |
| Total | 350 | 100.0 |

The result in Table 1 suggested a fair distribution between males and female respondents, though there are more female respondents. This is because females constitute about 51.1% of the respondents, which obviously resulted in the male respondents being about 48.9% of the total respondents. The plausibility is that more females attend this hospital than their male counterparts.

**Table 2:** *Summary Statistics for Ages of Respondents*

| Statistic | Values |
|---|---|
| Mean | 38.71 |
| Std. Deviation | 7.396 |
| Skewness | 0.704 |
| Kurtosis | -0.041 |
| Minimum | 19 |
| Maximum | 54 |

Results from Table 2 based on a sample of 350 patients show that the range of ages is from 19 to 54 years. The table shows that the average age of patients is approximately 39 years with a standard deviation of about 7 years. Also, the distribution of ages of patients is somewhat positively skewed, indicating that most of the patients have ages below an average of 39 years.

**Table 3:** *Descriptive Statistics for Overall Actual Waiting Time and Overall Waiting Time Expected*

| Waiting time | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Overall Actual | 112.94 | 350 | 13.720 | 0.733 |
| Overall Expected | 99.09 | 350 | 11.923 | 0.637 |

Table 3 shows that the overall actual waiting time experienced has a higher mean than the overall waiting time expected. While the mean appears to suggest a significant difference, it is often not the best practice to draw inferences based on summary statistics. Hence, the next output Table 4 presents the results for determining the significance of the difference in the mean of overall waiting time experienced and overall waiting time expected.

**Table 4:** *Test for Differences between Actual and Expected Waiting Times*

| | | | | 95% CI of the Diff. | | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Dev. | Std. Error | Lower | Upper | t | df | Sig. (2-tailed) |
| Actual – Expected | 13.846 | 9.412 | 0.503 | 12.856 | 14.835 | 27.522 | 349 | 0.000 |

Table 4 shows a paired *t*-test statistic value of 27.522 for the comparison of the average overall actual waiting time experienced and overall waiting time expected with a corresponding p-value of 0.00, which is less than a significant level of 0.05. Thus providing us the evidence that the difference in the overall actual waiting time experienced and overall waiting time expected is statistically significant. This indicates that the actual overall waiting time experienced is significantly higher than the overall waiting time expected by patients.
In what follows in Table 5 is the logistic regression model which helps to identify factors that significantly affect the probability of patients' waiting time being rated as unacceptable.

In Table 5, the values of the Wald statistic are used to assess the significance of each of the independent variables. The results show that only six out of nineteen (19) predictor variables significantly contribute to the waiting time of patients. These predictor variables are CF3 (Type of diagnosis), CF4 (Type of treatment sought), PF1 (Day of attendance), PF4 (large number of patients or long queue), PF6 (Long registration time) and PF7

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(Arrival time of patients). For these variables, the *p*-values associated with their Wald statistic values are generally less than 0.05 level of significance. The results indicating that the probability of the acceptability, or otherwise, of patients' waiting times can be predicted using the identified factors.

Thus, the logistic function for acceptability of patient waiting time is given by equation 1.

$$P = 5.105 + 0.627CF3 - 0.807CF4 - 1.088PF1 + 0.887PF4 - 0.829PF6 + 0.515PF7 \quad \text{.....(1)}$$

Furthermore, the odds ratio results in Exp(B) column of Table 5, per Tabachnick and Fidell (2001) is the increase or decrease of being in one outcome category (in this case, either acceptable or unacceptable wait time) for any one unit increase in the estimated predictor value.

Table 5: *Binary Logistic Regression Model of Factors Affecting Patient Waiting Times*

| | | | | | | | 95% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|---|---|
| Factors | B | S.E. | Wald | df | Sig. | Exp(B) | Lower | Upper |
| CF1 | -0.028 | 0.149 | 0.036 | 1 | 0.850 | 0.972 | 0.726 | 1.303 |
| CF2 | 0.233 | 0.201 | 1.341 | 1 | 0.247 | 1.262 | 0.851 | 1.872 |
| CF3 | 0.627 | 0.243 | 6.661 | 1 | 0.010 | 1.872 | 1.163 | 3.013 |
| CF4 | -0.807 | 0.276 | 8.523 | 1 | 0.004 | 0.446 | 0.260 | 0.767 |
| CF5 | -0.129 | 0.257 | 0.252 | 1 | 0.616 | 0.879 | 0.531 | 1.455 |
| PF1 | -1.088 | 0.313 | 12.056 | 1 | 0.001 | 0.337 | 0.182 | 0.623 |
| PF2 | 0.160 | 0.227 | 0.498 | 1 | 0.480 | 1.174 | 0.752 | 1.831 |
| PF3 | -0.295 | 0.375 | 0.620 | 1 | 0.431 | 0.745 | 0.357 | 1.552 |
| PF4 | 0.887 | 0.211 | 17.678 | 1 | 0.000 | 2.429 | 1.606 | 3.673 |
| PF5 | 0.264 | 0.326 | 0.658 | 1 | 0.417 | 1.302 | 0.688 | 2.465 |
| PF6 | -0.829 | 0.327 | 6.450 | 1 | 0.011 | 0.436 | 0.230 | 0.828 |
| PF7 | 0.515 | 0.222 | 5.383 | 1 | 0.020 | 1.674 | 1.083 | 2.586 |
| PF8 | -0.053 | 0.263 | 0.040 | 1 | 0.842 | 0.949 | 0.567 | 1.588 |
| PF9 | 0.154 | 0.244 | 0.398 | 1 | 0.528 | 1.166 | 0.723 | 1.880 |
| HF1 | 0.062 | 0.253 | 0.060 | 1 | 0.806 | 1.064 | 0.648 | 1.746 |
| HF2 | 0.184 | 0.354 | 0.270 | 1 | 0.603 | 1.202 | 0.601 | 2.404 |
| HF3 | 0.138 | 0.157 | 0.771 | 1 | 0.380 | 1.147 | 0.844 | 1.560 |
| HF4 | -0.053 | 0.126 | 0.177 | 1 | 0.674 | 0.948 | 0.740 | 1.215 |
| HF5 | -0.252 | 0.234 | 1.161 | 1 | 0.281 | 0.777 | 0.492 | 1.229 |
| Constant | 5.105 | 2.461 | 4.302 | 1 | 0.038 | 164.791 | | |

From Table 5, the odds ratio for CF3, however, is 1.872, which is greater than 1. This indicates that the more differential a diagnosis is conducted on a patient, the more likely he or she will report waiting time as unacceptable. Thus, for every differential diagnosis conducted, the odds of a patient reporting unacceptable waiting time increases by a factor of 1.872, all other things being equal. Also, the odds ratio for CF4 is 0.446, a value less than 1. This indicates that the more intense a treatment, the less likely would a patient report waiting time as unacceptable. Thus, for every intense treatment given to a patient, the odds of him or her reporting unacceptable waiting time decreases by a factor of 0.446, all other things being equal. Furthermore, the odds ratio of 0.337 for PF1 (Day of attendance) indicates that when a patient visits or patronizes the hospital on any day, the risk of a patient reporting waiting time as unacceptable decreases by a factor of 0.337, all other factors being equal. Also, the odds ratio for PF4 (large number of patients or long queue) is 2.429, which is greater than 1. This indicates that when a patient patronizes the hospital any day when the queue is large or the number of patients is large, the risk of a patient reporting waiting time unacceptable increases by a factor of 2.429, all other factors being equal. For PF6 (Long consultation time), the odds ratio of 0.436 means that for any extended consultation time period of a patient, the risk of reporting waiting time unacceptable decreases by a factor of

0.436, all other factors being equal. Finally, for PF7 (Arrival time of patients), the odds ratio of 1.674 indicates that the risk of a patient reporting waiting time unacceptable increases by 1.674 times higher for a patient patronizing the hospital at a particular time when there is pressure, all other factors being equal.

### *3.1 Relationship between Waiting Times Factors and Patients' Satisfaction*

This section seeks to examine the nature of relationship socio-demographic characteristics, clinical factors, process factors and hospital factors has with unacceptable waiting time leading to overall patient satisfaction using structural equation modelling. The result of the measurement model is presented in table 6.

Table 6: *Measurement Models Evaluation Result*

| Construct | Factors | Loadings | CA | CR | AVE |
|---|---|---|---|---|---|
| Socio-demographic Characteristics | SD1 | 0.713 | 0.719 | 0.826 | 0.543 |
| | SD2 | 0.886 | | | |
| | SD3 | 0.940 | | | |
| Clinical Factors | CF1 | 0.871 | 0.823 | 0.875 | 0.587 |
| | CF2 | 0.745 | | | |
| | CF3 | 0.940 | | | |
| | CF4 | 0.929 | | | |
| | CF 5 | 0.878 | | | |
| Process Factors | PF1 | 0.701 | 0.849 | 0.893 | 0.626 |
| | PF2 | 0.861 | | | |
| | PF3 | 0.723 | | | |
| | PF4 | 0.909 | | | |
| | PF5 | 0.704 | | | |
| | PF6 | 0.901 | | | |
| | PF7 | 0.840 | | | |
| | PF8 | 0.803 | | | |
| | PF9 | 0.847 | | | |
| Hospital Factors | HF1 | 0.700 | 0.737 | 0.835 | 0.559 |
| | HF2 | 0.843 | | | |
| | HF3 | 0.871 | | | |
| | HF4 | 0.726 | | | |
| | HF5 | 0.842 | | | |
| Unacceptable Waiting time | WT1 | 0.705 | 0.826 | 0.878 | 0.590 |
| | WT2 | 0.879 | | | |
| | WT3 | 0.787 | | | |
| | WT4 | 0.890 | | | |
| | WT5 | 0.759 | | | |
| Overall Patient Satisfaction | LS1 | 0.793 | 0.783 | 0.860 | 0.606 |
| | LS2 | 0.848 | | | |
| | LS3 | 0.874 | | | |
| | LS4 | 0.748 | | | |
| | LS5 | 0.939 | | | |

Table 6 depicts that all indicator loadings are above 0.5, as the recorded loadings varied between 0.700 and 0.940, thus showing indicator or item reliability (Hulland, 1999). This also suggests that these items are a good measurement of the construct. It is also clear that the Cronbach alpha and composite reliability of all constructs exceeds the 0.7 thresholds, suggesting construct reliability. This further illustrates the reliability of the measurement model in this study (Hair Jr *et al.,* 2014). In addition, it could be found that the AVE for each construct was above 0.5, thus indicating that the measurement model exhibits converging validity, which is confirmed by Sarstedt *et al.* (2014) research, which suggests that the AVE should be greater than 0.5 for the design to exhibit adequate converging validity. Conclusively, findings indicate that all assumptions underlying the measurement model have been satisfied.

Table 7: *Indicator Item Cross Loadings*

| Constructs | Factors | SD | CF | PF | HF | WT | LS |
|---|---|---|---|---|---|---|---|
| Socio-demographic Characteristics | SD1 | 0.713 | 0.422 | 0.343 | 0.368 | 0.515 | 0.490 |
| | SD2 | 0.886 | 0.525 | 0.495 | 0.459 | 0.488 | 0.479 |
| | SD3 | 0.940 | 0.620 | 0.556 | 0.401 | 0.506 | 0.491 |
| Clinical Factors | CF1 | 0.468 | 0.871 | 0.594 | 0.405 | 0.506 | 0.46 |
| | CF2 | 0.501 | 0.745 | 0.452 | 0.400 | 0.474 | 0.491 |
| | CF3 | 0.470 | 0.940 | 0.585 | 0.443 | 0.442 | 0.482 |
| | CF4 | 0.552 | 0.929 | 0.566 | 0.431 | 0.520 | 0.504 |
| | CF 5 | 0.469 | 0.878 | 0.547 | 0.458 | 0.484 | 0.483 |
| Process Factors | PF1 | 0.478 | 0.428 | 0.701 | 0.489 | 0.504 | 0.521 |
| | PF2 | 0.430 | 0.531 | 0.861 | 0.545 | 0.531 | 0.437 |
| | PF3 | 0.442 | 0.444 | 0.723 | 0.536 | 0.437 | 0.477 |
| | PF4 | 0.413 | 0.429 | 0.909 | 0.686 | 0.407 | 0.523 |
| | PF5 | 0.509 | 0.579 | 0.704 | 0.432 | 0.466 | 0.494 |
| | PF6 | 0.455 | 0.496 | 0.901 | 0.627 | 0.495 | 0.446 |
| | PF7 | 0.492 | 0.540 | 0.840 | 0.604 | 0.517 | 0.474 |
| | PF8 | 0.448 | 0.584 | 0.803 | 0.599 | 0.473 | 0.423 |
| | PF9 | 0.462 | 0.559 | 0.847 | 0.542 | 0.467 | 0.462 |
| Hospital Factors | HF1 | 0.375 | 0.621 | 0.463 | 0.700 | 0.536 | 0.444 |
| | HF2 | 0.507 | 0.555 | 0.474 | 0.843 | 0.472 | 0.446 |
| | HF3 | 0.420 | 0.526 | 0.413 | 0.871 | 0.462 | 0.485 |
| | HF4 | 0.367 | 0.317 | 0.487 | 0.726 | 0.462 | 0.424 |
| | HF5 | 0.433 | 0.510 | 0.484 | 0.842 | 0.51 | 0.548 |
| Unacceptable Waiting time | WT1 | 0.438 | 0.48 | 0.444 | 0.525 | 0.705 | 0.475 |
| | WT2 | 0.510 | 0.475 | 0.454 | 0.495 | 0.879 | 0.366 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | WT3 | 0.493 | 0.523 | 0.495 | 0.499 | 0.787 | 0.464 |
| | WT4 | 0.384 | 0.514 | 0.480 | 0.477 | 0.890 | 0.459 |
| | WT5 | 0.505 | 0.526 | 0.493 | 0.506 | 0.759 | 0.496 |
| Overall Patient Satisfaction | LS1 | 0.387 | 0.405 | 0.515 | 0.455 | 0.472 | 0.793 |
| | LS2 | 0.484 | 0.586 | 0.462 | 0.459 | 0.508 | 0.848 |
| | LS3 | 0.498 | 0.455 | 0.525 | 0.525 | 0.472 | 0.874 |
| | LS4 | 0.472 | 0.530 | 0.494 | 0.471 | 0.513 | 0.748 |
| | LS5 | 0.504 | 0.486 | 0.449 | 0.428 | 0.491 | 0.939 |

From Table 7, it could be observed that all indicator's outer loadings on a construct were higher than all its cross loadings with other constructs, thus, implying a discriminant validity of the constructs. This implication is consistent with research by Henseler et al. (2009), which opined that discriminant validity is established when loadings of each indicator exceed its cross loadings. This result on discriminant validity is further supported by output Table 8.

**Table 83:** *Discriminant Validity* (*Fornell-Larcker Criterion*)

| Construct | SD | CF | PF | HF | WT | LS |
|---|---|---|---|---|---|---|
| SD | 0.737 | | | | | |
| CF | 0.553 | 0.766 | | | | |
| PF | 0.576 | 0.626 | 0.791 | | | |
| HF | 0.517 | 0.530 | 0.596 | 0.747 | | |
| WT | 0.529 | 0.556 | 0.613 | 0.551 | 0.768 | |
| LS | 0.486 | 0.516 | 0.570 | 0.559 | 0.646 | 0.778 |

Table 8 displays the correlation analysis across all constructs. In specific, Table 8 further assessed the discriminant validity using Fornell-Larcker criterion, which is a more pragmatic approach to evaluating discriminant validity in order to support the result of Table 7. In order to establish discriminant validity, the square root of the AVE of each construct should be greater than its highest correlation with any other construct, as per Fornell and Larcker (1981). Consequently, the result in Table 8 indicates that the estimated squared root of the AVE of the six reflective constructs is significantly higher than their inter-construct correlations, indicative of adequate discriminant validity. This illustrates that each construct is unique and varies from other constructs in the model. Therefore, it can be concluded that the measurement model is reliable and valid.

### *3.2 Structural Model Assessment*

Once the reliability and validity assumptions have been met, the researchers then looked at the structural model based on the symbol, magnitude, and significance of the coefficients of each path. However, to assess the importance of each route, a typical bootstrapping protocol of 5000 re-samples was used to replace the original 350 samples. Furthermore, the coefficient of determination $(R^2)$ and standardized root mean square residual (SRMR) was used in assessing the consistency of the measurement model (Henseler, et al., 2012).

The structural model result is displayed in Figure 1, and consequently, the hypothesis testing results in Table 9.

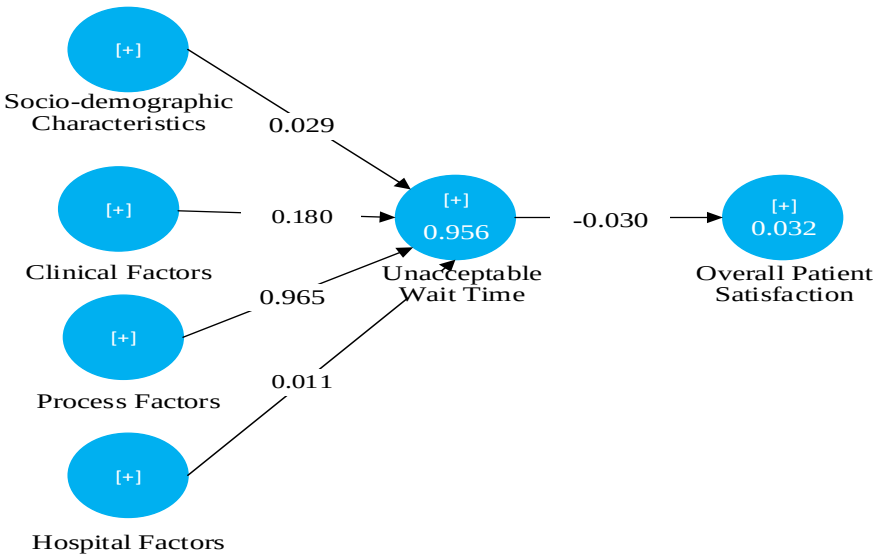


**Figure 1:** PLS *Results for Structural Model*

The structural model results in Figure 1 showed that the estimated model paths recorded coefficients which ranged between -0.030 and 0.965. More specifically, the highest correlation of 0.965 signifies a strong positive relationship between process factors (PF) and unacceptable waiting time (WT). The implication is that the more patients perceive process factors as a cause of delays in assessing health care services at the university of cape coast hospital, the more they would perceive waiting time as unacceptable. In addition, the result in Figure 8 establishes the lowest correlation of 0.011 between hospital factors (HF) and unacceptable waiting time (WT).

Furthermore, results revealed that socio-demographic characteristics, clinical factors, process factors, and hospital factors jointly accounted for 95.6% of the variance in unacceptable waiting time, whiles unacceptable waiting time accounted for only 3.2% of the variance in overall patient satisfaction. Consequently, the significance of all structural paths was assessed using bootstrap *t*-values results presented in Table 9.

**Table 9:** *Results for Hypotheses Testing*

| Hyp. | Hyp. Path | Original Sample (O) | Sample Mean (M) | Std. (STDEV) | T Statistics (\|O/STDEV\|) | *P* Values |
|---|---|---|---|---|---|---|
| $H_1$ | DF→WT | 0.029 | 0.031 | 0.017 | 1.636 | 0.102 |
| $H_2$ | CF→WT | 0.180 | 0.194 | 0.051 | 3.501 | 0.000 |
| $H_3$ | PF→WT | 0.965 | 0.958 | 0.027 | 35.978 | 0.000 |
| $H_4$ | HF→WT | 0.011 | 0.017 | 0.036 | 0.300 | 0.764 |
| $H_5$ | WT→PS | -0.030 | -0.018 | 0.022 | 1.335 | 0.182 |

Results from the standard bootstrapping in Table 9 shows that only two out of the five hypothesized paths were significant, hence, only hypotheses were supported in this study. Thus, results from the bootstrapping established that there is a significant positive relationship between clinical factors (CF) and unacceptable waiting time (WT) $(\beta = 0.180, t = 3.501;\ P < 0.001)$, thus providing support for $H_2$. Also, the analysis revealed that there is a significant strong positive relationship between process factors (PF) and unacceptable waiting time (WT) $(\beta = 0.965, t = 35.978;\ P < 0.001)$, thus providing support for $H_3$.

However, socio-demographic characteristics $(\beta = 0.029, t = 1.636;\ P > 0.05)$ and hospital factors $(\beta = 0.011, t = 0.300;\ P > 0.05)$ was respectively found not to be significant predictors of unacceptable waiting

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time (WT), thus providing the evidence to reject the claim for $H_1$ and $H_4$ respectively. Finally, results from the bootstrapping provide sufficient evidence to reject the hypothesis $H_5$, and thus conclude that unacceptable waiting time (WT) $(\beta = -0.030, t = 1.335;\ P > 0.05)$ is not a significant predictor of overall patient satisfaction.

## 4.0 Discussion

Results of this study have demonstrated that average wait time in Ghanaian hospitals was found to significantly exceed the recommendation from the Institute of Medicine (IOM), which was that at least 90% of patients should be seen within 30 minutes of their scheduled appointment (O'Malley *et al.*, 1983). The study further revealed that Day of attendance, Arrival time of patients, large number of patients or long queue, Long registration time, Type of diagnosis, and Type of treatment sought were statistically significant in the prediction of patient waiting time. These findings support research which concluded that patient perceived cause of the prolonged waiting as long queues (Abdulsalam & Khan, 2017). Results are also consistent with a study which reported that patient waiting time is because of long queues due to high patient load, particular days, and late patient arrivals (Conrad, 2013). However, findings of this study is in disagreement with a finding which asserted that long wait time result from staff behaviour, job procedures, unreasonable workload, weak monitoring and oversight, insufficient services, among others (Pillay et al., 2011). (Pillay *et al.,* 2011). Also, another finding opined that factors associated with long wait times are multi-factorial, ranging from insufficient bed space, extreme nurse shortages, difficulty in reaching healthcare practitioners on the phone, high-acuity patients, and lack of insurance coverage for patients; is inconsistent with the results of this report (Hall, 2013).

The study also established that there is no relationship between socio-demographic characteristics and unacceptable waiting time, as well as no relationship between hospital factors and unacceptable waiting time. Additionally, the study shows that unacceptable waiting time does not have any influence on overall patient satisfaction. However, a strong positive relationship between process factors and unacceptable waiting time was established, which suggests that the more patients perceive process factors as a cause of delays in assessing health care services at the hospital, the more they would perceive waiting time as unacceptable.

## 5.0 Conclusion

Conclusively, the study finds that the overall actual waiting time experienced and overall waiting time expected by patients significantly differ. In this case, the actual waiting time of patients is generally higher than the expected times. Also, the study suggests that there is 98.80% probability that patients in the study area will experience waiting times based on Day of attendance, Arrival time of patients, large number of patients or long queue, Long registration time, Type of diagnosis, and Type of treatment sought. Finally, the relationship between process factors and unacceptable waiting time is positively strong.

In view of the findings, we recommend that:

- There is a need for health care policy formulators to adopt more efficient strategies, like the use of computer modeling to help assign appointment time to patients, so as to significantly reduce the time patients spend waiting at the hospitals.
- It is also essential that hospital management resolve the delayed causes or factors identified so that patients can access timely care. For example, hospital management may enhance their ability to screen patients with mild disease by reinforcing their triage scheme.
- It is also recommended that hospital administrators should put measures in place to resolve human resources deficiencies and other organizational processes and institutional structures aimed at minimizing waiting times and thereby maintaining efficient patient care.
- Finally, hospital administrators should endeavor to resolve the problem of long wait times in order to maximize client satisfaction. In the end, a good knowledge of the factors affecting client satisfaction will form a basis for mechanisms for future improvement.

**References**


Abdulsalam, A., & Khan, H. T. (2017). Hospital Services for Ill Patients in the Middle-Belt Geopolitical Zone, Nigeria: Patient's Waiting Time and Level of Satisfaction. *Illness, Crisis & Loss*, 1054137316689582.

Acton, J. P. (1975). Nonmonetary factors in the demand for medical services: some empirical evidence. *Journal of Political Economy*, 83(3), 595-614.

Afrane, S., & Appah, A. (2014). Queuing theory and the management of Waiting-time in Hospitals: The case of Anglo Gold Ashanti Hospital in Ghana. *International Journal of Academic Research in Business and Social Sciences*, 4(2), 34.

Alrasheedi, K. F., AL-Mohaithef, M., Edrees, H. H., & Chandramohan, S. (2019). The Association Between Wait Times and Patient Satisfaction: Findings from Primary Health Centers in the Kingdom of Saudi Arabia. *Health services research and managerial epidemiology*, *6*, 2333392819861246.

Bleustein, C., Rothschild, D. B., Valen, A., Valatis, E., Schweitzer, L., & Jones, R. (2014). Wait times, patient satisfaction scores, and the perception of care. *The American journal of managed care*, *20*(5), 393-400.

British Columbia Medical Association. (2006). *Waiting Too Long: Reducing and Better Managing Waiting times in BC: a Policy Paper by the BCMA's Council on Health Economics & Policy*. British Columbia Medical Association.

Camacho, F., Anderson, R., Safrit, A., Jones, A. S., & Hoffmann, P. (2006). The relationship between patient's perceived waiting time and office-based practice satisfaction. *NC Med J*, 67(6), 409-413.

Creswell, J. W., Plano Clark, V. L., & Gutmann, M. L. (2003). Hanson. WE (2003). Advanced mixed methods research designs. *Handbook on mixed methods in the behavioral and social sciences*, 209-240.

William, G. C. (1977). Sampling techniques. *Canada: John Willey & Sons Inc.*

Donkor, E. S., & Obed, S. A. (2012). Waiting time and women's satisfaction at an antenatal clinic in Ghana. *African Journal of Midwifery and Women's Health*, 6(1), 7-12.

Eilers, G. M. (2004). Improving patient satisfaction with waiting time. *Journal of American College Health*, 53(1), 41-48.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 18(1), 39-50.

Grossman, M. (1972). On the concept of health capital and the demand for health. *Journal of Political economy*, 80(2), 223-255.

Hair Jr, F. J., Sarstedt, M., Hopkins, L., & Kuppelwieser, G. V. (2014). Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research. *European Business Review*, 26(2), 106-121.

Hall, R. (2013). Patient flow. *AMC*, 10, 12.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2012). Using partial least squares path modeling in advertising research: basic concepts and recent issues. *Handbook of research on international advertising*, 252.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. *New challenges to international marketing* , 277-319.

Hill, C. J., & Joonas, K. (2005). The impact of unacceptable wait time on health care patients' attitudes and actions. *Health Marketing Quarterly*, *23*(2), 69-87.

Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: a review of four recent studies. *Strategic management journal,* 20(2), 195-204.

Kenagy, J. W., Berwick, D. M., & Shore, M. F. (1999). Service quality in health care. *Jama*, 281(7), 661-665.

Mesfin, M. M., Newell, J. N., Madeley, R. J., Mirzoev, T. N., Tareke, I. G., Kifle, Y. T., . . . Walley, J. D. (2010). Cost implications of delays to tuberculosis diagnosis among pulmonary tuberculosis patients in Ethiopia. *BMC Public Health*, 10(1), 173.

Musinguzi, C. (2013). *Patient waiting time and associated factors at the Assessment Center, General outpatient Department Mulago Hospital Uganda.* Makerere University, Kampala.

Nnenna, C. V., Onyeka, V. N., & Nwankwo, C. (2016). Internal Control System and Working Capital of Manufacturing Firms in Nigeria: An Empirical Review. *Journal of Economics and Sustainable Development,* 7(16):2222-2855.

Oche, M. O., & Adamu, H. (2013). Determinants of patient waiting time in the general outpatient department of a tertiary health institution in north Western Nigeria. *Annals of medical and health sciences research*, 3(4), 588-592.

O'malley, M. S., Fletcher, S. W., Fletcher, R. H., & Earp, J. A. (1983). Measuring patient waiting time in a practice setting: A comparison of methods. *The Journal of ambulatory care management*, 6(3), 20-27.

Sarstedt, M., Ringle, C. M., Henseler, J., & Hair, J. F. (2014). On the emancipation of PLS-SEM: A commentary on Rigdon (2012). *Long range planning*, 47(3), 154-160.

Sørup, C. M., & Jacobsen, P. (2013). Application of Structural Equation Modeling to determine Emergency Department patient satisfaction drivers. *In Scandinavian journal of trauma, resuscitation and emergency medicine* , (Vol. 21, No. S2, p. A18). BioMed Central.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics (Vol. 5).* Nedham Heights, MA: Allyn & Bacon.

Wanyenze, R. K., Wagner, G., Alamo, S., Amanyire, G., Ouma, J., Kwarisima, D., ... & Kamya, M. (2010). Evaluation of the efficiency of patient flow at three HIV clinics in Uganda. *AIDS patient care and STDs*, *24*(7), 441-446.

World Health Organization. (2014). *World health statistics 2013: a wealth of information on global public health.* World Health Organization.

Willoughby, K.A., Chan, B.T.B. and Strenger, M. (2010), "Achieving wait time reduction in the emergency department. *Leadership in Health Services*, Vol. 23 No. 4, pp. 304-319.