The Effect of Facility Layout Design on Perceived Health Service Quality in Dire Dawa Hospitals

Nigus Kassie Worku[1]*, Bezabih Amsalu Sedeta[1], Enyew Talie Fenta[2], Alemwork Abie Getu[3], Betelhem Mengist Sharew[4], Shegaye Yibabie Damtie[5]

[1]Department of public health, College of Medicine & Health Science, Dire Dawa University, Dire Dawa, Ethiopia
[2]Department of Public Health College of medicine and health science, Injibara University, Injibara Ethiopia
[3]Department of midwifery, College of Medicine and Health Science, Bahir Dar University, Bahir Dar, Ethiopia.
[4]Department of Midwifery, College of Medicine and Health Science, Dire Dawa University, Dire Dawa, Ethiopia
[5]School of Medicine, College of Medicine and Health Sciences, Dire Dawa University, Dire Dawa, Ethiopia

Abstract

Introduction: In service organizations, customers have become more demanding with an ever-growing expectation not only concerning quality of service but also concerning also the surrounding where these services are offered. Minimal studies have focused on facility layout design and those that did so mainly focused on health provider perspective and medical material perspective.

Methods: An institutional-based comparative cross-sectional study was employed in Dire Dawa hospitals from January 2023 to February 2023. Data were collected using a pretested interviewer-administered questionnaire and entered into and analyzed using statistical package for social science version 23.0. Inferentially, Prison correlation and multiple linear regression analyses with a 95% confidence interval were employed. Variables with p-value < 0.05 were identified as significant factors to the outcome variable.

Results: Generally, in this research, the value of R-Square was 0.702 that means 70.2% of variation in health service quality was predicted by the selected independent variables. Amongst the predictors, social element/ interaction highest value (B =0.266) followed by Spatial Layout and Functionality (B=.234) then by ambient conditions (B= 0. 220) and finally, artifacts, Signs and Symbols took the smallest effect on health service quality of Dire Dawa hospitals with (B = 0.132).

Conclusion: All components of facility layout design (ambient conditions, Spatial Layout and Functionality, artifacts, Signs and Symbols and social interaction) were positively associated with health service quality. Thus, researchers recommend that the management should invest more on a good facility layout design as it affects customers" perception on hospitals' service quality.

Key Words: Health service quality, Facility layout design, Dire Dawa

1. Background

Facility layout Design (FLD) is the first aspect of a service that consumers notice when they visit a service organization in the current market and economic climate, where product and price do not offer a distinct competitive edge [1]. There are four main types of facility layout design which are used in the industrial and service institutions [2]. These types are process facility layout design, product facility layout design, and cell product facility layout design, and fixed facility layout. With regard to the facility layout design of the health facilities, the process facility layout design type is the best fit. Process facility layout design will be designed according to the specified processes, as each activity will be processed according to the specialty. This can be achieved by specifying units and departments involve the similar and heterogeneous activities and tasks [3].

Health service quality is also defined as the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and there are multiple approaches to measuring the quality of care [4]. Donabedian proposed that one could assess whether high-quality care is provided by examining the structure of the setting in which care is provided, by measuring the actual process of care and by assessing the outcomes of cares [5]. Thus, the most suitable and sustainable environment for continuous quality improvement is the introduction of a quality culture based on common understanding, vision, purpose, values, and principles. Five criteria were provided by (Parasuraman et al. 1988) for evaluating service quality. These measurements are according to the SERVQUAL measuring device which comprise; Tangibility, reliability, responsiveness, assurance and empathy. To measure the quality of service, it is necessary to find standards as characteristics of quality according to the type of the service and the activities performed by the service provider.

A number of theories can provide anchorage on the link between facility layout design and service quality. This study was grounded on stimulus-organism response theory, cue utilization theory and the approach-avoidance theory. Stimulus organism response theory points out that dimensions of facility layout design will affect customers and that the customers will respond and behave differently depending on their internal reactions to the facility layout design. The Approach-Avoidance theory on the other hand entails the response of people to the facility layout by way of emotional state [6]. Cue utilization theories, which suggest that services and products are made up of an array cue. These cues serve as alternate pointers of anticipated quality of service [7]. Facilities which adopt a good facility layout design can

achieve the following: High compensation of the area and equipment and workforce, distinct improvement of the flow of information, material and the movement of the individuals and workers, improvement of the morale of the employees and assuring a good work condition, improving the relationship with the customers and improving the flexibility of the production system [3].

Providing the best health outcomes for patients is one of the crucial functions of government in any nation and to have a healthy and active society, quality of design is therefore very evident in the context of Healthcare Facility (HF) buildings. Each HF can accomplish its goals by engaging in certain activities, such as patient care, staff health education, health promotion, and research connected to health [8]. Recent studies have demonstrated a high correlation between the design of HFs and the outcomes experienced by staff, patients, and families [9]. The design of HF physical environments may be to blame for rising rates of mortality and infection, medical errors, sluggish patient treatment, staff injuries, and high nurse turnover for a number of significant and obvious reasons Other disputable but significant repercussions of poor layout design include lost productivity, financial loss, and performance impairment [10].

According to several studies, various HF issues, like dangers and risks of injuries related to medical care, may be the result of inadequately designed care delivery systems and again instead of poor provider performance, this issue is mainly tied to design [10]. The appropriate physical design of HFs' working space had several positive effects and led to advancements in patient happiness and health; additionally, it improves medical care delivery, lowers healthcare expenses, and staff satisfaction [11]. The research issue focuses on the facility and building-related shortcomings of the healthcare services provided by hospitals in Dire Dawa. By using hospitals' services and visiting them as patients and healthcare professionals, this issue has been noticed. Research finding showed that some problems in HFs, such as, hazards and risks of health care–associated injury could be because of the bad design of the systems of care. This problem more related to design rather than weak performance by providers [10].The acceptable design of physical environment of HFs had lots of beneficial and occurred progresses in satisfaction of patient and health which is also increases the staff satisfaction, reduction in healthcare costs, and delivery of medical care [11].

Researches also investigated that the physical environment of private healthcare services in India which included the physical facilities, infrastructure, equipment, medical staff dress-up etc. Authors revealed that, neatness, cleanliness, quietness**,** drugs**,** and payment receipt and

friendly environment significantly influence patients' perceived service quality [12]. Research findings in social and health psychology demonstrate that physical environmental factors – or "artifacts" – can influence patients' perceptions about the quality of their care, and, as a result, even their health outcomes [13, 14]. This research finding was focused on the effect of artifacts on tangibility of quality dimension.

Factors like hospital's atmosphere**,** physical facilities, location, hygienic care and visually appealing significantly affect quality of care specially patients' satisfaction. The atmosphere aspect considered cleanness, no foul smell, soothing, space considered layout and fixtures; signs, symbols and artifacts considered signage, physical facilities considered laundry service, drug store etc and other tangible aspects consisted building exterior, direction signs, waiting areas, medical equipment, staffs' uniform or dress-up [15]. Both the design of the health scape has a considerable association with patient perceived healthcare outcomes [16].

Despite studies conducted on facility layout design there is minimal research that has been done on the effect of facility layout design on quality of health care service in health facilities as well as detail effect facility layout design components on quality of care is not well studied in our country. In addition, even studies conducted in Dire Dawa health facilities on health care quality which focused on provider perspective and equipment perspective and which ignores health facility layout design perspective. Therefore, this study was aimed to address this problem by seeking to determine the effect of facility layout design on perceived health service quality in Dire Dawa hospitals.

2. Methods

2.1. Study design and Population

An institutional-based cross-sectional study was conducted in Dire Dawa City Administration hospitals from January 1/2023 to February 30/ 2023. The source population was admitted adult patients and their attendants/visitors in Dire Dawa hospitals where as the study population was all selected patients and their attendants/visitors in Dire Dawa hospitals during the study period. All patients and attendants who were in Dire Dawa hospitals were included in the study while critical ill patients who were unable to communicate and involuntary attendants were excluded from the study.

2.2.   Sample Size Determination and Sampling Procedure

There are two public and five private hospitals in Dire Dawa city administration. From these hospitals one hospital from public and one hospital from private were selected randomly. Therefore, Dilchora referral hospital and Delt general hospital was selected since these hospitals can be represent other hospitals especially in the context of my research. Based on report from Dilchora referral hospital, there were an average of 480 patients and 960 visitors (attendants). Therefore, in Dilchora referral hospital the total target population was 1440. In Delt general hospital, there were 101 patients and 202 visitors. Therefore, the total target population in Delt general hospital was 303. Finally, the total target population in two hospitals was 1743. The following sample size formula was used for the calculation of the sample size since it is relevant to studies where a probability sampling method was used based on Yemane' s formula [17].

$$n = N/1+N (e)^2$$

Where n, required sample, N, total target population, e, margin of error

$$Therefore, n=1743/ (1+1743) * (0.05)^2$$
$$n = 1743/1+4.36$$
$$n= 325$$

Finally, to get calculated sample size, simple random sampling technique was used to select patients and attendants and proportional allocation was employed for each hospital based on their number of patients and attendants.

2.3.   Measurement and Definition

Facility layout design: is defined as determining the best place for the production equipment and means in the way that ensure the stream of the production processes efficiently and effectively, in addition to the determination of the suitable places of the servant departments. Moreover, facility layout takes into account the side of raw material inventory, work in progress inventory and final product inventory [18]. It was measured by four components: ambient conditions, spatial layout and functionality, Artifacts, signs & symbols and social interaction measured it. Each component was also measured by five Likert scale (1-strongly agree to 5-strongly disagree). Finally, mean score was calculated for each component.

Health service quality: is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with evidence-based professional knowledge [19]. It was measured by five components: tangibility, reliability, responsiveness, assurance and empathy. Each component was also measured by five Likert scale

(1-strongly agree to 5-strongly disagree). Then mean score was calculated for each component and finally total mean score was calculated from each mean of five components.

2.4. Validity and Reliability of the Instrument

The validity of scale was improved by asking questions that best answers the research hypothesis and ensuring the instrument had bias freedom and targeting the right respondents. The questionnaire was further tested for validity by supervisors through assessing whether the instrument is measuring the concept under study. In this study, the pretesting was done by distributing 10% questionnaires to target respondents. The reliability of the tool Computation of Cronbach's Alpha score was used in measuring internal Consistency. As rule of thumb, reliability value of 0.7 and above is recommended for most research to denote the research instrument as reliable. Reliability results for all the set of variables in the questionnaires gave a Cronbach alpha statistics or more than 0.7.

Prior to the main study the researcher was conducted a pilot survey or a pretesting in order to check the reliability of the questionnaire by distributing to and collecting from 33 sample respondents of Dire Dawa hospitals (Sabiyan general hospital and Art general hospital for 10% of the sample 33. After obtaining the result the researcher has then conducted a reliability test on SPSS Version 23 software to ensure the reliability of the instrument using Cronbach's alpha coefficient and when the under mentioned results were obtained the research had finally conducted the main study. Therefore, all Cronbach alpha values for all variables were greater than 0.7 **(Table 1).**

Table 1: Cronbach's alpha value for pretest for effect of facility layout design on perceived health service quality in Dire Dawa hospitals, 2023

No	Variable of the study	Cronbach's alpha	No. of Items
1.	Ambient conditions	0.861	4
2.	Spatial layout and functionality	0.773	5
3.	Social element/interaction	0.795	5
4.	Artifacts, signs & symbols	0.898	7
5.	Quality of health care	0.741	29
	Overall	**0.733**	

(Source: Own Survey, SPSS output, 2023)

2.5. Data Processing, Analysis and Interpretation

The collected data was entered and cleaned using SPSS. The collected data was analyzed using descriptive and inferential methods. The researcher was used frequencies; percentage, mean, and standard deviations to analyze descriptive research while inferentially, prison correlation and linear regression were used to show the relationship between components of facility layout design and perceived health service quality.

The final model that was used in the form; $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4$

Where; Y is health service quality,

β_0 is the constant;

β_1 to β_4 is the coefficients to be estimated,

X_1 is ambient condition,

X_2 the spatial layout and functionality,

X_3 is the artifacts, signs and symbols, and

X_4 is the social elements

3. Results

3.1. Sociodemographic characteristics of respondents

Among the total of 325 patients and visitors, 315 patients and visitors were participated in the study, making a response rate of 96.9%. Two hundred twelve (67.3%) study participants were attendants. The mean age for respondents was 40.69 with SD of ± 8.43. Majority of the respondents, 162 (51.4%) were in the age group of 38-47. One hundred sixteen of respondents (36.8%) were attending their education with collage and above. One hundred ninety (60.3%) of respondents were visiting the current hospital from 2-4 times **(Table 2).**

Table 2: Sociodemographic characteristics of patients and attendants for effect of facility layout design on perceived health service quality in Dire Dawa hospitals, 2023

Variable of the study	Frequency	Percent
Characteristics of respondents		
Patient	103	32.7
Attendant (Visitors)	212	67.3
Age		
18-27	12	3.8
28-37	98	31.1
38-47	162	51.4
Greater than or equal to 48	43	13.7
Sex		
Male	186	59
Female	129	41
Residence		
Urban	220	69.8
Rural	95	30.2
Educational status		
Not attending formal education	26	8.3
Primary school (1-8)	78	24.8
Secondary school (9-12)	95	30.2
Collage and above	116	36.8
Number of visits		
One times	73	23.2
2-4	190	60.3
>4	52	16.5

(Source: Own Survey, SPSS output, 2023)

3.2. Descriptive Statistics

Descriptive finding for independent variables showed that social elements with a mean of 3.40 is the highest adopted aspect, followed by artifacts, signs and symbols with a mean of 3.13,

then ambient conditions with a mean of 3.10 and lastly the least adopted was Artifacts, Signs and Symbols with a mean of 2.93. On average adoption of facility, layout design had a mean of 3.14, which implies that it has been with some extent adoption **(Table 3).**

Table 3: Adoption of Facility Layout design for effect of facility layout design on perceived health service quality in Dire Dawa hospitals, 2023

Facility Layout design Aspect	Mean	Std.	Rank
Ambient Conditions	3.13	0.90	2
Spatial Layout and Functionality	3.10	1.33	3
Artifacts, Signs and Symbols	2.93	1.36	4
Social Elements	3.40	1.32	1
Average	**3.14**	**1.22**	

(Source: Own Survey, SPSS output, 2023)

Descriptive finding for dependent variables showed that assurance with a mean of 3.65 was the highest adopted aspect, followed by Empathy with a mean of 3.64, and lastly the least adopted was reliability with a mean of 3.45. On average adoption of health service quality had a mean of 3.55, which implies that it has been, adopted **(Table 4).**

Table 4: Adoption of health service quality for effect of facility layout design on perceived health service quality in Dire Dawa hospitals, 2023

Health service quality dimensions	Mean	Std.	Rank
Reliability	3.45	1.19	5
Tangibility	3.50	1.31	4
Empathy	3.64	1.30	2
Responsiveness	3.51	1.40	3
Assurance	3.65	1.36	1
Average	**3.55**	**1.31**	

(Source: Own Survey, SPSS output, 2023)

3.3.   Inferential Statistics

Inferential statistics analysis allows researchers to infer about the total population based on sample data. Here, correlation analysis was used to examine the type and strength of the association betweenthe variables deployed in the study, while regression analysis was applied to investigate the effect of the explanatory variables, including ambient conditions, spatial Layout and Functionality, Artifacts, Signs and Symbols and social element on the dependent variable, which is health service quality.

3.4.   Correlation Analysis

Pearson's correlation was used to see the strength and direction of association between the independentvariable and the dependent variable. As per the collected data from 315 patients and visitors, the Pearson correlations extracted showed a significant relationship between the study variables. It was proven that all the independent variables showed a strong and positive

relationship with perceived health service quality. The findings reveal that with regards to the facility layout design variable of layout design, social interaction had the strongest and most positive relationship with perceived health service quality (r= 0.758, p<0.001) followed by ambient conditions (r= 0.731, p<0.001) then by spatial Layout and Functionality (r= 0.747, p<0.001) and then after by artifacts, Signs and Symbols (r= 0.731, p<0.001) **(Table 5).**

Table 5: Correlation of dependent and independent variables for effect of facility layout design on perceived health service quality in Dire Dawa hospitals, 2023

Correlations		AC	SLF	ASS	SE	HSQ
Ambient conditions	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	315				
Spatial Layout and Functionality	Pearson Correlation	.759**	1			
	Sig. (2-tailed)	.000				
	N	315	315			
Artifacts, Signs and Symbols	Pearson Correlation	.759**	.767**	1	.	
	Sig. (2-tailed)	.000	.000			
	N	315	315	315		
Social element/ interaction	Pearson Correlation	.653**	.680**	.683**	1	.
	Sig. (2-tailed)	.000	.000	.000		
	N	315	315	315	315	
Health service quality	**Pearson**	**.747****	**.731****	**.731****	**.758****	**1**
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	315	315	315	315	315
**. Correlation is significant at the 0.01 level (2-tailed).						

(Source: Own Survey, SPSS output, 2023)

3.5.   Testing Multiple Linear Regression Assumptions

3.5.1. Normality Assumption Test

To analyze the distribution of the values of dependent variables in the model associated with the independent variables, a normality test of the histogram or a Shapiro-Wilk test of normality can be used to check whether the normality assumption is fulfilled or not. In the case of the histogram, if the data is normally distributed, the shape of the frequency distribution will depict a symmetrical, bell- shaped curve with the most scores in the middle and the rest being distributed towards theextremes.

Kolmogorov-Smirnov or Shapiro-Wilk test could also be used. Here, P-value > 0.05 indicates the fulfillment of normality assumption. Kolmogorov- Smirnov or Shapiro-Wilk test shows a non-significant value of 0.059 and 0.069 respectively which is greater than 0.05, thus it can be concluded that we can reject the alternative hypothesis and accept the null hypothesis which states the data is normally distributed.

3.5.2. Homoscedasticity Assumption Test

In order to test for homoscedasticity, a plot of the standardized residuals (ZRESID) against the standardized predictors (ZPRED) is used, and when observing the result, if the plot of the residuals resembles a fan or cone shape, this shows the presence of heteroscedasticity, which violates regression assumptions. In this study, the researcher has tested homoscedasticity, and as it can be seen in the under figure,a random array of dots is evenly dispersed around zero, which indicates the residuals at each levelof the predictor variable(s) have similar variances. Therefore, since the plots of the residuals have constant variance and were distributed evenly, we can say that there was no presence of heteroscedasticity.

3.5.3. Multicollinearity Test

The existence of a multicollinearity problem was checked using VIF and (Tolerance = 1/VIF) values for each predictor variable. Tolerance values less than 0.10 and VIF (variance inflation factor) greater than 10 indicate the existence of multicollinearity. Based on the test result below, all the variance inflated factor (VIF) values are less than 10 and all the tolerance values are greater than 0.1; therefore, in this model, there is no high multicollinearity problem **(Table 6).**

Table 6: VIF and Tolerance Statistics of Multicollinearity for effect of facility layout design on perceived health service quality in Dire Dawa hospitals, 2023

Parameters	Collinearity Statistics	
	Tolerance	VIF
(Constant)		
Ambient conditions	.506	1.975
Spatial Layout and Functionality	.429	2.329
Artifacts, Signs and Symbols	.398	2.514
Social element/ interaction	.583	1.714

(Source: Own Survey, SPSS output, 2023)

3.5.4. Regression Coefficients and Interpretations

The beta coefficient value of social element/ interaction was (B = .266, T = 6.433), which shows that by keeping other factors constant, one unit change in social element had 0.266 unit or 26.6% increasing effect on health service quality. The beta coefficient value of Spatial Layout and Functionality was (B=.234, T = 4.751), which shows that by keeping other factors constant, one unit change in Spatial Layout and Functionality causes with .234-unit change or 23.4% (23.4 percent) increase on health service quality. Since from *p- value,* we can conclude that Spatial Layout and Functionality had statistically positive and significant relationship with perceived health service quality because its *p-value* was found to be < 0.05 or T>1.96.

The beta coefficient value of ambient conditions was (B = .220, T = 4.697), which shows that by keeping other factors constant, one unit change in ambient conditions had .220-unit change impact or 22% increase on health service quality. Here, T ambient conditions had statistically positive and significant relationship with perceived health service quality because its *p-value* is less than 0.05 or T >1.96.

The beta coefficient value of artifacts, Signs and Symbols was (B = .132, T = 2.543), which shows that by keeping other factors constant, one unit change in artifacts, Signs and Symbols had 0.132 unit or (13.2%) increasing impact on perceived health service quality **(Table 7).**

Table 7: Coefficients of Regression Analysis for effect of facility layout design on perceived health service quality in Dire Dawa hospitals, 2023

	Coefficients^a							
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.420	.105		4.002	.000		
	ambient conditions	.220	.047	.250	4.697	.000	.500	1.975
	Spatial Layout and Functionality	.234	.049	.261	4.751	.000	.429	2.329
	artifacts, Signs and Symbols	.132	.052	.140	2.543	.011	.397	2.514
	Social element/ interaction	.266	.041	.294	6.433	.000	.583	1.714
a. Dependent Variable: health service quality								

(Source: Own Survey, SPSS output, 2023)

Finally, the regression model was generated as follows.

$$\text{Yi} = b0 + b1\ (SE) + b2\ (SLF) + b3\ (AC) + b\,4(ASS) + \varepsilon_i$$

$$\textit{HSQ} = 0.42 + 0.266\ SE + 0.234 SLF + 0.22 AC + 0.132\ ASS + \varepsilon_i$$

4. Discussion

This study was intended to assess the effect of facility layout design on the quality of health service. Thus, this part elaborates the findings of the results in line with the specific objectives of the study. It describes the relationship between the independent variables (ambient conditions, Spatial Layout and Functionality, artifacts, Signs and Symbols and Social element/ interaction) with the dependent variable (perceived heath service quality).

The results of the findings revealed that ambient conditions had statistically positive and significant effect on perceived health service quality (person correlation = 0.731, B = 0.220, p<.05). According to Baker 1986; Baker, Berry & Parasuraman 1988, the ambient conditions have been acknowledged as a major factor affecting perception and customer response to the facility layout environment. This finding was also supported by Stimulus Organism-Response Theory which stated that a particular stimulus such as color, light, temperature and noise influence a customer's internal states towards service. This finding was also supported by study conducted in Korea which stated that ambient conditions strongly influence the customer's approach behaviors in the full-service carrier industry (19). This study was also consistent with study conducted in Indonesia which revealed that ambient conditions have strong relationship with customer's behavior towards hotel, café and shopping service [20].

The results of the findings revealed that spatial layout and functionality had statistically positive and significant effect on perceived health service quality (person correlation = 0.747, B = 0.234, p<.05). This   finding was supported by Approach–Avoidance Theory which stated that Approach–Avoidance Theory which stated that the predictive values represent the extent to which a customer will associates a specific cue to the service quality. This finding was also supported by study-conducted Indonesia which revealed that spatial layout and functionality had great influence customer's behavior towards hotel, café and shopping service [21]. This finding was also consistent with study conducted in Nigeria which states that spatial layout and functionality had significant effect on service quality [22]. This study was also similar with study conducted in Bahrain which sated that spatial layout had strongest relationship with the perceived quality of the services cape [23].

The results of this finding revealed that Artifacts, Signs and Symbols had statistically positive and significant effect on perceived health service quality (person correlation = 0.731, B = 0.234, p<.05). This finding was consistent with study conducted in Bahrain, which stated that Artifacts, Signs and Symbols was positively associated with shopping service [22]. This finding was also supported by study conducted in Canada, which stated that Artifacts, Signs and Symbols has significant effect on service quality [24].

The results of this finding were revealed that social element/interaction had statistically positive and significant effect on perceived health service quality (person correlation = 0.758, B = 0.266, p<.05). This finding was supported by Approach–Avoidance theory which stated that positive behaviors which are directed to a place and they include; the desire to stay, desire

to communicate with others, willingness to explore the environment and the degree of enhancement. This finding was consistent with study conducted in Island, which stated that social element of facility layout environment was significantly associated with quality of service [25]. This study was also similar with study conducted by Xuanjin Wua, Dogan Gursoyb, and Meng Zhang, [26] which revealed that social interactions is a critical determinant of experiential quality, service quality and satisfaction.

This study was limited to hospitals founds in Dire Dawa city administration, which might not be generalized to the total population across the countries. This study was conducted using a cross-sectional study design in which the link between the outcome and the exposure cannot be determined because of the exposure and outcome were simultaneously assessed.

5. Conclusion

Based on the study findings and discussions made over the findings of this study the followingconclusive points were drawn in line with the research objectives. The study's first objective was to determine the extent of adoption of elements of facility layout design in Dire Dawa hospitals by using mean and standard deviation. The finding of this study showed that most of the respondents was not agreed that elements of facility layout design have not been adopted by hospitals. The second objective was to establish effects of facility layout design on the health service quality at Dire Dawa hospitals by using regression analysis. Findings indicated that facility layout design were related in a positive way to patients' and visitors' emotions which affects their perceptions of health service quality, directly reflects good facility design enhances positive health service quality, this is because facility layout design conveys the total organizations' image. Therefore, all components of facility layout design (ambient conditions, Spatial Layout and Functionality, artifacts, Signs and Symbols and social interaction) were positively associated with health service quality.

However, this research could testify that amongst the above-mentioned facility layout design factors, social element/ interaction had relatively the highest effect on health service quality. This implies that, patients and visitors who had good interaction with hospital employees could facilitate their satisfaction on the service and on the other side have positive effect on the service that they get. Spatial Layout and Functionality, ambient conditions and artifacts, Signs and Symbols are also had significant effect on health service quality in their order respectively.

Acronyms and Abbreviations

DDA: Dire Dawa City Administration, DW: Durbin Watson, FLD: Facility Layout Design,

HF: Health Facility, IRB: Institutional Review Board, SERVQUAL: Service Quality, SOR: Stimulus Organism Response, SPSS: Statistical Package for Social Sciences, VIF: Variance Inflation Factor

Competing Interest

The authors declare no competing interest.

Ethics Approval and Consent to Participate

Ethical clearance was obtained from Institutional Review Board (IRB) of Dire Dawa University with Ref No: DDU/IRB/0231/2023. Further approval was granted by the Dire Dawa city health office and respective hospitals. Informed written consent was obtained from all participants and finger print was obtained from study participants who cannot write. Confidentiality was assured throughout the process. The names and addresses of the participants were not recorded in the questionnaire. Furthermore, all the basic principles of human research ethics (respect of persons, beneficence, voluntary participation, confidentiality, and justice) were respected.

Data Availability

All related data has been presented within the manuscript. The data set supporting the conclusions of this article is available from the corresponding author upon reasonable request with email address of niguskassie19@gmail.com.

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