The Quality of Physical Environment in University of North India

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Abstract

Aim: The study aimed at creating current baseline status of profile of the quality of physical environment in Panjab University, Chandigarh campus, with a view to facilitate development of a suitable policy & plan of work for its improvement.

Methodology: Cross-sectional evaluation study was done to cover various houses, buildings and road stretches of Panjab University sector 14 and 25. For the roads a sample of 8 road stretches from both the sector 14 and 25 were taken into account; such that among them two were major and two were minor road from each campus. For the water and air secondary data from pollution control board was taken under consideration. For housing and buildings, out of 1,225 buildings and housing a sample of 9 building, 4 shops & cafeteria and 36 houses were drawn randomly and for the sanitation purpose one sample each from the department, market, hostel and residential area was taken from sector 14 and 25 campus.

Results: Overall grading of the physical environment parameter in Panjab University, Chandigarh campus showed, mild defect in traffic worthiness, satisfactory air quality, good level of water quality, very good building quality, excellent housing condition and very good level of sanitation making an overall physical environment quality of the Panjab University campus of Moderately Good level.

Conclusion: Like other universities, Panjab University also has good infrastructure. The campus has excellent, greenery with basic civic amenities. The physical environment quality of Panjab University campus was of good quality. Though there were few minor flaws in various physical environment parameters. But these can easily be rectified.

Keywords: Cross-sectional; Evaluation; Quality; Parameters

Introduction

A good physical environment is a component of health promotion which, has been defined as a set of activities which prevent and reduce the chances of occurrence of disease. Health promotion is not directed towards a particular disease, but towards general health and well being of the community. These activities will be more fruitful and will yield rich dividends if they are directed towards promoting the factors which foster good health. Health promotion also aims to reduce the factors which endanger health. So, it is important to understand the determinants of health if we plan to introduce a health promotion intervention in any area. As per health field theory, health and illness result from the interplay of four key determinants-genetic factors, the environment, lifestyle and medical services [1].

As per the health field theory (psychology theory of human and the environment), people and their surrounding and conditions depends upon each other. Thus to understand or to predict the behaviors, the person and his environment have to be considered as one constellation of interdependent factors [2]. From this theory it is clear that the environment in which an individual resides is critical for shaping the behavior and sustaining a good health. As per "settings" approach of health promotion, it is true for educational institution also. Thus it becomes an important concern to have a good environment inside any University campus were half of the day students live, thus directly affecting the behavior and health.

An ideal university would have to focus on its beautiful location, clean campus, and good and disciplined students, best mentors, resource availability [3]. A good infrastructure is achieved by a sound physical environment inside the campus and surrounding area. This could be measured on the basis of wholesome drinking water, clean air, good building and housing infrastructure and conditions of living, proper sanitation and beautification of the internal as well as external environment.

Campus sustainability has become an issue of global concern for university policymakers and planners. This is the result of the realization of the impacts the activities and operations of universities have on the environment. The issue has also been intensified by the pressure from government environmental protection agencies, sustainability movements, university stakeholders as well as the momentum of other forces including student activism and NGOs [4]. In 1990, the Talloires declaration at an international conference in France made the first official statement made by university administrators of a commitment to environmental sustainability in higher education. The declaration is a ten-point action plan for incorporating sustainability and environmental literacy in teaching, research, operations and outreach at colleges and universities. Over 300 university presidents and chancellors in over 40 countries signed the declaration as a commitment to campus sustainability. Several of them had embarked on projects and initiatives to incorporate sustainability into their systems [5].

In our study the physical environment was checked inside the Panjab University campus. Chandigarh. E.g. Water, air, building and housing and the sanitation inside the University campus.

Material and Methods

Cross-sectional evaluation study was done to cover various houses, buildings and road stretches of Panjab University sector 14 and 25. Out of the total sample size of 4 roads, a sample of 2 road stretches each (one within campus and one intersection.) were taken from the sector 14 and 25 respectively. For this purpose, the campus was divided into 4 sections i.e. I, II, III, IV, such that each section come near to the major road horizontally as well as vertically, than listing was done and randomly one intersection and one within campus road were selected from both the sector i.e. 14 and 25, respectively. Afterwards assessment was made for the traffic worthiness as per the criteria developed (Table 1).

Quality of the air and water was determined by gathering the data from the nearby pollution control board and water checking lab. Afterwards the values of the components were compared with the standards available in air quality index and water quality index (Table 2).

While considering the buildings and houses, out of 78 Departments, 15 centers, approximately 1,057 houses, 75 shops & cafeteria in market and 17 hostels, a sample of 7 Departments, 2 centers, 36 houses, 4 shops & cafeteria, 1 boy's hostel and 1 girl's hostel was selected randomly (Table 3).

For this purpose, each building (Departments, centers and hostels) was divided into various floors and from each floor 5 rooms were selected randomly for the purpose of evaluation, similarly the houses were divided into various division as per the class A, B, C, D, E, f and G, and from each division one house was chosen for this purpose of evaluation, afterwards from the market shops were taken

into account and from all the shops 2 shops were selected randomly and assessed for the quality.

However for sanitation purpose, out of all the sample one Department, one shop, one hostel, one house of the campus was analyzed as per the Swachh Survekshan Survey Toolkit 2019 available, in which a questionnaire was prepared and marking system was used and hence for each question there ascertain a specific marks thereafter the total average marks were calculated and evaluated which determined the level of sanitation in the university campus (Table 4, 5). Various scoring tools were used to evaluate the score, these are, traffic worthiness scale, air quality index, Water quality index and Swachh Survekshan Survey Toolkit 2019.

Data analysis: was done using the Microsoft Excel sheet in terms of mean, median, mode and standard deviation, etc.

Ethical clearance: Was taken from the university. An interactive session were made with the stakeholder after obtaining a written informed consent from each participants of the study, in which all the objective of the study was informed to them and were assured about the confidentiality of information provided by them. This was only be used for the purpose of research and study.

Results

No road stretch had severe defect in traffic worthiness, one road stretch each had moderate or mild defect. Table 6 shows that the average percentage defect was found to be 57.5%, making the moderate defect in the traffic worthiness of the road stretches at Panjab University campus. Table 7 shows that the yearly average Air Quality Index for the year 2018 was 96.55556, i.e. a satisfactory air quality, and the average water quality index was 81 i.e. of good quality. Figure 1 shows the month wise air quality index, with marked satisfactory level. And water quality index with marked good range level. Table 8 shows the average score obtained by the various housing types and buildings in the Panjab University. Which were of excellent

Table 1: Traffic worthiness scoring scale.

Traffic Worthiness Score	Traffic Worthiness Grade
≤ 25	Severe Defect
26-50	Moderate Defect
51-75	Mild Defect
76-100	Adequate traffic worthiness

Table 2: Air Quality Index (AQI) and Water Quality Index (WQI) scoring scale.

Air Quality Index Score	Inference
0-50	Good
51-100	Satisfactory
101-200	Moderate
201-300	Poor
301-400	Very poor
401-500	Severe
Water Quality	**Score(water quality index)**
Heavily polluted	0-24
Poor	25-49
Fair	50-74
Good	75-94
Excellent	95- 100

Table 3: Sampling plan for housing and buildings.

Areas	Total number	Sample
Department	78	7
Hostel		
(a) Boys	7	1
(b) Girls	10	1
Centers	15	2
House		
(a) Category .A	320	8
(b) Category .B	260	7
(c) Category .C	196	6
(d) Category .D	60	5
(e) Category .E	60	4
(f) Category .E1	116	3
(g) Category .F	24	2
(h) Category .G	20	1
(i) Category .H	1	-
Market		
(a) Shops	65	3
(b) Cafeteria	10	1

Table 4: Scoring scale for the quality of housing and buildings.

Score	Quality
0.0-1.0	Poor
1.1-2.0	Fair
2.1-3.0	Good
3.1-4.0	Very good
4.1-5.0	Excellent

Table 5: Scoring scale for sanitation.

Sanitation Score (%)	Quality
0-20	Poor
21-40	Fair
41-60	Good
61-80	Very good
81-100	Excellent

Table 6: Traffic worthiness score of various road stretches.

Road area	Traffic worthiness score	Traffic worthiness grade
1	31	Moderate defect
2	48	Moderate defect
3	61.5	Mild defect
4	42	Moderate defect
5	81	Adequate traffic worthiness
6	61.5	Mild defect
7	58	Mild defect
8	77	Adequate traffic worthiness
Average	57.5	Mild defect

and very good quality? Table 9 shows that the average sanitation score was 840 out of 1,200 i.e. 70% score for sanitation in the Panjab University Campus.

Table 7: Month wise Average Air Quality Index and 1st Quarter Water Quality Index.

Month (2018)	AQI	Inference	Date	WQI	Inference
January	279.6667	Poor	1-Jan-19	77	Good
February	83	Satisfactory	12-Jan-19	76	Good
March	63	Satisfactory	28-Jan-19	62	Fair
April	84.66667	Satisfactory	1-Feb-19	96	Excellent
May	78.33333	Satisfactory	19-Feb-19	98	Excellent
June	39	Good	24-Feb-19	75	Good
July	78.33333	Satisfactory	3-Mar-19	83	Good
August	41.66667	Good	14-Mar-19	87	Good
September	59	Satisfactory	22-Mar-19	78	Good
October	88.66667	Satisfactory			
November	141.6667	Moderate			
December	121.6667	Moderate			
Average	96.55556	Satisfactory	Average	81	Good

Table 8: Average score obtained various types of housing and buildings.

House Category	Score	Inference
A	4	Very good
B	4	Very good
C	3	Good
D	5	Excellent
E	5	Excellent
F	5	Excellent
G	5	Excellent
Average score	**4.5**	**(Excellent)**
Building	**Score**	**Inference**
CPH	3	Good
Nano-science	3	Good
bio informatics	3	Good
Fashion designing	4	Very good
Hostel 8	4	Very good
Anthropology	4	Very good
Zoology	4	Very good
Botany	4	Very good
UIET	4	Very good
UIAMS	4	Very good
Nuclear science	4	Very good
Average score	**3.7**	**(Very good)**

Table 10 shows overall grading of the physical environment parameter in Panjab University, Chandigarh campus as mild defect in traffic worthiness, satisfactory air quality, good level of water quality, very good building quality, excellent housing condition and very good level of sanitation making an overall physical environment quality of the Panjab University campus of Moderately Good level.

Figure 2 shows a pictogram with overall physical environment parameter quality in Panjab University campus.

Discussion

The School/University must provide a safe, supportive,

Figure 1: The month wise air quality index, with marked satisfactory level. And water quality index with marked good range level.

Table 9: Average sanitation score for each sanitation questions.

Parameter	Maximum Marks	Marks Obtained
Are the residential and commercial areas clean?	200	150
Toilet is dry and clean with no broken tiles/wall plaster	40	0
Separate section for Men and Women	30	30
Bins available with each toilet seat– regularly emptied	10	10
Usable taps and fittings – running water and flush system	40	10
Toilet is child friendly – low height urinal / smaller seat	10	0
Ramp and bar for differently able people	10	10
All areas in the toilet well lit –electric light and natural light	30	30
Availability of soap/soap dispenser near wash basin	10	0
Caretaker is present for operations & maintenance	20	20
Adequate ventilation with fresh air flow	20	20
ICT based feedback system	20	0
Are Public and Community Toilets are prominently displaying SBM messages designed by the Ministry or ULB, with Swachh Survekshan-2019 logo?	80	0
Are public and community toilets are connected with onsite safe disposal system (septic tank with no overflow) or sewer network – no open drainage.	80	80
Area should be clean with zero litter; Litter bins available at every 50 meter, Market area should be free from stray cattle/animals – Messaging around cleanliness through signage/displays/hoarding at every 100 meters.	170	130
Catchment areas are clean, all shopkeepers in catchments area have litter bins, with Swachh Survekshan-2019 hoarding/bill board/wall writing in place?	130	100
Swachh Survekshan-2019 hoarding/bill board/wall writing in place?	100	100
Visible beautification of slums/old city areas, flyovers, public places? (1) Wall paintings/murals/Artifacts, (2) Plantation, (3) Covered drainage, (4) No water logging, (5) No broken footpath/pavement, (6) No solid waste in water bodies/storm water drains – filtration/screening system in place to check solid waste flowing?	200	150
Total	**1200**	**840 (70%)**

Table 10: Overall grading of the physical environment parameter in Panjab University campus.

Physical Environment Parameter	Score Obtained/Maximum Score	Grading
Roads	57.5/100	Mild defect (Good)
Air	96.5/500*	Satisfactory
Water	81/100	Good
Buildings	3.7/05	Very good
Houses	4.5/05	Excellent
Sanitation	840/1200	Very good

*The air quality index is depicted as, lower the marks more cleaner is the air, Hence it is inferred in negative direction as compared to all other parameter's, which are inferred as with higher marks the quality increases, i.e. in positive direction
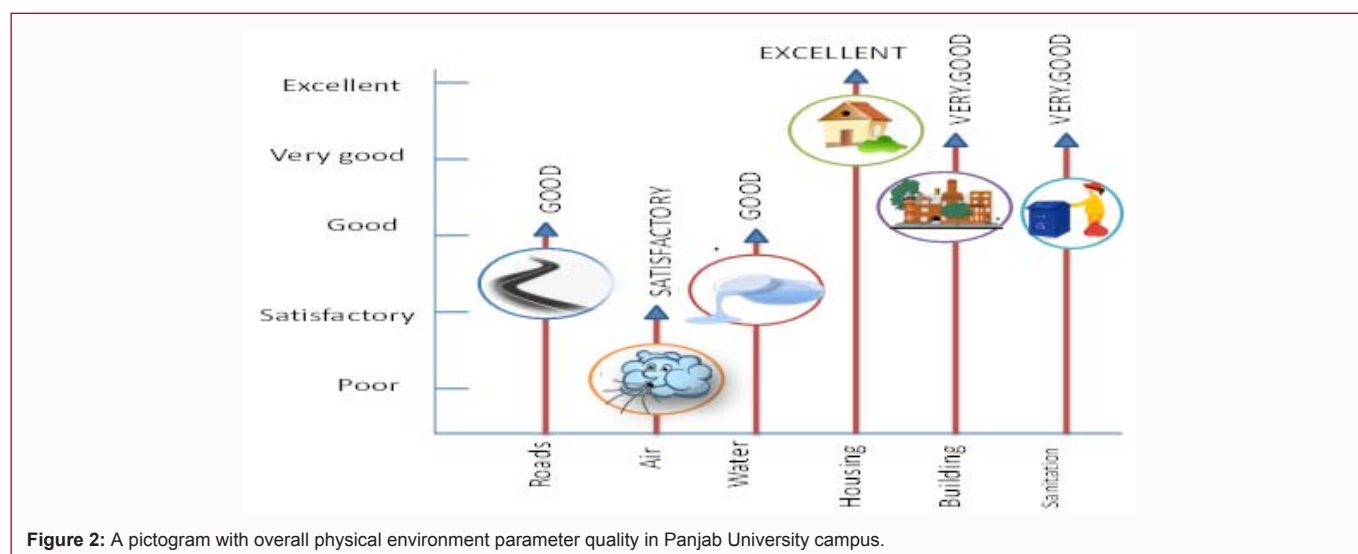
Figure 2: A pictogram with overall physical environment parameter quality in Panjab University campus.

accessible and resourceful environment for all the pupils, staff and the wider community, including appropriate provision for all who have additional support needs. The various factors which affect the environment largely the physical are as roads, healthful School/University environment, location, site, infrastructure, classroom, furniture, doors & windows, color of walls, lighting, water supply, lavatory, etc [6].

For any University or the educational institution, a good quality physical environment is necessary; else it will directly affect the individuals in multiple ways including the psychological conditions as well. The physical environment quality in terms of roads is largely affected by various factors [4].

For example; material of the road laying which if not of adequate quality will decrease the life of the road and thus various damages. Rain contributes to another factor for the damage to the roads, which is again dependable over the material of choice for road laying. The surface condition over which road is laid down plays a major role in defining the life of laid road [7]. The quality of road inside the Panjab University campus was of "good" quality with only mild defects. The air quality of Panjab University campus was found to be of "satisfactory level" with the average air quality index of 96.5 out of the maximum permissible limit of 500, these data were collected from the nearby air quality checking center i.e. Panjab Engineering College, Sector 12, Chandigarh, which is the nearer most place to the University; as air quality largely depend upon the wind direction, as it can spread pollution to various places, In certain months, as in case of the winters the air quality index falls to the poor level as cool air stagnate over the city, keeping pollution close to the ground level, were people breathe. Also it could be as in winters the practice of burning wood is more for various purpose also the large number of the vehicle in the city directly affect the air quality by virtue of producing the lager amount of vehicular exhaust which intern increase the level of pollution in the city [8]. Overall the quality of air inside the campus was good due to the fact that there's no nearly source of the air pollution except the sector 25 and 38 waste disposal sites.

The water quality inside the Panjab University campus was of "good quality" with the average water quality index of 81 of maximum limit of 100. This is due to the purification of water by using the filters inside campus, and also the water supply to the University came from the municipal corporation water supply unit of sector 12 and 37. This is cleaned and purified on various parameters by the corporation as well. Very less impurity of the water could be due to any breach or improper fitting of the underground water pipe lines.

Quality of housing was evaluated on criteria such as providing physical protection, space for adequate household work like cooking, eating, washing, etc. Provides protection from hazards of exposure to noise and pollution, constructed and maintained in order to prevent the spread of communicable diseases, free from unsafe physical arrangements due to construction, toxic or harmful materials and encourage the community development, promoting social relationships, reflects a regard of ecological principles and by these means promotes mental health [9]. Various other studies used different checklists (b) evaluating public housing performance: Providing a basis for residential quality improvement in Nigeria which uses the various housing parameter like adequate space, ventilation lighting, cleaning facilities, house sanitation and presence or absence of stray animals to access the quality of housing [10]. The quality of the housing inside the University campus was of "excellent quality" with the average score of 4.5 out of the total score of 5. This implies that the engineering work done has been good. The housing category like A, B and C are of little low in quality due to the presence of damp ,improper lighting, and stray animals. The quality of the building in the University campus was "very good quality" with the score of 3.7 out of total score of 5. This implicating that the engineering work has been done well. But some areas of buildings are having the damps, dust and few breaks in the wall which affect the quality.

Considering the sanitation level in University, it was found that the University has very good level of sanitation, as 2019 Swachh Survekshan survey showed that 40% of ward use ULB door to door garbage collection, ULB are processing 80% if the collected wet waste within the Chandigarh city. However, Indore was considered as the cleanest place in India with the rank of 1, and Chandigarh was ranked 20 in the list and ranked 5 among all the 5 major cities in India, and was considered as the best city in solid waste management.

Conclusion

Like other universities, Panjab University also has good infrastructure. The campus has excellent, greenery with basic civic amenities. Air is quiet clean and roads have good traffic worthiness.

Water supply & portability inside the campus was also found to be of good quality. The housing inside the university residential areas was of excellent quality. The building quality of the University was very good. Sanitation level inside the campus was in very good condition. The physical environment quality of Panjab University campus was of good quality. Even though few minor flaws were there in various physical environment parameters. But these can easily be rectified.

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