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Incorporating Neighborhood Safety through Urban Planning – A Case Study

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***Abstract*: Crime, an issue every community faces, can be controlled by applying Crime Prevention through Environmental Design (CPTED) principles to public and private realms. These techniques are relatively simple and cost effective. Data were collected by both objective and subjective evaluation. Objective evaluation was carried out by conducting street audits in three streets in Nagercoil city, Tamil Nadu, Chennai. Subjective evaluation was carried out by conducting household survey. Household questionnaire survey has to be done based on the CPTED parameters which includes natural access control, natural surveillance, Target hardening, Territoriality and Maintenance. Descriptive statistics and bivariate analysis for the data collected from the household questionnaire survey is done using SPSS software. The result obtained from the analysis is compared with self-audit checklist to obtain the difference between people's perceptions on CPTED features and the opinion from the audit. The 3 places selected are also compared and the least crime friendly land use is identified. Bivariate correlation and regression were performed to identify the factor that influences the occurrence of crime the most, which will aid in providing cost effective solution and recommendations.**

***Keywords*: Crime, pickpocketing, CPTED principles, design, safety.**

1. Introduction

Crime prevention can be defined as the application of certain measures to the causes of criminal and disorderly events to reduce the risk or potential of occurrence and their consequences. The often-reported criminal incidents such as burglary, household robbery, fear and anxiety has developed within the communities. In order to ensure safety, it is essential to identify the key factors that restrict these criminal activities. Crime Prevention through Environmental Design (CPTED) is a crime fighting technique that believes that proper design and effective use of Built Environment can lead to a reduction in the fear and incidence of crime as well and improve the Quality of Life. Guidelines Design layout should be taken care of during the planning stage considering the safety principles toward crime and enhancing safety for all users. [14]

Responsibility for an offence committed should be taken up not just by the traditional criminal justice system agencies but also by planners, architects, developers and managers of public space. Offenders will maximise opportunities for crime, but these opportunities must be removed or avoided. [13] CPTED investigated the effectiveness of the concept as a crime prevention strategy in communities by conducting a meta-analysis of different studies. The study found that CPTED is largely effective in deterring crimes in various communities. [5] CPTED is a pro-active model which focuses on reducing or removing the opportunity for crime to occur in an environment and promote positive interaction with the space by legitimate users. Many of the concepts of CPTED are part of the Indian tradition, though they may have been lost sight of in the course of urban evolution. With modifications, standard urban planning can address the needs of community safety and policing much better.

A. CPTED Principles

There are two generations in CPTED.

1) First generation CPTED principles

First generation approach is toward design strategies that create more pedestrian friendly zones within the city.

- *Natural Surveillance*

A potential offender should feel like they are being watched, and that the surroundings offer no easy escape routes. This includes “eyes on the street,” good light that does not create shadows, keeping areas well lit. In particular, building entrances should be bright at all times and provide a clear line of sight from both inside and outside. Besides these, eliminating hiding spots, cutting down hedges and removing trees, bushes, fences, dumpsters, etc. that create blind spots or hiding places are prescribed measures.

- *Access Control*

Criminals feel that they are in control. However, this sense of control can be denied by clearly marking the approaches to buildings and properties and channelling visitors into a defined area. The space should give some natural indication of where people are allowed and not allowed. In this context, “access control” means keeping out strangers.

- *Territory Reinforcement*

Reinforcement in the form of good boundaries and enclosure of spaces. Here the recommendation is a clear line of demarcation between public and private space, although physical barriers also are recommended wherever possible.

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Motion detectors and security system signage are encouraged to support residential boundaries.

- *Hardening the Target*

This term is used to refer to tactics that make it more difficult to break in or to inflict other damage. For instance, deadbolts or bars on the windows may be said to harden the target. We would include security guards in this category. Less often, this phrase also refers to strategies that individuals might undertake to make themselves less vulnerable to criminal activity.

- *Maintenance*

Good maintenance of both buildings and landscapes are thought to deter crime, especially when undertaken in conjunction with other measures. The maintenance emphasis illustrates the affinity of CPTED with "broken windows" theory.

- *Activity*

It includes organizing activities within spaces and along streets rather than leaving them comparatively deserted and lifeless.

2) Second generation CPTED

1st generation CPTED focuses on space and location, while 2nd generation CPTED extends beyond physical design to include social factors by adding risk assessments, socio-economic and demographic profiling. It is designed to encourage social interaction and promote "eyes on the street".

2. Objectives

1. To identify the quality of life within neighbourhood and likely impacts based on rigorous spatial, socio economic and psychosocial analysis.
2. To identify the social, physical and economical hindrance to safety and the methods to eliminate it.
3. To determine which land use is suitable for healthy livelihood.

3. Methodology

The study involves identifying the type of land use that is severely affected by crime and the socio-economic characteristics of people residing in those areas. The objective of this study is to promote the integration of CPTED principles in the built environment by analysing various parameters. This study systematically examines links between land uses and violent crime and whether such links are conditioned by socio economic disadvantages. The descriptive and bivariate analysis was carried out.

4. Study Area

The study has been conducted in Nagercoil city located in Kanyakumari district, the southern part of Tamil Nadu. Three study areas have been selected from the city based on the different types of land use namely residential land use, commercial land use and mixed land use are selected.

A. West Lutheran Street (Residential Land Use)

It is a residential area with only one super market. It is a 0.5 km stretch road with a width of 3m. The residents of this area are well educated and decently designated. Houses here are mostly 2 storeyed, occupied by a single family and surrounded by trees. It is quite easy for thieves to hide within the bushes during the night. There are several intersections making the area even more unsafe. There is no side walk provided in this road.

Fig. 1. West Lutheran Street view

Fig. 2. Map and Layout of West Lutheran Street

B. Ozhuginasery-Meenakshipuram Road (Commercial Land Use)

Fig. 3. Ozhuginasery-Meenakshipuram Road view

Fig. 4. Map and Layout of Ozhuginasery-Meenakshipuram Road

It is a commercial land use area of 1 km length. This street is usually busy throughout the day. There are several jewellery shops which are the major theft prone areas. But the area around the streets is well lit by the light from the shop which encourage pedestrians to walk even at night. The roads in this area are paved with interlocking blocks to avoid flooding during rainy seasons. There is no side walk provided in this area.

C. Peruvilai Street (Mixed Land Use)

The length of the street is 1 km with mixed land use namely residential and commercial land use. There are several shops in the area making it easy for the residents to meet their needs. There are a good number of places of worship. The road is not maintained properly and even the street lights were not functioning in few places.

Fig. 5. Peruvilai Street view

Fig. 6. Map and Layout of Peruvilai Street

5. Data Collection

The collection of data involves both objective evaluation and subjective evaluation. Objective evaluation is done by street audit to know about the existing infrastructure based on the CPTED principles. Subjective evaluation is done by conducting questionnaire survey from the breadwinner of the family.

A. Primary Data

Through street-audit, data such as type of land use, presence and absence of parks, number of storey's in each building, distance from the police station, street lights, and sidewalks safety aspects of the residents were obtained and CPTED parameters were collected.

B. Secondary Data

The primary data that has been collected through household questionnaire survey include socio demographic characteristics such as gender, age, income, marital status, education, employment status, number of years residing in the location house ownership, household size, housing type, vehicle ownership, transportation modes used, no. of trips per day, opinion on pedestrian infrastructure in the locality, street network, safety from crime, no of victims of crime and neighbourhood satisfaction level.

6. Analysis and Results

Data collected has been analysed using the SPSS software. The results obtained should be compared with street audit results to determine the relationship between the existing infrastructure and safety.

Household survey was conducted with the residents of three areas and their opinion about the crime rate, fear of crime was collected. CPTED parameters were introduced to them which was included in questionnaire survey.

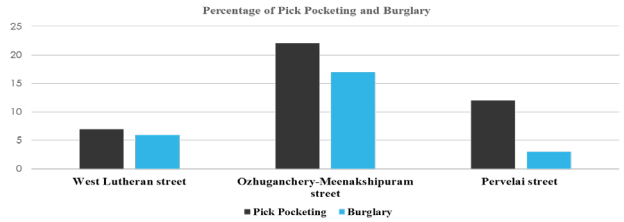

Fig. 7. Percentage of Burglary and Pickpocketing

Maximum Burglary and Pick Pocketing incidents are more in Ozhugiansery- Meenakshipuram streets comparing to other two areas.

Table 1
Street audit results of West Lutheran Street, Ozhuginasery-Meenakshipuram Road and Peruvilai Street

Study Area	West Lutheran Street	Ozhuginasery-Meenakshipuram Road	Peruvilai Street
General Characteristics			
Length of the street	0.5 km	1 km	1.5 km
Width of the street	3 m	3 m	3 m
Type of residence	Single-family house	Single-family house	Single-family house
Types of commercial activities	Petty shops, super market	Street vendor, petty shops, shopping complex	Street vendor, petty shops, super market
Distance from various facilities			
Grocery store	1-5 mins	1-5 mins	1-5 mins
Super market	1-5 mins	5-10 mins	5-10 mins
Fast Food	>20 mins	5-10 mins	>20 mins
Bank	5-10 mins	10-20 mins	10-20mins
Bus stop	10-20 mins	1-5 mins	5-10 mins
Auto/ paratransit	>20 mins	5-10 mins	>20 mins
MRTS/ Metro	>20 mins	5-10 mins	>20 mins
Parks	>20 mins	1-5 mins	>20 mins
Hospital	1-5 mins	1-20 mins	1-5 mins

Table 2
Correlation and Regression Coefficient for Burglary and Pickpocketing for West Lutheran Street

Pearson correlation	Highest level of education	Annual Income	Presence of camera	Special Windows	Security guards	Feeling safe during night	Lighting during night
Burglary r =	- 0.514	- 0.608	- 0.526	- 0.732	- 0.583	- 0.686	- 0.521
Pickpocketing r =	- 0.617	- 0.504	- 0.622	- 0.739	- 0.586	- 0.589	- 0.624

Table 3
Correlation and Regression Coefficient for Burglary and Pickpocketing for Ozhugianchery- Meenakshipuram Street

Pearson correlation	Highest level of education	Annual Income	Presence of camera	Special Windows	Security guards	Feeling safe during night	Lighting during night
Burglary r =	- 0.711	- 0.509	- 0.524	- 0.633	- 0.882	- 0.683	- 0.525
Pickpocketing r =	- 0.315	- 0.504	- 0.720	- 0.831	- 0.683	- 0.581	- 0.623

Table 4
Correlation and Regression Coefficient for Burglary and Pickpocketing for Peruvelai Street

Pearson correlation	Highest level of education	Annual Income	Presence of camera	Special Windows	Security guards	Feeling safe during night	Lighting during night
Burglary r =	- 0.512	- 0.503	- 0.621	- 0.734	- 0.681	- 0.583	- 0.527
Pickpocketing r =	- 0.548	- 0.608	- 0.524	- 0.732	- 0.581	- 0.686	- 0.531

It is a residential area. Statistical test results indicate that presence of CCTV cameras, Special windows and security guards are most important parameter for reducing level of crime with respect to Burglary and Pickpocketing. It is also observed residence in streets are highly educated and fall under HIG and MIG and awareness has resulted in installing security cameras moreover the presence of Special windows in their houses which act as natural surveillance, one of the parameter of CPTED principle and the major influencing factor. It is also confirmed from response of residents that 80% of houses installed CCTV cameras. Around 76% of residents felt the street safe during night time.

It is a commercial area. Due to the continuous movement and overcrowding, people feel safe during day time, but during night time they feel unsafe because the shops being closed early and pedestrian movements reduces. Survey results shows that around 25% of burglary and Pickpocketing occurs in this street. Statistical test results indicate that presence of Security guards, presence of CCTV cameras and Special windows are important aspect to reduce the fear of crime.

It is a mixed land use. It is observed that the residents of this street feel safe during day time than night time due to the absence of street lights. About 20% of the houses having CCTV camera installation. Majority of the people feel that their neighbourhood being watched either by street hawkers or by the people using the street. The burglary and pickpocketing cases were less than 5%. Statistical test results indicate that security guards and special windows are the important parameter in reducing the crime with respect to burglary and pickpocketing.

The parameters which have strong relation (Pearson Correlation <0.5), with people who are affected by Burglary and Pickpocketing which have the significance value less than 0.05. Special windows and CCTV camera have strong negative correlation when compared with other parameters.

7. Results and Discussion

- Higher population density in Peruvilai road, Ozhuginasery-Meenakshipuram is associated higher crime because it affects territoriality and increase neighbourhood permeability.
- Absence of street activity in West Lutheran Street is observed because it is pure residential area. However presence of camera and special windows which are big and wide reduces fear of crime because of the feeling that a road user is watched by the residents in the house.
- People consider Peruvelai road, to be safer than other areas because of the neighbourhood cohesion. Parks and other recreational areas in Peruvilai road, has increased activity support.
- Petty shops has to be encouraged as in Peruvilai road, because they act as natural surveillance.
- The parameters which have strong negative correlation with burglary and pickpocketing are highest level of education, Annual income, presence of CCTV camera, Special windows in houses, presence of security guard, Feeling safe and lighting during night.
- Public spaces should be designed with proper territorial reinforcement for interaction, public gathering to encourage and ensure community ownership.
- From the study it is understood that CPTED parameter play a major role in reducing the crime and fear of crime mong the community people and road users.
- Among the land use, mixed land use appears to be safe in neighbourhood because of active movements, access can be increased by means of Surveillance.

8. Recommendations

Trees inside the compound wall as has to be trimmed above 3mts or else it will serve as hiding spot for criminals. While planning, mixed land uses should be promoted in a neighbourhood as it increases as it increases local access and surveillance by incorporating local shopping, offices and community uses. Gathering spaces should be designed for sitting, shopping, resting, and interaction to encourage and ensure community ownership.

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