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Evaluation of Non-Standard Sidewalks in Barangay 171 and its Impact on Public Infrastructures

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Abstract

The sidewalks are an essential part of urban infrastructure, providing safe and accessible public space pathways for pedestrians. However, in the Philippines, pedestrian infrastructure often receives less attention in planning and implementation, resulting in non-standard sidewalks. This study focused on non-standard sidewalks and aimed to identify common dimensional inconsistencies and to determine whether these conditions affect the functionality, safety, and maintenance of sidewalks in Barangay 171, Caloocan City, and analyzed their relationship with the quality of public infrastructure. The research implemented a quantitative-correlational design. Data were gathered through a field measurement or observation of selected sidewalks in the barangay using a checklist aligned with the standards of the Department of Public Works and Highways (DPWH) and a survey distributed to 100 residents that were selected through convenience sampling. The analysis used the Pearson-R statistical tool that determined the relationship between the non-standard sidewalks and public infrastructure quality. The results showed a very weak negative correlation of $r = -0.047$ with a p-value of 0.897, expressing that there is no statistically significant relationship between the two variables. Regardless of the result of no significant correlation between the non-standard sidewalks and public infrastructures, the findings reveal the ongoing issues of substandard sidewalks in the community that it lacks accessibility, safety, drainage, and quality. The findings of this research can be a basis for future studies that can be further explored and study the need for improved planning of sidewalks that promote safety, walkability, and maintenance.

Keywords: Non-Standard Sidewalks, Pedestrian Infrastructure, Accessibility, Safety, Public Infrastructure Quality

Introduction

Sidewalks, also known as pavements (British English) or footpaths (Australian English), are designated pedestrian paths alongside roads. An international journal of sustainable development by Hasannudin Lamit (2012) [15] explained that physical and environmental qualities, referred to as "perceptual qualities," reflected basic attributes of urban design that needed to be considered in the concept of "walkability." According to General Theory of Walkability by Jeff Speck's (2012) [25]. A location must offer a walking experience that is on par with driving in order to be considered really walkable. This implies that a walk needs to be practical, secure, cozy, and engaging all at once. People are less likely to prefer walking than driving if any of these factors are absent. Sidewalks are important part of urban infrastructure, providing pedestrians with safe and accessible public spaces. However, many urban areas, sidewalks are often overlooked in planning and construction, which resulted in inconsistencies in their design and measurements. In developing countries, including the Philippines, pedestrian infrastructure often receives less priority in urban planning, which results in unsafe, incomplete, or poorly maintained sidewalks. National Artist Pablo S. Antonio, a pioneer of modern Philippine architecture, stated that simplicity and functionality were all that a sidewalk should have. Laws such as the Batas Pambansa Blg. 344 (Accessibility Law) and Republic Act No. 6541 (National Building Code) still provide clear guidelines for sidewalk dimensions, gradients, and features that ensure accessibility for all, including persons with disabilities. Additionally, the MMDA Resolution No. 02-25 mandated the allocation of local funds for the construction and maintenance of pedestrian infrastructure in Metro Manila. Despite these legal frameworks, various

studies, including the work of Ramos Vallente *et al*. (2017), revealed that sidewalk conditions in cities across the Philippines remained substandard, putting users at risk and affecting the overall quality of public infrastructures. The Philippine Institute for Development Studies (PIDS) highlighted the struggles of the country due to poor-quality road and rail systems, and also showed the importance of incorporating pedestrian needs such as sidewalks and walkways in national transport plans. The Philippine Institute of Civil Engineers (PICE) promoted best practices in infrastructure planning and engineering, providing benchmark voices on sidewalk policy, design, and governance.

Within the National Capital Region, where urban density and pedestrian activity are high, the need for quality sidewalk infrastructure was critical. Nevertheless, inconsistencies in sidewalk design prevailed. In Caloocan City, sidewalks often suffered from narrow widths, surface obstructions, and frequent non-compliance with national standards. Walkways are required to have a minimum clear width of 1.20 meters, or 0.90 meters if the total sidewalk width is less than 3.50 meters. Longitudinal gradients must not be steeper than 1:20 and cross gradients must not exceed 1:100. Curbs at pedestrian crossings should be ramped with a maximum slope of 1:12 and should not rise more than 25 millimeters above the road gutter. Walkway surfaces must be continuous and slip-resistant, with no abrupt level changes greater than 6.5 millimeters, and gratings should have openings not exceeding 13 × 13 millimeters (Department of Public Works and Highways [DPWH], 2009). In Barangay 171, Caloocan, many sidewalks did not match the usual measurements set by national guidelines. Because of the given conditions, this study, "Evaluation of Non-Standard Sidewalk Dimensions in Brgy. 171 and Their Impact on Public Infrastructure Quality," focuses on checking and comaparing the sidewalks in the locality and also aim to show how these differences affected the people using them and the overall quality of public spaces.

Materials and Methods

This research used a quantitative-correlational design to find out whether there was a significant relationship between the condition of sidewalks and the safety perception of the pedestrians. The researchers conducted the study in Barangay 171, Caloocan City, which has a total population of approximately 120,000. Using the Raosoft Sample Size Calculator, the required sample size was 385 respondents. However, due to constraints in time, accessibility, and resources, the researchers employed convenience sampling, a practical and efficient method for data gathering in large urban populations (Golzar *et al*., 2022). Consequently, 100 respondents were selected to represent the entire population. Although this sampling technique is a non-probability, it was commonly used in exploratory studies and allows for faster data collection without compromising the quantity of responses.

Two research instruments were developed for the study: a ten-item Likert scale structured observation checklist and a survey questionnaire. The observation checklist, formatted using a Likert scale, was used to evaluate the physical features of the sidewalks based on the standard criteria set by the Department of Public Works and Highways (DPWH). On the other hand, the survey aimed to gather the perspectives of residents regarding the condition and usability of the sidewalks in Barangay 171. Both instruments were reviewed and validated by a field expert to ensure clarity, accuracy, and alignment with the study's objectives. The validation focused on the relevance of the content, appropriateness of the language, and consistency with the research framework.

Data Gathering Procedure

This study, titled "Evaluation of Non-standard Sidewalks in Brgy. 171 and Its Impact on Public Infrastructures," was conducted along major roads where sidewalks were often used by the public. The researchers personally visited these areas to check and observe the sidewalks. They measured the width, length, and height, and took note of any damage like cracks, missing parts, or obstacles that blocked the path. Photos were also taken as part of documentation and evidence. To support the observation, the researchers also gave out a 10-item survey using a 5-point Likert scale (Strongly Agree, Agree, Neither, Disagree, Strongly Disagree) to chosen citizens from Brgy. 171. This survey helped the researchers understand the experiences and opinions of the people regarding the condition of the sidewalks and how it affected public infrastructure and daily life.

Analyses

The data gathered from the field observation and survey were analyzed using both descriptive and inferential statistics. For the descriptive statistics, the weighted mean was employed to determine the central tendency of responses for each item. The weighted means were then interpreted using two sets of Likert scales, depending on the instrument. The field observation checklist employed the conventional scale (Table 1; Boone and Boone, 2012), whereas the survey questionnaire utilized a reversed scale to account for negatively constructed items (Table 2; Jamieson, 2004; and Joshi *et al*., 2015).

Table 1: Interpretation of the Conventional Likert Scale

Range	Interpretation
1.00–1.80	Very Unlikely
1.81–2.60	Unlikely
2.61–3.40	Neutral
3.41–4.20	Likely
4.21–5.00	Very Likely

Table 2: Interpretation of the Reversed Likert Scale

Range	Interpretation
1.00–1.80	Strongly Agree
1.81–2.60	Agree
2.61–3.40	Neutral
3.41–4.20	Disagree
4.21–5.00	Strongly Disagree

For the inferential statistics, to analyze the relationship between the presence of non-standard sidewalks and the quality of public infrastructure in Barangay 171, the researchers utilized the Pearson Product-Moment Correlation Coefficient. This statistical method is appropriate as it measures the strength and direction of the linear relationship between two continuous variables. It determines whether there is a statistically significant correlation between the level of sidewalk standards and the perceived quality of public infrastructure. In addition to

inferential statistics, the researchers also employed descriptive statistics such as frequency, mean, and standard deviation to summarize and interpret the data collected from the respondents. These tools provide a comprehensive understanding of the data and support the evaluation of the stated hypothesis. (Cohen, 1988).

Results

Table 3: Field Observation Data

S. No	Questions	Weighted Mean	Interpretation
1	Sidewalk has a minimum width of 1.2 meters	2.49	Unlikely
2	Sidewalk is elevated 6 inches above the adjacent road surface.	2.54	Unlikely
3	Sidewalk is continuous and follows the length of the roadway or block.	2.17	Unlikely
4	Sidewalk is free from obstructions (e.g., utility posts, vendors, parked vehicles).	2.27	Unlikely
5	Sidewalk surface is flat, even, and non-slip.	2.49	Unlikely
6	Presence of curb ramps at intersections or crossings.	2.73	Neutral
7	Presence of tactile paving for the visually impaired.	1.22	Very Unlikely
8	Pedestrian crossings are present and clearly marked.	2.10	Unlikely
9	Signage are visible and accurate.	1.24	Very Unlikely
10	Sidewalks connect to key destinations (schools, terminals, markets, etc.).	2.68	Neutral

Based on the results of the field observation, in Question 6, which refers to the presence of curb ramps at intersections or crossings, acquired the highest weighted mean of 2.73. This shows that the respondents observed the presence of curb ramps more frequently compared to the other features assessed. On the other hand, Question 7, which concerns the presence of tactile paving for the visually impaired, received the lowest weighted mean of 1.22. This suggests that tactile paving was rarely present in the area, and this highlights a lack of provisions for accessibility among visually impaired individuals. The overall weighted mean which is 2.19 shows that the majority of the responses tended towards "Unlikely," suggesting that most accessibility features in the field observation were generally lacking.

Table 4: Survey Data

S. No	Questions	Weighted Mean	Interpretation
1	Sidewalks in Brgy. 171 are often blocked by vendors, cars, or construction.	1.74	Strongly Agree
2	Most sidewalks in our area are too narrow.	1.97	Agree
3	The sidewalks in our area were built properly.	3.14	Neutral
4	Flooding often happens on sidewalks when it rains.	2.15	Agree
5	I have tripped on uneven sidewalks.	2.49	Agree
6	I avoid using sidewalks because it is unsafe.	3.36	Neutral
7	Current sidewalk problems make it hard for kids, seniors, and PWD's to walk safely.	2.13	Agree
8	Poorly built sidewalks make our public infrastructure worse.	1.81	Agree
9	I feel like the Government do not maintain the sidewalk accordingly.	2.02	Agree
10	Having proper sidewalk standards would make walking safer in our barangay.	1.49	Strongly Agree

Based on the results of the survey questionnaire, Question 6 got the highest weighted mean of 3.36, showing that the respondents generally recognized sidewalk safety concerns. Meanwhile, Question 10 received the lowest weighted mean of 1.49, meaning most respondents disagreed that sidewalks follow proper standards to ensure safety. Overall, the 2.23 weighted mean suggests that the answers tended towards "Unlikely," reflecting acknowledgment of significant shortcomings in the current condition of sidewalks and the need for improvement.

Table 5: Pearson r Statistical Summary

Statistic	Value
Sum of the products of deviations	-0.12
Sum of squared deviations of X	0.03
Sum of squared deviations of Y	0.04
Sample size	10
Degrees of Freedom	8
Significance Level	0.05

To calculate the Pearson Correlation Coefficient, the researchers use the formula:

$$\mathbf{r = \Sigma(X - \bar{X})(Y - \hat{Y}) \div \sqrt{[\Sigma(X - \bar{X})^2 \times \Sigma(Y - \hat{Y})^2]}}$$

Where:

r = Pearson Correlation Coefficient
$\Sigma(X - \bar{X})(Y - \hat{Y})$ = sum of the products of deviations
$\Sigma(X - \bar{X})^2$ = sum of squared deviations of X
$\Sigma(Y - \hat{Y})^2$ = sum of squared deviations of Y

Substitute the values to the formula:

$$r = \Sigma(X - \bar{X})(Y - \hat{Y}) \div \sqrt{[\Sigma(X - \bar{X})^2 \times \Sigma(Y - \hat{Y})^2]}$$

$$r = -0.12 \div \sqrt{(2.62 \times 2.69)}\ r = -0.12 \div 2.655$$

$$\mathbf{r = -0.047}$$

Table 6: Pearson r Results

R score	-0.047
P-Value	0.897

The Pearson r correlation coefficient between the observed and survey values is −0.047, signifying a very weak negative linear relationship. The corresponding p-value is 0.897, which is much greater than the significance level of 0.05 means that the result is not statistically significant, and

we failed to reject the null hypothesis. In conclusion, there is no evidence of a linear relationship between the two variables. Hence, the observed correlation could have occurred by random chance.

Discussion

Sidewalks in Barangay 171, Caloocan City, faces issues regarding of sidewalk designs that are uneven or irregularly surfaced that present a lot of inconveniences to the residents, reduce mitigating functional capacity of public spaces. Poor sidewalk conditions directly weaken public infrastructure functioning owing to access and mobility problems affecting them.

Based on the Department of Public Works and Highways (DPWH) guidelines, sidewalks in urban areas should be at least 1.20 to 1.50 meters wide so that all people can walk safely. In Barangay 171, many sidewalks do not follow the standards set by the Department of Public Works and Highways (DPWH) and other national laws. In terms of durability, DPWH also requires that sidewalks must be made with strong and well-finished concrete to avoid cracks and uneven surfaces. Barangay 171 has many sidewalks that has cracks, broken parts, and rough leveling that lessens their durability. Other than that, the Accessibility Law, also called Batas Pambansa Blg. 344, requires features like curb ramps and tactile paving for the visually impaired which is not mostly present in the barangay especially, tactile paving. Maintenance is also a problem. Many sidewalks are often blocked by electric poles, vendors, or trash, and poor drainage causes water buildup and flooding when it rains. These problems damage the sidewalks and cause them to be non-accessible public spaces.

These problems show not only the failure to meet required standards but also reflects a bigger issue of poor care and lack of priority for safe and inclusive pedestrian facilities. Hence, the participants suggested standard designs, strong construction materials, and safety features such as ramps and good drainage.

Conclusion

The primary goal of this research is to assess the non-standard sidewalks in Barangay 171 and determine their impact on public infrastructures. Based on the researchers' field observation and survey distributed to 100 respondents, the sidewalks in Barangay 171 do not meet the required standard of the Department of Work and Highways (DPWH) and local rules regarding sidewalks. However, the analysis failed to reject the null hypothesis, stating that there is no significant relationship between the two variables.

Recommendations

Residents: Residents are encouraged to see the importance of having safe and well-designed sidewalks. Joining community discussions and supporting local projects that aim to improve public spaces are recommended to further understand having standardized sidewalks.

Urban Planners: Urban planners are advised to use the findings of this study when planning and implementing a renovation of sidewalks, considering the needs of children, the elderly, and persons with disabilities (PWD's) to ensure safe and highly maintained sidewalks.

Local Government Officials: Barangay and City Officials may use this study as a guide for future projects and rules. By having a proper overview of the issue regarding sidewalks, mistakes can be avoided. Other than that, better planning for the community can be done as the study can be a reference.

Community: The whole community is recommended to take part in activities, projects, and programs that promote improvement of sidewalks and other public spaces. Working together can help to create safer and more convenient public spaces for all residents.

Future Researchers: Future researchers can use this study as a reference for their own work. The researchers encourage them to study more areas or other factors that affect sidewalk safety and quality. Furthermore, the research gaps in this study are recommended for further investigation.

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