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Understanding the Influence of Urban Form on the Physical Activity in the Open Spaces Using Photovoice Method

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Abstract—This study presents the photovoice approach, a participatory qualitative research tool to study the relationship between urban form and physical activity in urban open spaces. According to the World Health Organization, increased automation of daily tasks and work has decreased physical activity over recent years across all age groups. One of the significant factors that determines an active lifestyle is the way our cities are built and the urban environment is designed. This study investigates perceived beneficial or negative impact of built environment on the levels of physical activity that result for both individuals and communities.

Keywords — Photovoice, physical activity, active living, sedentary living, urban form, open spaces

I. Introduction

Worldwide, 81% of adolescents (aged 11 to 17) and 23% of adults do not satisfy WHO guidelines for physical activity for health [7]. WHO defines physical activity as any force used by muscles to expend energy. It can take different forms, including walking, cycling as a means of transportation, sports, working, and playing [7]. There is a significant rise in levels of physical inactivity and unhealthy lifestyles due to recent changes in transportation patterns, greater use of technology, and urbanization [1]. As a result, there is a high risk of chronic diseases like cancer, diabetes, and cardiovascular diseases [7].

Promoting physical activity is a crucial element that addresses the issues of a sedentary lifestyle, obesity, and the prevention and treatment of non-communicable diseases (NCDs)[7]. Active societies can produce extra returns on investment, such as lower fossil fuel use, cleaner air, and less congested, safer roadways. Individuals' physical and emotional health, as well as the social cohesiveness and general well-being of communities, are all improved by an active lifestyle. One of the goals of the Global Action Plan (GAP) is to “create an active environment” to promote physical exercise [1].

Opportunities for being physically active are not limited to sports and organized recreation. Physical activity can and should be integrated into the settings in which people live,

work and play in neighborhoods, in educational and health establishments. Hence, the way we build our cities influences peoples' participation in physical activity. Elements of the built environment or urban form such as street layout, land use, the location of recreation facilities, parks and public buildings and the transport system can either encourage or discourage physical activity [7]. The Global Action Plan on physical activity (2018-2030) focuses on physical activity as well as active mobility in everyday life in open space that may be public, semi-public or private [1]. Further the action of “creating environment” focuses on sub action of access and additional management of more green and public open space where general public can come and enjoy active living [1].

Open Spaces may be publicly accessible for everyone (e.g. street, squares, park), semi-public with limited accessibility (e.g. school-yard, allotment gardens) and private open space (garden of a home) [9]. The open spaces here discussed is more about the public and semi-public open spaces. Generally, women, adults, marginalized populations with disabilities and low socio-economic status often have less access to safe, accessible, affordable and appropriate space and places in which to be physically active [7].

Spatial analysis of the open spaces and the participatory action research (PAR) helps to understand the people's perspective [2] of physical activity in open spaces. Photovoice method is such a participatory exploratory approach for participatory spatial analysis used in urban health [7]. It involves discussion of the research topic through photographs [8]. Only few research is done like a study of “Walkability in Dar es Salaam, Tanzania” [7] tries to understand the influence of built environment on physical activity in developing country's context. There is a research gap regarding the study of the physical activity situation in developing country in general and specific to Nepal. Hence, the study tries to look into the influence (barrier and facilitator) of built environment in physical activity of people and how they perceive them in the context of developing country like Nepal.

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II. Objective

The study investigates perceived beneficial or negative impact of built environment on the levels of physical activity that result for both individuals and communities. Also, the study explores the photovoice method and its critical reflection on application to run place analysis for urban health domain of physical activity in open spaces.

III. Method

“Photovoice is a qualitative method of inquiry whereby individuals can document their lived experiences, particularly individuals whose voices are not typically heard in regard to promoting social change and policy development” [3]. Reflecting on the photograph that was taken and chosen by the participant is part of the photovoice method. People from various backgrounds can express their unique perceptions and expertise on a topic by using photographs [3]. With time, the photovoice technique has changed. At first, the photovoice method involved giving participants disposable cameras so they could snap a few quick pictures of the topic. As a result of digitization, the technique now uses smartphones or digital cameras that can not only take pictures but also aid in georeferencing the location where the picture was taken. Similar to this, social media can occasionally be used to engage viewers of the images as much as participants in their creation and discussion [5]. The discussion centers on the rationale behind the selection of the images, their significance, and the opinions of the participants regarding one another’s images. With the development of online communication systems, group talks that once required physical gatherings can now be conducted online using digital copies of the chosen images.

To investigate physical activity in the open area, the digital photovoice method is used in this study. A digital learning platform for urban health called “Urban Health digiSpace” [4] made it possible to conduct study on the subject simultaneously in various nations. The Digital Participatory Spatial Analysis Lab (DiPS_Lab) developed a digital tool for this platform’s “photovoice exploration of physical activity in open space” module [4]. The KoboCollect enabled collection of photos and GPS location along with data from the participants for subjective place-based assessment. The platform and tool offered a simple-to-access online digital portal with ready-to-use information, resources, and tools, making it possible to conduct the study digitally and remotely. The tool can be accessed both online and offline.

The research was conducted with a group of students from Kathmandu University. The Dhulikhel municipality of Kavrepalanchowk district in Nepal was chosen as a case study area. Dhulikhel municipality is located at the eastern rim of Kathmandu valley. It is situated 30 km southeast of Kathmandu. Initially, potential participants were called for the project. They were introduced about the event, photovoice method (14th November, 2021). The online

platform and the photovoice tool tools were initially introduced to the participants. One week of time (14th – 21st November, 2021) was given to get familiar with the online method. Then a follow up meeting was organized to select the students for data collection. Four students (male=2, female=2) aged between 21-39 were selected to participate in the event. A focus group discussion (on 5th December, 2021) using an online platform was held at the end of two weeks (21st November – 4th December, 2021) of data collecting. Using the SHOWED method [3], the focus group discussion included choosing particular photographs, discussing their meanings, and asking participants about chosen photographs of one another. The SHOWED Approach involved explaining the pictures by answering the questions: S - What do you See in the photograph?, H - What is Happening in the photograph?, O- How does this photograph relate to Our lives or other members in the community? E- Why do these issues currently Exist within the community? And D- What can we Do about these issues? [3]

After the focus group discussions, the perspectives of the participants in the form of photographs and voice were recorded and transcribed and further analyzed to understand the topic. Then, these transcribed data were conveyed into action-oriented findings and presented from Nepal in the international platform.

IV. Findings

From the data collection regarding the location of open spaces in Dhulikhel municipality participants geolocated open spaces where they want and do not want to be physically active. The discussion over the map produced (fig. 1) and photographs of the pinned open spaces show that the urban fringes (western part) of the municipality promotes physical activity compared to the core urban areas (eastern part) as seen in fig. 1.

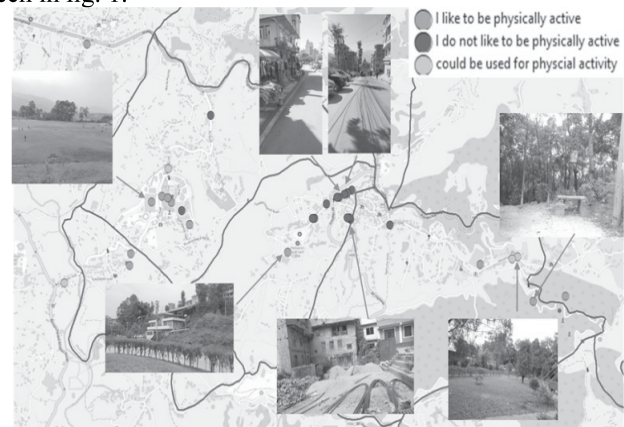


Fig. 1 . Map of Dhulikhel municipality showing georeferenced open spaces by the participants indicating red spots as physically inactive, green spots as physically active and orange as the open spaces which could be more physically active

“Walking” and “exercise” were observed as the preferred physical activity in the recorded open spaces of public parks, institutional and communal open spaces whereas “safety” is observed as the major issue in these open spaces.

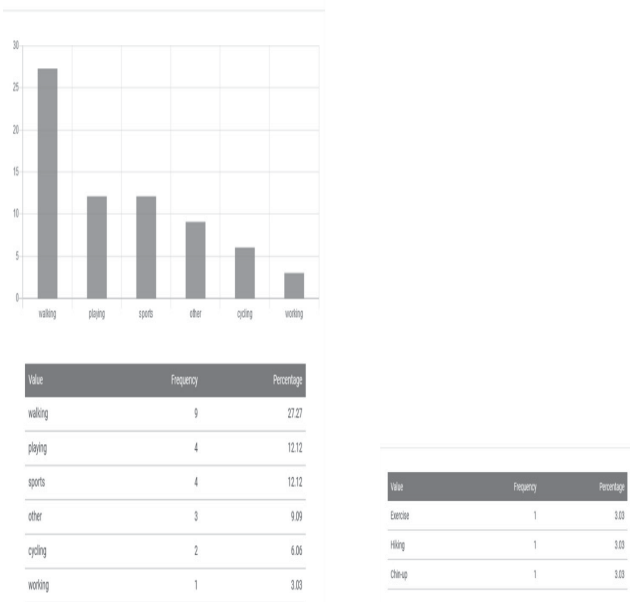


Fig. 2. Graph showing the preferred physical activity in the open spaces

Findings from SHOWED approach Based on the focus group discussion about pictures using the SHOWED approach, the following are some of the key areas that demonstrate how built form affects physical activity in open spaces.

1) Urban Sprawl

Due to urban sprawl, encroachment of spaces in various forms creat barriers to day-to-day physical activity (e.g. walking). In fig. 3 a participant explained the encroachment of pedestrian way by the street vendors and problem in walking due to it. The ParticipantA states

“Sidewalks are used in many places by small businesses such as these. Although municipality tries to control time to time but it is not being effective”.



Fig. 3. Streets encroached by street vendors; Figure 4 Community open space encroached to store construction materials; Figure 5 Open space used to dump old electronic devices

With the increasing population and rapid construction in the urban area the open spaces that were previously used to play, socialize and rest are now used to accommodate the resources to manage the rapidly growing urban population. ParticipantA explains it in fig. 4.

“This space is community area but is now used for parking, piling up of construction materials. It could have been used by community for physical activity. The issue is difficult to solve as this space is entitled to be used by all”.



Fig. 6. Old man crossing street Fig. 7. Children park

Another participant B in fig. 5 further explains how visual obstruction of space also negatively affects the physical activity of people.

“Dumping of unused computers/printers in some parts of open space. Though it does not affect directly as the space is large enough for people. But seeing these junkyards certainly gives bad visual impression”.

Hence, urban sprawl leads to encroachment of the open spaces by people, vehicles materials or junk disrupts the probable physical activity that could be carried out in it.

2) Design of spaces

Lack of inclusive space for all age, gender, differently abled people and other minorities. The physical environment like accessibility, peacefulness, availability of resources to play, rest etc. encourage physical activity. Participant B explains the point with the help of fig. 6 and states

“Old man is crossing the street. There is no designated route for old age people to walk around the neighborhood”.

Though a certain park is designed for children no proper safety measures are considered according to their age as seen in fig. 7.

Spaces with appropriate instruments to play and exercise though motivates people to be physically active, people of other gender might not be as active as male. A male participant C explains fig. 8 showing a resting place in a hiking route as he states

“Hiking route is also preferred by female but this place is used by male. I have not seen female doing exercise here”.

The spaces if designed considering the sensitivity of other genders spaces can accommodate them as well. A female participant D explained this opinion clearly sharing how she feels comfortable only in semi-public open spaces as it feels secured and maintains her privacy. She explains it in fig. 9.

“This space is designed within the girls’ hostel. I like this space as it is surrounded in the form of a courtyard. Female students can do physical exercise here”.



Fig. 8. Hiking route with benches; Figure 9 Green space in Girl's Hostel at KU premises

3) Institutional open spaces

Institutions in Dhulikhel Municipality like the Dhulikhel hospital and Kathmandu University provide space for community. A participant explains that the open space in the hospital is used by the community as well as the patients. The participant A states:

“The open space is in front of Dhulikhel hospital. Other physiotherapy space are usually congested. But this space provides open space to do physical activity for patients but also community.

Similarly, the open spaces of Kathmandu University also enables the community to be physically active there. A participant A explains

“The open space is sports ground within the premise of Dhulikhel University. This space is semi-public so people, especially young people in the community also use this space for playing. This ground is open to any kind of activities for both male and female”.

4) Safety

Safety as an issue remains in various forms. The urban form defines not only physical safety as well as psychological safety to be physically active in the open spaces. The road safety defines the walkability of the streets. Participant D clearly explains it with a fig. 10 showing a road inside the University which is undesirable to walk stating

“This space is good for walking within the university. Due to paved road, there is the issue of fast driving of two wheelers may cause accidents. May be adding speed breakers, sign as drive slow could be installed”.

The built form around the open space can also make people feel psychologically safe or unsafe to use it. The major earthquake of 2015 has hugely influenced people’s perception regarding the old built forms even more than before. Participant A explaining the fig. 11 states

“This narrow road is used for walking. But I do not like to walk here as the building nearby is old and is not maintained. So I feel insecure walking here”.



Fig. 10. Road inside Kathmandu University; Figure 11 Narrow alley between old buildings

Another participant C explains how the vehicle movement near the open spaces feels unsafe with the fig. 12. The participant states

“This park behind is used by community and children. this park. This parking area has to be shifted and can make the whole area as a park connecting the both the parks behind”.



Figure 12 Heavy vehicles near public park

V. Discussion

Urban form can both negatively and positively affect physical activity in the open spaces. Some of the major opportunities in the built environment to promote physical activity in Dhulikhel municipality can be done by focusing on these urban planning strategies based on the Global Action Plan on physical activity (2018-2030) [1].

A. Land use and Building Design:

Urban sprawl, large shopping centers on the urban periphery and the geographical separation of living, working, learning and shopping require increased car use and reduce the opportunities for active living in the city. Walkable and compact neighborhoods with mixed land use allow people to travel on foot in their everyday lives. Neighborhood Parks within walkable or cycling distance encourage active living.

B. Greenery:

Green spaces and parks offer a socializing space and spaces for outdoor recreational activities. Green environment in residential areas encourages people to enjoy it by being physically active in the form of walking, jogging, etc.

C. *Safe roads:*

Traffic calming measures, infrastructure such as dedicated routes for pedestrians and cyclists as cycle lanes can increase pedestrian and bicycle travel. More people will walk and cycle if the traffic speed is reduced and convenient and safe infrastructure is built.

D. *Connectivity:*

Providing easy access to the natural environment like rivers, lakes and forests on the periphery of the city encourages people to hike and make short trips to enjoy the nature helps in promoting physical activity and active living.

E. *Local plans and policies:*

Plans and policies should focus on encouraging physical exercise among people of all ages, from all socioeconomic backgrounds, and residing in various urban areas, paying attention to equity, deprivation, and vulnerability. Partnership-based strategies should be focused to promote physical activity in various settings (such as neighborhoods, health care settings, workplaces, schools and transport systems). Investing in policies to promote walking, cycling, sport, active recreation and play can contribute directly to achieving many of the 2030 Sustainable Development Goals (SDGs).

VI. Conclusion

Physical activity is essential for physical and mental health as well as social cohesion and community wellbeing. Physical activity is either encouraged or discouraged by the way we build the cities. Various barriers exist in the social environments within which people work, learn, play and live. Architects, Planner and Government should focus on removing the barriers addressing the needs of all citizens in different settings for ensuring equity and inclusiveness to promote physical activity and active living by making the city green, walkable, well designed and safe.

The photovoice method is best suited to carry out such qualitative participatory action research which requires participation from the stakeholders or general public who are less vocal. The digital photovoice approach with online place-based digital tool integrating sensory experiences like visual (photos), audio (participants' own voice), location tag was found to be very effective in constructing the geo-narrative from participants. Method is easy to apply with low barrier for participants. The photovoice method's digitalization made it simpler for participants and researchers to use it in a global setting. Further implications of digital photovoice method can be further applied in academic research in social science background or even in the field of architecture.

However, research in the setting of the global south was comparatively complex. There are some limitations of the study as there were only limited number of participants to carryout photovoice method, generalization of findings

was not possible. The tool's GPS location was less precise because Nepal has a spotty internet link, making it difficult to upload data and pictures. Taking pictures in public places presented a significant challenge because it raises suspicions. However, the photovoice method and its digitalization can assist in effectively communicating the opinion and needs of the less vocal public to decision-makers.

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