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The Situation of Infrastructure Development in Semi-Urban Areas of Nepal

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Abstract

The main thrust of this paper is to deliver genuine situation of infrastructure within the specific context of development as it is prevailed in semi-urban area of Nepal. Well-developed infrastructure enhances productivity and efficiency projected towards forecasting the economic growth. Policy makers and development agencies have to concern for improved transportation, communication, and energy system to a competitive social environment. Infrastructure development is pre requisite for attractive investment atmosphere and enhances entrepreneurships. The aim of this paper is to depict the related issues of infrastructure related activities and actions as prevailed in the semi-urban area of Birendranagar, Surkhet, Nepal. This paper is based on the qualitative data and information as available from the field and government publications. The term infrastructure primarily denotes two aspects; physical and social infrastructures. This has been argued that both physical and social infrastructure have been inevitable components for the balance development for a contemporary society.

***Key Words**:* infrastructure, semi-urban, development, activities, prevailed

Introduction

Infrastructure primarily indicate tangible assets; like bridges, railways, roads, seaports, power plants, airports, water supply systems, telecommunication networks, sewages systems, and buildings that support social support and well-being of the people. Infrastructure serves as the foundation for a nation's overall development. Before beginning any national activities or actions, infrastructure is the cornerstone of progress. It is the fundamental state of society in terms of geography, organization, and physicality (Bojanic, 2018). Socioeconomic development, people-nature interaction, and societal functioning all depend on the development of infrastructure. Regarding the development of infrastructure, Chen et al., (2023) stressed that it's bring changes in society, transfer the natural environment. Infrastructure development sets new structure of a natural environment by replacing new modern facilities (Bojanic, 2018). For the production, distribution, exchange of goods and services, development of infrastructure facilities is crucial (Chen et al., 2023). Effective service delivery mechanism is a part of infrastructure. Infrastructure development is mainly brought the quality and quantity changes in structure (Chen et al., 2023). Infrastructure development is related to road, bridge, building, communication network, transport facilities, and safe drinking water facilities (Foster & Garmendia, 2010). Communication services are a powerful tool for spreading development and educating people about new ideas and innovations (Chen et al., 2023). Inadequate infrastructure is a constraint on economic growth, improve life style.

❋ **Writers are work at Mid.West..University.**

Unreliable and insufficient infrastructure affects the growth and development of the society (Frauendorfer & Liemberger, 2010).

As reported by Digdowiseiso, (2024) infrastructure development is at the center of the nation's social and economic development. It provides the foundations for virtually all modern economic activities and actions and contributes to uplift living standard and quality of life style (Liu et al., 2017). Inverse of this, Melema at el.,(2024) suggest that the extension of more roads may more traffic and noise, energy plants continuously greenhouse gas, dams may bring about the damage of large area of land and displacement of settlement. Infrastructure encompasses producers, management styles, and development policies that work in physical environment and social demands to enable the public movement, supply goods, supply drinking and irrigation water, disposal of waste products, energy supply, and communication within community (Jmetti &Jonis, 2016). Social and physical infrastructure needed for the development process of a society and organization. It provides easy service delivery and facilities for an economy growth (Liu et al., 2017). Digdowiseise (2024) focused that infrastructure development is a collection of structural components that work together to support a whole development framework.

In 1950, Nepal's physical infrastructure began to take shape (World Bank, 2008). Nepal had no infrastructure connections to the outside world prior to that time. Since then, the government has worked to expand access to infrastructure services including power, health care, education, transportation, and communication. Building the essential infrastructure to quicken Nepal's development speed is one of its biggest problems. For this reason, transportation is essential to a nation's entire growth and socioeconomic transition. Since there is no other option for public transportation in Nepal outside the limited air service to some areas of the nation, which is out of reach for the average citizen, road transit plays a major role (Economic survey, 2012). Infrastructure development is important for the overall progress and wellbeing of the society. This paper is related to the situation of infrastructure in semi-urban area of Nepal. The classification of rural urban area of Nepal, 27.1 percent of the population resided in urban areas, 39.7 percent lived in prey-urban areas, and 33.2 percent lived in rural areas (economic survey, 2023). By the Mid-March 2024, black tapped roads 18,241kilometers, gravel roads 7697 kilometers, and 8329 kilometers earthen roads had been constructed by the government of Nepal (Economic survey, 2024).

Table 1

Road expansion by the federal government of Nepal (in kilometers)

Description	**2019 Mid-July**	**2020Mid-July**	**2021Mid-July**	**2022Mid-July**	**2023Mid-July**	**2024 Mid-March**
Paved roads	14695	15424	16614	17232	18052	18241
Graveled roads	8594	8622	8171	7888	7696	7697
Earthen roads	9590	9198	8931	8876	8491	8329
Total	**32879**	**33244**	**33716**	**33996**	**34239**	**34267**

Source: Ministry of Physical Infrastructure and Transport, 2024

Ministry of Communication and Information Technology (2024) recorded that during the mid-march 2024 broadband internet service has reached all the centers of local government. Its service also has expended to 5951 Ward centers, 4272 health centers, and 5341 community secondary schools across the country.

Nepal represents the unusual and diverse land structure with significant height fluctuation over short distances. Natural hazards such as soil erosion, sedimentation, landslides, deteriorating water resource, and drought have increased infrastructure development activities in Nepal, reducing food production, increasing social abuse, resource exploitation, and social structure destruction, among other things. People have become dependent on modern communication tools, and there is no chance of development without them. Similarly, electricity has a stronger impact on the economic and social growth of a place. In terms of infrastructure development, Nepal's urban areas have advanced faster than its rural areas. However, infrastructural development in Birendranagar Municipality especially in outside of the valley, Surkhet, has not been completed. There are several concerns and issues that have hampered development in Birendranagar Municipality in semi-urban area. This study primarily analyzes the issues related to infrastructure development in Birendranagar Municipality of Surkhet district by assessing the condition of infrastructure development activities available in semi urban area. The main thrust of this paper is to provide information about the present state of infrastructure development in the semi urban areas of Nepal. An attempt has been made to depict present situation and highlight its development process.

Methods and materials

The research methodology for studying semi-urban area in Birendranagar Municipality, particularly, this paper should be designed to capture both qualitative and quantitative data and information. This study employed mixed-method and had followed descriptive research design. The research work was carried out in a semi-urban of Birendranagar Municipality, Surkhet district Nepal. This research paper has adopted various sequential steps to meet the objective. This study used both quantitative and qualitative data in order to analyze the phenomena under consideration. From the study area, primary data had been collected from selected sample in the study area using an appropriate tool (field observation and focus group discussion). Data had been carefully checked to remove the possible errors. The collected data had been tabulated classifying mainly under different headings and sub-headings and presented by the support of table, figures chart.

Result and Discussion

It's a critical part of the research where researcher demonstrate the ability to critically think, synthesize information, and contribute to the field of study. Attempts have been made to provide a detailed interpretation of research findings. The specific findings depending on the goal and objective of the study are presented here under.

The situation of infrastructure development has been assessed in the specific context of following development intervention as made by government and non-government sectors;

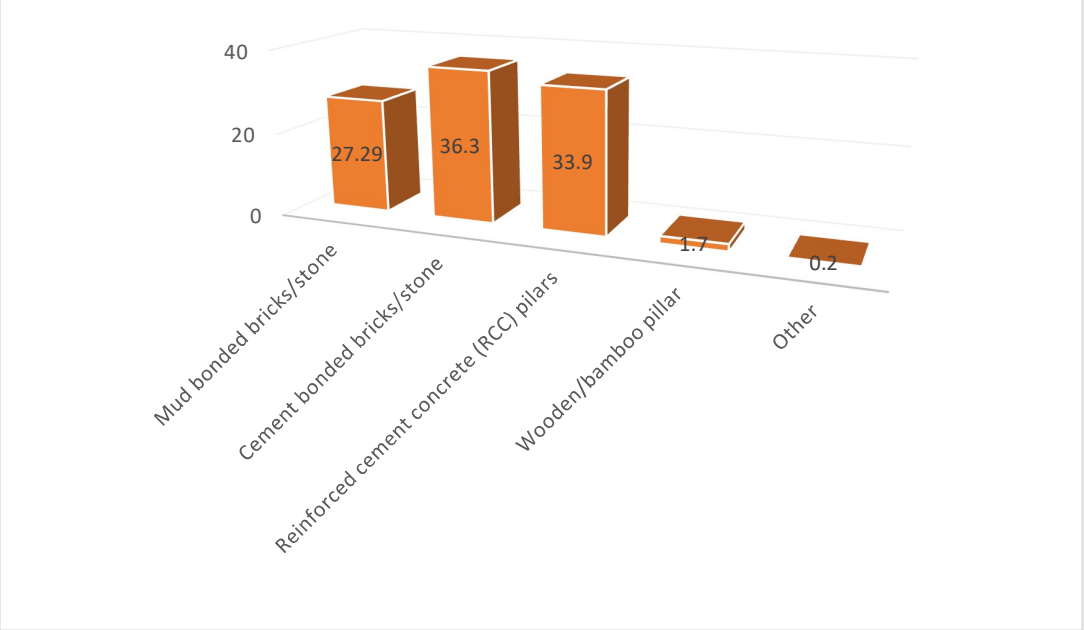
Housing pattern
Drinking water
Fuel infrastructure
Health and sanitation
Household amenities and assets

Housing pattern

The specific housing pattern in the study area can show a significant impression on the quality lifestyle of the people, social interactions, and access to services and amenities for its residents. Urban planners, architects, and policymakers often play a role in shaping housing patterns to meet the needs of communities and promote sustainable development. A "housing pattern" typically refers to the arrangement or configuration of housing units or residences within a given area or community. It describes how houses, apartments, or other types of housing are situated and organized within a neighborhood, city, or region. Housing patterns can vary significantly depending on factors like cultural norms, economic conditions, urban planning, and historical developments. The picture of the housing system in Birendranagar Municipality Surkhet is shown below.

Figure 1

Households by types of foundation of housing unit



Source: CBS, 2078

The above figure gives status details of the foundation of the building houses as the part of infrastructure development in the research area. The households of the Birendranagar Municipality Surkhet have made their houses using the foundation of mud bonded bricks and stone which covers 27.9 percent. The houses made by use of

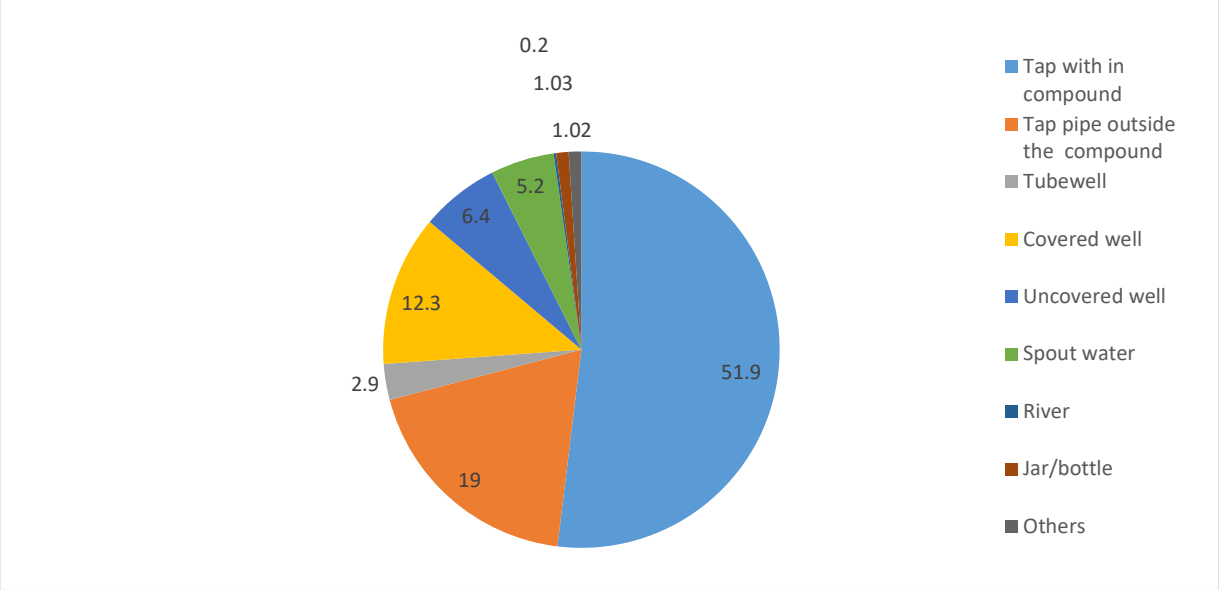
the cement bonded bricks and stone cover 36.3 percent, likewise, houses made by using reinforced cement concrete (RCC) pillar covers 33.9 percent. Similarly, houses made by the use of wooden/bamboo pillars covers 1.7 and lastly, houses made by using the others materials cover 0.2 percentage. This study shows that inhabitants are adopting innovative ideas in terms of making their houses. They are integrating modern ideas and technologies without replacing their old and existing ones. The houses they made are neither old nor new but the modern in terms of its structure and function.

Drinking water

Facilities for managing, treating, distributing, and storing water include a variety of systems. This infrastructure is essential for access to clean and safe water for industrial processes, drinking, irrigation, and other applications. Facilities known as water treatment plants are in charge of cleaning raw water from natural sources, such as lakes, rivers, or groundwater, so that it is fit for human consumption and other use. To get rid of contaminants and impurities, they usually use procedures including coagulation, filtering, disinfection, and more. Before returning the cleaned water to the environment, these facilities filter and treat sewage and industrial wastewater to eliminate contaminants. Plants that process wastewater help to in preventing natural water bodies from becoming contaminated.

Figure 2

The infrastructures and supply of drinking water



Source: CBS, 2078

Above figure shows the distributed water system and the infrastructure made for the distribution of water to the public houses. There are three water supply projects in the study area. The distribution line supply of drinking water is made by the metal

and plastic pipe connected to the small tanks. Most households of this study area have been using distributed water by the government. The main sources of clean and safe drinking water in the area is tap/pipe water with in the compound which cover 51.9 percentage, secondly tap/piped water outside the compound cover 19.00 percentage. Likewise, covered well or kuwa covers 12.3 percentage, uncovered well covered 6.4 percentage, spout water cover 5.2 percentage, tube well 2.9 percentage, jar bottle covers, 1.03 river stream covers 0.2 percentage and others sources cover 12.01 percentage. The finding based of the study indicates that people make rational choices in terms of using the water. The use well water, spring water, rain water, and piped supply water on the basis of its availability and access. In the context of availability of water people argue that they face scarcity especially during the summer season.

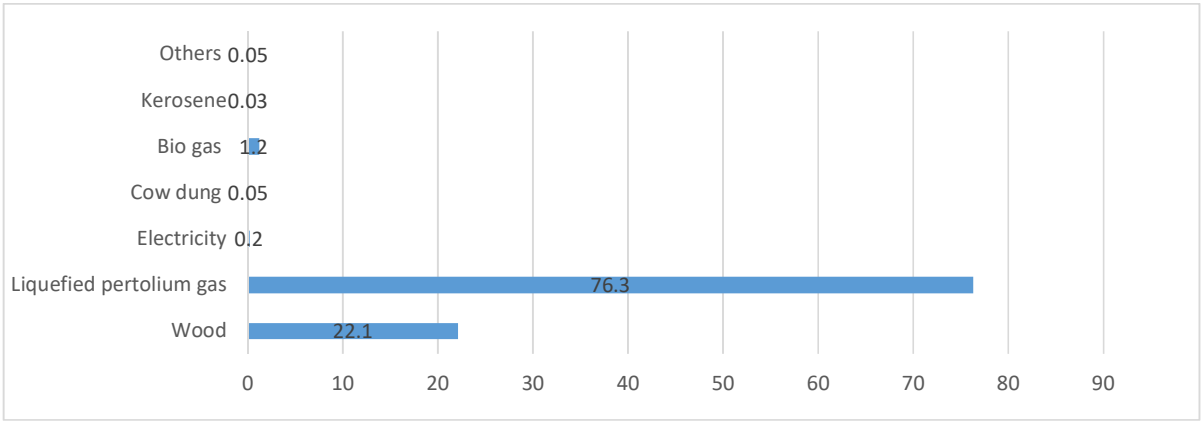
Fuel infrastructure

"Nepal has no known major oil, gas, or coal reserves, and its position in the Himalayas makes it hard to reach remote and extremely remote communities" (Economic Survey,2012). As a result, the majority of Nepali people have traditionally relied on biomass, labor, imported kerosene, and/or traditional water-powered vertical axis mills to meet their energy needs. Despite this, the country's per capita energy consumption is "startlingly low," at one-third the average for Asia overall and less than one-fifth the global average. Merely 53% of Nepal was electrified in 2010, and 76% of people relied on fuel wood for cooking. Because of this imbalance between the supply and demand for power, some analysts have referred to the nation's energy portfolio as "medieval" in terms of the fuels it employs and "precarious" in terms of the load shedding that takes place throughout Kathmandu. But Nepal has all it needs to get out of these issues.

The real situation of the fuel consumption of cooking in the study area is presented below:

Figure 3

Households by fuel consumption for cooking



Source: CBS, 2078

Above figure indicates that the major use of cooking is liquefied gas followed by the wood. Traditionally fire woods have been the major sources of fuel wood in the study area. Now a day gas and electricity have been using popularly among the people who live urban and semi-urban area. The people who live under poverty and deprivation still maximum use of firewood as collected nearby forest area.

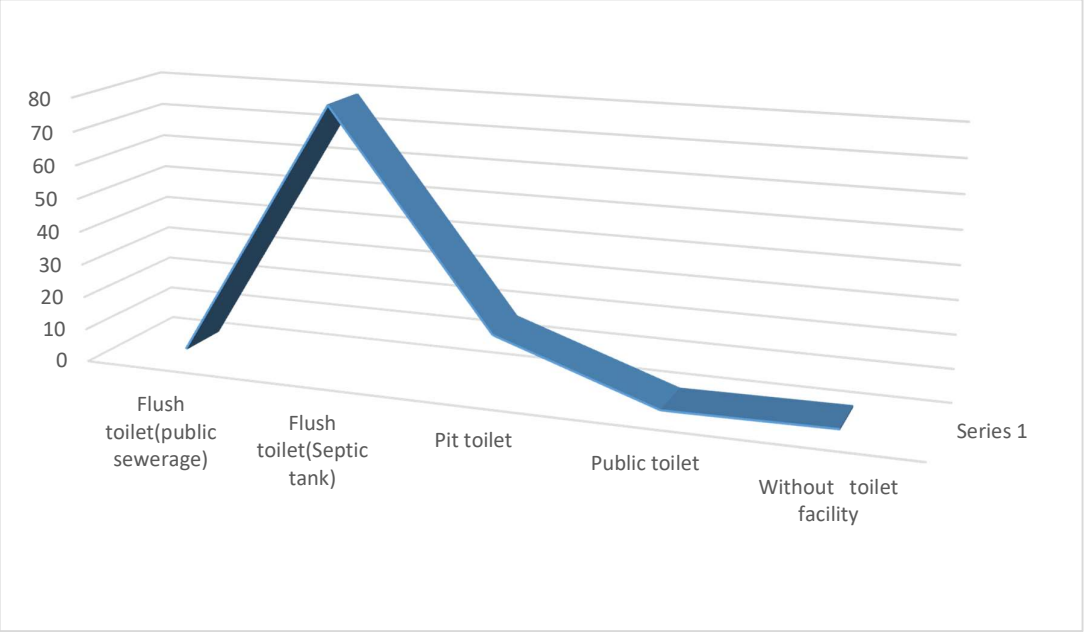
Health and sanitation

Safe water and adequate sanitation are essential for social and economic development as well as for good health. However, sanitation progress has been too sluggish, despite evidence that sanitation interventions can significantly enhance health outcomes. 2.6 billion people worldwide lack proper sanitation, which accounts for roughly 10% of the world's disease burden, primarily from diarrheal illnesses. The WASH Sector Development Plan (2016–2030), which will be carried out by the Ministry of Water Supply, serves as the framework for UNICEF's WASH component of the Nepal country program (2018–2022). In Nepal, our water, sanitation, and hygiene (WASH) division aims to enhance fundamental hygiene practices and water and sanitation services.

The health and sanitation is maintained by the use of safe drinking water, use of quantity of water and use of the toiles by the households and peoples. The scenery of use of toilets in the Birendranagar Municipality Surkhet is presented in the following figure.

Figure 4

Types of toilet facility of the households

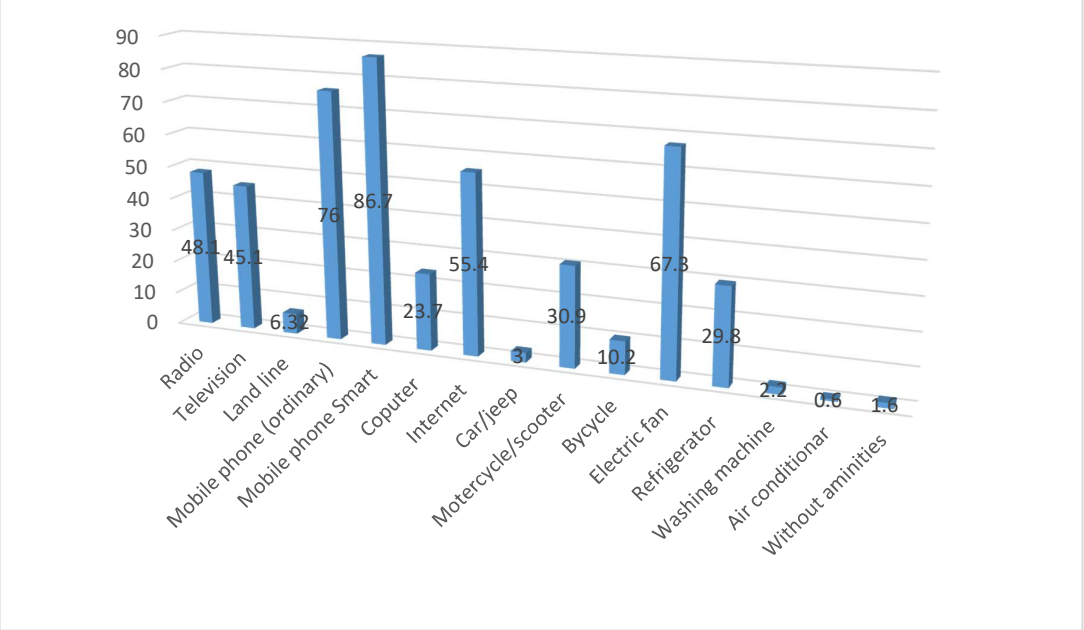


Source: CBS, 2078

The higher level of peoples has been using the flush toilet (septic tank) 79.8 followed by pit toilet 16.9 percentage. The noticeable fact is the still there are 0.9 percentage households are living without toilet facility. People of the study area inform that their toilet remain dirty because of the lack of supply of water especially during the summer season.

Household Amenities and Assets

Household facilities refer to the various amenities and infrastructure within a home that are designed to provide comfort, convenience, and functionality for the residents. These facilities can vary depends on types and size of the dwelling, but some common household facilities include: electricity, TV, Radio, Motor bike, Computer/ laptop, Mobile Phone, Solar Panel, water supply etc. Household facilities are essential for meeting basic needs, ensuring safety and health, enhancing comfort and convenience, and ultimately contributing to an improved quality of life. They also have economic, environmental, and social implications, making them a fundamental part of modern living. This is asserted that abundant amenities and facilities is provided to the people provide them improved quality of work and life.



Source: CBS, 2078

The use of amenities in the study area is normal as around the country. The smart phone user has covered the highest portion which is 86.7 percent and air conditioner is used by the lowest portion of the households which is 0.6 percent. This

is evident from this study that mobile phone and TVs have been common to all middle class people. However, the poor section of peoples is still depriving such facilities.

Problems faced for using infrastructure

Study area has been aging infrastructure systems that require significant maintenance and upgrades. Neglecting these can lead to safety hazards and inefficiencies. Infrastructure projects often require substantial funding, and budget constraints can hinder their development and maintenance. Building and using infrastructure can have adverse environmental effects. For example, transportation infrastructure contributes to air pollution and habitat destruction. Some infrastructure, like roads and public transportation, can become congested and overused, leading to delays and inefficiencies. Unequal access to infrastructure can exacerbate social and economic disparities. Proper maintenance of infrastructure is crucial, but it can be costly and challenging to execute efficiently in the study area. Above all, how to make physical and social infrastructures easily accessible to the poorest of the poor people in the main challenges before the planners and development works.

Prospects of infrastructure development

Proper investment in infrastructure may stimulate the economic growth by creating employment opportunity and improving productivity in the study area; most of the respondents use various infrastructures and enhance their life style. Infrastructure can be designed and managed in environmentally friendly ways, reducing its impact on the planet Digdowiseiso K. (2024). For example, renewable energy infrastructure can decrease reliance on fossil fuels. Novelties in technology can improve the efficiency and functionality of infrastructure. Smart infrastructure can monitor its own condition and adapt to changing needs. Well-maintained and efficient infrastructure, such as public transportation and utilities, can improve inhabitants' quality of life by reducing commute times, improving access to services, and increasing safety. Building resilient infrastructure can help communities better withstand natural disasters and other crises.

Expanding access to infrastructure, particularly in underserved areas, can promote equity and inclusivity. Collaborations between the public and private sectors can facilitate funding and expertise for infrastructure projects; like health posts and schools. Infrastructure networks can enhance connectivity projected towards improving the quality of life of the concerned general public. Sustainable and organized urbanization, intensive urban development program, regional urban development projects, and urban corridor projects are being implemented. Physical infrastructure development programs facilitate to environmental improvement and organized urbanization.

Discussion

The state of infrastructure development in semi-urban areas of Nepal reflects both opportunities and challenges shaped by geographic, economic, social, and political factors. Many semi-urban areas have seen improvements in road connectivity, linking them to urban areas. However, maintenance remains a challenge, with many roads becoming impassable during monsoons due to poor drainage and landslides. Access to electricity has improved significantly, especially with the government's rural electrification programs and the expansion of hydropower projects.

Even though, still, frequent outages and voltage fluctuations are common. While there has been progress in providing drinking water, many semi-urban areas face shortages, particularly during dry seasons. Sanitation facilities are often inadequate, leading to health and hygiene issues. Mobile phone networks and internet connectivity have expanded, but the quality of service remains inconsistent, limiting the potential for digital transformation. Semi-urban areas often lack well-equipped schools and healthcare facilities, forcing residents to travel to urban centers for quality services. National Statistics Office (2021) published a report by classified rural and urban areas of Nepal in which 27.1 percent of the people resided in urban areas, 39.7 percent lived in semi-urban areas, while 33.2 percent people resided in rural areas.

Even in the short time period, beginning of 1990s, the legal conformity had maintained and increase in private sector to certain extent (Kellermann &Keller, 2014). National audit office (NAO) of England focused of successful development of infrastructure depends on inclusive planning, rigorous review, transparency and proper use of budgets (NAO, 2009). Like this, Funke et al., (2013) stressed weak public investment and administration in emerging infrastructure development can lead to an absence of strategic guidelines. It shows that proper guidelines should be required for infrastructure development. These issues are apparent in infrastructure development in semi-urban area of Surkhet District of Nepal.

Federalism in Nepal has empowered local governments to plan and implement infrastructure projects tailored to local needs. Initiatives like public private partnership (PPP) have encouraged private sector involvement in infrastructure development. Increasing focus on small hydropower, solar energy, and biogas has improved energy access in semi-urban areas can play decisive role to develop the contemporary society. By the Mid-March 2024, 96.7% of the population has access to electricity.

Development plans that consider transportation, water supply, sanitation, and energy together can lead to more sustainable outcomes. Training local officials and communities in project management and technical skills can improve efficiency. Involving residents in decision-making ensures that infrastructure meets actual needs and encourages maintenance. Using modern construction techniques and digital tools can accelerate development and reduce costs. Building infrastructure that withstands natural disasters and adapts to climate change is essential for long-term sustainability. Infrastructure development in semi-urban areas of Nepal is at a pivotal stage. While significant strides have been made, persistent challenges require coordinated efforts among government agencies, private sectors, and local communities. By addressing systemic inefficiencies and embracing innovative approaches, semi-urban regions can unlock their potential and contribute more effectively to Nepal's overall development.

The findings from the Focus Group Discussion (FGD) conducted in the context of the situation of infrastructure development in semi-urban areas underscore the multidimensional challenges inherent in current urban planning paradigms. Participants articulated a pervasive sense of marginalization regarding non-motorized transport users, noting that existing infrastructure investments excessively favor motorized vehicles. This prioritization has resulted in inadequate provisions for pedestrians and cyclists, thereby exacerbating safety concerns and diminishing overall urban mobility equity. The discussion further exposed that infrastructural expansion has not kept pace with the rapid urbanization and motorization in these regions, leading

to sensitive traffic congestion, inefficient mobility patterns, and a strain on existing road networks.

The FGD also illuminated a strong demand for inclusive, community-driven planning frameworks that center the voices of historically underrepresented populations, including women, elderly residents, and low-income groups. Participants advocated for a bottom-up approach to infrastructure development. They emphasized the need for better health facilities, sufficient clean drinking water, social security, improved education system, and funding for agriculture modernization with irrigation facilities. Furthermore, the integration of public awareness campaigns was seen as essential for fostering a culture of civic engagement and shared responsibility in urban development. Collectively, these insights suggest a critical need for reimagining infrastructure planning through the lenses of equity, sustainability, and participatory governance in Nepal's semi-urban contexts.

Conclusion

Infrastructure development is a continuous process developed through the proper planning, designing, construction, and maintenance of physical structures, facilities and systems. The development of infrastructure system supports to develop the social and economic activities and actions to enable and fulfill the need of contemporary society. For this a balance development of physical social infrastructure is required to lead a good quality of life of people under consideration. Infrastructure development has gradually developing in semi-urban areas covering various amenities and facilities of people under consideration. The stakeholders are holding positive impacts of infrastructure development taking place around them and their areas. Data and information available to this study suggest that local people are learning to involve themselves in the infrastructure development related activities and actions came out by both government and non-government sector in their area. This paper highlights the current situation of infrastructure development initiatives and provides insights of contemporary society of semi-urban area of Nepal.

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