

A Comparative Study of Urban Infrastructure Facilities of Kohima, Dimapur, and Mokokchung Towns, Nagaland, India

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Abstract: *The present study was undertaken in three municipal towns of Nagaland; namely, Kohima, Dimapur, and Mokokchung to carry out a comparative study and understand the present urban infrastructure facilities status and the people's perception and satisfaction with the available urban infrastructure and basic services. The analysis of the data involves both primary and secondary data. The Cronbach's alpha of reliability analysis of internal consistency for the Satisfaction on Urban Infrastructure (SUI) of all three towns revealed that the questionnaire for Mokokchung town reached the highest acceptable reliability of, $\alpha = 0.748$ as compared to Kohima and Dimapur town. The perception analysis on the urban infrastructure and basic services revealed that health centers should be given the prime importance in the case of Mokokchung town, while in the case of Dimapur town the drainage should be given the prime importance, while, in the case of Kohima town, water should be given the prime importance according to the perception of the respondents.*

Keywords: Comparative study; Dimapur; Kohima; Mokokchung; Urban Infrastructure facilities

1. Introduction

The development of an urban area is to a large extent determined by the fundamental reality of its urban infrastructure. By the term urban infrastructure here, it means any permanent installation constructed for urban use such as; roads, buildings, bridges, railways etc. In simple words, anything that is being built or constructed for the basic requirement or necessity of the existing urban population can be termed as urban infrastructure. The nature of the growth of population in any particular urban area directs the path of infrastructure to take its place. As the growth of population begins to take place the demand for more educational institutions, more housing facility, better road connectivity, more electricity consumption, more water supplies etc., becomes the key priority for the government to look into the matter diligently and bring about solutions and meet the requirements of the growing population demand. The present study was undertaken in three municipal towns of Nagaland; namely, Kohima town, Dimapur town and Mokokchung town in order to carry out a comparative study and understand the present urban infrastructure status and the people's perception and satisfaction on the available urban infrastructure and basic services of these three towns. Brahmachary (2010) noted that the basic and the key foundation of development is signified by the presence of infrastructure, which is presented by permanent installations of some kind and which is used for a long period of time for supplying basic inputs such as railway, roads, power, education, health etc. Ayemi and Kar (2020) made an attempt to study the patterns of urbanization and associated infrastructure and socio-economic development in Nagaland where it was mentioned that infrastructure is the base for the growth and development of an urban centre. Ezung and

Jamir (2018) opines that a socio-economic development can be accomplished only when the infrastructural facility is sound and secured. Jamir *et. al.* (2017) made an attempt to understand the agro-based industry in the district of Dimapur, wherein it was found that the main constraints that hamper the agro-industry, were due to inadequate infrastructural facilities such as electricity and poor road connectivity. Esakki (2017) focused on the importance of infrastructural facilities in the growth of tourism sector by stating that good road connectivity should be given the highest priority by every country, this can attract the tourists by providing comfort and immense pleasure even during their time of travel.

Nayak (2013) in his statement about the facts of Nagaland observed that the status of drinking water supply seemed to be at its worst specially in the rural areas, the state also has the lowest per capita consumption of power, inadequate banking and health facilities and a pathetic road condition due to poor maintenance. Jamir (2021) in his study found out that there is a positive impact of urbanization in the two sample districts of Kohima and Mokokchung, however, it was suggested that in order to make the state an egalitarian society, government should give priority in providing the basic infrastructural facilities in the urban areas. Rajapaksa *et. al.* (2018) made an attempt to study the pro-environmental behaviour by implementing the role of public perception in infrastructure and the social factors for sustainable development, where it was found that there was a direct and indirect influence of environmentally related perceptions. Rout and Bhagat (2012) made an attempt to study the city dweller's perception on urban environment in Bhubaneswar where it was found that the level of satisfaction with urban environment decreased with the increasing age of the respondents. Amis and Kumar (2000)

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demonstrated the significance of infrastructure and provision of service for poverty reduction by applying participatory research. Ahuja and Priyadarshini (2017) attempted a study in order to understand the dynamics of effective community participation for the project of development of road in the context of India, where it was found out that the structure of public consultation and parameters for urban road projects differs in the case of core urbanized areas and peri-urban areas. Kumar *et. al*, (2014) evaluated the public transport and urban mobility in Bathinda with the help of people's perception about the quality of public transport wherein it was found that people from all income class were satisfied with the services, networking, security, comfort and cleanliness of the public transport but showed dissatisfaction with the crowding and duration of travel. Hisschemöller and Midden (1999) strongly stated that attitude research through the understanding of public perceptions and behaviors is considered the most usable approach for policy making. Cronbach (1951) developed the Alpha in the year 1951. Suman and Sanjit (2017) attempted a study on the spatial modelling of urban infrastructure in Rajarhat Gopalpur Municipality in India using Cronbach's Alpha analysis where it was found that the peripheral part of the city was lagging behind in socio-economic amenities. Tavakol and Dennick (2011) reassures that before running test for research or examination purposes, the internal consistency in Cronbach's alpha should be determined first in order to ensure its validity and to estimate the amount of measurement error in a test. Resdiansyah *et. al*, (2020), they applied Cronbach Alpha (α) statistical method and Importance Performance Matrix Analysis (IPMA) for data processing in order to understand the satisfaction levels and the importance of road users. Setiawan *et. al*, (2020) applied Cronbach's alpha in order to test the validity and reliability of the research data using SPSS 24, where it was mentioned that the use of SPSS statistics helps researchers to analyze, understand and solve various research problems by consuming less time through its user-friendly interface and makes large complex data much easier to understand by giving out high accuracy and quality decision making. Patil *et. al*, (2016) applied Cronbach's alpha in order to check the reliability of internal consistency of items in the questionnaire where it was found that the Cronbach's alpha coefficient accounted to 0.936, indicating that all the criteria

were reliable for assessing the sustainability of Public Private Partnerships (PPPs).

2. Study Area

Kohima town is located in district of Kohima in the state of Nagaland, Northeast India. It is located between 25°38' 0" N to 25°42' 30" N latitude and 94°4' 30" E to 94°8' 30" E longitude. The physiographic irregular features are plateau, elevated ridges, hilly, rugged and with opens having an average altitude of 1444 meters above mean sea level. The temperature varies from 5°C in winter to 35°C in summer in a moderate type of climate. Annual average rainfall varies from 800mm to 1800mm, and the highest rainfall was 2000mm. Angami and Rengma are Kohima town's dominant tribal community and also inhabitants of Kohima town. The town has a total population of 99039 according to the 2011 census (Fig.1).

Dimapur town is located in Dimapur district in the state of Nagaland, Northeast India. It is located between 25°53' 30" N to 25°56' 0" N latitude and 93°41' 0" E to 93°45' 0" E longitude. The physiographic feature of the town is plain and it is the only plain sub-micro region in Nagaland having a mean elevation of 260 meters above sea level. The temperature varies from 7°C in winter to 40°C in summer. Annual average rainfall varies from 1504.7 mm – 1800 mm. Semas are the dominant tribal community inhabitants of Dimapur town. The town has a total population of 122834 according to the 2011 census (Fig.1).

Mokokchung town is located in Mokokchung district in the state of Nagaland, Northeast India. It is located between 26°18' 0" N to 26°21' 0" N latitude and 94° 30' 0" E to 94° 32' 0" E longitude. The physiographic feature comprises hill ranges and steep slopes with an average altitude of 1325 meters above mean sea level. The temperature varies from 5°C in winter to 35°C in summer. Annual average rainfall varies from 1800mm to 2200mm. Aos is the dominant tribal community inhabitants of Mokokchung town. The town has a total population of 35913 according to the 2011 census (Fig.1).

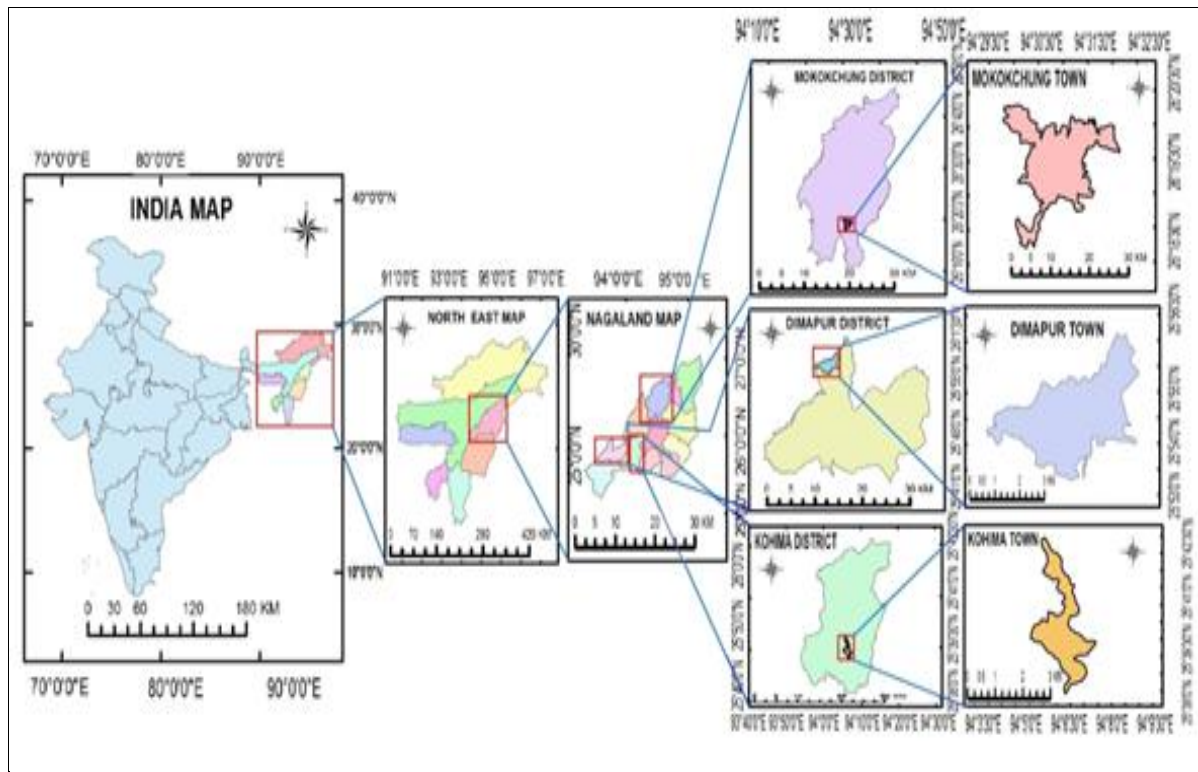


Figure 1: Location map of Mokokchung, Dimapur, and Kohima town

Source: Nagaland Remote Sensing and GIS Centre

The main aim of the study

The main aim of the study is to carry out a comparative study as well as to understand the present urban infrastructure status and the people’s perception and satisfaction with the available urban infrastructure and basic services in these three municipal towns of Nagaland; namely, Kohima town, Dimapur town and Mokokchung town.

Data base and methodology

This study was carried out by applying both primary and secondary data collection. The primary data were collected through a questionnaire survey using Google forms. To analyze the people’s satisfaction based on the questionnaire Likert scores responses with the adoption of Cronbach’s alpha reliability test of internal consistency in the urban infrastructure of Kohima, Dimapur, and Mokokchung towns and applied SPSS for calculation. The selection of respondents randomly each in town was 155 Kohima, Dimapur, and Mokokchung towns. The total number of respondents was 465. For computation, an unweighted element known as the Satisfaction on Urban Infrastructure (SUI) was prepared to comprise four items for Kohima and Dimapur towns and three items for Mokokchung town. The four items for Kohima and Dimapur town were on the satisfaction of road connectivity first, the second item was on the satisfaction of water availability, the third item was the satisfaction of electricity and the fourth item was on the satisfaction with the health centers.

The three items for Mokokchung town were on the satisfaction of road connectivity first, the second item was on satisfaction of water availability and third item was satisfaction with the health centers. The variable values assigned were ‘1.00’ for ‘Satisfied’, ‘2.00’ for ‘Not-

satisfied’, and ‘3.00’ for ‘Don’t know’ for all the three and four selected items. To compute the perception analysis on urban quality of life, prime importance for urban infrastructure and basic services, and the type of surroundings the respondents wished to live in, multiple type questions were set up using five options. Respondents were asked to choose their answers according to their perceptions of all three towns. The secondary data were collected from the PWD, PHED, Electricity department, Municipal Council Office, and District Census Handbook 2011.

Standardization of items and questionnaire of SUI through Cronbach’s alpha test

The Cronbach’s alpha of reliability analysis of internal consistency for the Satisfaction on Urban Infrastructure (SUI) five items are standardized values for Kohima ($\alpha=0.717$), Dimapur ($\alpha=0.731$) and, four items of Mokokchung ($\alpha=0.738$). The questionnaire reliability checked for SUI five items of Kohima and Dimapur towns revealed that $\alpha= 0.730$ and 0.736 respectively but for Mokokchung SUI comprised four items with reliability value $\alpha= 0.748$ (Table 01).

Table 1: Cronbach’s Alpha for Satisfaction on Urban Infrastructure (SUI) of Kohima, Dimapur, and Mokokchung towns

S. no.	Name of the town	No. of Items	Cronbach's Alpha Reliability Analysis of SUI	
			Standardized Items α values	Standardized Questionnaire α values
1.	Kohima	5	0.717	0.730
2.	Dimapur	5	0.731	0.736
3.	Mokokchung	4	0.738	0.748

Source: Primary Survey

Respondents profile

It can be seen from the given figure that the majority of the respondents in both Mokokchung and Dimapur town were female 59.50% and 57.40% except in the case of Kohima town where 59.2 percent of the respondents accounted to male and only 40.8 percent accounted to female respondents (Fig.2). The respondent's profile revealed that the majority of the respondents were under the age group less than 35 years, followed by 35-44 years age group, the next was under the age group 45 to 54 years, lastly the age group of 54 years and above in Kohima, Dimapur and Mokokchung towns respectively (Fig.3).

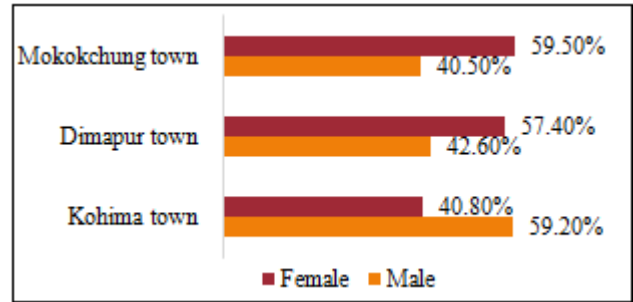


Figure 2: Gender Profile
Source: Primary Survey

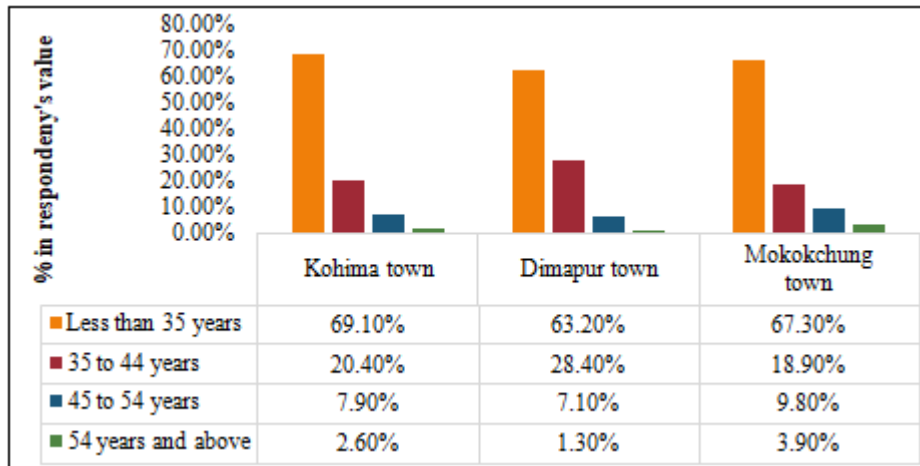


Figure 3: Respondent's profile
Source: Primary Survey

3. Results and Discussion

Satisfaction levels on road connectivity in Kohima, Dimapur and Mokokchung town

The satisfaction levels analyzed on road connectivity of Mokokchung town revealed that majorities of 75.8 percent of the respondents were not satisfied with the road connectivity however 23.5 percent of the respondents were satisfied and only 0.7 percent of the respondents does not know or were unaware about the situation. In Dimapur, the

satisfaction analysis on road connectivity revealed that 68.4 percent of the respondents were not satisfied with the road connectivity and only 31.6 percent of the respondents were satisfied. The satisfaction analysis on the road connectivity in Kohima town revealed that a majority of 76.9 percent of the respondents were not satisfied with the road connectivity, while 22.5 percent of the respondents were satisfied, however 0.6 percent of the respondents does not know or were unaware of the situation (Fig.4).

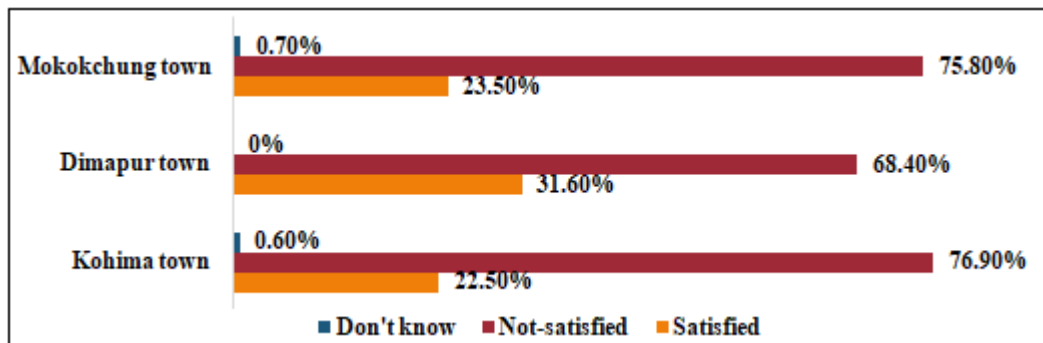


Figure 4: Satisfaction levels on road connectivity
Source: Primary Survey

Satisfaction levels with electricity supply in Kohima, Dimapur and Mokokchung town

Similarly, in the case of satisfaction with the electricity, it was revealed that a majority of 58.6 percent of the respondents was not satisfied while 39.5 percent of the respondents were satisfied and the remaining 1.9 percent

was unaware or does not know about the electricity situation in Kohima town (Fig.5). On the other hand in the case of the satisfaction with the electricity of Dimapur town, it was found out that 89 percent of the respondents were completely not satisfied and only 9.7 percent of the respondents were satisfied and the remaining 1.3 percent of

the respondents does not know or were unaware about the situation.

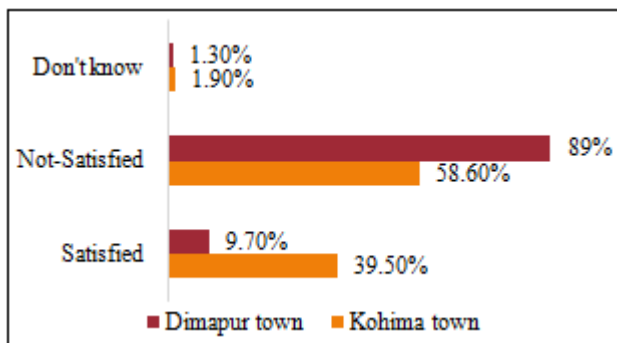


Figure 5: Satisfaction levels with electricity supply
Source: Primary Survey

Meanwhile, in regards to the satisfaction with the availability of water in Kohima town, a majority of 91.4 percent were not at all satisfied with the water availability, while only 8.6 percent showed their satisfaction (Fig.6). In regards to the satisfaction with the availability of water in Dimapur town it was found out that 61.9 percent of the respondents were not satisfied with the availability of water, while only 34.8 percent of the respondents were satisfied and the remaining 3.3 percent of the respondents does not know on were unaware about the situation. In respect to the satisfaction analysis on the availability of water in Mokokchung town, it was found out that 85.6 percent were not satisfied with the water availability, while 13.7 percent of the respondents were satisfied and only 0.7 percent of the respondents did not know or were unaware about the situation.

Satisfaction with the availability of water in Kohima, Dimapur and Mokokchung town

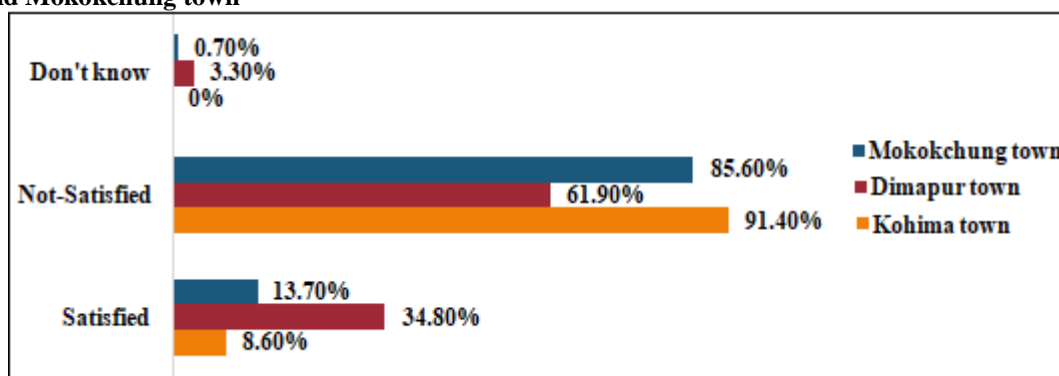


Figure 6: Satisfaction levels with availability of water
Source: Primary Survey

Satisfaction with health centers in Kohima, Dimapur and Mokokchung town

In the case of satisfaction with the health centers in Kohima town, it was found that 61.8 percent of the respondents were not satisfied with the health centres, while 36.9 percent were satisfied and the remaining 1.3 percent of the respondents were unaware or does not know about the situation. The satisfaction analysis with the health centers in Dimapur town revealed that 54.8 percent of the respondents were not

satisfied with the health centers whereas 43.9 percent of the respondents were completely satisfied and only 1.3 percent of the respondents were unaware or does not know about the situation. Furthermore, the satisfaction analysis with the health centers in Mokokchung town revealed that 75.8 percent were completely not satisfied with the health centers in Mokokchung town and only 22.9 percent of the respondents were satisfied and the remaining 1.3 percent of the respondents was unaware of the situation (Fig.7).

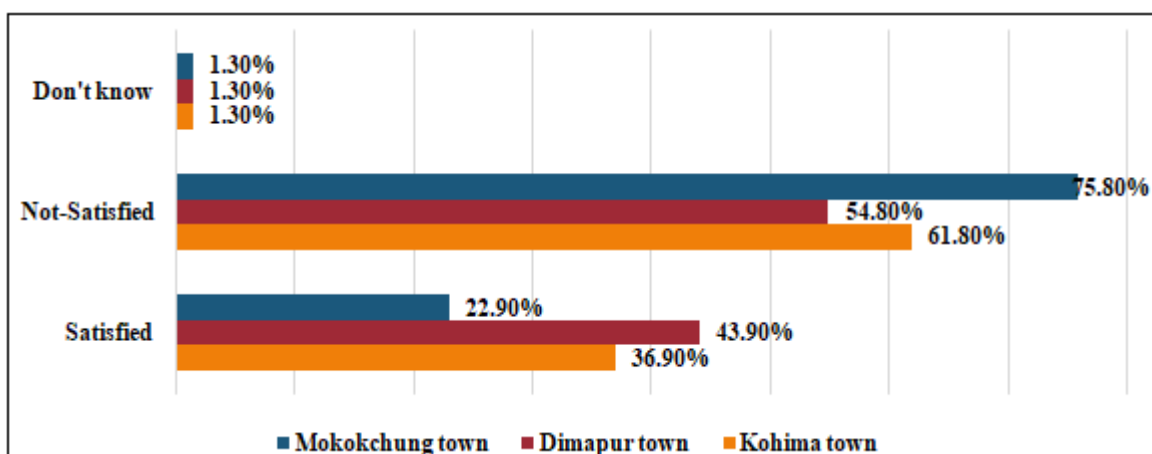


Figure 7: Satisfaction with health centers
Source: Primary Survey

Perception on improving urban quality of life, urban infrastructure and basic services, and type of surroundings in Kohima, Dimapur and Mokokchung town

Improving the urban quality of life in Kohima, Dimapur and Mokokchung town

The perception analysis in improving the urban quality of life in Kohima town revealed that 73.1 percent of the respondents perceived that more parking lots are required for a better urban quality of life, which was followed by 11.8 percent of the respondents who perceived that there is need of more pay and use toilet, while 9.9 percent of the respondents perceived that Kohima town needs to have more park facilities, 4.6 percent of the respondents who perceived the need for more library facility in Kohima town and the remaining 0.6 percent perceived the need for more ATM/CDM facilities (Fig.8). The perception analysis on improving urban quality of life in Dimapur town revealed

that, 45.2 percent of the respondents perceived that more parking lot were required, while 23.2 percent of the respondents perceived the need for more pay and use toilet, whereas, 16.8 percent of the respondents perceived that Dimapur town needs more park facilities for recreational purpose, while 10.9 percent of the respondents perceived the need for more library facilities and only 3.9 percent of the respondents perceived the need for more ATM/CDM facilities for a better urban quality of life in Dimapur town. While, the perception analysis on improving urban quality of life in Mokokchung town revealed that 58.1 percent of the respondents perceived that more parking lot were required for a better urban quality of life, while 14.4 percent of the respondents perceived the need for more pay and use toilet, 13.1 percent of the respondents perceived the need for more park facilities, 7.2 percent of the respondents perceived the need for more library facility and another 7.2 percent of the respondents perceived the need for more ATM/CDM facilities.

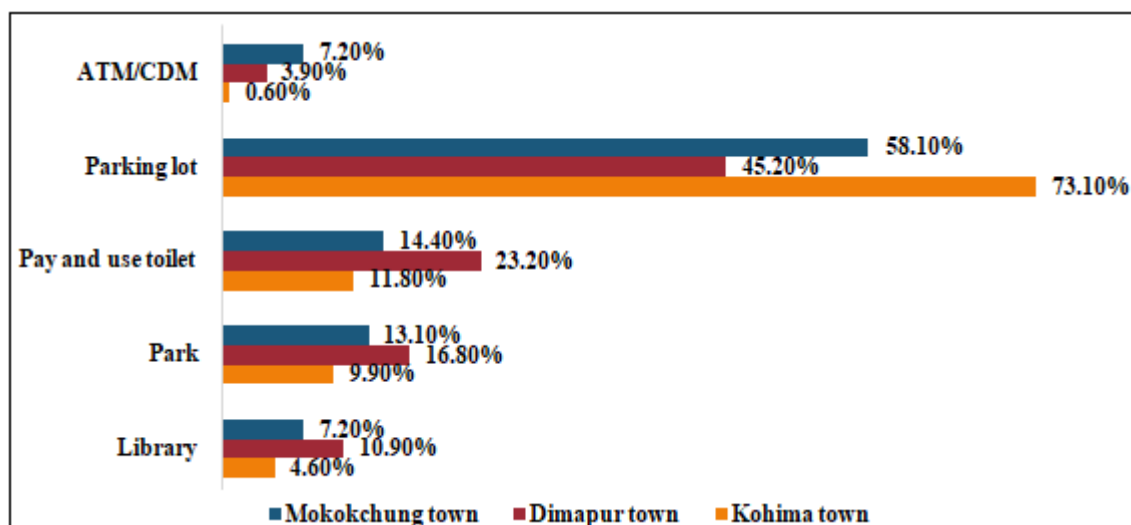


Figure 8: Improving the urban quality of life

Source: Primary Survey

Urban infrastructure and basic services in Kohima, Dimapur and Mokokchung town

On the other hand in the case of perceptions in giving prime importance in regards to urban infrastructure and basic services in Kohima town, it was revealed that 34.2 percent of the respondents perceived that water should be given the prime importance, which was followed by 30.3 percent of the respondents who perceived that drainage should be given the prime importance, while 21.7 percent of the respondents perceived that sanitation should be given the prime importance, 11.2 percent of the respondents perceived that health centres should be given importance while the remaining 2.6 percent perceived that energy should be given prime importance (Fig.9). The perception analysis on the prime importance to be given in regards to urban infrastructure and basic services of Dimapur town revealed that 40 percent of the respondents perceived that drainage should be given the prime importance, which was followed by 29 percent of the respondents who perceived that

sanitation should be the prime importance, on the other hand in the case of energy and health centres, each shared respondents of 12.3 percent, however, only 6.4 percent of the respondents perceived water as the prime importance for urban infrastructure and basic services of Dimapur town. On the other hand, in the case of the perception analysis on the prime importance to be given in regards to urban infrastructure and basic services in Mokokchung town, it was found out that a majority of 34.6 percent of the respondents perceived that health centres should be given prime importance, while 26.8 percent of the respondents perceived that drainage should be given prime importance, 16.9 percent of the respondents perceived that water should be given importance, sanitation accounted to 12.4 percent of the respondents and the remaining 9.3 percent of the respondents perceived that energy should be given prime importance.

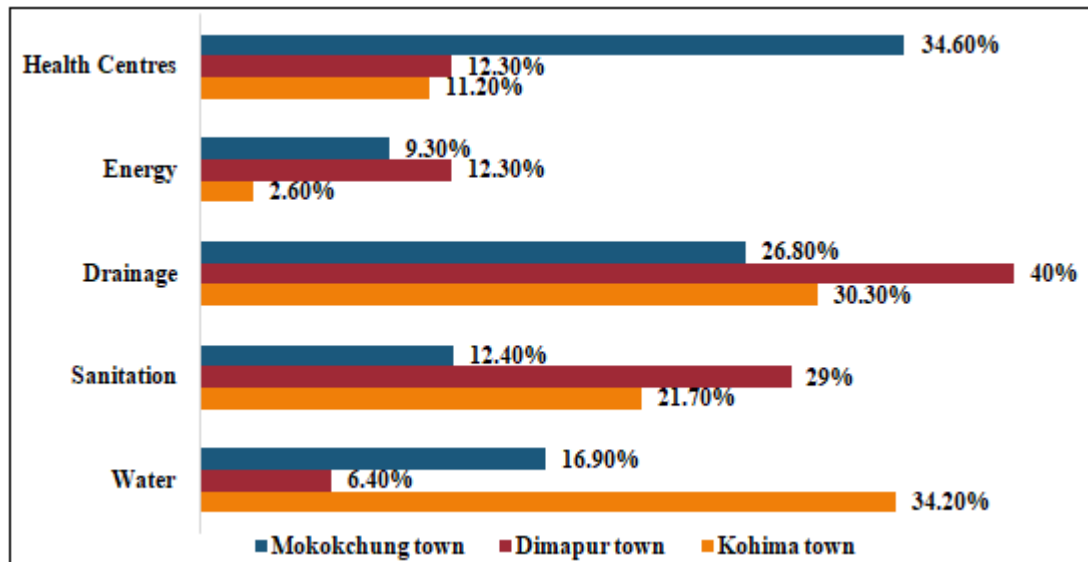


Figure 9: Urban infrastructure and basic services

Source: Primary Survey

Types of surroundings (nature and greenery) of Kohima, Dimapur and Mokokchung town

The analysis on the type of surroundings the respondents wish to live for the Kohima town respondents revealed that a total majority of 78.3 percent of the respondents wished to live by being surrounded by nature and greenery, while 15.1 percent of the respondents wished to live by being surrounded by families, friends and neighbor and the remaining 6.6 percent of the respondents wished to live by being surrounded by parks, shopping malls, cinema halls, etc. (Fig.10). In respect of the type of surroundings the respondents wished to live for the Dimapur town respondents, intriguingly, it was found out that 79.3 percent of the respondents wished to live being surrounded by nature and greenery, 12.9 percent of the respondents wished to live

being surrounded by families, friends and neighbor, 7.1 percent of the respondents wished to live being surrounded by parks, shopping malls, cinema halls, etc and only 0.6 percent of the respondents wished to live being surrounded by mobile phones, laptop, internet, etc. In regards to the perception analysis on the type of surroundings the respondents wished to live for the Mokokchung town respondents, it was found out that 76.5 percent of the respondents wished to live being surrounded by nature and greenery, while 16.3 percent of the respondents wished to live being surrounded by families, friends and neighbor, however only 3.9 percent of the respondents wished to live being surrounded by parks, shopping malls, cinema halls etc and the remaining 3.3 percent of the respondents wished to live being surrounded by mobile phones, laptop, internet etc.

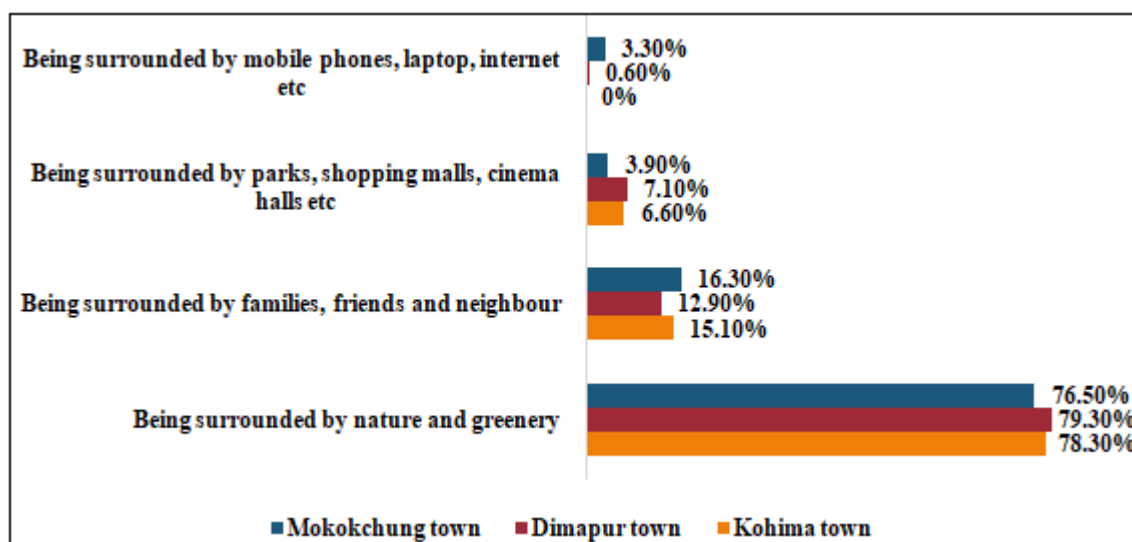


Figure 10: Types of surroundings (nature and greenery)

Source: Primary Survey

4. Findings

The Cronbach’s alpha of reliability analysis of internal consistency for the Satisfaction on Urban Infrastructure (SUI) of all the three towns revealed that the questionnaire

for Mokokchung town reached the highest acceptable reliability of, $\alpha = 0.748$ as compared to Kohima and Dimapur town. The people’s satisfaction analysis on road connectivity revealed that Kohima town depicted the major dissatisfaction level of 76.9 percent as compared to

Mokokchung and Dimapur town with 75.8 and 68.4 percent respectively. The people's satisfaction analysis with electricity revealed that Dimapur town portrayed the highest dissatisfaction level with 89 percent as compared to Kohima town with 58.6 percent. The people's satisfaction analysis with the availability of water revealed that as compared to Dimapur and Mokokchung town, the major dissatisfaction level was witnessed in Kohima town with 91.4 percent who were completely not satisfied with the water availability. Locals lack of knowledge regarding the implementation of rainwater. In the case of the people's satisfaction with the health centers, it was found out that the majority of respondents from Mokokchung town were not satisfied with the available health centers accounting to 78.8 percent as compared to Kohima and Dimapur town.

The perception analysis on improving urban quality of life revealed that the majority of respondents from all three towns perceived that parking lot is the utmost requirement for a better urban quality of life. This seems to be a practicable perception and the parking situation in all the three towns apparently is desperately in need of it. The perception analysis on the urban infrastructure and basic services revealed that health centers should be given prime importance in the case of Mokokchung town owing to the reason mentioned earlier, while in the case of Dimapur town the drainage should be given prime importance. This again reflects the present drainage condition of Dimapur town which is mostly not properly constructed, poorly maintained, too small in size and mostly uncovered and gets clogged due to garbage dumping which leads to overflowing of drain water over the surface of roads, highways, and pedestrians. While, in the case of Kohima town, water should be given prime importance according to the perception of the respondents. Lastly, it was interesting to find out that the majority of the respondents from all age groups of all the three towns wished to live being surrounded by nature and greenery. It can be understood that there is the need and want for better urban quality of life as well as better urban infrastructure but at the same time, there is the need and want for a better environment, with fresh air, nature and greenery as well. This directs us to just one solution and that is proper and sustainable urban planning. This shows that even if the urban infrastructure improves and more infrastructures are being set, there should be a balance, in regards to the environmental point of view in one hand and the developmental activities on the other.

5. Conclusion

It was found that despite the high dissatisfaction levels with the various urban infrastructural facilities by the respondents, the majority of the respondents of all age groups still wished to live surrounded by nature and greenery. This shows that even if the urban infrastructure improves and more infrastructures are being set, there should be a balance, in regards to the environmental point of view on one hand and the developmental activities on the other. Thus, for sustainable development to be achieved, the basic and minute details should be given importance and not ignored. This predicates the fact that, though infrastructure is important to meet the demands and requirements of the growing population, preserving the environment should

never be forgotten, because Nagas will remain as Nagas who share a very close bond with nature and the environment as a whole from time immemorial.

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