

Feasibility Study of Sustainable Urban Development in Yangon city (Case study- Hlaing Thar Yar Township)

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Abstract: *Sub urban sprawl in developed countries and developing countries are not the same condition. The characteristic of sub urban sprawl has been already identified low density development, leapfrog development, and scatter development that become automobile depended to access basic amenities in their daily lives. It brings many consequences people and communities with socially and environmentally. In this paper, people in different locations were questioned to determine sub urban sprawl by using accessibilities method. Communities' nodes were identified across the township and question people who live new settlements away from the nodes. The communities' nodes consist of school, market, hospital, park and playground. The result found out current situation of Hlaing Thar Yar Township in Yangon city. And the result also demonstrates causes of sub urban sprawl in developing country and what are the challenges for sustainable development in Yangon city.*

Key Words: *sprawl, suburban, accessibilities, communities' node, communities.*

1. INTRODUCTION:

In 16 May 2018, New York, UN announced 55% of the world's population lives in urban area and 68% will reach in 2050. But Myanmar is still in an early state of urbanization because of only 30% of population live in urban area. It has good chance to plan cities for sustainable development and livable communities. Myanmar is an agriculture country and its economic is totally based on agriculture. The country remains largely rural, although this is set to change with greater development and as agricultural employment declines. Since 1988, the government starts to introduce market oriented economic so many foreign investors came to Myanmar for investment. From that time, rural to urban migration immediately increases. More people who are working nonfarm activities concentrate in urban areas especially in Yangon region. Because there are 56% of total industries of Myanmar located in Yangon region.

In Myanmar, policy favoring urban areas and industrialization are the main factor of migration which creates urban development. The country still has rural population of around 70% and 30% of 51million live in urban area (2014 census). But, in Yangon region, 70.1% of over 7 million populations live in urban area and 14.3% of the Union. Yangon Region consists of 4 districts and 45 townships. The Municipal area of the Yangon city covers only 33 of 45 townships with including CBD. CBD consists of 7 townships and locates along the Yangon River. International port and harbor also still locate in CBD area. Due to the rapid growth of population, the area of the city expend from 8 square miles in 19 century to 231.75 square miles in 2014. When urbanization brings good opportunities for city dwellers, the city and citizen face urban growth and challenges. Inadequate planning and a lack of investments in infrastructure and the provision of basic services can lead to urban sprawl.

City especially Yangon becomes center of economic and job opportunities but unequal earning and urban poor push people away from city center to urban fringes and informal settlement. Consequences of rapid urban growth and development, city dwellers face traffic congestion, pollution, and climate change, flood and so on. Lack of parking space and illegal parking on the road causes traffic jam. Inadequate Park and playground make loss of community's sense. Emergency services and health care is challenges for citizen especially in suburb. Moreover accessibility to basic amenities is also challenges for people in suburb. Accessibility to basic amenities is very important factor to meet sustainability in daily lives. So, this paper intends to study current accessibility to basic amenities of Hlaing Thar Yar Township in Yangon city.

In this paper, the author fined the accessibilities to community's node from the selected communities within the Hlaing Thar Yar Township and Ryo Gyi, Ryo Lay village at the border line between Hlaing Thar Yar and Htan Ta Bin Township. Because industrial workers who are working in adjacent factories in Hlaing Thar Yar Township are living in those villages and all villager's social actions concentrate at Hlaing Thar yar Township even they are in Htan Ta Bin

area. So, Ryo Gyi and Ryo Lay village also combined to other communities in Hlaing Thar Yar Township and find accessibilities. Because urban sprawl may happen within and outside of the township's border.

2. LITERATURE REVIEW:

2.1. What is sprawl?

Urban sprawl is the expansion of the city from its city center to urban fringe with inadequate planning management, lack of investments in infrastructure and poor accessibility to basic amenities. Many researchers described urban sprawl under the various field of researches.

Bhatta et al. defined sprawl as “uncoordinated growth: the expansion of community without concern for its consequences, in short, unplanned, incremental urban growth which is often regarded unsustainable.” John P. Rafferty also defined sprawl as “urban sprawl, also called sprawl or suburban sprawl, the rapid expansion of the geographic extent of cities and towns, often characterized by low-density residential housing, single-use zoning and increased reliance on the private automobile for transportation.” Reid Ewing has shown the three typically characterized pattern of urban sprawl that consists of low-density or single-use development, strip development, scattered development, and/or leapfrog development.

Sprawl is measured in multiple factors by different researchers. Galster et al. (2000) introduce eight dimensions of sprawl measurement that consists of density, continuity, concentration, compactness, centrality, nuclearity, diversity, and proximity. Urban areas are divided in to one mile grids by using GIS and field survey for measurement. Nasser and Paul (2001) measured sprawl by using population density. Sprawl can also defined as a condition of poor accessibility by using private vehicles (Ewing 1994, 1997; Ewing et al., 2002).

Proximity to jobs and easy accessibilities to basic amenities in daily routing is very important key factors to stop urban sprawl. Most people commute to work by getting long travel distance when the city is growing big. Low-density single use development and large industrial plot make the city linear expansion. Incomplete spatial planning brings numerous challenges for city dwellers.

2.2 Understanding accessibility

Accessibility is widely used in transportation and connectivity researches especially transport orient development (TOD) programs. Accessibility means the distance between starting point to ending point. It may be the distance from home to job or home to shop or home to hospital and so on. So, accessibility in daily routing becomes very important factor today. According to the literature, the locations of land use such as housing, industrial, commercial, education and recreation must be distribute according to the human activities that includes shopping, schooling, working and leisure activities. The distribution of Human activities in urban area consists of travel distance, travel time and mode of transportation between household and location of activities.

Al Gore said about accessibility very simply that “a gallon of gas can be used up just driving to get a gallon of milk.” Ewing 1994, 1997; Ewing et al., 2002, and Galster et al. (2000) mention poor accessibility is one character of the sprawl. Road length, road areas, and the travelling times can be used to measure accessibility (Hadly, 2000). The pattern of road network is also calculated to measure accessibility (Benguigui, 1995). Transportation models are also used to measure accessibility (Torres & Alberti, 2000). Another way to quantify accessibility is to measure road length and travel time between house and community nodes (John Hasse and Andrea Kornbluh, 2004). The locations with good accessibility to amenities had higher chance for being developed and higher density than other locations example with Washington DC (Hansen, 1959).

John Hasse and Andrea Kornbluh from department of Geography and Anthropology had been used accessibility by spatial indicator for measuring urban sprawl in 2004. They developed sprawl grading system based on accessibilities between individual housing units and community nodes. Table (2.2.1) represents the condition of different travel time and distance between housing unit and community nodes whether it is easy or not. In this table, the travel time and distance were based on walking speed of 2.8 mph, biking speed of 5.7 mph, and driving speed of 22.7 mph.

Table (2.2.2) consists of accessibility distances for categories that define the level of sprawl. If the distance between residential units and average community nodes is less than 2,500 feet (approximately ½ mile), it can easily accessible by walking and therefore consider walking smart growth. If the distance between residential units and average community nodes is between 2,500 and 5,000 feet (approximately a mile), it can also be defined moderately accessible by walking and easily accessible by bicycle therefore exhibit signs of bicycle smart growth. The distance between 5,000 feet and 10000 feet are moderately accessible by bicycle and easily accessible by automobile that

represent suburban sprawl. Rural sprawl represent the distance between 10,000 and 20,000 feet that depend on only accessible by automobile. The unit that locates over 20,000 feet from average community nodes that can be considered excessive sprawl.

Table. 2.2.1 Accessibility Categories Based on Mode of travel and Distance ^[4]

Mode of Travel	Ideal	Easy	Moderate	Poor
Pedestrian	0-5minutes 0-1250 ft. Ideally accessible pedestrian	6-10 minutes 1251-2500 ft. Easily accessible pedestrian	11-20 minutes 2501-5000 ft. Moderately accessible pedestrian	>20 minutes >5000 ft. Poorly accessible pedestrian
Bicycle	0-5 minutes 0-2500 ft. Ideally accessible bicycle	6-10 minutes 2501-5000 ft. Easily accessible bicycle	11-20 minutes 5001-10000 ft. Moderately accessible bicycle	>20 minutes >10,000 ft. Poorly accessible bicycle
Automobile	0-5 minutes 0-10000 ft. Ideally accessible automobile	6-10 minus 10000-20000 ft. Easily accessible automobile	11-20 minutes 20000-40000 ft. Moderately accessible automobile	>20 minutes >40000 ft. Poorly accessible automobile

Table. 2.2.2 Sprawl grading categories based on Accessibility to community nodes ^[4]

Grade	Criteria	label
A	0-2500 feet on average to community nodes	Walking smart growth
B	2501-5000 feet on average to community nodes	Bicycle smart growth
C	5001-10000 feet on average to community nodes	Suburban sprawl
D	10001-20000 feet on average to community nodes	Rural sprawl
E	>20000 feet on average to community nodes	Excessive sprawl

3. METHOD:

This research was conducted by questionnaires and calculates the results of the accessibilities data from different locations of the Township. Firstly, find location of communities' nodes and fix them on a map by using goggle earth pro app. And then find the settlement which locate very far distance in this township and prepared questions for accessibility to communities' nodes with including different work places. Questions were prepared by accessibility Categories Based on Mode of travel and Distance from Table (1). After comparing the result of the data, the researcher will present the current situation of Hlaing Thar Yar Township in Yangon city.

4. Township overview :

Hlaing Thar Yar (the biggest township of the Myanmar) locates in the western part of the Yangon city. It is also the most populated township with twenty wards and nine village groups. It was surrounded by Htantabin Township in the north and west, Insein Township, Mayangon Township, and Hlaning Township in the east across the Hlaing River and Twante Township in the south. The four bridges that include Aung Zeya Bridge, Bayinnaung Bridge 1and 2, Shwe Pyi Thar Bridge connect with Hlaing Thar Yar and other parts of Yangon city across the Yangon River and Hlaing River. The Pan Hlaing Bridge connects with Hlaing Thar yar Township and Twante Township across the Pan Hlaing River. The most developed of new satellite township; Hlaing Thar Yar was founded in the 1980s.



Fig. 4.1 Hlaing Thar Township's Map

The township was named Hlaing Thar Yar in 13 July 1989. Firstly government relocated homeless people from Sein Pan Mying ward in Mayangon Township to Thar Yar Gone village in Insein Township due to the fire disaster in 1985. In 1989, people were relocated again from South Oakalapa Township, Hnin Se Gone ward in Thingangyun Township and Nar Nat Taw in Kamayut Township because of the fire disaster. Moreover, government planned five village groups that include Tharyargone, Kazine, Naung, Chanchaung, Alal Ywar village in Insein Township and Thaugyi, Ye Oakkan, Shwe Lin Ben, Atwin Padden, Apyin Padden, Kalargyisu villages in Htantabin Township to resettle people from fire disaster and informal settlement. Hlaing thar Yar Township was founded with eight wards and nine village groups in 13 July 1989. And then the township was redesigned with twenty wards and nine village groups in 30 March 1995. Finally, the township was separated into two townships with east Hlaing Thar Yar Township and West Hlaing Thar Yar Township in 27 January 2020. But most government service sectors are not totally separated for two Townships.

The total area of East Hlaing Thar Yar Township is 13.97 sq. miles with nine wards, six industrial zones and five village groups. There are 344,210 people live in urban area and 211,867 people live in rural area according to 2021 township report. The total population of East Township is 556,077 in August 2021. The 0.03 percent of total population can access YCDC water in East Township according to Hlaing Thar Yar Municipal department. The total area of West Hlaing Thar Yar Township is 12.24 sq. miles with eleven wards, eight industrial zones and four village groups. There are 289,985 people live in urban area and 129,676 people live in rural area according to 2021 township report. The total population of West Township is 419,661 in August 2021. The 0.2 percent of population only can access YCDC water in the West Township.

The total area of Hlaing Thar Yar Township is 67.4 km or 26.01 sq. miles. The total population of the township is over 700,000 according to 2014 census. Now the Township's population reaches nearly one million in August 2021 according to Ministry of Immigration and Population. Population projections with 1% growth rate next 30 year will be 1,315,000 in this area. So, the city needs to prepare for future increased population. The largest industrial zone locates in Hlaing Thar Yar Township. There are 3236 factories operate with 20,638 workers in every day now according to Ministry of Industry and Ministry of labor, Immigration and Population in 27 October 2021. Most of factories workers migrated from other states and regions of the Myanmar to Hlaing Thar Yar Township. Moreover, huge people group from Ayeyarwady region moved to Hlaing Thar Yar Township after blowing Cyclonic Nargis in 3 May 2008. Most of those people settled informal settlement in Hlaing Thar Yar.

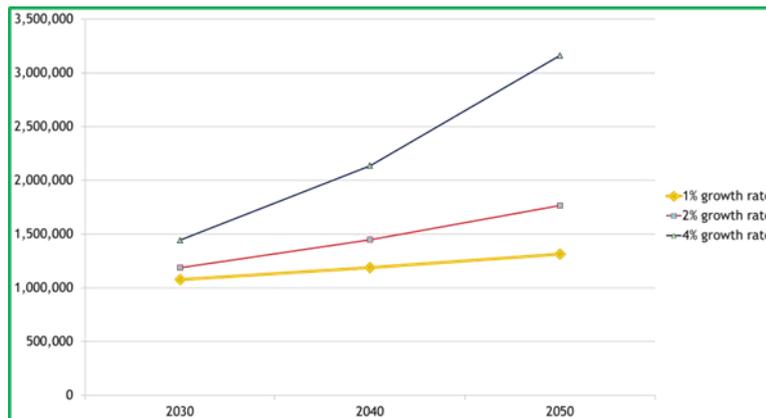


Fig. 4.2 Hlaing Thar Yar's Population Projection

There are 27 basic education high schools, 5 basic education middle schools, 25 basic education principle schools, and one technological university in Hlaing Thar Yar Township. Teacher and student ratio of BEHS, BEMS and BEPS is 1:37, 1:20 and 1:45. The total ratio of teacher and student in the whole township is 1:37 according to the 2019-2020 township report. The township consists of officially 17 numbers of wet market and 4 super markets. Moreover, 39 numbers of illegal markets locate across the township. The illegal markets emerged due to the requirement of consumers.

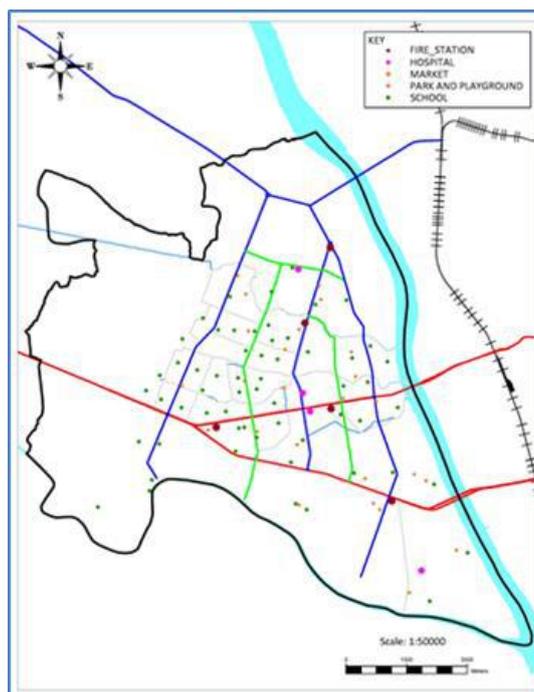


Fig. 4.3 Locations of Communities's nodes

The township has four hospitals with 331 beds. Two of them are government hospital and the rest two are private hospitals. Hospital beds per 1000 people in Hlaing Thar Yar Township are 0.3 according to 2020-2021 township report. Doctor, nurse, and health worker and people ratio are also very low in area. There are eight numbers of doctors, thirteen numbers of nurses and four numbers of health workers in government hospital. A typical township health care system in Myanmar has arranged of people between 150,000 and 200,000. So, current situation of emergency service isn't enough for one million populations. So, it must be upgrade from township level emergency service.

Percentage of green space in urban area, the abilities of green space to promote urban biodiversity and ecosystem, interconnection with urban area and accessibility to green space is important aspect for sustainable urban planning. Global standard and LEED recommend at least 33% green space should cover for urban area and minimum of 12.5 m² for open space per one person. The total area of parks and playgrounds in current planning are 19.429 acres (0.12 % of the whole township) and the ratio of open space and population is 0.08 m² in Hlaing Thar Yar. That is one point of challenge for sustainable development.

Two main arterials roads with six lanes without pavement, bicycle way and motor cycle way across the township from east to west and lead to Ayeyarwady Division. Three main collector roads with four leans without pavement, bicycle way and motor cycle way are laying along the north –south direction. Although some local bus runs through the township, most citizen don’t like local bus because it always take much time and delay to destination. The quality of roads is also another challenge for sustainable development.

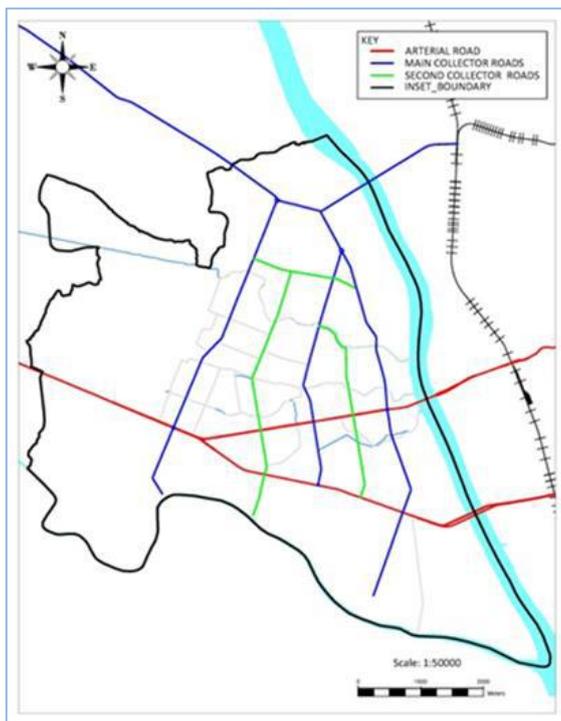


Fig. 4.4 Hierarchy of Road

Unplanned settlements also develop in some villages which locate at the edges of the township. Industrial zones is a key driver of rapid urbanization which across the urbanize area and township boundary to adjacent villages. Village’s areas increased from two times to 10 times without planning management within 10 Years. Because of the nature of unplanned settlement, these areas has very poor road, with narrow, and unpaved road. If unplanned settlements will neglect to redevelop, there would be new unplanned settlement in and outside of the township within 5 to 10 years.

5. RESULTS:

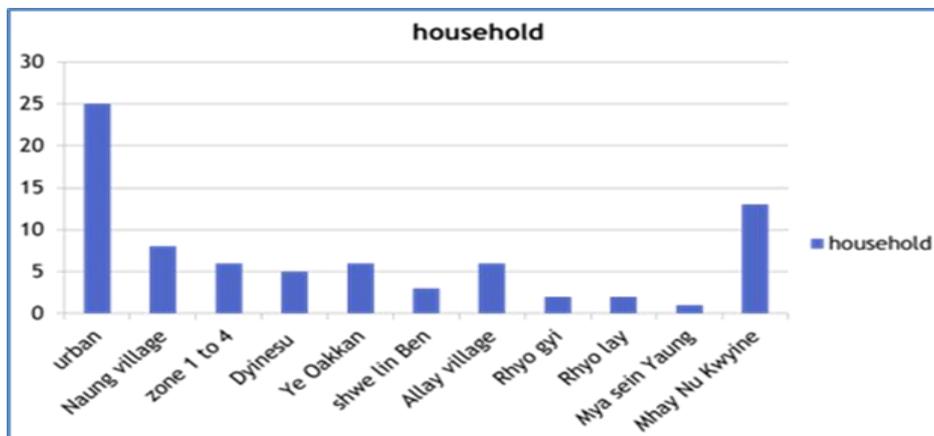


Fig. 5.1 Numbers of Respondents in Different Location



Fig. 5.2 Locations of Respondent Families

Answers were collected from 77 households from 11 locations across the township but 25 households located in different urban area shown in figure (5.2). Most of respondents from families are factory workers and the whole families' incomes are very low. According to the results, 69% of families are living in rental houses, 29 % of families live in their own houses and 3% of families can access labor housing. The result shows the condition of requirement of affordable housing for low income families. The 71% of households use electricity for the source of the lighting and 26% of families use for community generator. YCDC water supply system mention above only covers in present in Hlaing Thar Yar Township. Figure (5.3) results shows 23% of families can access tap water because of the location of the respondents. The main sources of cooking materials are used electricity (70%), charcoal (14%), fire wood (10%), and gas (5%).

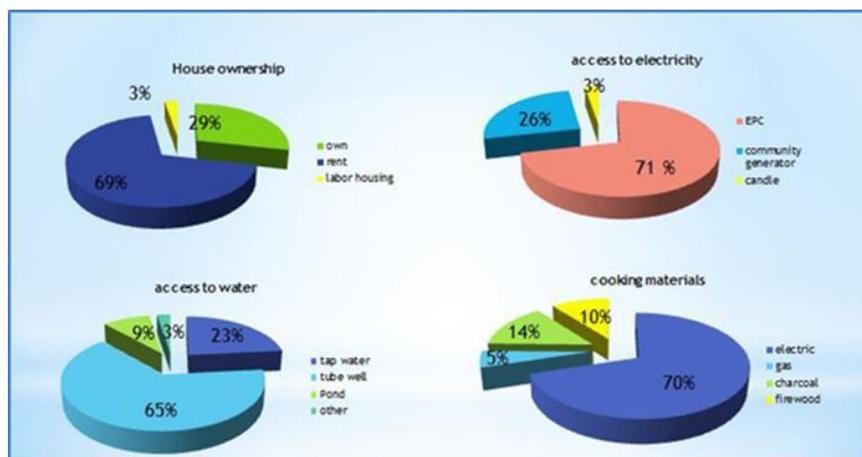


Fig. 5.3 Accessibilities to Basic Amenities

According to the result, the people who are living in some part of urban area, Mya Sein Yaung village and Myay Nu Kwyine (informal settlement) locate over one mile away from the market. The people who are living between half and one mile distance from the market is 27%, less than half mile distance from the market is 52% and over one mile distance from the market is 21%. There are five modes of transport to market that include on foot, bicycle, trichaw, motorcycle and bus. Many people are walking to market. People using motorcycle to market is about 26% and 5% of people are using bicycle to market. The half of the respondents took time to market between 0 to 5 minutes, 23% took 6 to 10 minutes, 11 % took 11 to 20 minutes and 14% took more than 20 minutes. Figure (5.6) presents accessibilities to markets as shown in below.

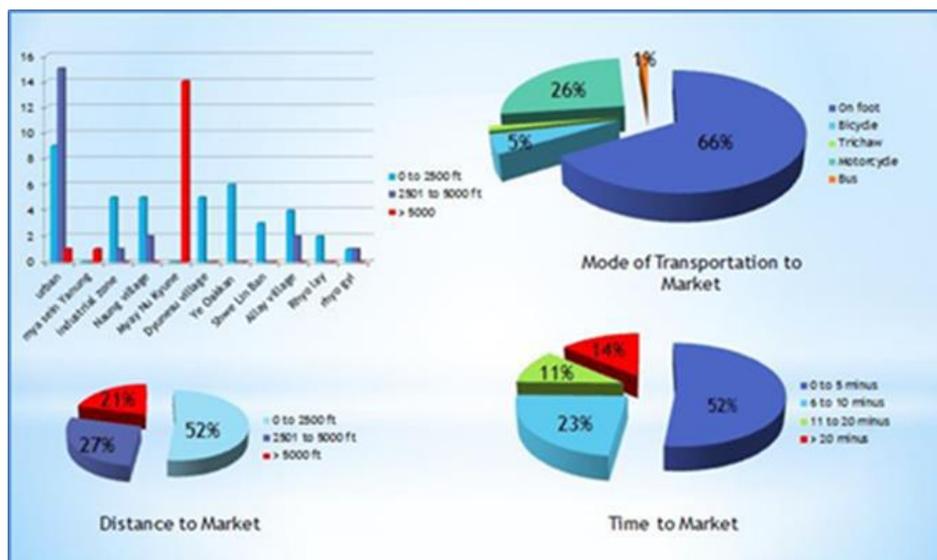


Fig. 5.6 Accessibilities to Markets

The result showed the communities which situate the distance away more than two miles from the school. They are Myay Nu Kwyine (informal settlement), Mya Sein Yaung village that locates Myan Seing Yaung industrial zone and Allal Ywar village on the northern part of the township. The people who are living between one mile and two mile distance from the school represent the yellow line that include some part of urban, some of industrial zone, Naung village and Ryo Gyi village. The light blue lines represent the community between half and one mile distance from the school and the dark lines represent between zero to half mile from the school. Over 60% of students are walking to school and over 20% of students are biking to school. In the same time, 7% of students use motorcycle cycle and 9% of students took the bus. And the duration of time between 0 to 5 minutes are used about 14% of students, between 6 to 10 minutes are used 35% of the students, between 11 to 20 minutes are used about 35% of students, and more than 20 minutes are used by 16% of students. The above results came from figure (5.7).

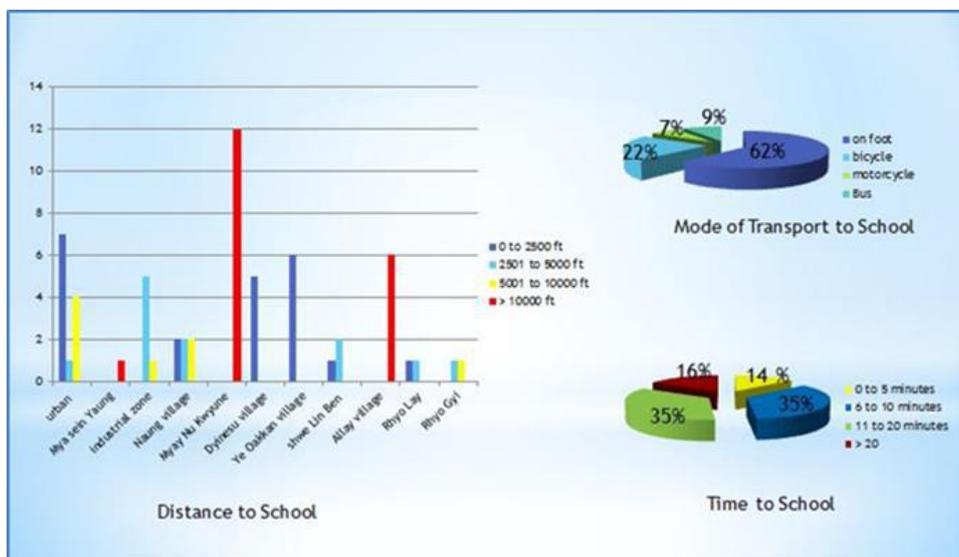


Fig. 5.7 Accessibilities to Schools

From figure (5.8), the red lines represent the communities which locate the distance over four miles from the hospital that locate in Mya Sein Yaung, Naung Ywar village, Dyinesu village, Allal Ywar village, Ryo Gyi and Ryo lay village. The green lines represent the distance between two to four miles from the emergency services that include some communities in urban area, industrial zone, and Myay Nu Kwyine. Some communities in urban area, Ye Oakkan village and Swee lin ben urban locate between one to two miles distance from the emergency services. Percentages of using motorcycle and taxi to Hospital are the same amount which is about 48%. The 72% of people in this township took over 20 minutes to Hospital and 28% of people took between 11 to 20 minutes to Hospital.

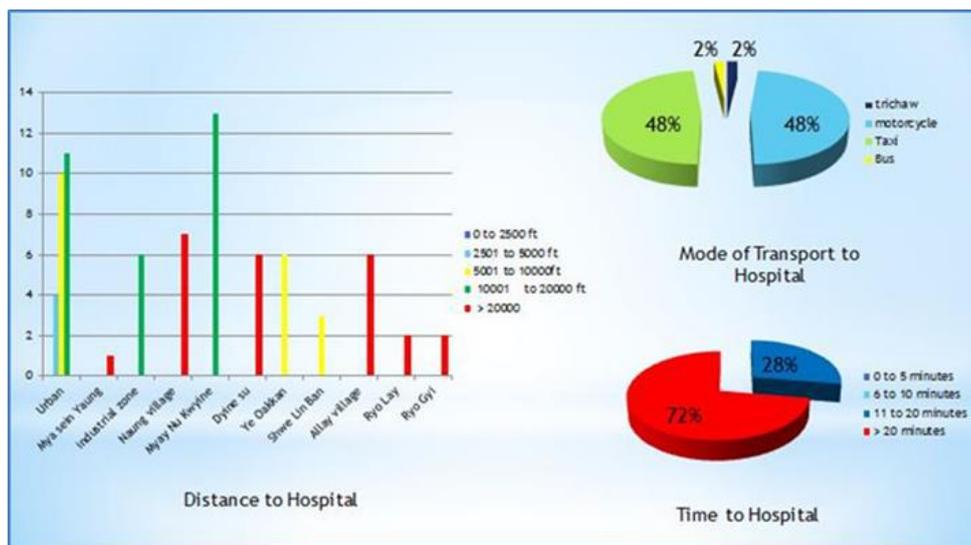


Fig. 5.8 Accessibilities to Hospitals

The results from figure (5.9) base on the distance from their communities and the nearest bus stop which connects Hlaing Thar yar Township and other part of the Yangon city. Some communities in urban area, in industrial zone, in Naung Ywar village, in Myay Nu Kwyine, and in Ryo Lay situate between one and two miles from the bus stop. The blue lines represent the distance between half and one mile from the bus stop that locates in some communities in urban area, in Mya Sein Yaung village, in Industrial zone, Naung Ywar village, Dyinesu village, Ye Oakkan village, Swe Lin Ben urban, Allal Ywar, Ryo gyi and Ryo Lay village. The green lines represent the distance between zero to half mile from the bus stop. They have some communities in urban area, in industrial zone and in Allay Ywar village. Walking people are 49% and biking people are 4% to bus stop. The people who are taking motorcycle to bus stop are 39% and 7 % of people are taking trichaw to bus stop. The time with more than 20 minutes between their houses to bus stop is 9%. The time between 11 to 20 minutes to bus stop is 40%. The time from 6 to 10 minutes and 0 to 5 minutes to the bus stop are 32% and 18%.

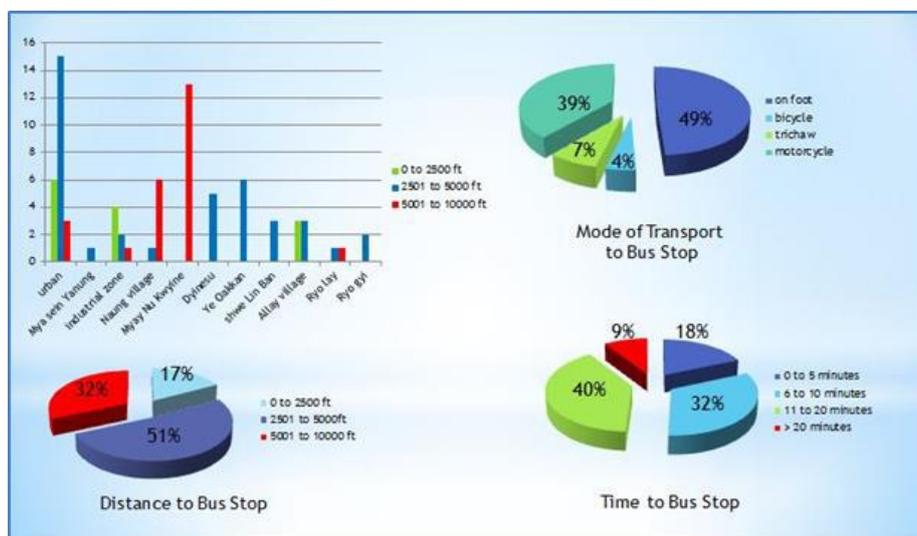


Fig. 5.9 Accessibilities to Bus Stops

According to the results from figure (5.10), the distance between their communities and work place is depending on the location of work place. Some people who are living more than four miles away from the work place that locate in urban area, in Mya Sein Yaung, in Industrial zone, Myay Nu Kwyine and Dyinesu village. Some people who are living in urban area, industrial zone, Naung Ywar village, Dyinesu village, and Ryo Lay village are working between two and four mile away. The people who are living in Shwe Lin Ben and Allal Ywar village are working between zero to half mile away from their house. The people who are working more than four miles away from their house is 8%, the

distance between two to four miles are 31%, the distance between one to two miles are 36%, the distance between half to one miles away are 16%, and 9% are working from zero to half mile away. The workers who are biking to work place are 15% and 24% of workers are taking company car. The workers who are taking motorcycle and bus are 30% and 9%. In the same time, 21% of workers are walking to work place. And 17% of workers took more than 30 minutes to work place. The time between 20 to 30 minutes from their houses to work place is 27% and between 11 to 20 minutes to work place is 38%. According to the result, Shwe Lin Ben urban and Alal Ywar village locate very close to Industrial zone. Actually, all villages locate near the industrial zones except the urban area. It is one of the reasons of village growth in Hlaing Thar Yar.

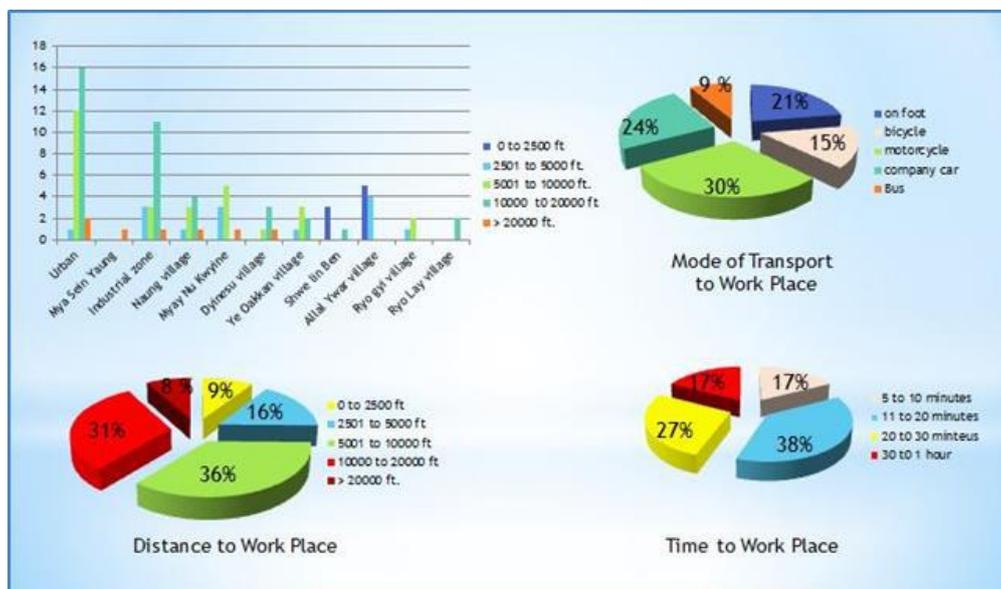


Fig. 5.10 Accessibilities to Work Places

6. CONCLUSION :

Hlaing Thar Yar Township is the largest and the most populated township in Yangon, Myanmar. There are so many challenges for sustainable development. Affordable housing requirement is also challenge for low income worker. People are taking different mode of transport to access their destination so road must be improved for different modes. Open space along the both major road side must be replaced green area are to increase sense of community and biodiversity. Drainage system also should be repaired to protect flood and malodorous smell. Spreading communities with unplanned settlement must be redevelopment or readjustment. Now the Township is spreading horizontally between Hlaing River and Pen Hlaing River. If the area keeps going spread horizontally, the two townships will combine next coming 10 years.

It is not too late to prevent suburban sprawl. Planners and governments sector must be collaborated and resolved the problems under different point of views to achieve sustainable goal. Weakness national urban policy must be strong and support by using national urban and rural planning laws. And then, planning knowledge must be shared every level of government across the country especially rural areas around the cities which will be urbanized.

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