IRESPUB Journal of Environmental & Material Sciences
ISSN: 2770-4084
Volume: 3 | Issue: 1 | NOV – DEC 2023 | Available Online: www.irespub.com

Investigating Bicycle Riding as A Means of Green Mobility in Mubi Metropolis, Nigeria

Nuhu H. Tini* & Ahmed Bello

Department of Geography, Adamawa State University Mubi, Nigeria

ABSTRACT

The growing concerns about environmental sustainability and urban congestion have necessitated the promotion of green mobility options to become imperative in modern urban planning. This research explores the potential of bicycles as a sustainable transportation option in the Mubi metropolis, considering its unique geographical, socio-economic, and cultural context. Using a mixed-methods approach, the study gathered qualitative and quantitative data to understand local perceptions, attitudes, and barriers toward bicycle adoption. The findings revealed that the majority of the respondents frequently ride bicycles for various purposes, such as exercise, commuting to work, markets, farms, and schools. Bicycle ownership was found to be higher among the unemployed, but its ridership was greater among the employed. Males were more likely to own and ride bicycles than females. Affordability, health benefits, and congestion avoidance were identified as the top reasons for choosing cycling over other modes of transport. The research also highlighted several challenges associated with bicycle riding, including unsafe parking spaces, theft cases, accidents, injuries, and poor infrastructure conditions. To overcome these challenges, the study suggested measures such as wearing helmets, obeying road signals, and improving road design and safety measures. The research offers valuable insights for policymakers and urban planners in Mubi and similar regions to develop strategies that promote bicycle usage while addressing traffic congestion and air pollution. By advocating bicycle riding as a green mobility alternative, this research aims to improve the overall livability, health, and sustainability of the Mubi metropolis. It also serves as a potential model for other cities facing similar environmental and transportation challenges, contributing to the development of sustainable mobility plans that prioritize environmentally friendly transportation options. Ultimately, the study strives to inspire a transformation towards a greener, more resilient urban transportation system in Mubi and beyond.

KEYWORDS

Bicycle; green mobility; livability; sustainability; Mubi metropolis

CORRESPONDING AUTHOR*

Nuhu H. Tini

1.0 INTRODUCTION

Bike riding or cycling has become a cultural expression of lifestyle in our society today. It is recently becoming a primary means of transport in many countries of the world. In large parts of Europe, even in Asia and Africa, many people still rely on bicycle for daily activities (Aldred, et al, 2017). This is essentially used to move people and goods in areas where there are few automobiles. Bicycle is widely regarded as an effective and efficient mode of transportation optimal for short to moderate distances and for commuting into a place more quickly (Buehler, et al., 2009). People ride bicycle to work, farm, school and shopping (Buehler, et al., 2009). Globally, there are twice as many bicycles as automobiles, and they outsell automobiles three to one. Bicycle plays a vital role in the green mobility transition. It improves air quality, reduces congestion, and promote public health and economic growth. Cycling is a relatively inexpensive activity. This makes the mode of transportation so popular around the world.

In fact, statistics show that cycling has become a popular way to commute and run errands, which makes it reliable and, sometimes, the fastest way to get around. More people indicate desire to get to work by bicycle than ever try (Preise & Auszeichnungen; Preising, 2015).

Cycling is known to be one of the best way to maintain weight and boost person's overall health because it is an intense cardio exercise that works out the entire body at once (WHO, 2022). No wonder the number of bicyclist has been increasing to about 80 million in the U.S (Buehler, et. Al., 2009). To keep progressing and improving fitness, a person ideally needs to be riding bike every two-three days. The minimum one can get away with and still see significant fitness gains is three rides a week (Buehler, et al., 2009). Cycling provides a popular form of recreation, and have been adapted for use as children's toys, general fitness, military and police applications, courier services, bicycle racing, and bicycle stunt (Chuck, 2008). It is also an environmentally sustainable non-motorized transportation, that is, a green mobility mode which does not pollute the environment. It requires much less space in terms of land use than other forms of motorized transport (Thompson and Rivara, 2001). Other advantages of cycling-related transport include economical cost of travel to the traveler and the environment. It also increases access to key services and destinations (e.g education, employment, social activities), create or enhance new kinds of businesses, such as bicycle messengers, traveling seamstresses, riding academies, and racing rinks (Norcliffe, 2001). Cycling improve the liveability and liveliness of cities, enhances safety in central area of cities, and fosters social cohesion in urban environment, among others (Pucher and Dijkstra, 2003). Increased cycling can lead to increased policy interest and funding, which could then increase cycling (Aldred, 2015).

Convincingly, in Copenhagen, spacious bike lanes run parallel to roads, making traveling by bike more efficient than pounding the pavement or calling a cab. In Paris, scooting around town on a city bike is a hundred times more fun than sitting in traffic or spending hours underground in the metro. By opting for two-wheeled cycling, one gets the chance to cruise alongside locals and enjoy an intimate tour of the city (Bike Share Toronto, 2016).

In the five-mile radius of downtown Munich (Germany), travel is more quickly and flexibly on a bike than by any other means of transport (Nircliffe, Glen 2001). The Minneapolis city experience community dedication to biking and has been rearranged to facilitate recreation on two wheels, meaning, one can cruise around and through the city on miles and miles of pathways (Parkiteer, 2006). In Colombia, Bogota's system of bicycle paths and separated lanes, speeding along the Complementary Network, showcases the city's green spaces and travels along riverbanks. Hence, planning for Colombian cycling vacation over a Sunday, can make a person experience a car-free version of the city, a tradition that existed strong since the 1970s (Pucher and Buehler, 2009).

Bordeaux is a busy, pedestrian-friendly region of France having more than 400 miles of bicycle paths that crisscross through and around Bordeaux. For a quick 5-mile route that straddles both left and right banks, depart from Place Gambetta for views of world-class monuments (Grand Théâtre, place de la Bourse, Porte Cailhau, and Place du Palais) from bicycle seat along Cours de lIntendance, Cours du Chapeau Rouge, and Pont de Pierre (Pucher and Buehler 2009). Flight on a bike and cruise through Tokyo City (Japan) surprisingly quiet (and safe) streets or leads to the waterfront, where one can cruise along the Sumida River, which flows into Tokyo Bay, Bicycle Network (Parkiteer, 2016).

About 870,000 people in the U.S. commute to work by bicycle — that is, 0.6% of all workers in the country. According to the U.S. Census Bureau, 1.1% of commuters in big cities get to work by bike. Outside of metropolitan areas, almost 0.3% of workers commute by bike. About 1% of workers between the ages of 16 to 24 use their bike to get to work. Virtually 0.7% of workers between the ages of 25 to 44 commute to work by bike. In the past, cycling was a sport dominated by males, with females making up only about 24% of all bicycle trips in the U.S. It is affirmed that men historically traveled, on average, 10 more miles per day than women. But today, the gap between male and female cyclists is narrowing (Santos, et al., 2011).

Green mobility transition is the shift away from fossil fuel-powered transportation towards more sustainable modes of transportation. With its undeniably low environmental impact, bicycles are ready to lead the way toward a greener, more sustainable future (Preising, 2015). Bicycle forms an integral part of sustainable transport in developed countries as it plays several roles in the mobility and accessibility of its users, and the environment by being emission-free.

As a non-motorized transport (NMT) mode, cycling has proven to improve mobility, accessibility, and the environment in major cities and suburban areas of countries such as the Netherlands, Denmark, and China (Pucher and Buehler, 2009; Shaheen et al., 2011).

The common transport challenge in most Sub-Saharan African urban cities is reduced mobility and accessibility. Apart from the lack of adequate transport facilities, poor traffic management and planning and the neglect of multimodal transport system contribute immensely to the transport problems. However, cycling has been noted to contribute toward meeting the Sustainable Development Goals (SDGs) especially in "improving energy efficiency in the transport sector. It makes cities and human settlements inclusive, safe, resilient and sustainable. Additionally, it combats climate change impacts on transport (Sustainable Review, July 27, 2022).

Since cycling as a means of non-motorized transport is being encouraged globally, the need to provide infrastructure (well planned, designed and constructed) to facilitate cycling in Nigeria is indispensable. However, lack of attention to the needs of pedestrians, and a tendency to favor motorized transport, pedestrians and bicyclists who constitute a high percentage of non-motorized transport are hardly considered or catered for in the design of roadways in Nigerian cities. This put cyclists at high risk of accidents in our cities. Moreover, in spite of the benefits associated cycling as a means of green mobility, little efforts have been made to sustain and increase its patronage in Nigerian cities. It is against such backdrop that this study intends to assess the practice of bicycle riding in Mubi metropolis. The aim is to understand the socio-economic characteristics of cyclists, extent of patronage, perception and attitude toward its usage, identify the challenges faced by the cyclists and proffer adequate solutions to the challenges. This will encourage bicycle riding by the general public, thereby reducing automobile pollution and improving environmental air qualities in developing country cities.

2.0 MATERIALS AND METHOD

This study was carried out in Mubi metropolitan area of Adamawa State, Nigeria. The city lies between latitudes 10° 13' 50" and 10°18' 10" N of the equator and between longitudes 13°14' 00" and 13° 18' 10" E of the Greenwich Meridian (Figure 1). The area has a projected population of - persons for the year 2021 (National Bureau of Statistics, 2006). For this study, primary data were collected using a structured questionnaire designed based on the research objective. Secondary data were acquired from textbooks, journal articles, government official documents, and occasional paper that are relevant to the research topic. Balloting method was used to select five, out of the eleven wards in the metropolis for questionnaire administration. The sampled wards included Lokuwa, Digil, Nassarawo, Wuro Patuji and Yelwa. Purposive sampling was used to select respondent cyclists for questionnaire administration in each of the wards.

The respondents were selected using purposive sampling, also known as judgmental, selective, or subjective sampling. This is a form of non-probability sampling in which researcher rely on his/her own judgment when choosing members of the population to participate in their surveys based on their ability to provide the relevant information needed for the survey. About one hundred and fifty (150) questionnaires were distributed, but a total of hundred (66.6 %) questionnaires were retrieved and analyzed. These were evaluated using simple percentages to understand the trend of people's responses and then discussed in relation to the objectives and assumptions of the study.

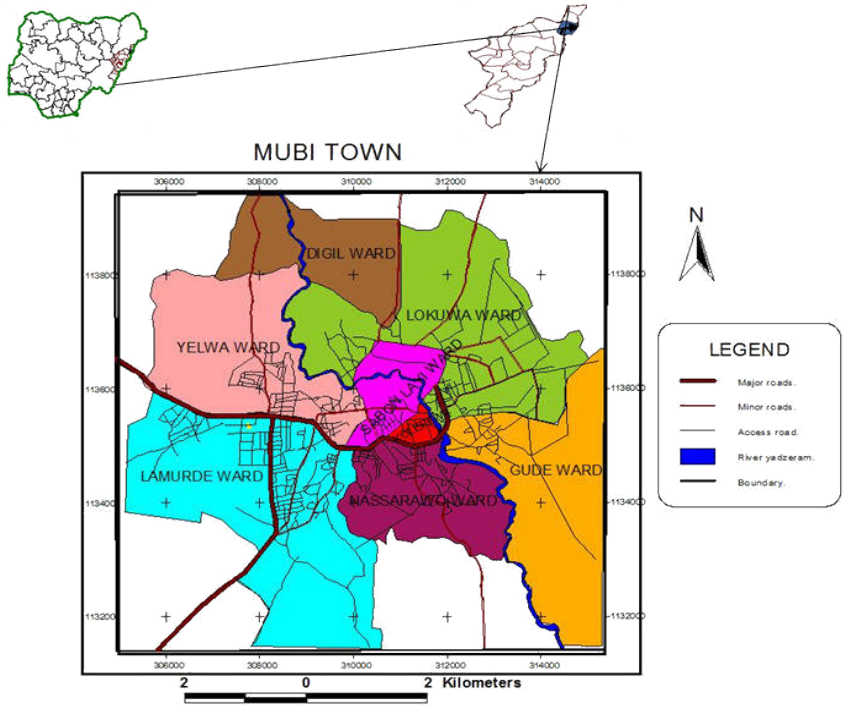

FIGURE 1: The Study Area.

3.0 CHARACTERISTICS OF THE RESPONDENTS

3.1 Gender

Gender influences bicycle riding and was therefore examined in this study. The gender result in Figure 2 shows that majority (85.9%) of the respondents were males, while females were only 14.1%. This implies that bicycle riding is mostly done by males in Mubi metropolis. An increase in male cyclists could lead to reduced congestion on roads and decreased demand for parking spaces, as bicycles take up less space than cars. This can contribute to smoother traffic flow and reduced travel times. An emphasis on cycling by males can bring attention to gender norms and inclusivity, prompting discussions about promoting cycling as a gender-neutral activity. In comparison, the gender balance of cyclists in UK has changed significantly. In 1986, female participation was higher (6.1%) than male (3.9%) involvement. By 2016, just 1.7% of females cycled to work, as against 3.9% of males (Gregory, 2020).

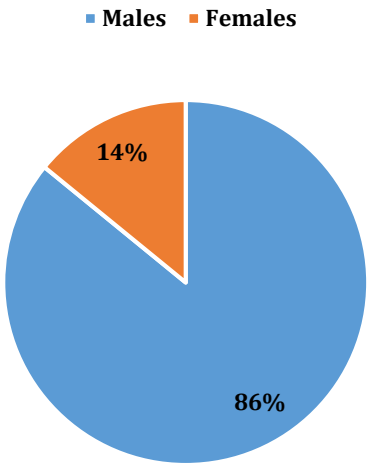

FIGURE 2: Gender of the Respondents.

3.2 Age Group

Age determines bicycle riding. Thus, age group of the respondents was investigated. The result presented in Table 1 shows that majority (35.8%) of the respondents were less than 20 years old. About 32.1% were within the ages of 21-40 years, 17.9% were within the ages of 41-60 years, while only14.2% of the respondents were above 61 years of age. This outcome reveals that bicycle is predominantly (67.9%) rode by youths in Mubi metropolis. This could be attributed to the fact that bicycle riding require energy especially the non-solar powered bicycle. Hence youths who are vibrant and energetic can easily pedal around; unlike the older folks who are less active and find it difficult to ride. The elderly rather prefers to take public transport or if possible, acquire personal vehicle.

TABLE 1: Age Group of Respondents.

Age	Frequency	Percentage
Less than 20 years	33	35.8 %
21 – 40 years	30	32.1 %
41 – 60 years	16	17.9 %
Above 61	13	14.2 %
Total	**92**	**100 %**

3.3 Marital Status

Marital status of the respondents was investigated. The result in Figure 3 indicates that bulk (56.8%) of the respondents were singles, while 43.2%) were married. This indicates that most bicycle riders in the metropolis are singles. This finding is similar to Ireland, where majority (57.2%) bicycle riders are singles and youths. Only 38% are married and of old age (Gregory, 2020). Singles have reasons for choosing bicycles as their key mode of transportation. Such might include leisure activity. Moreover, independence and flexibility; which allow them to move around on their own schedule without relying on others. The singles also find bicycle convenient for navigating through traffic, short distances, and areas where parking is limited. Hence, cycling allows singles to explore their surroundings, discover new places, and embark on adventures, fostering a sense of exploration and spontaneity.

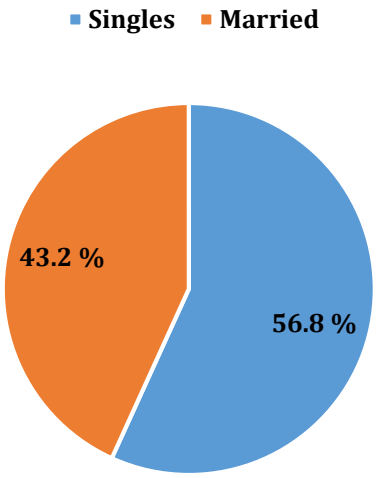

FIGURE 3: Marital Status of the Respondents.

3.4 Educational Qualification

Educational attainment influences bicycle usage and adoption. Higher level of education often leads to greater awareness of environmental issues and stronger commitment to sustainable practices. It is also more likely to make individuals conscious of the environmental benefits of cycling, such as reduced carbon emissions and lower air pollution.

In due course, educational qualification of the respondents was investigated to ascertain their awareness of environmental benefits of cycling. The information in Figure 4 demonstrates that most (52.2%) of the respondents were SSCE certificate holders, 26.1% were NCE/ND certificate holders, while 13.0% own HND/B.Sc certificates, 6.5% had FSLC certificates. Only 2.2% of the respondents had M.Sc/PhD certificates. Bicycles might represent an efficient, affordable, and practical mode of transportation for individuals with lower educational qualifications. Another reason may be limited Job Opportunities or Geographic Mobility: Individuals with lower educational qualifications might work in jobs that are closer to home or have limited opportunities for career advancement. Bicycles offer a practical way to commute to these jobs, especially if they are located nearby.

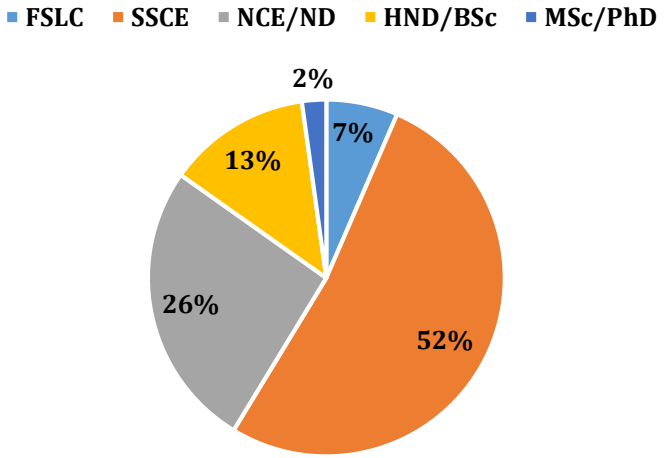

FIGURE 4: Educational Qualification of the Respondents.

3.5 Occupation

The nature of one's job significantly shape their relationship with cycling, whether it's for commuting, leisure, fitness, or professional purposes. Furthermore, local infrastructure, workplace culture, and personal preferences also play roles in determining bicycle riding. Thus, occupation of the respondents was examined. Figure 5 shows that majority (51.1%) of those who ride bicycle were employed. About 38.3% of the cyclists were unemployed, while10.6% were students. The use of bicycle by the unemployed can be attributed to the meagre resources they earn. Bicycle riding seems to be the best and most economical means of transportation for the unemployed, old age and retired people (Coulon, 2020). The result implies that majority of cyclist in Mubi metropolis are working class. Factors such as cost efficiency, traffic congestion, environmental consequences, health and fitness, accessibility, distance, cultural and social factors, along with personal preferences and lifestyle choices, might have significantly influenced majority of the individuals to choose cycling as the best means of commuting.

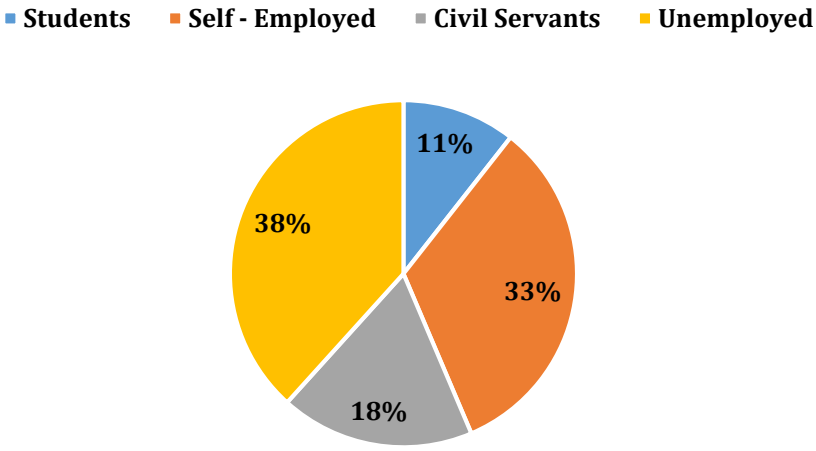

FIGURE 5: Occupation of the Respondents.

3.6 Household Ownership of Bicycle

The number of bicycles possessed by households was explored. The result in Figure 6 reveals that most (81.7%) of the respondents own between 1- 5 bicycles, 11.7% have 5 – 10 bicycles. Only 6.6% respondents have above 10 bicycles in their houses. The fact that majority of people own bicycle implies that is popular mode of transportation in Mubi metropolis. Households with children might be more inclined to own bicycles for family outings and recreational activities. Cost of living and economic factors mainly influence bicycle ownership. Affordability also plays a significant role. In areas where owning a car or using public transportation is expensive, bicycle becomes a more practical and economical option, leading to higher ownership rates. These in addition to local preferences, economic conditions, and available infrastructure, significantly impact why the majority of people in a specific place own bicycle.

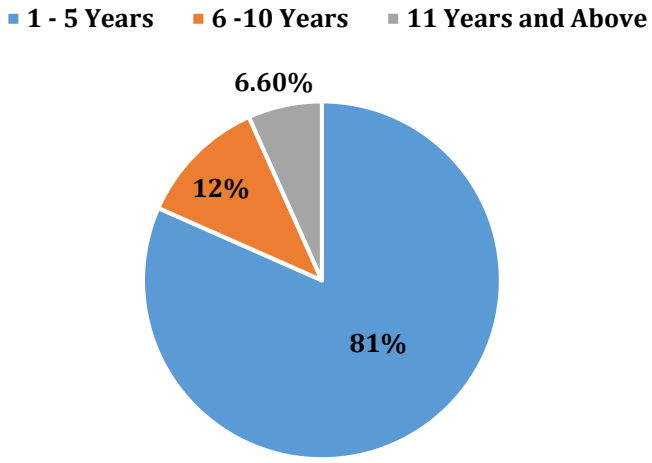

FIGURE 6: Household Ownership of Bicycle.

3.7 Duration of Bicycle Riding

Duration of bicycle riding by the respondents was surveyed. The result in Table 2 indicates that majority (48.0%) reported to have been cycling for over 10 years. About 40.0 % cycled for the period of 5 – 10 years, 10.0% rode for only one year while 2.0% rode bike for 1 – 5 years. The rate of bicycle usage is observed to be increasing since the ban on motorcycle in the metropolitan area of Mubi since the year 2012.

TABLE 2: Duration of Bicycle Riding.

Options	Frequency	Percentage
1 year	9	10.0%
1-5 years	2	2.0%
5-10 years	37	40.0%
10 years and above	44	48.0%
Total	**92**	**100%**

4.0 RESULTS AND DISCUSSION

4.1 Reasons for Bicycle Riding

This study explored the reasons for which people ride bicycle in Mubi metropolis. The information generated and presented in Table 3 shows that about 83.7% of the respondents ride bicycle to market, 71.7% of them ride bicycles for exercise, 60.8% ride bicycle to their place of work, 60.9% to farm while 58.7% ride bicycle to school. Majority (83.7%) of the respondents indicated that they ride bicycle to market. This result implies that Mubi residents have resolved to bicycle riding as the best mobility means for shopping. This is perhaps due to the lack of parking space in Mubi market which results to on street parking and blockage of passages causing traffic congestion and time wasting.

TABLE 3: Reasons for Bicycle Riding.

S/N	Response	Strongly Agree	Agreed	Disagreed	Strongly Disagreed
1	I ride bicycle for leisure	7.6%	21.7%	27.2%	43.5%
2	I ride bicycles for exercise	40.2%	31.5%	20.7%	7.6%
3	I ride bicycle to place of work	47.8%	13.0%	33.7%	5.4%
4	I ride bicycle to market	60.9%	22.8%	7.6%	8.7%
5	I ride bicycle to farm	28.3%	32.6%	18.5%	20.7%
6	I ride bicycle to school	56.5%	2.2%	21.7%	19.6%

4.2 Frequency of Bicycle Riding

The frequency of bicycle riding by the respondents was investigated. Result in Table 4 indicates that majority (76.0%) of the respondent ride bicycles on a daily basis, 55.4% ride bicycle twice and 58.7% ride trice a week. It was however noted that most (43.5%) respondents were of the opinion that they do not ride bicycles only for leisure (70.7%). Also, most (68.4%) of the respondents do not ride bicycle once a week. It was further ascertained that bicycles in Mubi metropolis are not only ridden in emergency cases as indicated by 51.0% of the respondents. Compared with Netherlands, cycling is a common mode of transport in Netherlands, with 36% of Dutch people indicating bicycle as their most frequent way of getting around on a typical day (Gregory, 2020). In 2016, over a quarter of all trips made by Dutch residents were by bike (Netherlands Institute of Transport Policy Analysis). Only 25% of those trips were work-related compared to 37% which were made for leisure. In Netherland, children cycle a lot, especially when compared to children in other countries. Almost 75% of school age children cycle to school. In Copenhagen, 62% of all citizen commute to work, school, or university by bicycle. In 2016, around 12.4% of Americans cycled on a regular basis. The number of bicycle riders in US has increased over the past three years from around 43 million to 47.5 million. Report reveals that there are more bicycles in Amsterdam than people, and in 2017, 68% of traffic to and from work and school was done by cycling (Chuck, 2008).

TABLE 5: Frequency of Bicycle Riding.

S/N	Response	Strongly Agreed	Agreed	Disagreed	Strongly Disagreed
7	I ride bicycle on daily basis	38.0%	38.0%	21.7%	2.2%
8	I ride bicycle once a week	22.8%	8.7%	38.0%	30.4%
9	I ride bicycle twice a week	4.3%	51.1%	31.5%	13.0%
10	I ride bicycles trice a week	28.3%	30.4%	4.3%	37.0%
11	I ride bicycles only in emergency cases	29.3%	20.7%	8.7%	41.3%

4.3 Significance of Bicycle Riding

The perception of respondents on significance of bicycle riding was assessed. The result presented in Table 6 reveals that some of the respondents ride bicycles for weight management (60.5%). About 53.7% ride bicycle for leg strengthening as prescribed by their medical consultants. Majority (78.3%) ride bicycle to boost their mental health. Almost 52.7% of the respondents ride bicycles to save money, while others (84.8%) ride bicycles to get to places more quickly. It was however noted that 65.6% respondents do not ride bicycles to avoid environmental pollution. Similarly, most (63.0%) of them don't ride to avoid noise pollution. The study further shows that majority (72.6%) of the respondents do not ride bicycle for social interaction with people nor to be connected with local community (48.9%).

The importance of riding bicycles as perceived by the respondents is majorly for medical reason. This finding is in line with Preising's (2023) observation that cycling promotes public health by encouraging physical activity and reducing sedentary lifestyles.

In the UK, commuting by bike is associated with 45% lower risk of getting cancer and a 46% lower risk of heart disease compared to driving or taking public transportation. The result also shows that cycling saves money. This affirm the fact that cycling has positive impact on local economy by reducing transportation cost, and promoting local businesses. Getting to places more quickly is another universal reason for cycling, just as confirmed by this study.

TABLE 6: Significance of Bicycle Riding.

S/No	Response	SA	A	D	SD
12	I ride bicycle for weight management	26.4%	34.1%	7.7%	31.9%
13	I ride bicycle for legs strengthening	3.2%	50.5%	44.1%	2.2%
14	I ride bicycle to boost mental health	69.6%	8.7%	3.3%	18.5%
15	I ride bicycle to avoid environmental pollution	16.1%	18.3%	36.6%	29.0%
16	I ride bicycle to avoid noise pollution	14.1%	22.8%	33.7%	29.3%
17	I ride bicycle to save money	38.7%	8.6%	35.5%	17.2%
18	I ride bicycle to get to places more quickly	51.1%	33.7%	3.3%	12.0%
19	I ride bicycle to socially interact with people	25.3%	2.2%	34.1%	38.5%
20	I ride bicycle to be connected with local community	23.9%	16.3%	10.9%	48.9%

4.4 Challenges of Bicycle Riding

The respondents' view on the challenges associated with bicycle riding was surveyed. The result in Table 7 reveals that majority (51.6%) of the respondents felt that there are no safe bicycle parking spaces in Mubi metropolis. About 62.0 % of them said that bicycles could easily be stolen at home or anywhere they are parked on the street. However, recently, technology is making bicycle more accessible and convenient than ever before. With the advent of electronic bike lock system, cyclists no longer have to worry about their bikes being stolen, giving them even more confidence to take to the streets (Preising, 2023).

Most (63.0%) of the respondents perceived that bicycle riding causes lower back pain. About 76.1% of them said cycling may result to eye damage risk. Another 45.7% reported that riding without shades or helmet can result to injury. It was further found that most (59.8%) of the respondents sensed that riding too close behind other vehicles would most likely lead to accidents. Most (53.9%) believed that carrying heavy weighted objects on the bicycle affects the balance, causing discomfort and sometimes accidents. The assertion that bicycle riders usually involve in accidents was rejected by most (59.6%) of the respondents. However, observed motor traffic danger is noted as a major obstacle to both adult and child cycling in countries such as Britain (Aldred, 2015).

TABLE 7: Challenges of Bicycle Riding.

S/N	Response	SA	A	D	SD
21	There is no safe bicycle parking space in Mubi Metropolis	38.7%	12.9%	16.1%	32.3%
22	Bicycles are always stolen at home/parking place	35.9%	26.1%	22.8%	15.2%
23	Bicycle riders are usually involved in accidents in Mubi metropolis	17.6%	23.1%	23.1%	36.3%
24	Bicycle riding causes lower back pain	31.5%	31.5%	13.0%	23.9%
25	Bicycle results in eye damage risk	45.7%	30.4%	12.0%	12.0%
26	Riding too close behind other vehicles leads to accident	31.5%	28.3%	23.9%	16.3%
27	Carrying heavy weight on bicycle affects balance/causes discomfort and accident	24.2%	29.7%	22.0%	24.2%

4.5 Mitigating the Challenges of Bicycle Riding

In order to ascertain measures for mitigating the challenges of bicycle riding, we inspected people's view on the possible ways of alleviating the challenges in Mubi Metropolis. The result presented in Table 8 reveals that majority (88.1%) of the respondents indicated that wearing helmet while riding bicycle prevents head injury during accident. In California, approximately 38% of adults who ride bicycles wear helmet regularly, while 69% of children under the age of 16 do as well. The percentage of bike helmet owners rose between 1991 and 1999, moving from 27% to 60%, anyone at the age of 18 years and under operating bicycle, scooter or skateboard must legally wear bicycle helmet for safety (Gregory, 2020).

About 65.2% of the respondents indicated holding of handle bar while riding prevents accident casualty. Most (65%) of them reported that knowledge of signals and using them helps in avoiding accident. Greater percentage (65.6%) testified that obeying traffic rules alleviates bicycle riders from accident. Regular maintenance reduces accident rate as indicated by 91.3% of the respondents. About 61.3% mentioned avoidance of alcohol and 51.1% specified being careful at intersection as measures for mitigating accident while riding bicycle. However, 55.4% of the respondents said riding between heavy traffic do not prevent accident.

TABLE 8: Measures for Mitigating the Challenges of Bicycle Riding.

S/No	Response	SA	A	D	SD
28	Wearing Helmet while riding bicycle prevents head injury	78.3%	9.8%	2.2%	9.8%
29	Holding handle bar while riding bicycle prevents accident	32.6%	32.6%	10.9%	23.9%
30	Knowing signals and using them helps in avoiding accident	52.2%	9.8%	23.9%	14.1%
31	Avoiding distraction while riding bicycle protects from accident	33.3%	28.0%	15.1%	23.7%
32	Obeying traffic rules prevents bicycle riders from accident	21.5%	44.1%	20.4%	14.0%
33	Regular bicycle maintenance reduces rate of involving in accident	19.6%	71.7%	4.3%	4.3%
34	Avoidance of alcohol while riding bicycle prevents accident	30.1%	31.2%	14.0%	24.7%
35	Avoidance of riding between heavy traffic protect person from accident	22.8%	21.7%	51.1%	4.3%
36	Looking behind and sideways at intersection avoid accident	44.6%	6.5%	38.0%	10.9%

5.0 CONCLUSION AND RECOMMENDATION

This research explored the potential of bicycle as a sustainable transportation option. However, systematic review of the health benefits of cycling need to be undertaken. Similarly, the factors associated with bicycle ownership, people's view on cycling as a fundamental alternative to automobile transportation and the influence of transportation infrastructure on cycling injuries and crashes are other focus areas that need to be addressed. *R*esult of this investigation showed that bicycle ownership and ridership decline with increased income. Males more likely to own and ride bicycles than females. Furthermore, affordability, health benefits and avoidance of congestion, among others were found to be significant reasons why cyclists choose bicycles over other modes. Unsafe roadway conditions and poor condition of infrastructures were found to be the major challenges faced by cyclists. Remedies to limit these challenges includes wearing of helmet, holding handle bar while riding, knowledge of signals and its usage, avoidance of alcohol and regular bicycle maintenance. Nevertheless, to make bicycle a viable option for all, it is necessary for government to invest in the infrastructure to support this mode of transport. These are to include dedicated bike lanes and paths to guarantee the safety of cyclists, secure bike parking to offer peace of mind for riders, maintenance and repair stations to keep bikes in good working order and integration with public transportation to make it easy for cyclists to travel longer distances. With these elements rightly put in place, bicycle surely has the prospective to become the vehicle of choice for all, leading to a greener, more sustainable future for our cities.

REFERENCES

[1] Aldred, R. (2015). Adults'Attitudes Towards Child Cycling: A Study of the Impact of Infrastructure. Eur. J. Transp. Infrastruct. Res. 15, 92–115.

[2] Aldred, R., Best, L., Jones, P., 2017. Cyclists in Shared Bus Lanes: Could There Be Unrecognized Impacts on Bus Journey Times? Published Ahead of Print. ICE: Transport. http://www.icevirtuallibrary.com/doi/abs/10.1680/jtran.16.00072.

[3] Buehler. R., Hamre, A., Sonenklar, D., & Goger, P. (2009). Trends and Determinants of Cycling in the Washington, DC Region. Mid – Atlantic Universities Transportation Centre, Region III.

[4] Chen, P., Shen, Q., 2016. Built Environment Effects on Cyclist Injury Severity in Automobile-Involved Bicycle Crashes. Accid. Anal. Prev. 86, 239–246.

[5] Coulon J. (2020, September 19). New Study Says Bicycles Are the Future of Urban Transportation. https://www.bicycling.com/news/a30518994/ deloitte-2020-study-bicycle-transportation/.

[6] Gregory, Bruno (2021). Predicting Winners in Cycling Races with Machine Learning. https://brunogregory.medium.com/.

[7] Koeppel, Dan (January–February 2007). "Flight of the Pigeon". Bicycling. Vol. 48, No. 1. Rodale. pp. 60–66. ISSN 0006-2073. Retrieved 28 January 2012.

[8] Norcliffe, Glen (2001-05-15). Ride to Modernity: The Bicycle in Canada, 1869-1900 by Mass Market Paperback – January 1, 1726. https://www.amazon.com/Ride-Modernity-1869-1900-Norcliffe-2001-05-15/dp/B01FJ12SZ4.

[9] Pucher, J. and Buehler, R. (2008). Making Cycling Irresistible: Lessons from the Netherlands, Denmark, and Germany. Transport Reviews, Vol. 28, No. 4, July 2008.

[10] Preise and Auszeichnungen (October, 2015). Designing Our Own Hedkayse Unique Cycling Helmet. ZDFmediathek Series Tatort Best Presented - xworldse.online.

[11] Pucher, J. & Dijkstra, L. (2003). Promoting Safe Walking and Cycling to Improve Public Health: Lessons from the Netherlands and Germany. American Journal of Public Health, October 2003, 93(9) DOI: 10.2105/AJPH.93.9.1509.

[12] Rivara F, Thompson D, Thompson R. (2015). Epidemiology of Bicycle Injuries and Risk Factors for Serious Injury. 1997. Injury Prevention. 2015; 21(1):47–51. [PubMed: 25609752].

[13] Parkiteer (2016). Bicycle Network. https://www.bicyclenetwork.com.au/general/programs/370/. Accessed January 17, 2017.

[14] Preising, Laura (2023). Riding the Green Wave: Exploring the Role of Bicycles and Digital Tools in the Green Mobility Transition. 02.20.23: https://en.reset.org/.

[15] Pucher, J. & Buehler, R. (2008). Cycling for Everyone: Lessons from Europe. Transportation Research Record: Journal of the Transportation Research Board, 2008. 2074: 58–65.

[16] Santos, Adella; McGuckin, Nancy; Nakamoto, Hikari Yukiko (2011). Summary of Travel Trends: 2009 National Household Travel Survey. https://rosap.ntl.bts.gov/view/dot/50506

[17] Shaheen, S.; Zhang, H.; Martin, E.; Guzman, S. (2011). "China's Hangzhou Public Bicycle"(PDF). Transportation Research Record. 2247: 33-41.

[18] Sustainable Review (July 27, 2022). How Cycling Contributes to New Climate Conversation. https://sustainablereview.com/

[19] TPA (2016). Feasibility Study for the Expansion of Bike Share Toronto. https://www.toronto.ca/legdocs/mmis/2020/pa/bgrd/backgroundfile-145374.pdf.

[20] WHO (October 5, 2022) Physical Activity. https://www.who.int/news-room/.