

Wheels of Change:

Integrating Women into the Indonesian Cycling Landscape

ITDP Indonesia / November 2023





The Institute for Transportation Development Policy (ITDP) is a non-profit organization that has been established since 1985 and is headquartered in New York, United States, with the main focus of creating sustainable transportation in cities around the world. For almost two decades, ITDP Indonesia has provided technical assistance to local governments in Indonesia such as Jakarta, Semarang, Surabaya, Bandung, and Medan in supporting the development of sustainable transportation through mass public transportation, pedestrian facilities, parking management and Transit Oriented Development (TOD).

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Glossary

ATM	Automatic Teller Machine
BRT	Bus Rapid Transit
CCTV	Closed-circuit Television
GEDSI	Gender Equality, Disability, and Social Inclusionr
GHG	Greenhouse Gas
ITDP	Institute for Transportation Development and Policy
MRT:	Mass Rapid Transit/Moda Raya Terpadu
NGO	Non Governmental Organization
SD	Sekolah Dasar/Primary School
SMP	Sekolah Menengah Pertama/Secondary School

Table of Contents

1 Introduction	5
1.1 Background of Study	5
1.2 What is Gender Equity?	6
1.3 Why Focusing on Women in Cycling is Necessary	6
2 Women and Cycling	8
2.1 Women Cyclist Profile	9
2.1.1 Who are they?	9
2.1.2 Journey Characteristics of women cyclists	11
2.1.3 Reasons to choose cycling	12
2.1.4 Purpose of cycling	13
2.1.5 Preferences while Cycling	14
2.2 Women's Needs and Barriers	18
2.2.1 Access to bicycles	18
2.2.2 Cycling infrastructure	22
2.2.3 Lack of Security while Cycling	26
2.2.4 Cycling supporting facility	30
2.2.5 The need to carry a lot of items	31
2.2.6 Environmental factors	31
2.2.7 Male dominated activity	33
2.2.8 Physical limitations	34
3 Conclusion and Recommendations	35
3.1 Conclusion	35
3.2 Recommendations	39
4 Reference	43

1 Introduction

1.1 Background of Study

The increase of cyclists during large-scale social restrictions in 2020 saw a large increase of cyclists in Jakarta. The increase in the number of cyclists occurred in various locations, including the Jendral Sudirman Street, Central Jakarta segment. It was noted that there was a 4-fold increase in the number of cyclists along Jalan Sudirman, even reaching 11 times in the Dukuh Atas segment. In collaboration with communities and experts, the Government of Jakarta responded to the bike boom with the rapid increase of cycling infrastructure to support cycling as a zero emission mode of transportation that was becoming increasingly popular. Similar trend was also seen in other cities in Indonesia, in which there was an increase of cycling infrastructure due to the increase in cyclists who can be seen on the major streets. The enthusiasm for cycling can also be seen from the various regulations issued by the national and city/provincial governments to support cycling.

However, as more and more surveys were conducted to gather input and data from cyclists, results showed that participation of women and other vulnerable groups was considered low compared to men. An example is ITDP's survey on the characteristics and perception of cyclists in the main road of the Jendral Sudirman-Thamrin that was conducted in February 2021, gathering respondents from both online platforms and offline in the Jendral Sudirman street. The results of the survey showed that only 13% of the respondents are women, which could indicate that the barriers to cycling for women and other vulnerable groups are different from the majority of cyclists who are captured in the surveys that have been conducted. Despite that, the perspective of vulnerable groups must be prioritized in bicycle infrastructure planning and interventions. In this case, the vulnerable groups in question are women, children, older persons, people with disabilities, and other marginalized groups. The inclusion of vulnerable groups can effectively promote gender equality, disability and social inclusion (GEDSI) by creating safe and secure spaces for vulnerable groups to cycle and contribute to the development of cities in Indonesia that are both sustainable and equitable.

1.2 What is Gender Equity?

Gender equality aims to create equal access to resources and decision making processes for all genders, with emphasis on the more vulnerable. This report will focus on women as a vulnerable group who are one of the vulnerable groups. These vulnerable groups may have less access and decision-making power, which in turn, can hinder the social and economic opportunities of these groups. Thus, a GEDSI perspective in urban planning and cycling facilities is used to prevent unintentional harm, exclusion and further marginalization for vulnerable groups, and to promote equal rights, opportunities and benefits.

1.3 Why Focusing on Women in Cycling is Necessary

GEDSI mainstreaming refers to the many strategies that are done to ensure equality for all, especially for vulnerable groups. Gender mainstreaming would focus on the vulnerable genders, and in the case of this report, women. Within the mainstreaming process, a gender perspective must be taken into account at all stages from planning, design, implementation, monitoring, and evaluation. This is done to ensure equal benefits can be felt and experienced by both men and women when there is an intervention, and there are no negative impacts that harm certain groups. So, in the context of cycling, it is hoped that the impact of the provision of bicycle lanes and other bicycle facilities can have a positive impact on women's and other groups' access to resources, as well as social and economic opportunities by increasing the mobility of women and other vulnerable groups.

Ensuring the involvement of women in planning cycling facilities will also ensure proper, quality cycling infrastructure that accommodates the various needs and characteristics of cyclists. This can increase the number of cyclists which will lead to various positive externalities from an environmental, economic and social perspective. Figure 1 illustrates the correlation between the cycling mode share and the percentage of female cyclists, which shows a positive correlation between the two variables. These data may indicate that countries that have accommodated the needs of cycling for women are also successful in increasing the mode of travel sharing using bicycles.

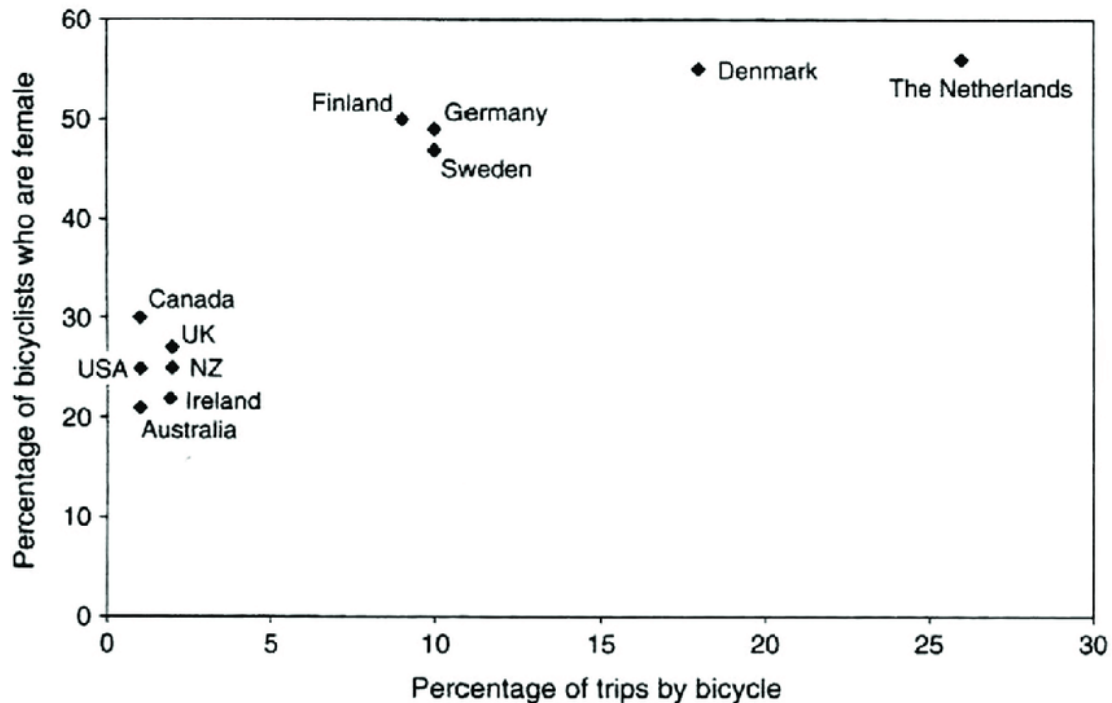


Figure 1. Percentage of trips using bicycle and percentage of female cyclists (source: Pucher and Buehler, 2012)

As previously mentioned, the large number of cyclists in urban areas can generate various positive externalities such as the improvement of public health, reduction of greenhouse gas (GHG) emissions and pollution, reduction of congestion and economic losses due to congestion, as well as being an affordable alternative mode of transportation. Figure 2 shows the cost of cycling per 100 km, which is more affordable than other modes, therefore, it is more accessible for all people.

Total Cost per 100km Traveled

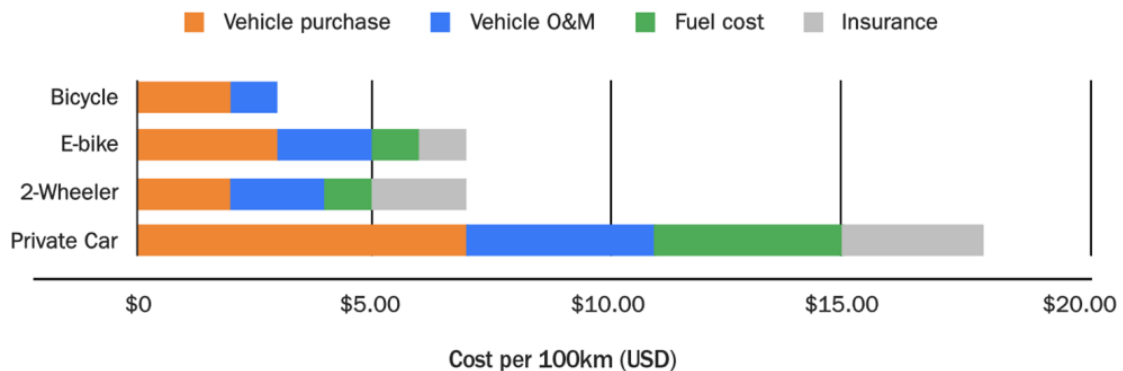


Figure 2. Total cost of cycling per 100 km traveled compared to other modes of transport (source: ITDP, 2021)

Moreover, cycling has additional value for women and other vulnerable groups in increasing mobility and access to resources. Data from a survey of online motorcycle taxi drivers in Jakarta in 2021 conducted by ITDP shows that 73.6% households prioritize the usage of their private motorized vehicles to male members of the family. The remaining 26.4% said that the priority for motorbike use was allocated to women, children, older persons and other people. The low access to private motorized vehicles for women and other vulnerable groups shows the potential for bicycles as an alternative mode to increase the mobility of women and other vulnerable groups. In addition, women, who are usually caregivers for children and/or the older persons in many households in Indonesia, are highly mobile as they need to carry out errands for their family such as grocery shopping, or taking their child to school, which can be more effective with the availability of bikes for personal vehicles as an alternative to motorcycles. Therefore, cycling has the potential to increase women's autonomy in life to support their activities but also empower women to engage in activities outside of being the main caregivers of the household, as well as increasing the mobility of other vulnerable groups. This is because cycling has the potential to make it easier for women to meet their social needs, like visiting neighbors and other families, and also help them unlock economic opportunities to support their families.

Bicycle use can also have a positive impact on the safety of women and other vulnerable groups. Vulnerable groups, especially women and children are groups that are most vulnerable to sexual harassment and violence. Data from a survey of sexual harassment in public spaces by the Coalition for safe women's spaces in 2019 shows that the location of the highest incidence of sexual harassment is on public streets (33%), public transportation including bus stops (19%). Although cycling cannot eliminate sexual harassment, cycling can be an alternative mode for women to reduce contact with other people and reduce the possibility of sexual harassment/violence. In addition, an increase in cyclists in public spaces can also have a positive impact on increasing security by increasing eyes on the street, where cyclists can become informal supervisors of the urban environment.

2 Women and Cycling

For the purpose of this study, ITDP gathered results from previously conducted offline and online surveys throughout 2021 to 2023 to highlight findings on women cyclist profiles, concerns, and needs across Indonesia. Furthermore, previous interviews with women cyclists conducted for other works are also included to give wider perspectives within this study. Table 1 shows the previous ITDP surveys that were used within this study.

No	Survey	Year Conducted
1.	ITDP Guideline on Participatory Planning	2020
2.	ITDP Survey on Characteristics and Perceptions of Cycling on Jenderal Sudirman Street	2021
3.	ITDP Survey on Online Motorcycle Taxi Drivers in Jakarta	2021
4.	ITDP Survey on Women and Cycling (Puan-Puan Bersepeda)	2021
5.	ITDP Joint Survey with Tim Konsorsium Surabaya Kota Ramah Bersepeda on “Towards Surabaya as a Cycling-friendly City” Programme (cyclist characteristics, assessment, and perceptions on Surabaya as a cycling-friendly city)	2022
6.	ITDP Survey on Bike Sharing System Evaluation	2022
7.	ITDP Survey on Evaluation of Jakarta Cycling Infrastructure	2022

Table 1. List of surveys used within the study

2.1 Women Cyclist Profile

2.1.1 Who are they?

From the surveys that have been conducted, women cyclists in Indonesia represent a diverse group in terms of age, occupation, and cycling behaviors. While the age range is broad, with participation spanning from children and teenagers to adults and older persons, there are notable concentrations within specific age groups. For example, The majority of women cyclists in Jakarta fall between the ages of 25 and 45. However, there are active participants in their teens as well as those who continue to enjoy cycling well into their older years.

In terms of occupation, women cyclists cover a wide spectrum. Among them, you'll find government authorities, business owners, students, and professionals from various fields. This occupational diversity reflects the universal appeal of cycling as both a mode of transport and a source of recreation. Their cycling behaviors reveal preferences and routines tailored to their daily lives. Many women cyclists opt for morning and evening cycling to escape the heat of the midday sun. Their chosen routes often combine practicality , providing an enjoyable riding experience.

The motivations behind taking up cycling are also varied. For many women in the surveys conducted, cycling serves as a means of commuting to work, getting exercise, participating in sports, or simply enjoying recreational outings. It's noteworthy that a growing number of women view cycling as a way to maintain physical and mental health, alleviate congestion, and promote environmentally friendly travel.

An additional 11 interviews were conducted from the months of January - March 2023 for the purpose of this report to further document the cycling characteristics, patterns, and barriers and needs of women cyclists. These interviewees represent the diversity of women cyclists in Indonesia, which vary from different characteristics, confidence levels, cycling ability, purposes, and preferences. The interviewees are listed below:

1. **Patricia**, working at a national government authority, cycles everyday to work which is located 5 km away from her house. She actively promotes cycling on her social media, introduces cycling to her children, and participates in multi-day, inter-provincial rides.
2. **Elva (54)**, working under the Government of Jakarta, bikes to work in the morning four times a week. She feels it is the most effective way to get exercise instead of doing it on the weekend which she should spend with her family, beside it also being the activity recommended by her cardiologist.
3. **Lala (33)**, an urban transport researcher at an NGO based in Surakarta, started cycling less than a year ago to better understand the needs of cyclists by fully experiencing the activity herself for close range trips. Behind her decision is also tremendous support from her brother and his wife who also regularly bike to work.
4. **Ani (42)**, running a woodcraft business with her husband in Surabaya called Saladin Art. Daily, she travels 22 km for a round-trip from her workshop to the wood seller and delivers the crafts herself to the customers, with the furthest delivery being 25 km away from her workshop.
5. **Satiti (48)**, cycling for the purpose of fulfilling her needs nearby, having exercises, and touring with her community. She is actively involved in several communities and hosting cycling events in Surabaya, becoming one of the most respected senior cyclists in Surabaya.
6. **Icha (24)**, a woman with cerebral palsy and a Law student, cycling for both the purpose of mobility and exercise to keep her supple. With her tricycle, she is usually found cycling to a nearby market at night, to the train station, and to explore the city with her cycling community on the weekends.
7. **Grace (10)**, a 10 year old elementary school student with hearing disability, cycling around her neighborhood with her friends and brother. She is cycling with her parents' close supervision and still not allowed to go to school by bike given the long distance.
8. **Tabitha**, founder of an all-women's cycling community in Indonesia. She started her community in 2016 in Jakarta, and since has grown to a community with more than 4000 members all over Indonesia. The community provides a safe environment for women cyclists and has different sub communities that focus on sport cycling, mountain cycling, as well as relaxed cycling.
9. **Natalia (48)**, a businesswoman who runs a traditional cake shop in the city of Makassar. She took up cycling following her friends who were already regularly cycling, and now she cycles 3 times a week in the morning.
10. **Irina (25)**, a sport cyclist who started cycling during the pandemic wave. She started cycling independently, as she normally cycles on a spin machine. She often cycles long distances on her road bike at high speeds.

11. **Melcy (53)**, used to cycle regularly in 2010-2017, now, Melcy cycles in a more relaxed manner, mostly through scenic areas with her husband. Her entire family are cycling enthusiasts, and she taught her son to cycle regularly from a young age, in which he cycles as a mode of mobility till this day.

2.1.2 Journey Characteristics of women cyclists

As depicted previously, there is a large variety of women cyclists in Indonesia and their individual experiences have also shaped their perspective on cycling in Indonesia. Nevertheless, there are some underlying similarities amongst women cyclists and clear differences when compared to their male counterparts. A lot of these differences highlight the differences between the travel patterns of men and women. Previous studies have agreed on the differences between men and women's travel patterns. Regardless of transport choice, the following differences were highlighted in the literature (Sustrans, 2018):

1. Women make more multi-stop trips than men, in line with care and domestic responsibilities (Barker, 2009)
2. Men make more journeys at peak times, while women make more off-peak journeys (Hine and Mitchell, 2001)
3. Radial journeys for commuting purposes are more commonly conducted by men, while women are more likely to make multi-stop trips, often by different modes (Greed, 2016)
4. Women are increasingly balancing journeys for work and childcare (Fawcett Society, 2016).
5. Women make shorter trips than men (Hine and Mitchell, 2001)
6. Women make more journeys using public transport, with children and otherwise "encumbered" (Hine and Mitchell, 2001)

Several of these differences have been highlighted in previous surveys conducted by ITDP, such as the survey on Women and Cycling, where 48% of the respondents' journey consists of close range trips such as going to get groceries, or looking for snacks near the house. Close-range daily cycling trips generally account for trips no more than 5 km. This further emphasizes that women's cycling behavior is much different from men, and cycling infrastructure that support women's mobility should consider close range trips, or within the neighborhood scale. This is further supported by ITDP's study in 27 urban villages, which showed that women and children tend to cycle within the neighborhood (ITDP Guideline on Participatory Planning), mostly to areas such as schools and traditional markets. On the other hand, long-range cycling trips are mostly done by courier and sport cyclists. It can range from 20 km to 70 km on weekends, sometimes done across multiple cities.

In choosing routes, women tend to choose routes depending on their level of confidence as well as their purpose of cycling. Women who cycle in main roads usually do so as they cycle for sport reasons, as the large roads allow for faster speeds. These women also tend to have a higher level of confidence whilst cycling, being comfortable cycling in mixed traffic roads with cars and motorbikes. On the other hand, local roads are usually used by women for close-range trips to local activities such as going to get groceries, to the ATM, or during laid

back situations such as going home from work or for recreational purposes. These women are those using their bike for their mode of transportation, to run errands, and carry out their day-to-day activities. Nonetheless, most beginners would rather choose going through local roads rather than main roads because it is calmer and less busy so cycling is way safer, even though they admit that sometimes it takes familiarity to the local area to not get lost and can be uncomfortable due to speed bumps. This also highlights the importance of intersectionality, and to increase the number of women cyclists (which will most likely be interested but concerned cyclists), we must recognise the need for safer cycling infrastructure for women of all cycling abilities.

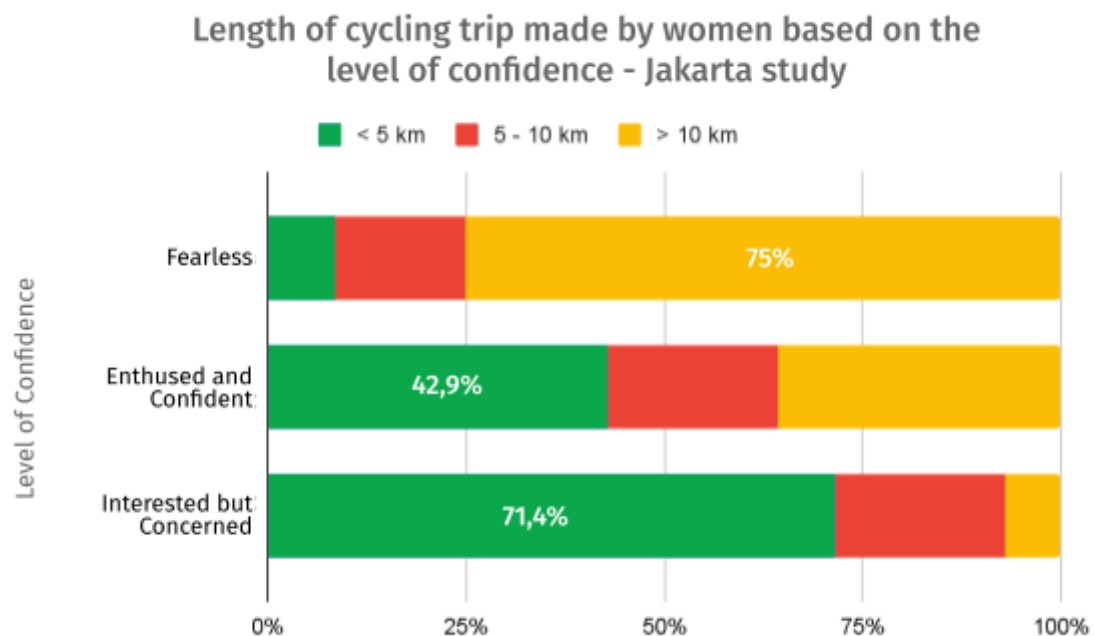


Figure 6. Trip distance made by women cyclists in Jakarta based on the level of confidence (source: ITDP, 2022)

2.1.3 Reasons to choose cycling

Cycling has advantages that drive women to use it for mobility or recreational purposes. A survey conducted in Surabaya (ITDP, 2022) regarding cyclist characteristics, as well as assessment and perceptions of Surabaya as Cycling-friendly City categorized these driving factors into 4 (four) general groups, which are cycling being fast, healthy, congestion free, and economical compared to other forms of transport. “Healthy” is the most outstanding factor that encourages women to cycle as revealed by the survey in Figure 3, chosen by 39 out of 41 women respondents. This factor, uniquely enough, is not only chosen by those who cycle for exercise once in a while, but also by those who cycle regularly. This may imply that cycling is still depicted as a way to keep women active, but some people choose to add more purpose to it, which is for commuting.

Furthermore, 37% of women respondents also claimed that cycling is “economical”, enabling them to save money for mobility needs. One respondent stated that the rise of the ride-hailing fee and the hassle of obtaining a driver’s license have actually influenced her to bike to work and exercise at least 2-3 times a month. In addition, though it is uncommon that cycling is a “fast” and “congestion free” option, these reasons are actually what women take the advantage of from cycling.

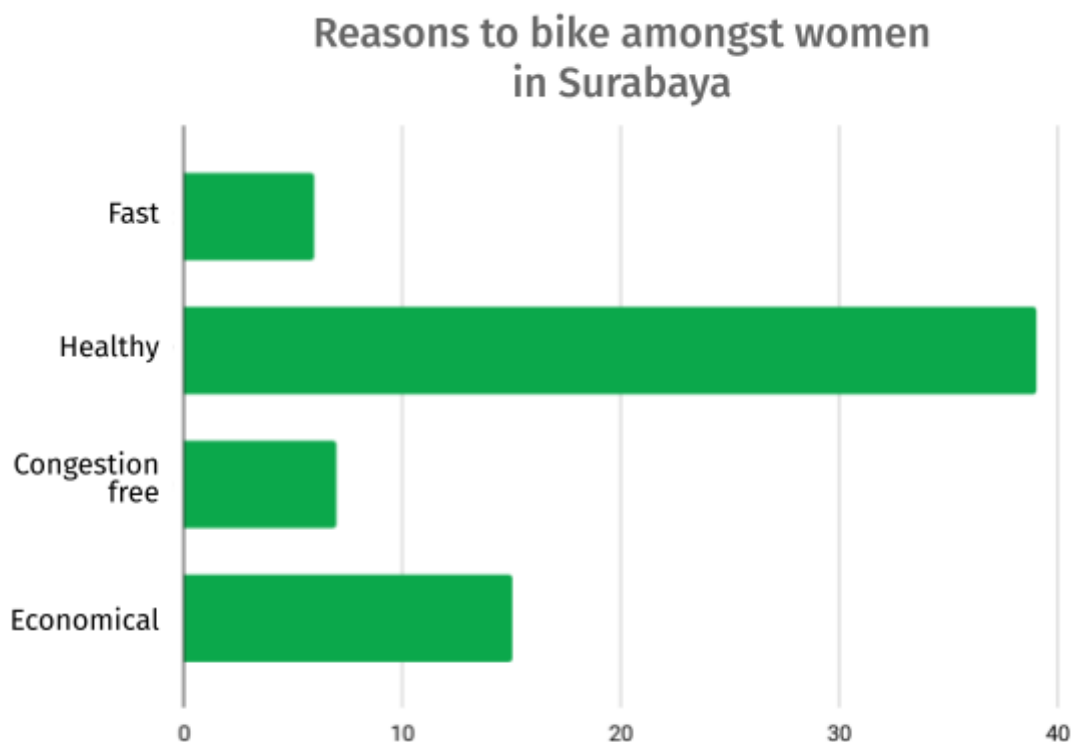


Figure 3. Reasons to bike amongst women in Surabaya (source: ITDP, 2022)

2.1.4 Purpose of cycling

In June 2021, ITDP conducted a survey regarding the Characteristics and Perceptions of Cycling on Jenderal Sudirman Street to gather perspectives of cyclists before and after a protected bike lane on the street was implemented. The survey was conducted both through online and offline platforms; both the male and female groups are dominated by cyclists with the aim of sport. The survey was answered by 727 respondents but only 13% of the respondents were women cyclists. This low number of female cyclists may not indicate the gender imbalance in cyclists, but it may indicate difference in cycling route choice amongst men and women. The results show that there is no significant difference in the percentage of men's and women's cycling objectives in the Sudirman-Thamrin street. Both genders are most likely to cycle as a sport activity. This implies that most respondents who cycled through the Sudirman-Thamrin street did not cycle for their day-to-day mobility, which may insinuate that other routes are

more favorable for cyclists who travel on a day to day basis. Figure 4 shows the distribution of objectives for cycling among men and women. The large number of sport cyclists may indicate that this route is highly favored for sport cyclists that go at high speeds.

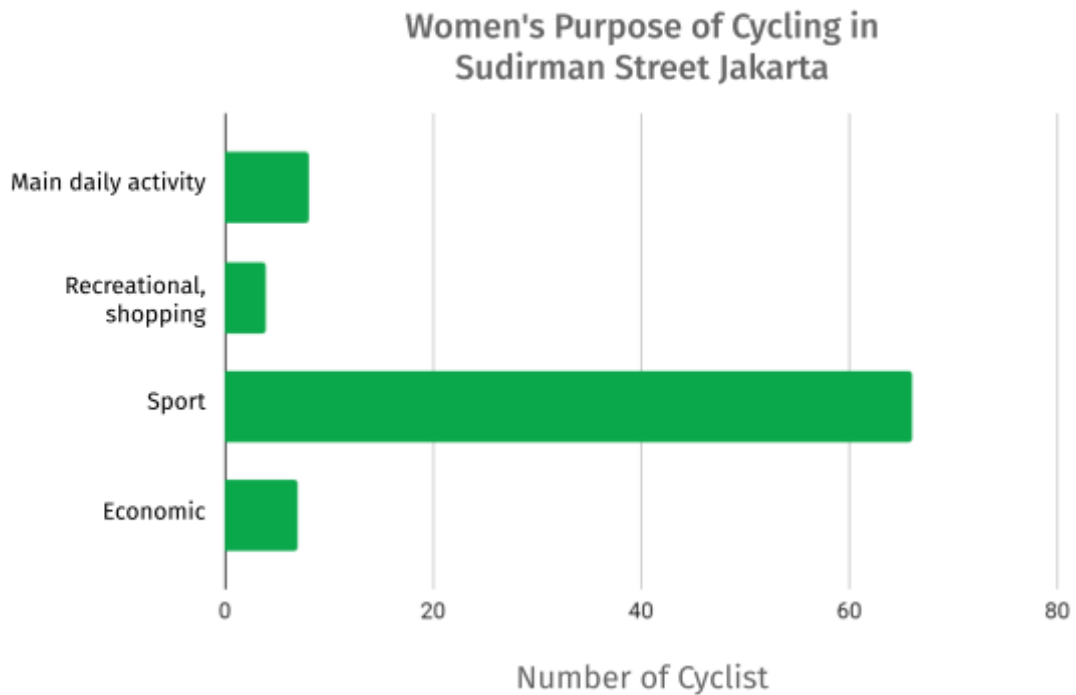


Figure 4. Purpose of cycling of women cyclist on Sudirman-Thamrin protected bike lane (source: ITDP, 2021)

2.1.5 Preferences while Cycling

According to the same survey, time preferences for cycling are similar between men and women, in which both genders prefer to cycle in the morning at 05:00 - 10:00 AM, this may be to avoid the hotter weather at noon. However, it must be noted that throughout the entire survey, no women were found to cycle at night time in the Sudirman-Thamrin street. This could be because of safety concerns by women whilst cycling at night, and that the Sudirman Thamrin street is not a street that is favored by women when cycling. Figure 5 shows the distribution of preferred time to cycle in Sudirman-Thamrin Street by men and women.

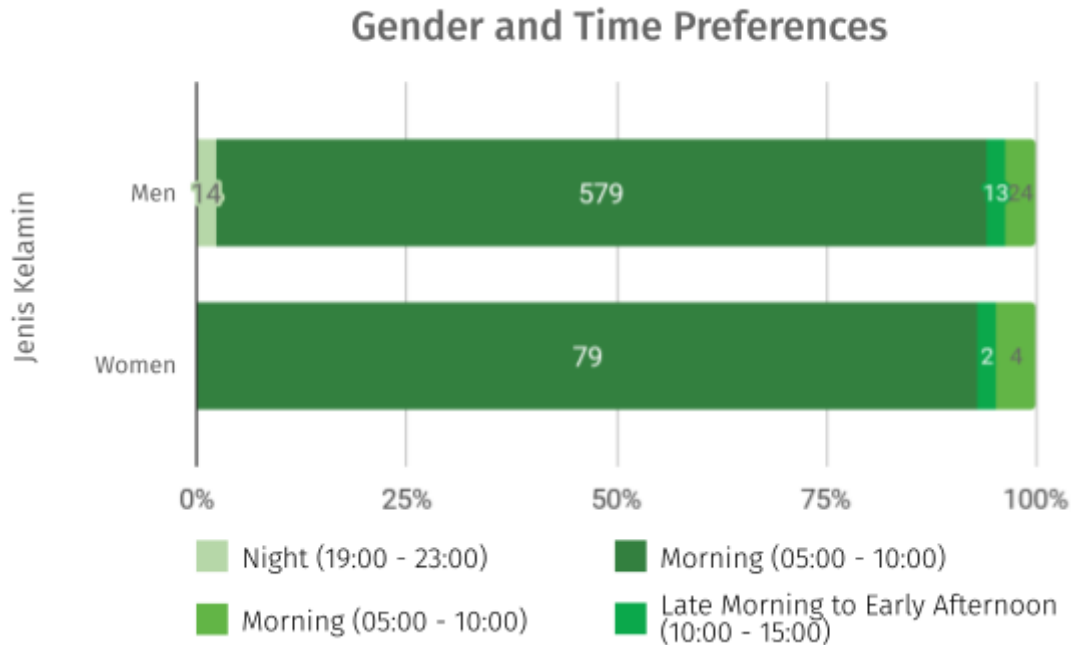


Figure 5. Time of cycling preference by gender on Sudirman-Thamrin protected bike lane (source: ITDP, 2021)

Another survey, regarding women and cycling conducted by ITDP, was conducted in the same year and aimed to target women cyclists as the main respondents. The survey was conducted online and offline as well, but included short interviews when capturing offline respondents, so that they could elaborate their answers even further. Moreover, the target scope of this survey went beyond the Sudirman-Thamrin street and Jakarta, and targeted any woman cyclist in Indonesia. In this survey, it was revealed that 55% of the respondents cycle at night, which was contradictory to results that were achieved in the survey in Sudirman-Thamrin. Moreover, 81 respondents say that their bicycle is always equipped with a light which proves that women do cycle at night, however, not on big streets such as Sudirman-Thamrin.

In terms of preferences of bike choice, women also use a variety of bike types. Folding bikes are the most common type of bikes for commuting as it is practical and flexible. Supporting bikes for first-last mile trips, folding bikes are also suitable for mix-commuters as they easily fit into public transportation fleets such as medium feeder buses or commuter trains. When bike parking is not available, women cyclists could take their folding bikes into the buildings they are visiting (e.g. office). They also come with a wide range of tire sizes; beginner cyclists could take advantage of the bigger tire diameter as it takes them to their destinations faster. On the other hand, non-folding bikes such as road bikes and mountain bikes are more popular amongst sport cyclists, including those who also bike for their day-to-day mobility. Modified bikes are also used by women to accommodate particular needs. For example, one interviewee from Surabaya modified her bike into a multi-functional cargo bike to deliver orders for her

customers. One woman cyclist with cerebral palsy from Jakarta also used a modified bike, which is a bicycle turned tricycle, so that she could be more stable when riding.

ITDP's survey on the Sudirman-Thamrin street showed the different types of bikes used by women, in which folding bikes were the most dominant types of bike (37.5%), which is closely followed by road bikes (36.2%). This can be explained by the fact that road bikes are ideally ridden in wide streets that allow for high speeds such as the Sudirman-Thamrin street. On the other hand, the convenience of folding bikes allows people to do mixed commuting with other modes of transportation such as the buses, trains, and cars. Respondents of the survey who picked specified their choice of bike as others included those who used bike sharing, being those who used conventional bike sharing or e-bikes, as bike sharing offers the ability to use a bike for one's mobility without having to purchase the bike itself. Figure 7 shows the types of bikes that were used by women in the survey.

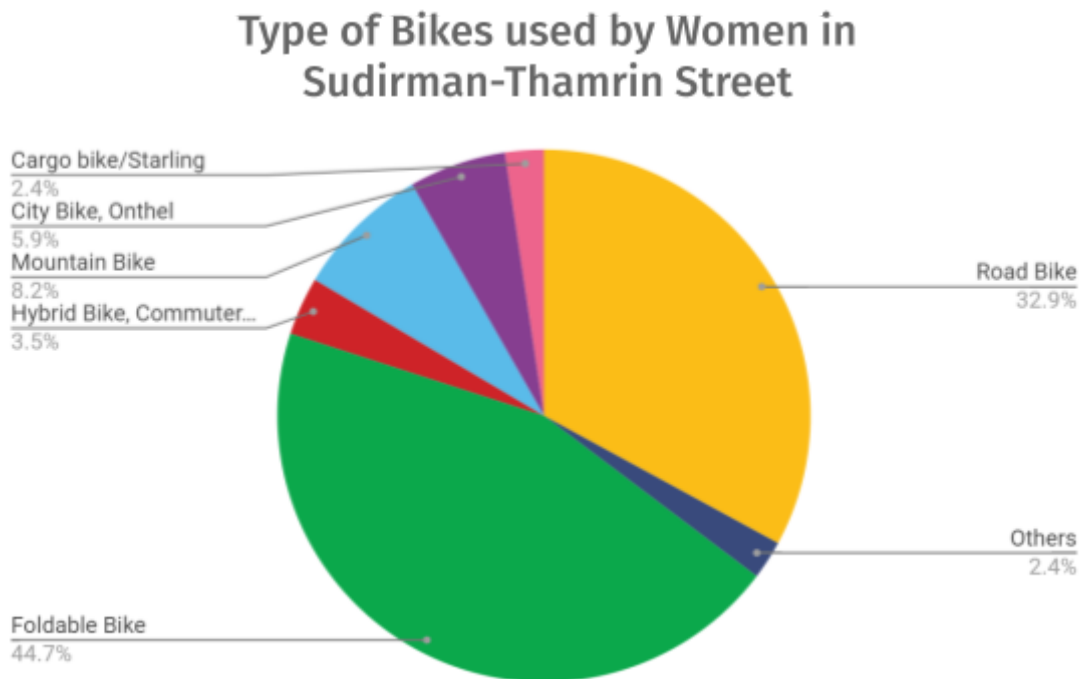


Figure 7. Proportion of the type of bikes used by women (source: ITDP, 2021)

Rising in popularity, e-bikes are increasingly being bought by women for their day to day mobility. However, this was not able to be captured within the Sudirman-Thamrin survey in 2021, which could be due to regulations on e-bikes only being legalized in the recent year of 2020 through the Ministry of Transportation Regulation 45/2020 regarding Certain Vehicles Using an Electric Motor. A survey conducted by ITDP to evaluate Jakarta's existing bike sharing system in 2022 as shown in Figure 8 also finds that the majority of both men and women (~75%) still prefer regular bikes. The top two reasons were because regular bikes support a healthier lifestyle, especially for working groups who struggle to find the right time to exercise, as well as

they are easier to use/maintain. The interviews conducted also found that most women are still not interested in purchasing e-bikes because even though they bike for their day-to-day mobility, their main purpose of cycling is to exercise. However, e-bikes emergence into the market helps boost opportunities for women who are elderly, have physical limitations, and/or live in hilly areas with up-and-down topography.

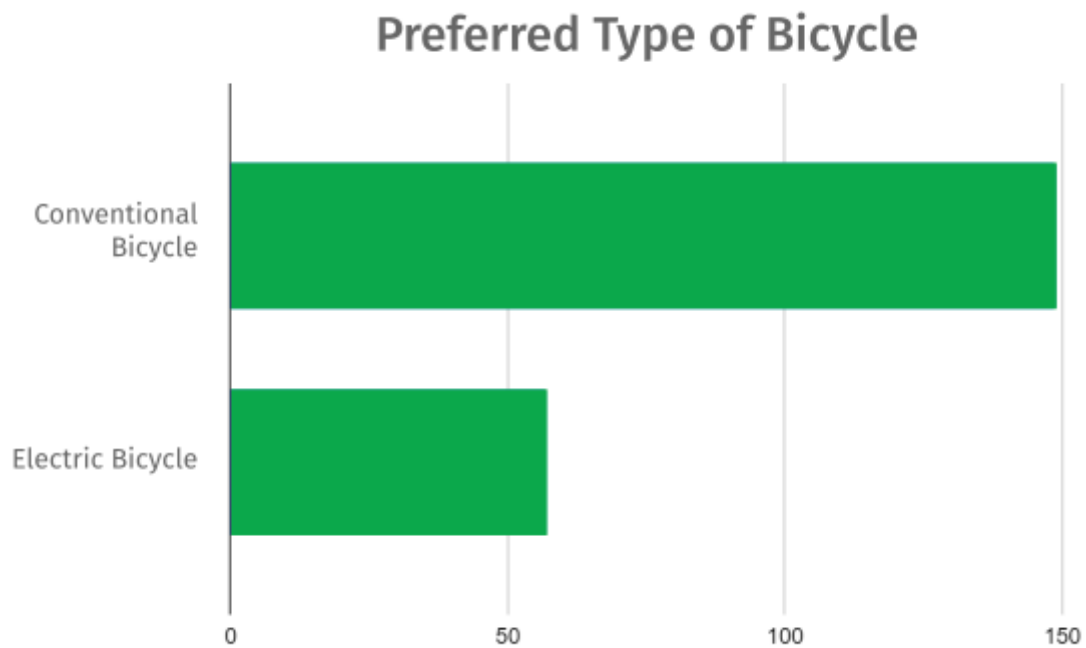


Figure 8. Regular and electric bike preference for Jakarta's bike sharing service (source: ITDP, 2022)



E-bike: A motorcycle that does not require driver's license?

In Indonesia, electric bikes (e-bikes) are often mistaken as electric motorcycles, and vice versa, which may cause confusion in terms of law enforcement. The Ministry of Transportation Regulation 45/2020 regarding Certain Vehicles using electric Motor dictates that electric bicycles or e-mopeds should not exceed 25 km/h. The main issue arises from numerous manufacturers producing two-wheelers branded as e-bikes or e-mopeds, yet with speeds surpassing the 25 km/h limit. Once a vehicle reaches 25 km/h, it falls under standard motorbike regulations, such as the need for type testing, inability to use bike lanes, the need for a license plate, and many more.

Moreover, due to the lack of physical differentiation of electric two wheelers that exceed 25 km/h and the ones who don't, consequently, confusion prevails, causing e-bikes under 25 km/h to also be prohibited by several local authorities due to ambiguous rules. Worse, under the name of "bikes", it is more appealing for those who still cannot obtain a driver's license to get one as it functions almost similar to motorcycle does, resulting in many school children using e-bikes without adult supervision.

To address this, there is a need to establish precise and explicit regulations regarding the physical difference between the two modes, which roads can be driven by certain age groups, as well as the legal obligations and prerequisites for electric two wheelers that must be fulfilled; alongside the responsibility of the Ministry of Industry and Trade to ensure manufacturers and sellers only offer products compliant with the stipulated rules.

2.2 Women's Needs and Barriers

Through surveys conducted and interviews with 11 women cyclist in different areas of Indonesia, it was found that the most common barriers faced to cycle are the following:

1. Lack of access to bicycles
2. Lack of cycling infrastructure
3. Lack of security while cycling
4. Lack of supporting cycling facilities
5. The need to carry a lot of items
6. Unsupportive environmental factors
7. Intimidation of cycling being a male dominated activity
8. Physical limitations

2.2.1 Access to bicycles

Women are less likely to have ownership of bikes which is shown in ITDP's 2022 survey regarding the evaluation of bike sharing facilities. They are more likely to also borrow bikes from their close friends and/or relatives. This trend is similar to the fact that Indonesian women also have less access to private vehicles in general, such as cars and motorcycles,

which is more prevalent in low income households in which traditional gender roles are still applicable. Here, the provision of bikesharing facilities can be a solution for those who wish to use bicycles as a means of transportation however do not have access to a bike.

Women's access towards personal bicycles

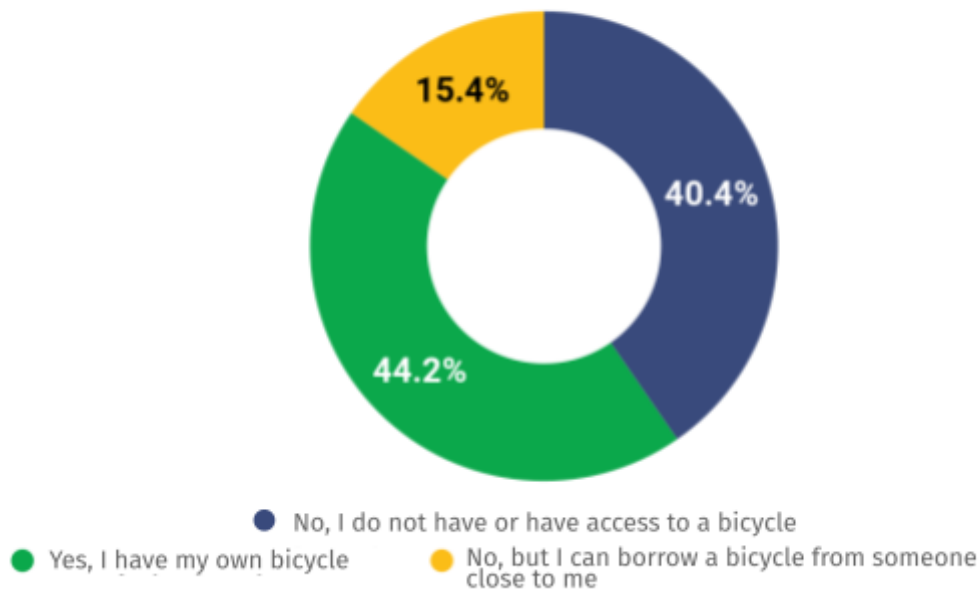


Figure 8. Ownership to bicycles by gender (source: ITDP, 2022)

Bikesharing can also be a solution for those who own a bike but feel like their bikes are not suitable for day-to-day mobility. This can be the case for sport cyclists that wish to cycle for their daily activities but do not want to use their road bikes. An interviewee mentioned how her road bikes are not suitable for her day-to-day mobility. However, she is familiar with bike sharing, and she often uses it when she is overseas in Beijing, while visiting her daughter. In this case, the availability of bike sharing can also support women sport cyclists who wish to cycle for their mode of transport without having to pay the upfront costs of a new bike.

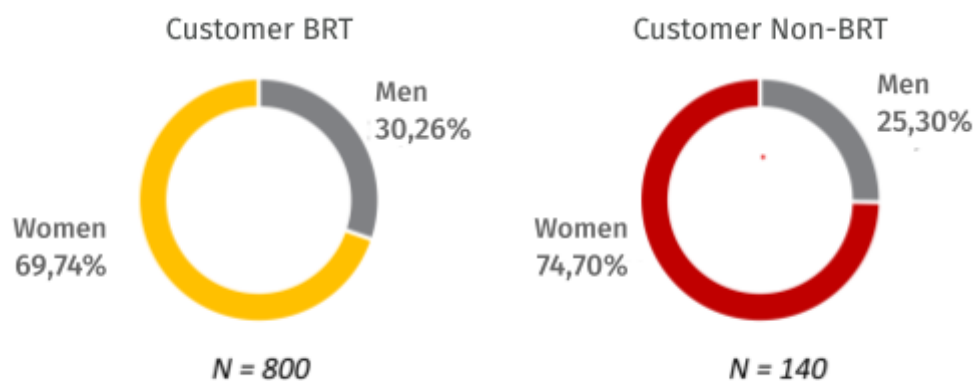
"Because of the hot weather and that my bike is not suitable for commuting, I do not use a bike for my day to day mobility. [...] If the conditions are like Beijing (regarding bike sharing facilities), maybe I would start cycling daily". - Natalia, 48

Bike Sharing to Support Women's First and Last Mile

Women and other vulnerable groups constitute the majority of users of public transportation. This could be attributed to the lack of access to private vehicles, particularly in the context of low-income households where traditional gender roles are still prevalent. In such scenarios, the preference for private vehicle usage is often given to male members of the household, leaving women reliant on alternative forms of transportation like public transit. According to the 2019 customer satisfaction report, a significant proportion of Transjakarta's passengers are female. Approximately 69% of their BRT (Bus Rapid Transit) passengers and 74% of their non-BRT customers are female.

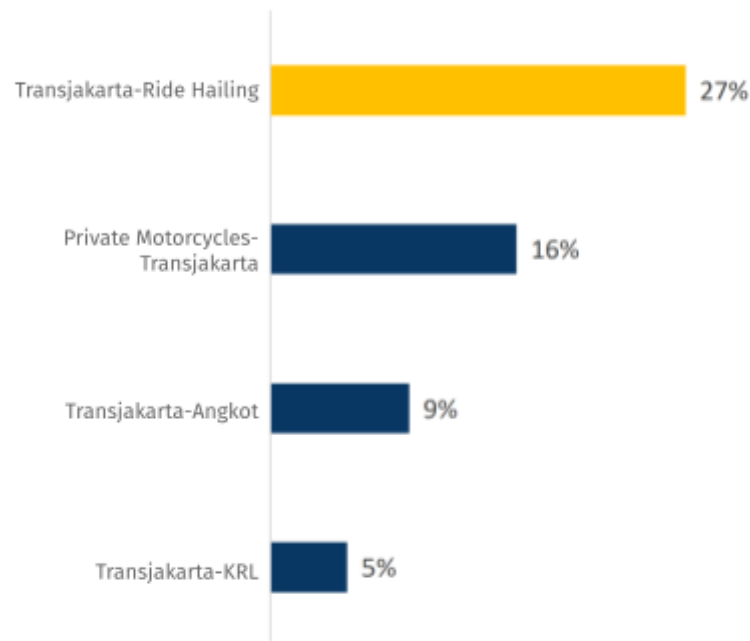
The same survey revealed that many Transjakarta users practice mixed commuting, often combining Transjakarta services with motorcycle taxis as the most common mode of mixed commuting. Additionally, a passenger survey conducted by ITDP in 2019 prior to the COVID-19 pandemic at one of the MRT stations highlighted that 70% of passengers opted for motorcycle taxis, private motorcycles, or private cars to reach the stations. These circumstances are concerning, as these modes of transportation are not sustainable and significantly contribute to the congestion and pollution issues faced by Jakarta. Micro mobility solutions, such as bikesharing, have the potential to play a pivotal role as sustainable transportation options for first and last mile connectivity. This is especially important for individuals who need to cover long distances for their day-to-day activities, where relying solely on bicycles might be impractical for the entire journey.

Gender



Combination of Transportation Modes

(All Respondents, N=1000)



Monetary Savings of Using Bikesharing Services

One of the major mode of transportation for first and last mile connectivity and short trips is the ride-hailing services or two conventional two wheelers. Bikeshare as one of the micro-mobility modes of transport in cities in Indonesia have the opportunity to substitute these two wheelers as a sustainable and affordable alternative.

1. **Cost Savings:** Bikesharing services typically charge around Rp3,000 for every 15 minutes, covering a distance of approximately 3 kilometers. In contrast, traditional ride-hailing services in Zone I* have minimum fares ranging from Rp9,250 to Rp11,500 for a 4-kilometer ride. For a 15-minute bikesharing ride, you would pay Rp3,000, while the same distance covered by a ride-hailing service could cost up to Rp11,500. This results in immediate savings of up to Rp8,500 for a 15-minute trip.
2. **Short but Frequent Trips:** Another key factor contributing to cost savings is the frequency of use. Bikesharing is often more suitable for short, frequent trips within urban areas, such as the first and last mile of a commute. In contrast, ride-hailing services may become more expensive when used for multiple short trips throughout the day. By opting for bikesharing for these short trips, commuters can potentially save a substantial amount over time.
3. **Sustainability and Long-Term Savings:** Beyond immediate cost savings, there are long-term economic benefits to consider. Bikesharing is a sustainable transportation option that reduces reliance on fuel-powered vehicles. Over time, this can lead to reduced personal transportation expenses, including fuel and maintenance costs, for individuals who choose to incorporate bikesharing into their daily routines.

* Cost of ridehailing is divided into 3 zones: Zone 1: Zone I includes Sumatra, Java (excluding Jakarta, Bogor, Depok, Tangerang, Bekasi), and Bali, Zone 2 Includes Jakarta, Bogor, Depok, Tangerang, and Bekasi, Zone III includes Kalimantan, Sulawesi, Nusa Tenggara and surrounding areas, Maluku, and Papua.

In addition, access to bicycles is also an issue amongst women with disabilities. In order to help them travel independently, women with physical disabilities require a specific type of bike that can fit their special needs. Some may be able to ride a bicycle, but those who can no longer ride a bicycle can find a safer alternative with a tricycle that allows for more stability, however, it may not be easy to find one made for adults at regular markets. Modifications of bicycles into a tricycle, or making it automatic, would then cost them a considerable amount of additional charges unless subsidized by a certain party. Establishing cycling communities that support women with disabilities can be a tool to provide access to bicycles, a healthier and environmentally-friendly option, for them. Icha, a woman cyclist with cerebral palsy is participating in a cycling community where in the recent year of 2022 she was given a new folding tricycle, also equipped with a basket. She usually uses her bikes to go to the market and to the station, then connect her trip chain with the Commuter Line.

2.2.2 Cycling infrastructure

Poor cycling infrastructure is one of the main barriers for women while cycling. From ITDP's 2021 survey regarding women and cycling, it was revealed that improvements in cycling infrastructure, such as the increase of protected bike lanes availability, parking facilities in public spaces, as well as safer cyclist crossings were the three aspects that were most important for women to ensure a bike-friendly environment. This was supported by ITDP's 2021 survey in the Sudirman-Thamrin Street, which showed that women were more likely to use pop-up bike lanes than men, and deemed the speed of cars as well as lack of cyclist priority in points of conflict as the most dangerous situations for female cyclists. These surveys show that women are mainly concerned about their safety while cycling, mostly regarding having to interact with motorists during most of their rides. One cyclist who has recently started cycling less than one year ago stated that she is still concerned about fast-moving vehicles that can potentially throw her unstable while riding her bike.

"The conflict with vehicles is either them being too fast, or them being too many. Living in Boyolali, the road is not that packed with motorists, but they are always moving at high speeds. As a cyclist who just started less than a year ago, I still don't have the capability to control myself in such situations, sometimes it makes it more difficult when the route I take is uphill." - Lala, 33

However, concerns about cyclists having conflicts with motorized vehicles are not only experienced by the beginner cyclists. Women who cycle for their day-to-day activities also claimed that even though they are confident riding on busy roads, be it roads with high volume of vehicles and/or high-speed vehicles, they are still afraid of the external factors that they could not control; vehicles could hit them at any time. One interviewee who usually bikes to work added that she finds it hard to make a turn when accessing buildings because of aggressive motorcyclists. When crossing the street, most women including those with disability usually rely on crossings where motorists would stop for them, such as signalized junctions

and pelican crossings. In addition, beeping sound equipped into the signal made crossing way easier. This indicates that both space and time segregation from motorists are necessary even for the fearless cyclists. Sometimes they are unaware that they could get in a dangerous situation because of their high level of confidence.

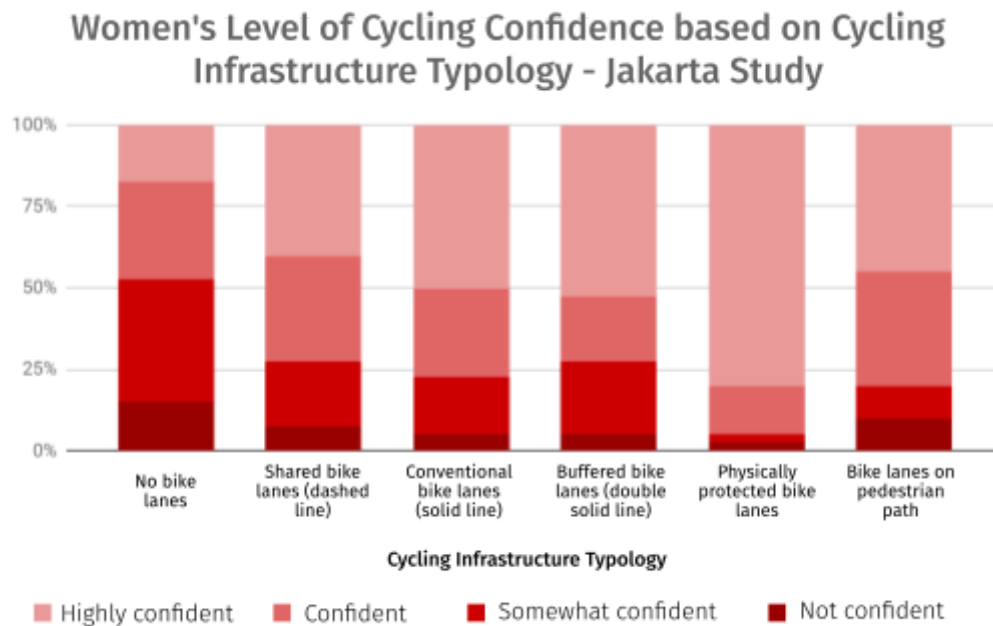


Figure 9. Women's level of cycling confidence on different types of cycling infrastructure (source: ITDP, 2022)

Figure 9 shows data regarding women's level of cycling confidence when cycling on different types of cycling infrastructure from ITDP's survey in Jakarta (2022). It is worth highlighting that 80% of women respondents are highly confident when they cycle on physically protected bike lanes. This result is aligned with the fact that one of the biggest concerns that women are facing is exposure to motorized vehicles. It is also interesting to note that, though most women stated that they are highly confident riding on bike lanes without protection, the number revealed a significant difference when protections are in place. On the contrary, a striking number of somewhat confident to not confident women cyclists can be seen on streets/roads without bike lanes. This implies that cycling infrastructure with only markings could even be helpful for cyclists than no cycling infrastructures at all, because it could raise motorists' awareness of cyclists' presence. Regardless, the provision of physical protection where it is highly needed, mainly on high volume and/or high speed roads, would be a much better option as it fully segregates the space between cyclists and motorists.

In addition to bike lanes, an interviewee also explained how the roads themselves are not safe to cycle on. Uneven roads, lack of maintenance, as well as damages on the roads cause a safety hazard for cyclists. ITDP's 2021 survey on women and cycling revealed that during night time, damage on roads is the most common fear for women cyclists when cycling at night, as

damages will be least visible at night, making cyclists more vulnerable to accidents. This may indicate both the lack of proper roads to cycle on as well as lack of lighting at night which not only affects visibility but also one's perception of security. Supporting this statement, it was revealed that lighting is the most popular bike accessory that women have on their bikes.

"The (Makassar) government prepares bicycle lanes, it just doesn't accommodate the needs of cyclists, it's really not safe. There are many holes in the road and one time, there was an instance where 2 cyclists from 2 different communities had an accident within one day." - Natalia, 48

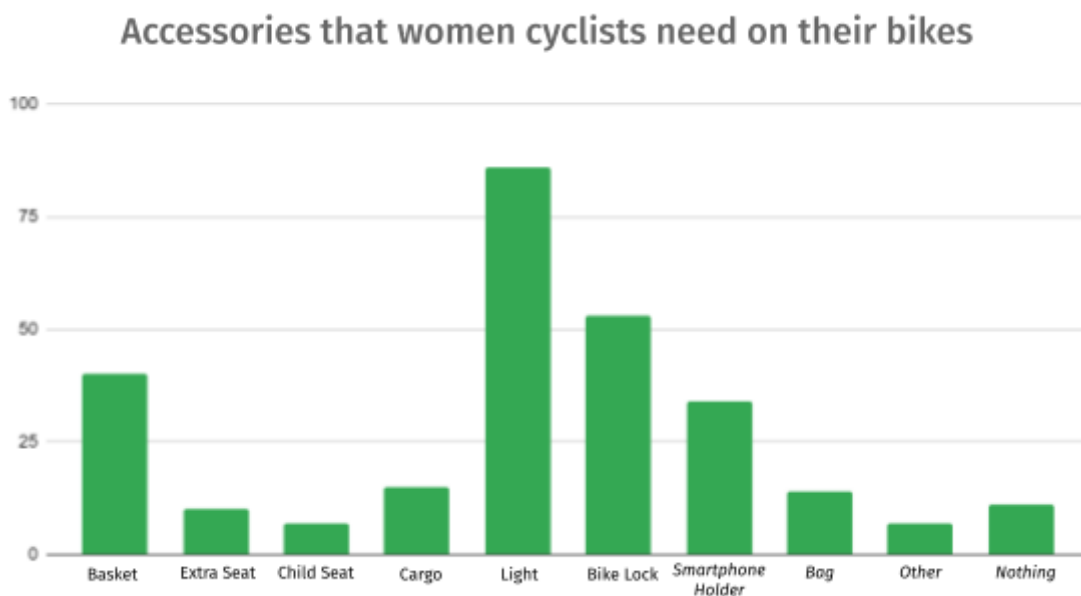
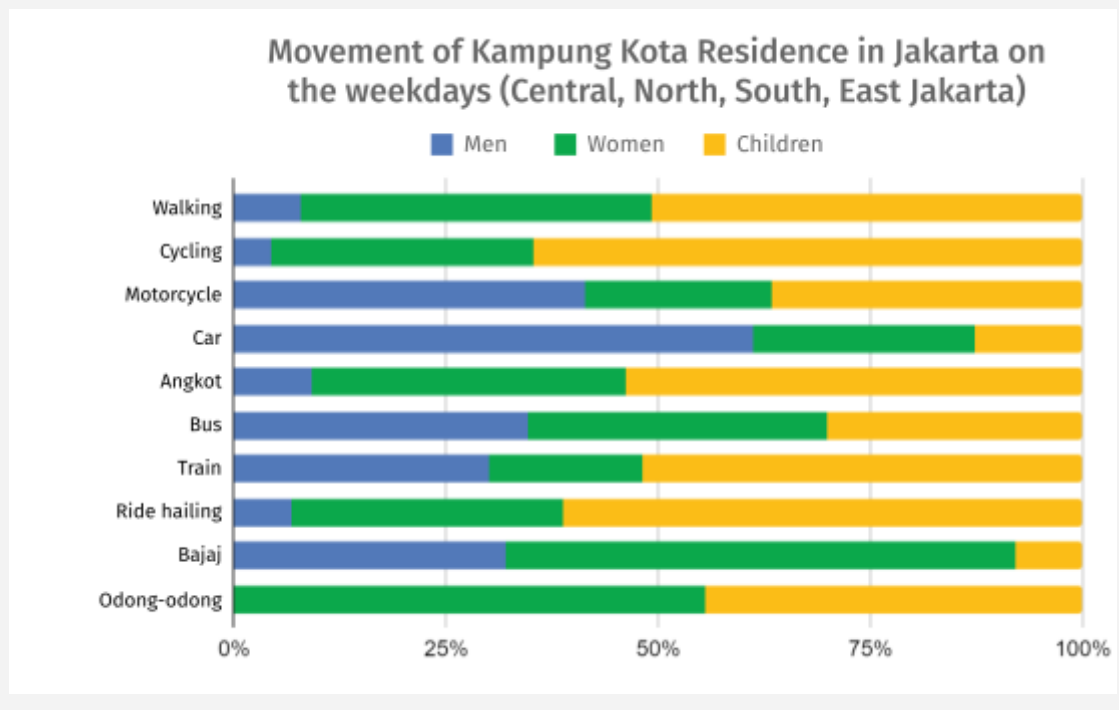


Figure 10. Accessories that women cyclists need on their bikes (source: ITDP, 2021)

A network of cycling infrastructure should also be connected to each other. At a road segment, bike lanes should not be discontinued and should at least span from one junction to the other. By being so, it provides continuous safety throughout cyclists' journeys by keeping themselves segregated and be visible to other road users. One interviewee from Surabaya described that she had once cycled on a bike lane where at some point it discontinued and she was confused where to position herself, which unfortunately led her to being hit by a car. This shows that the available cycling infrastructure is not safe. It is not well-protected and not continuous which later puts cyclists in conflict with motorists, as motorists are likely to be less aware of cyclists when there is no protection, marking, and signs indicating a segregated bike lane. Coherent networks also allow cyclists to navigate safe routes for cycling especially on main roads; on local roads, wayfindings or signages will help cyclists find alternative routes to avoid congestion and fast-moving traffic on main roads.

The Need to Focus in Urban Villages

Within urban villages, bicycle users mostly consist of women and children. The purpose of children's trips is usually to use bicycles to go to school or play with other children, while mothers are more use it for basic necessities like traveling to the Traditional market. This raises the importance of increase cycling infrastructure within the neighbourhood. Through surveys conducted in 27 urban villages, it was further revealed that the lack of segregation of bike lanes is one of the main barriers for women cyclist . Cyclists often feel afraid of being hit by a vehicle and are often honked at, causing them to be shocked. Cyclists also feel unsafe cycling because the vehicles are speeding on neighborhood roads.



The need for a larger network when cycling was also mentioned by sport cyclists. Sport cyclists are known to cycle in mixed traffic, out of protected bike lanes, to be able to cycle at higher speeds. However, if the roads are also filled with cars that go at high speeds, collisions and accidents are more likely to occur. In the city center of Jakarta, in the Sudirman-Thamrin Street, in response to this, the Government of Jakarta instated a rule that obliged cyclists to use the protected bike lanes after 6:30 AM, which is the rush hour. One of the interviewees then mentioned,

"Personally, I am interested in using bicycles as a means of transportation, but the problem is safety and pollution. [...] There are no bike lanes near my house, but I'm used to it. However, the problem is when other road users say we are using their lane, even though we are sharing it because there is no bike lane. For example, at Sudirman-Thamrin, once it is 6:30 we're obliged to use the bike lane, if not, we'd get scolded. I'm OK with that. so we get into the bike lanes and go home, but there is no bike lane after Sudirman-Thamrin Street, on the way home." - Tabitha

Cycling through the eyes of the mothers

Some interviewees are also mothers. Through the interviews, they shared their perspectives regarding their children following their paths – to make cycling as part of their lives.



*"A cycling-friendly city is where a mother could sleep soundly when her children are cycling. [...] Surabaya's main roads are still too dangerous for children to ride their bikes. Heavy vehicles fill up the roads with no protected bike lanes, **it would be too unsafe for my children.** Moreover, there is no local roads that lead to their schools, so they will have to take the main road." – Satiti, 48*



*"**Age and maturity are to be taken into consideration** when giving permissions for my children to start cycling. My son, who is in elementary school, wants to bike to school, but I want him to wait until he is in Junior High School to do so. [...] By cycling, children learn to be aware towards their surroundings, **to be more independent, and to have courage** in dealing with the traffic." – Patricia*



*"When my son wanted to start cycling to school, **I made sure that he would know which route to take when going to school and going home from school.** My husband and I would first go with him on the weekend to show the safest route to use when cycling to and from school. Now he cycles everywhere by himself" - Melcy, 53*

2.2.3 Lack of Security while Cycling

Common barriers cyclists have when wanting to shift to cycling for mobility is the fear of criminal activity such as getting mugged (begal) or experiencing sexual harassment while cycling. One of the interviewees who cycles for sport reasons shared her experiences getting robbed whilst cycling with two other cyclists in a suburban area in South Tangerang. These events may cause additional fear when having to cycle alone for one's day-to-day mobility.

"I'm not interested yet (regarding cycling for day-to-day mobility), right now my main concern when i'm biking towards somewhere is safety from criminal activities, specifically muggers. [...] I've been robbed in BSD before, while I was cycling with 2 other cyclists in front and behind me, both male cyclists."

- Tabitha

In addition to mugging incidents, sexual harassment was often mentioned amongst interviewees as a barrier to cycling. Due to high rates of sexual harassment incidences involving women on public transportation and public areas, bicycle use can be seen as a solution as it is solitary and reliable to keep its users' distance from the other. However, sexual harassment turns out to also be a problem among cyclists, which was contradictory to the previous statement. The most common sexual harassment that women experience while cycling is cat-calling by men motorists. There are also times when male motorists would scoot over to women cyclists and try to grab them; this is made even easier when there is no physical segregation. Results from ITDP's survey regarding women and cycling reveals that 56% of the overall women respondents mentioned cat-calling as one of their concerns for cycling at night, placing cat-calling as the biggest obstacle when cycling at night. A way in which some women respond to this by cycling with a group at night and also equipping their bicycles with a light to be aware of other road users.

The fear of being sexually harassed/assaulted was mentioned by many interviewees, with one mentioning that she feels sexual harassment is more of a threat than being mugged. In reaction to the fear of being sexually harassed, interviewees have mentioned cycling with their partners to feel safer and to watch out for suspicious behavior from other road users, as well as stopping cycling forever due to the trauma experienced. One interviewee, who happens to be the founder of a all women's cycling community mentioned that unwanted attention from men as well as men trying to enter their community despite the community aiming to provide a safe environment for women. She mentioned that she tries to mitigate these situations, by practicing modesty in clothing and teaching that to her community members as well. Additionally she also filters the type male cyclist her community collaborates with to ensure no ulterior motives from other male cyclists.

"I will feel safe and comfortable only when cycling together with my husband. We watch out for each other's safety, but mostly he would watch out for unwanted moves from passing motorists that may happen to me. Other than that, when cycling longer distances, cycling with my husband keeps me from getting lost." - Ani, 42

Cycling at Night

A survey conducted by ITDP in 2021 revealed that 55% of women cycle at night. For women who cycle at night, the most frequent obstacles for women are:



1. Falling due to holes on the ground and lack of light

"Lights that are installed behind the bicycle are added, lights are also installed on the rear of the helmet, and holographic tape is attached to the hands or back. mirrors are also installed on bicycles."



2. Cat Calling

"When this happened i speed up the bike, next time I cycled, prepared pepper spray and dress up in to look like a tomboy"



3. Being Followed by strangers

"I would usually pull over to a rather crowded place, for example a street food stall or minimarket."

It is common among the interviewees who cycle for sporting reasons to condemn their cycling attire for the unwanted attention that they receive, however, other cyclists who wear casual attire when cycling also receive these unwanted comments. The variety and diversity of cyclists being harassed indicates that neither time nor clothing directly correlates with the abundance of sexual harassment experienced. Nonetheless, it may have an effect on the perceived security. For example, the interviewee who was traumatized and stopped cycling forever due to harassment was cycling in the morning, where other interviewees perceive night time being the most dangerous time to cycle.

"Cycling at 5 in the morning, you would think that the biggest issue are robbers, but there are more times where i am more afraid of sexual harassment. It is true that our outfits are tighter because that is what is most comfortable for cycling, however, people do not respect us whilst cycling. When I do get catcalled, I get insecure whilst cycling." - Irina, 25

The impacts that cat-calling could have on women and how women would react to the acts might differ, but it definitely correlates with discomfort while cycling. Figure 11 shows the results from ITDP's study in Surabaya (2022), where a high percentage of men (66%) and women (71%) stated that cat-calling is relevant to highly relevant to feelings of discomfort, thus likely causing them to cycle less or worse, deter from cycling. This implies that more men are aware that the acts of cat-calling could happen to just anyone, with women being more vulnerable. Furthermore, it is quite unique that there is a bigger percentage of women who choose 'irrelevant' than men, though this could be an anomaly. Measures to eliminate and mitigate the

issue of sexual harassment among cyclists therefore need to be taken seriously, for example by applying physical barriers and providing sufficient street lighting, encouraging active bystanders, and raising awareness regarding these issues.

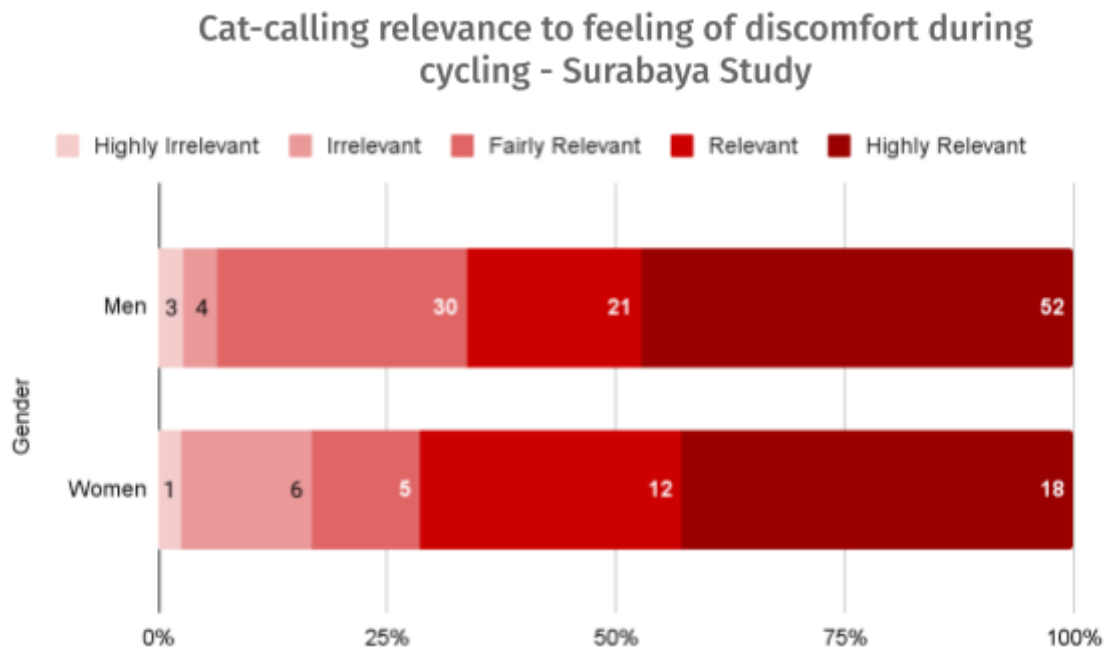


Figure 11. Discomfort of catcalling to cycling perceived by women and men (source: ITDP, 2022)

Active Bystanders

Bystander intervention presents an effective approach for enhancing situations where someone may require assistance. It revolves around actively and positively contributing, rather than disregarding the situation or expecting someone else to resolve it. Bystanders are individuals who have witnessed unfavorable events, with passive bystanders opting to disregard or take no action for various reasons. Conversely, active bystanders are those who proactively strive to improve the situation.

1. **Distraction:** Distraction serves as a discreet and inventive method of intervention. Its purpose lies in safely interrupting the incident by engaging the at-risk individual, offering them an opportunity to safely remove themselves from the potentially perilous situation.
2. **Directly Asking:** Addressing the individual at risk directly allows for an assessment of whether immediate action is necessary to ensure a secure environment. Questions such as "Do you require assistance?" or "May I accompany you?" or "Would you like to relocate to a safer place?" enable you to extend support and determine the appropriate course of action.
3. **Mobilizing Support:** At times, the most secure approach to intervention involves enlisting the aid of an authority figure, such as a resident assistant, bartender, bouncer, or security guard. This choice ensures the presence of additional support and may offer enhanced safety measures against the perpetrator.

4. Offering Assistance: Extending a helping hand and a compassionate ear can yield significant impact. Providing suitable resources and presenting options for support, you can inquire, "Would you like me to accompany you to your destination?" or "Is there any way I can help you?"

By embracing the role of an active bystander, individuals possess the ability to effect positive change and potentially prevent harm in various circumstances.

2.2.4 Cycling supporting facility

Women are also concerned regarding the lack of supporting cycling facilities, such as the absence of secure bike parking facilities at offices, markets, and other public places. They are afraid that their bike may be stolen by other people, either because there are no racks to lock their bikes onto or because there are no security officers around. One of the interviewees even initiated to use a folding bike so that she could bring it inside the office with her. Some women cyclists, however, do not really care about parking their bikes as they think no one would be tempted to steal bicycles with it being an unpopular choice for mobility.

"When going to the market, I will usually leave my bike without locking it and when I come back, it's still there. I don't think no one is interested in stealing my bike – perhaps because it's not that expensive." - Satiti, 48

In Jakarta, provision of bike parking at transit stations has been regulated and therefore, bike parking could easily be found in any transit stations. By regulation (DKI Jakarta Governor Regulation No. 51 of 2020), office buildings in Jakarta are also required to retrofit 10% of its car parking space into bike parking. Some other cities like Surabaya have also provided bike parking at public spaces like parks and commercial areas. Unfortunately, many of these outdoor bike parking spaces are out of security and/or CCTV surveillance and not weather-protected, so cyclists cannot guarantee that their bicycles are secure or will not be damaged by weather.

Other than parking, some women cyclists also stated that they have trouble repairing their bikes when broken. Some of them tend to rely on family members, most being male (e.g. husband, brother, etc.), to fix their bikes, but when there's none, their only option is to look for repair workshops. One woman cyclist claimed that they just did not have the same capability to understand mechanics as men did; though she had tried to follow the exact instructions, she still failed to do so. Unfortunately, especially in small cities/regions like Boyolali, there are not many repair workshops available. If any, the mechanist is only capable of repairing regular bikes and has no advanced equipment to repair special bikes such as electric bikes and bikes with hydraulic brakes.

2.2.5 The need to carry a lot of items

Women who cycle for sport or recreational uses usually use bikes that are made for high speeds and long distances such as road bikes. Unfortunately, these bikes are not ideal to use to carry many items. From interviews, women usually carry many items for their day to day activities and have multiple destinations every day, therefore, a road bike cannot accommodate their daily mobility. Buying a different bike would therefore be necessary for women cyclists to be able to use a bike for their day to day activities, but this would add extra costs for women. The survey on women and cycling (ITDP, 2021), supported these claims, as it showed that a basket was the third most important accessory that women needed on their bikes, which is not common on road bikes.

"The distance from my house to my office is 8 km, which is much lower than how far I usually cycle when I am cycling for sporting reasons, however, after work I have other activities in which I need to bring a lot of items. So, using a car is more convenient." - Irina, 25

However, women who have tried cycling to work had a say in contrast to the previous statement. Strong will is important in this case, because eventually women will manage to find a way to simplify their journeys, either by eliminating the items that they have to carry or by equipping their bikes with storage, such as baskets and panniers. One interviewee mentioned that she only bikes to work 4 days a week (Tuesday to Friday) because she has to bring all of her essential items on Monday and leave the heavy ones (e.g. laptop) at the office. She will then only have to bring changing clothes in her backpack on cycling days.

"I just want women to acknowledge that cycling is not necessarily impractical – getting sweaty or bringing along a lot of items to the office. Instead, women should take this as a challenge to be more thorough in simplifying their needs, so that cycling for their day-to-day mobility could still be fun and comfortable." - Patricia

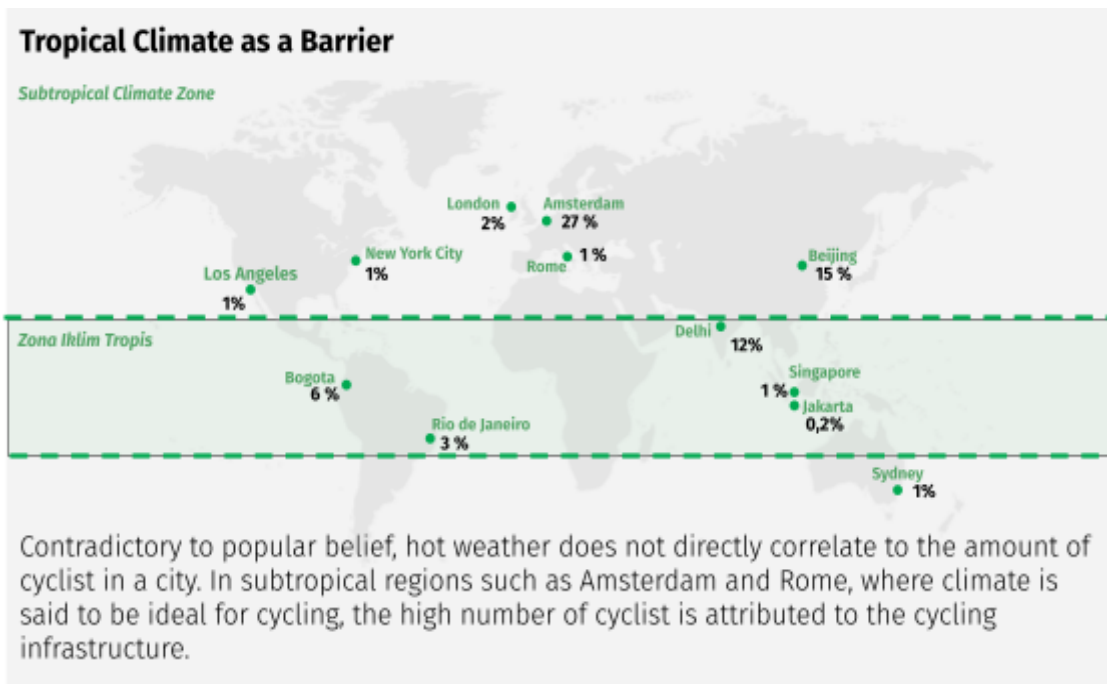
2.2.6 Environmental factors

Indonesia is a tropical country where the weather is either hot and humid, or wet in a way that it may rain all day. Some of the interviewees mentioned how the hot weather can hinder them from cycling, saying that in this kind of weather it would not be suitable for daily cycling because as women, they tend to avoid getting too sweaty when they arrive at their destinations. Some office buildings, though, have provided shower facilities, but sometimes women cyclists feel like they do not have enough time to shower. On the other hand, there are many more buildings that still do not have shower facilities, so it lowers down the opportunity

for women to cycle on a daily basis even more. The attention to provide more shower facilities that are accessible by the public needs to be raised; at the moment, public shower facilities can be found at a mixed-use building in Central Jakarta called f(x) Sudirman.

“Hot weather is no problem for me. I’m rather thankful for the sun as it doesn’t always come out and it could rain at anytime during the first-half of the year.” - Elva, 54

Nevertheless, it is also worth noting that hot weather tends to not cause any inconvenience for those who have chosen to cycle for their day-to-day mobility. For sport cyclists, rain was a more prevalent barrier mentioned when cycling rather than the heat. Hot weather was a normal factor that these cyclists experience, however, rain could act as a hazard when cycling as it causes less friction, making cyclists more prone to slipping and falling.



Tropical Climate as a Barrier



Cycling in Rome

Lack of cycling infrastructure such as safe protected bike lanes and supporting cycling facilities such as bike racks cause the lack of cyclist.



Cycling in Amsterdam

Wide, protected bike lanes, combined with a variety of street calming measures, and an abundance of cycling infrastructure supports cycling as a mode of transport



Pollution is also one of the factors that may limit one from cycling on a day to day basis. One of the sport cyclists mentioned how she only cycles early in the morning where there are less vehicles on the road and less air pollution. Her reasoning is because she has asthma, therefore she has health concerns if she were to cycle for a mode of transport which requires cycling throughout the day. This highly affects vulnerable groups that suffer from respiratory diseases and are more prone to premature deaths due to air pollution.

"My main issue is air pollution, because I have asthma. Everyday I check the air pollution index in Jakarta. If it were Yogyakarta or Bali, I would actually cycle (regarding different times), but because Jakarta is highly polluted, I only cycle in the morning." - Tabitha

Geographical contours may also act as a barrier to cycling on a day to day basis. Places such as Semarang and Boyolali which are hilly may cause cyclists to have to exert more effort when cycling. Here, e-bikes may aid their mobility, as zero emission vehicles but allow for less effort when pedaling. Protected cycling infrastructure will also help, as cyclists may go at slower speeds at an incline and the speed difference with motorized vehicles can be higher.

"I have been saving up money for an e-bike. It will definitely help me to take longer distance with the same effort that I exert using my current bike." - Lala, 33

2.2.7 Male dominated activity

As mentioned previously, cycling is still a male-dominated activity. This reality has also made it hard to fully capture the voice of women in creating cycling friendly cities. Supporting this statement, most cycling communities consist of a majority men, as confirmed by one interviewee from Surabaya, that in her community there is only 30% women participating.

Consequently, this may also cause women to be more hesitant to cycle. From the interviews conducted, it was revealed that cycling with other women encourages women to cycle. Tabitha, the founder of a women's only cycling community mentioned that women feel more comfortable cycling with other women, and the goal of her community is to establish a safe space for women to cycle.

"It's easier for women to cycle when they are cycling amongst other women, as it is easier to ask for permission from their husbands. A lot of time when cycling is the first thing you do when you wake up, and sometimes our trips require us to sleepover overnight somewhere when we are doing tours, a lot of women in our community feel more comfortable, therefore, doing these activities in an all women environment" - Tabitha

Cycling communities are widely spread across Indonesia with a variety of purposes, most of which are for recreational and sport purposes. Cycling communities however, must be differentiated from cycling clubs, which are performance-based cycling groups that train together usually for the purpose of an event such as long range tours, competitions and races. Both cycling clubs and communities however, are usually very male-dominated. Tabitha has also mentioned that within her cycling community, she has created subdivisions in her community such as those who want to cycle for sporting reasons using their road bike, and those who wish to cycle at shorter distances, in a relaxed manner, using bikes such as folding bikes. This allows women with different levels of experience cycling to start, even beginners.

2.2.8 Physical limitations

Some women cyclists possess physical constraints that limit their cycling activities. Beginner cyclists who are not used to working out their muscles will require much more effort than the advanced ones. This may cause them to move in a slow pace, which could be dangerous when they are cycling on roads with fast-moving vehicles without any segregations, due to bigger speed differences. In addition, women with a certain kind of disease may not have as much power to bike regularly as those without the disease. One interviewee who suffers from a cardiovascular disease mentioned that cycling is one of the most recommended exercises by her cardiologist, however, she is not able to take uphill routes because it could severely increase her heart rate and put her in a risky situation; she therefore needs to take a detour that takes longer distances.

"I usually just bike to the office in the morning, not the other way around in the afternoon. It is because I have to take a different route when going back home, it includes having to go through a steep flyover, and my heart wouldn't be able to take it." - Elva, 54

Moreover, physical limitations may apply to those who use bicycles for economic reasons, such as selling certain products/goods en route. They usually have to bike for a whole day everyday, not to mention the considerably heavy goods that they carry on the back/front of their bicycles. Though this may not be a constraint for them because they could have been used to it, e-bikes can act as an aid to ease their day-to-day mobility in fulfilling their needs.

Another example of cyclists with physical limitations are those who bear hearing disabilities. Their hearing disabilities put more negative remarks on the perceived safety while cycling on the road. Grace, a 10-year old girl with hearing disability in Surabaya, bikes everyday with her friends exploring the neighborhood with her parents' close supervision, in case there is any communication gap. She sometimes explores a neighboring area with her brother as well. Through the interview, she mentioned that she is afraid of the vehicles coming from behind as she is not able to indicate their presence. Bike lanes which are placed on the same level as pedestrian paths are therefore more favorable for her. Moreover, special signs attached to her bike saying "I Have Hearing Disability" would therefore be necessary as suggested by her parents.

"[using Bisindo] I love cycling, but I'm afraid to go on bigger roads because there are many fast-moving cars. I will usually stop when a car is passing by me. [...] I want to bike to school only if I am accompanied by my dad, and I want to keep cycling when I'm bigger." - Grace, 10

3 Conclusion and Recommendations

3.1 Conclusion

In Indonesia, back in the 1980's, cycling used to be a popular choice for mobility that people choose as a mode of transportation on a daily basis. Nowadays, when most parts of Indonesia have turned into car-centric cities where motorized vehicles are the most reliable modes of transport, there is barely any safe space for cycling. Responding to two of the biggest issues that correspond with economic other, which are severe traffic congestion and air pollution, communities, organizations, and city governments have taken initiatives to pay more attention to the needs of cycling. ITDP, for example, has collaborated with the Government of Jakarta, the Transportation Agency of Jakarta, the public works agency, as well as Bike2Work in planning a 500-km cycling infrastructure network until 2030, as well as assisted in the conceptual and detailed design of which from year 2019 to 2022. However, it is of importance to underline that there is almost always a considerable gap on the number of women participants compared to men on conducted multi-gender surveys. Surveys and input gathering revealed significantly lower participation from women compared to men, indicating an exclusionary trend. This can be seen in the considerable gap on the number of women participants compared to men on conducted multi-gender surveys such as in the Cycling Friendly Jakarta FGD in 2019.

Gender equality, disability and social inclusion (GEDSI), a perspective that aims to create equal access to resources and decision making processes for all, with emphasis on vulnerable groups being women, children, people with disabilities, older persons, and other marginalized groups, should therefore be mainstreamed. Within the mainstreaming process, the GEDSI perspective must be taken into account at all stages from planning, design, implementation, monitoring, to evaluation, even better by involving vulnerable groups throughout. In the context of cycling, the provision of cycling infrastructure and its supporting facilities are expected to give a positive impact on women's access to resources, as well as social and economic opportunities. The mainstreaming of this perspective can hopefully generate more demand from vulnerable groups, creating a more diverse and inclusive group of cyclists that can break the exclusive stereotype attached to this activity.

Women cyclists in Indonesia come with different purposes, such as for recreational, sporting, and for daily mobility. They also use a variety of bikes that suit their needs most; with the most popular being road bikes and folding bikes (ITDP, 2021). Time-wise, a survey in Sudirman-Thamrin revealed that the vast majority of women bike in the morning, but it was also found that women also bike at night time (55%) according to a survey conducted for women across Indonesia. The distance traveled by women ranges from short (2-5 km), long (10-20 km), to very long (> 20 km) distance depending on their purposes. The long to very long ride is usually done by courier, recreational (this can be a combination with those who bike to work), and sport cyclists; while the short ride is usually done for daily trips to fulfill needs that are available within close proximity to where they live, such as to get groceries and go to the office. The kampung kota data also proved this by showing the women and children often use their bicycles to travel within their neighborhood and go to destinations such as schools and markets.

Perceived safety and security from crime remain the most mentioned barriers by women based on the surveys and interviews conducted by ITDP throughout 2019 to 2022. In addition to that, there are concerns regarding the absence of supporting facilities (bike parking, shower facility, repair workshops), environment (weather, pollution, and geographical condition), the need to carry a lot of items, and physical limitations. A comparison of barriers experienced between each type of cyclist, as well as their needs are as shown by Table 2.

Table 2 describes 3 general types of women cyclists that are found in the city based on the surveys and interviews conducted. These cyclists have different characteristics, needs and barriers, which are defined below.

1. Utilitarian cyclists:

Purpose: Utilitarian cyclists primarily use their bicycles as a means of transportation to fulfill practical needs, such as commuting to work or running errands. Cargo cyclist are also included in utilitarian cyclist

Characteristics: They typically choose bicycles as a convenient and eco-friendly mode of transportation. Their choice of bike may prioritize comfort, durability, and functionality over speed or performance. Utilitarian cyclists often use accessories like

baskets to carry groceries, work attire, or other necessities. Safety and ease of use are paramount for this group.

2. Sport cyclists:

Purpose: Sport cyclists engage in cycling as a competitive sport or for rigorous physical exercise and training.

Characteristics: They often ride specialized road bikes, mountain bikes, or other high-performance bicycles. Sport cyclists may participate in events like road races, mountain bike races, triathlons, or criteriums. They focus on improving their cycling skills, speed, endurance, and performance. Some sport cyclists travel in large groups, and some in smaller groups or alone. In cities, sport cyclists often take advantage of wide empty roads and cycle in the morning when there is less traffic.

3. Recreational cyclists:

Purpose: Recreational cyclists ride for leisure, relaxation, and enjoyment rather than competition or practical purposes. Recreational cyclists include families and leisure cyclists.

Characteristics: Their choice of bicycle may vary widely, from cruiser bikes to hybrids or even e-bikes. Recreational cyclists explore scenic routes, parks, and trails, often with friends or family. They prioritize the joy of cycling, taking in the surroundings, and spending quality time outdoors. Speed and performance are typically secondary concerns for recreational cyclists.

Cycling Infrastructure		
Type of Cyclist	Barriers	Needs
Utilitarian Cyclists	<ul style="list-style-type: none"> Potential conflicts with fast-moving cars at busy roads 	<ul style="list-style-type: none"> Physical segregation with motorized vehicles on busy roads to add more protection Needed intervention within neighborhood roads, a lot of women do not cycle on the main roads with protected bikelanes. Intervention can be in the form of
Sport Cyclists	<ul style="list-style-type: none"> No potential cycling infrastructure conflict identified that is unique to sport cyclists 	
Recreational Cyclists	<ul style="list-style-type: none"> Potential conflicts with fast-moving cars at busy roads Bike lanes may not be wide enough when cycling in groups 	<ul style="list-style-type: none"> Larger protected bike lanes on busy roads

All	<ul style="list-style-type: none"> Discomfort and prone to falling when cycling on uneven road surface, especially at night time 	<ul style="list-style-type: none"> Smooth and even road surface Provision of sufficient street lightings
Security from Crime		
Type of Cyclist	Barriers	Needs
Utilitarian Cyclists	<ul style="list-style-type: none"> No potential security conflict identified that is unique to utilitarian cyclists 	
Sport Cyclists	<ul style="list-style-type: none"> Risk of getting sexual harassment (example: cat calling) 	<ul style="list-style-type: none"> Campaigns for raising awareness regarding sexual harassment towards cyclist
Recreational Cyclists	<ul style="list-style-type: none"> No potential security conflict identified that is unique to Recreational cyclists 	
All	<ul style="list-style-type: none"> Unwanted attention in the form of cat-calling at all times of the day Risk of mugging Being followed by strangers at night 	<ul style="list-style-type: none"> Cycling together with friends, family, or community Bike lights to equip their bikes with Increase street lighting and CCTV Active bystanders
Cycling Supporting Facilities		
Type of Cyclist	Barriers	Needs
Utilitarian Cyclists	<ul style="list-style-type: none"> Tendency of being unable to repair their bikes when broken Absence of shower facilities at private/public buildings 	<ul style="list-style-type: none"> Provision of more bike repair workshops with well-trained mechanics to fix special bikes Addition of showering facilities
Sport Cyclists	<ul style="list-style-type: none"> Absence of shower facilities at private/public buildings 	<ul style="list-style-type: none"> Addition of showering facilities
Recreational Cyclists	<ul style="list-style-type: none"> No potential security conflict identified that is unique to Recreational cyclists 	
All	<ul style="list-style-type: none"> Unavailability of secure and accessible bike parking in destination areas 	<ul style="list-style-type: none"> Provision of bike parking with supervision from security officers/CCTV
Access to Bicycles		
Type of Cyclist	Barriers	Needs

Utilitarian Cyclists	<ul style="list-style-type: none"> Places of work/activities are too far to cycle from home, difficulty in using bikes at home to commute. 	<ul style="list-style-type: none"> Ability for public transportation to allow for mixed mode of commuting Bike sharing services
Sport Cyclists	<ul style="list-style-type: none"> No potential access to bicycle conflict identified that is unique to sport cyclists 	
Recreational Cyclists	<ul style="list-style-type: none"> No potential access to bicycle conflict identified that is unique to Recreational cyclists 	
All	<ul style="list-style-type: none"> Unsuitable bikes for commuting (e.g. cannot attach baskets to road bikes, non-folding bikes cannot access public transport fleets) 	<ul style="list-style-type: none"> A more suitable type of bike Bike sharing service
Environment		
Type of Cyclist	Barriers	Needs
Utilitarian Cyclists	<ul style="list-style-type: none"> Hilly roads are hard to traverse by beginner cyclists 	<ul style="list-style-type: none"> Access towards E-bikes
Sport Cyclists	<ul style="list-style-type: none"> Hot weather during morning commute in conjunction with destinations located far away from where they live Air pollution from motorized vehicles during rush hour prevents sport cyclists from cycling for daily trips 	<ul style="list-style-type: none"> Allow more shower facilities in buildings Efforts to decrease personal vehicle usage in the city.
Recreational Cyclists	<ul style="list-style-type: none"> Air pollution, smog in cities that may make cycling less pleasant 	<ul style="list-style-type: none"> Efforts to decrease personal vehicle usage in the city, and air pollution.
All	<ul style="list-style-type: none"> No potential access to bicycle conflict identified that is similar among all types cyclists 	

3.2 Recommendations

Building a cycling culture in a city, or transforming a car-centric city into a cycling-friendly city in Indonesia's case, requires a strong joint effort between many stakeholders, starting from the Government, NGOs, communities, and public in general as potential users. Inclusive approach which puts communities and citizens (including vulnerable groups) as the experts plays an important role in creating an environment that meets the needs of existing and potential cyclists. It may come in the form of collaborative and participatory planning as well as

movements to call for cycling as part of urban mobility. Women initiation and participation are crucial in this matter, to encourage more women coming from a diversity of groups to start cycling and remove the stigma that cycling is exclusively made for men and other certain groups.

However, this must be followed up by concrete actions from the Government, who hold the authority to execute what has been planned together on a larger scale. Depending on the context of the city, City Governments may either start by providing a high-quality cycling infrastructure network or by reducing the number of car traffic throughout the city. To kick off, piloting in a certain period of time is recommended to see the short-term impacts to see and evaluate on how impactful the implementation can be when made permanent. NGO can play the roles as the middlemen between the citizens and the Government; gathering ideas and inputs from the citizens and assisting the Government to put the planning into action.

Based on the information achieved regarding constraints and needs of women cyclists from interviews and surveys conducted by ITDP in the last couple of years, Table 3 lists the recommendations that are specifically targeted for women and other vulnerable groups' participation in cycling and the potential associated key stakeholders. The feasibility of implementing these recommendations is subject to discuss with the potentially assigned key stakeholders.

Type	Actions	Stakeholders
Policy	Encouragement from the Education Agency for primary and secondary schools to support students to cycle to school. Support can be in the form of collective cycling to school with supervision from teachers and/or security/police.	Government ▾ <ul style="list-style-type: none"> Education Agency Women Empowerment and Child Protection Agency Transportation Agency Police Communities ▾ <ul style="list-style-type: none"> Primary Schools (SD) Secondary Schools (SMP)
	Regular evaluation of cycling infrastructure that allows assessing current cycling infrastructure using gender-segregated data.	Government ▾ <ul style="list-style-type: none"> Transportation Agency
	Subsidy for bicycles and e-bikes towards vulnerable groups as an alternative clean and affordable mode of transportation, as well as to achieve a more diverse pool of cyclists.	Government ▾ <ul style="list-style-type: none"> Ministry of Transportation Ministry of Finance Women Empowerment and Child Protection Agency

Type	Actions	Stakeholders
		<ul style="list-style-type: none"> Ministry of Education Private Sector ▾ CSR Programs
	Regulation aimed for Government office, buildings, and public spaces to dedicate a certain percentage of its area for a secure, weather-protected, and accessible bike parking space	Government ▾ <ul style="list-style-type: none"> Ministry of Public Works City mayor
	The effective use of gender responsive budget. The allocation of the budget should take into account both the general and special needs of women and other vulnerable groups.	Government ▾ <ul style="list-style-type: none"> Regional Planning Board Transportation Agency Public Works Agency
Infrastructure and cycling facilities	The involvement of vulnerable community members from the planning phase of infrastructure. Vulnerable community members' opinions are crucial in the planning phase as infrastructure is their main barrier.	Government ▾ NGO ▾ Citizens ▾
	Cycling infrastructure such as protected bike lanes should be implemented where possible to ensure the most vulnerable groups feel safe while cycling.	Government ▾ <ul style="list-style-type: none"> Transportation Agency Public Works Agency
	Tactical urbanism planning and implementation to create safe, low-speed residential areas that engage women, children, and other vulnerable groups at urban villages (<i>kampung kota</i>) throughout the whole process. This may help to improve accessibility to destinations around the neighborhood, such as school, public transit stops, and other essential needs.	Government ▾ <ul style="list-style-type: none"> Transportation Agency Public Works Agency NGO ▾ Citizens ▾ Private Sector ▾ <ul style="list-style-type: none"> Public Transport Operators
	Traffic calming in neighborhood areas that prioritize physical interventions such as speed bumps, the narrowing of car lanes, and changing road material. This allows for neighborhood spaces to be safer especially for those whose mobility patterns are higher in the neighborhood scale.	Government ▾ <ul style="list-style-type: none"> Public Works Agency Transportation Agency
	Cycling infrastructure connected in a cycling network that has taken into account origin-destination data of women and other vulnerable groups.	Government ▾ <ul style="list-style-type: none"> Transportation Agency Public Works Agency
	Bike on board facilities to support mix-commuting of vulnerable groups who live long distances from their workplace or area of day-to-day activity.	Government ▾ <ul style="list-style-type: none"> Transportation Agency Private Sector ▾ Public Transport

Type	Actions	Stakeholders
		Operators
	Provision of Bike Sharing facilities with docking stations that take into account origin-destination data of women and vulnerable groups, ensuring increased mobility of vulnerable groups by providing access to bikes.	<div>Private Sector ▾</div> <ul style="list-style-type: none"> Bike Sharing Operators <div>Government ▾</div> <ul style="list-style-type: none"> Transportation Agency
Campaign	Campaigning regarding current laws and regulations that aim to abolish sexual assault and harassment. Campaign for the rights of victims and siding with victims will not only have an expected impact to reduce sexual harassment and assault, but also ensures accountability of perpetrators, and reduces victim blaming.	<div>Communities ▾</div> <div>Citizens ▾</div> <div>Government ▾</div> <ul style="list-style-type: none"> Women Empowerment and Children Protection Agency Communication and Informatics Agency
	Campaigning regarding the active bystander approach, collaborating with citizens and communities in public spaces to allies for victims of sexual harassment. These active bystanders could be other cyclists, motorists, pedestrians and street vendors to name a few.	<div>Communities ▾</div> <div>Citizens ▾</div> <div>Government ▾</div> <ul style="list-style-type: none"> Communication and Informatics Agency Public Order Enforcers Police (<i>Satpol PP</i>)
	Campaigning for cycling as a means for transport in short distances. This will enable the stigma that cycling is a high impact activity, easing vulnerable groups to adopt cycling as a low-cost means of transport. Campaigns can be in the form of public service advertising attached to public transport fleets or billboards.	<div>Communities ▾</div> <div>Citizens ▾</div> <div>Government ▾</div> <div>Private Sector ▾</div> <ul style="list-style-type: none"> Communications and Information Agency Public Transport Operators Area Developers
Capacity Building	Workshop session for women and by women on essential basic repair skills. This session can be of help for women to learn freely without judgment.	<div>Communities ▾</div> <div>Citizens ▾</div>
	Capacity building through a local women's group on teaching women and children how to safely cycle for their day to day activities.	<div>NGO ▾</div> <div>Communities ▾</div> <div>Citizens ▾</div>
	Workshop for urban village (<i>kampung kota</i>) residents on the planning and implementation of tactical urbanism to create a safe environment for cycling.	<div>NGO ▾</div> <div>Communities ▾</div> <div>Citizens ▾</div>

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