

ANALYSIS OF HEALTH-BASED TRANSPORTATION SYSTEM FOR HEALTH TRANSFORMATION IN DKI JAKARTA

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ABSTRACT

The quality of transportation in big cities, especially in DKI Jakarta faces many challenges, such as high population creating traffic congestion, air pollution, and access to public transportation. Currently, DKI Jakarta has a population of 10.67 million in 2022 and is ranked 38 out of 60 countries with good public transportation, the development of health-based transportation that is effective in reducing health impacts, infrastructure and urban design are important in supporting high mobility. An important aspect of improving transportation in big cities is the development of sustainable public transportation systems. Using the PRISMA extension for Scoping Review (PRISMA-ScR) guidelines, 93 articles published between 2000 and 2022 met the inclusion criteria looking at Health-based transport, Urbanization, and Policy. Health-based transportation is very important to be addressed by encouraging sustainable development, green transportation, good urban planning to data-driven policy making, utilizing data and technology, can contribute to public health and a healthier and more livable urban environment, this still requires collaborative efforts from the government, policy makers, and the community to create an efficient and sustainable transportation system in DKI Jakarta.

Keywords: *transportation, health, data, policy*

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INTRODUCTION

One of the difficult and crucial issues in Jakarta's highly mobilized population is transportation. As the capital city of Indonesia, Jakarta is the center of social, political, and economic activities. The rapid growth of transportation in Jakarta has been unstoppable, the number of motor vehicles, urbanization, as well as the lack of adequate infrastructure, have posed a major challenge in providing efficient and sustainable transportation for the citizens of Jakarta. DKI Jakarta, with a population of 10.67 million in 2022, a slight increase of 0.66% compared to the previous year's 10.6 million (BPS, 2022), faces crucial problems in urban mobility. Traffic congestion is one of the main problems causing long travel times and high levels of air pollution. In the face of these challenges, the government and stakeholders in DKI Jakarta need to find sustainable solutions to overcome transportation problems that affect the daily lives of city residents, the right solution in dealing with this problem is using health-based transportation (Bansode & Tas, Ruhi Tanriover, 2018).

Jakarta is currently ranked 38th out of 60 cities with good public transportation The study was conducted by examining public transportation systems in 60 major cities around the world. The following factors were considered to create the best public transportation system in the world. Looking at traffic volume, current development, network system density, infrastructure quality, system efficiency, social impact, and affordability (World Health Organization, 2018). Health-based transportation refers to the implementation of strategies and policies that prioritize public health and well-being in transportation. As urbanization and population growth continue to accelerate, health-based transport has emerged as an important concept in addressing the growing challenges posed by urbanization, environmental degradation, and

public health concerns. As cities around the world continue to witness rapid population growth and increased motorization, traditional transport systems have become a major contributor to air pollution, traffic congestion, physical inactivity, and related health problems. In response to these pressing issues, health-based transportation is gaining prominence as a transformative approach that puts public health and well-being at the forefront of urban planning and transportation policy (Infield & Gurran, 2018).

In many urban areas, motor vehicles, such as cars and motorcycles, dominate transportation patterns, leading to increased levels of air pollutants and greenhouse gas emissions. Exposure to these pollutants has been linked to various respiratory and cardiovascular diseases, adversely affecting the health of urban residents. Furthermore, the sedentary nature of car travel has contributed to the emergence of chronic health conditions, including obesity, diabetes, and heart disease, as people lead increasingly sedentary lifestyles, so the concept of health-based transportation seeks to address these challenges by promoting sustainable and active mobility options. Active mobility, which includes walking, cycling, and other forms of non-motorized transportation, is considered an effective way to increase physical activity levels and reduce the risk of chronic diseases. Encouraging active modes of transportation not only improves individual health outcomes but also encourages social interaction, increases environmental vibrancy, and reduces the carbon footprint of transportation (Hamin & Gurran, 2009).

In addition, health-based transportation advocates for the development of robust public transit systems that are accessible, affordable, and sustainable. By offering a reliable alternative to private car ownership, well-designed public transit can ease traffic congestion, reduce air pollution, and promote equitable access to essential services, particularly for underserved communities. Health considerations in urban planning and transportation policy require collaboration between public health experts, urban planners, policymakers, and other stakeholders. Data-driven decision-making plays a critical role in identifying transportation-related health issues, monitoring health outcomes, and evaluating the effectiveness of health-based transportation initiatives (Philona & Listyaningrum, 2021).

Health-based transportation is a holistic approach to urban mobility, prioritizing public health and environmental sustainability. By encouraging active mobility, promoting sustainable public transit, encouraging green transportation, and integrating health considerations into urban planning, cities can create healthier, more resilient, and livable environments for their residents. Embracing health-based transportation is essential for achieving sustainable urban development and improving the overall well-being of urban residents (Litman, 2009; Yang et al., 2020).

Health-based transport is gaining increasing attention as a transformative approach to addressing the complex challenges of urbanization, environmental degradation, and public health issues in cities around the world. This literature review aims to explore existing research and scholarly works related to health-based transportation, focusing on its significance in promoting sustainable urban development and improving public health outcomes. The review will investigate various dimensions of health-based transportation, including active mobility, sustainable public transit, green transportation, urban planning, and data-driven decision-making. By analyzing the existing body of literature, this review seeks to highlight the potential of health-based transport as a key strategy for creating healthier and more sustainable urban environments.

METHOD

The writing method used is a literature study to explore the concept of health-based transportation and its significance in promoting sustainable urban development and public health outcomes that are reviewed from several journals related to the topic taken, namely on health-based transportation. Journals were searched through ScienceDirect, Google Scholar, American Journal of Public Health, and Researchgate. Then with the PRISMA extension for Scoping Review (PRISMA-ScR) guidelines, 96 articles published between 2000 and 2022 meeting the inclusion criteria were reviewed. selected according to the topic to be discussed and then screened to get eligible articles so that 13 articles were obtained that were suitable for use with the search keywords namely Health-based transportation, Urbanization, and Policy.

RESULTS AND DISCUSSION

Urban Mobility

Numerous studies highlight the positive impact of active mobility, such as walking and cycling, on people's health and well-being. Pucher et al. (2010) conducted a comparative analysis of city, state, and international data, revealing the health benefits of active transportation choices. Their findings showed that cities with higher levels of walking and cycling have lower rates of obesity and cardiovascular disease. In addition, Sallis et al. (2012) emphasized the role of the built environment and pedestrian-friendly infrastructure in encouraging active transportation and promoting physical activity. In Jakarta, the use of public transportation is still lower than private vehicles.

Table 1. Number of Public transportation passengers in DKI Jakarta

Vehicle Type	Number of Passengers	
	2020	2021
KRL	154.591.000	126.740.000
MRT	9.913.820	7.168.106
LRT	487.239	299.407
Transjakarta	126.845.277	123.812.052

By looking at the numbers in 2020 and 2021 KRL and Transjakarta are the main modes of public transportation that are often used by residents in DKI Jakarta, if we take the daily average use of public transportation as an example of taking the average Transjakarta user, it shows that in 2020 the daily average of passengers is 346,597 passengers/day and 2021 with a daily average of 338,285 passengers/day, this shows that the use of public transportation is still lower than private vehicles, as shown in table 2 below.

Table 2. Number of motorized vehicles in DKI Jakarta

Vehicle Type	Number of Passengers	
	2020	2021
Motorcycle	16.018.716	16.519.197
Cars	4 061 033	4 111 231

The data above shows that private motor vehicle users per day are higher than public transportation users, with motorcycle users being 79% higher than car vehicles, while according to the environmental service tribe in Jakarta, the use of vehicles contributes 67% due to air pollution in DKI Jakarta so it can be concluded that the transformation of mobility in DKI Jakarta needs to be done, the need for the use of health-based transportation in DKI Jakarta to reduce negative impacts is needed.

The health-based transportation approach has become a major focus in efforts to address the problem of community mobility and the use of public transportation in DKI Jakarta. Based on research by Sallis et al. (2012), the built environment has an important role in influencing physical activity, obesity, and cardiovascular disease. Factors such as settlement density, the presence of pedestrian infrastructure, and accessibility to public transportation greatly influence the level of physical activity of the community. Therefore, DKI Jakarta needs to pay attention to urban planning that focuses on supporting active mobility, such as walking and cycling, and improving the accessibility of public transportation so that people are more motivated to use health-based transportation.

Research by Pucher et al. (2010) also shows that walking and cycling can provide significant health benefits to society. Implementing policies and infrastructure that support walking and cycling can help reduce the risk of obesity and cardiovascular disease. DKI Jakarta needs to implement strategies that involve the community, government, and other stakeholders in creating a pedestrian and cycling-friendly environment, so that people are more motivated to choose active mobility as a healthy transportation alternative.

However, in the discussion about community mobility and public transportation users in DKI Jakarta, several challenges need to be overcome. One of them is the problem of traffic congestion, which often hampers active mobility and the efficiency of public transportation. In facing this challenge, DKI Jakarta needs to implement policies that encourage the reduction of private vehicle use and allocate more space for pedestrian and cycling infrastructure. In addition, support from the government and private companies in providing efficient and affordable public transportation is also key to improving people's mobility in the city.

The use of accurate data and information is also an important element in developing health-based transportation in DKI Jakarta. Data on community mobility patterns and preferences of public transportation users can help design policies and infrastructure that suit the needs of the community. Therefore, cooperation with research institutions and related institutions in collecting and analyzing mobility data is very necessary.

Sustainable Public Transportation

Sustainable public transportation systems have demonstrated their potential to reduce traffic congestion and air pollution while improving accessibility and social equity. (Woodcock et al.,

2009) conducted a comprehensive analysis of the public health benefits of urban land transport strategies with the importance of using public transport to reduce air pollution-related health problems. (Giles-Corti et al., 2016) emphasized the impact of well-connected and accessible public transport on improving health outcomes and urban livability.

DKI Jakarta as one of the metropolitan cities in Indonesia faces very complex challenges of mobility, health impacts, and weather changes related to the effects of transportation. In the context of health-based transportation, a study by Woodcock et al. (2009) on the public health benefits of greenhouse gas emission reduction strategies in urban transportation and a study by Giles-Corti et al. (2016) on urban planning and population health. Through the analysis of these two studies, the importance of sustainable public transportation in supporting public health in DKI Jakarta is illustrated.

Greenhouse gas emission reduction strategies in urban transportation have significant public health benefits. Research by Woodcock et al. (2009) shows that adopting sustainable transportation strategies, such as increasing the use of public transportation, walking, and cycling, can reduce air pollution and motor vehicle emissions that contribute to health problems such as respiratory diseases and cardiovascular diseases. Therefore, improving the accessibility and efficiency of public transportation in DKI Jakarta is key to reducing the negative impact of air pollution on public health.

Urban planning that focuses on population health plays a crucial role in supporting sustainable public transportation. Research by Giles-Corti et al. (2016) emphasized the importance of designing cities to promote physical activity, reduce dependence on private vehicles, and improve accessibility of public transport. In the context of DKI Jakarta, sustainability- and health-oriented urban planning is needed, including providing safe pedestrian and bicycle paths and integrating public transportation with diverse land uses.

According to Newman & Kenworthy (2006) sustainable public transportation focuses on urban design that reduces dependence on private vehicles, referring to Table 2 private vehicle users in DKI Jakarta reached 20.6 million users consisting of motorcycle users 16.5 million users and cars as many as 4.1 million users, BPS noted that the number of motorized vehicles in DKI Jakarta continues to increase every year. In the last five years, the most rapid increase occurred in 2021, which increased by 7.60% to 21.76 million motorized vehicles. This approach includes developing efficient and reliable public transportation infrastructure and services so that people are more likely to switch from private vehicles to more environmentally friendly public transportation. (Noviarini et al., 2022) in his research also stated that sustainable public transportation aims to create a city that can be easily reached by public transportation, currently, DKI Jakarta already has a variety of public transportation, both TransJakarta, Jaklinko, MRT, and KRL Commuter Line.

Green Transportation

Green Transportation, which is renewable transportation, especially electric and low-emission vehicles, has been a growing area of interest in health-based transportation research. (Mueller et al., 2017) conducted an urban health impact assessment, highlighting the potential benefits of green transportation in reducing air pollution-related health risks. (Gotschi, 2011) explored the costs and benefits of cycling investments, providing valuable insights into the environmental and health benefits of promoting cycling as a mode of transportation.

The development of cycling infrastructure can provide significant benefits to public health in DKI Jakarta. (Gotschi, 2011) found that the development of bike lanes in Portland, Oregon, resulted in health benefits that outweighed the costs. These included the benefits of improved physical health and reduced risk of respiratory and cardiovascular disease. The implementation of similar cycling infrastructure has been built along the available 309 Km of bike lanes by the end of 2022 in DKI Jakarta, this can improve public health by reducing air pollution and increasing active mobility.

Urban and transportation planning that focuses on active mobility can have a positive impact on public health in DKI Jakarta. Research by Mueller et al. (2017) shows that urban planning policies and strategies that support active mobility, such as walking and cycling, can reduce the risk of premature death and improve air quality in cities. In the context of DKI Jakarta, implementing bicycle lanes separated from motor vehicle lanes, widening sidewalks for pedestrians, and improving traffic safety can encourage people to adopt active lifestyles as part of their daily routine.

Green transportation based on electric buses is one of the interesting solutions in the discussion of health-based transportation in DKI Jakarta. With rapid population growth and urbanization, conventional motor vehicles contribute a large portion of air pollution and greenhouse gas emissions in this metropolitan city. In this context, the implementation of electric buses offers the potential to reduce the negative impacts of transportation on public health and the environment. In this deliverable, two main aspects of electric bus-based green transportation are discussed, namely the public health benefits and environmental impacts.

Urban Transportation Planning

Many studies have looked at the relationship between urban planning, active design, and public health outcomes. Frumkin et al. (2004) focused on the importance of urban sprawl and public health, emphasizing the role of urban design in influencing physical activity patterns and health. (Nieuwenhuijsen et al. (2016) discuss the challenges and opportunities in integrating transportation and health considerations in urban planning, calling for a more integrated approach to improving public health outcomes. Urban transportation planning is an important focus in the discussion of health-based transportation in DKI Jakarta. The main reference that is seen is about the relationship between urban sprawl and public health, through the analysis of these two studies, illustrates the importance of health-oriented transportation planning in building healthy communities in DKI Jakarta.

Research by Frumkin et al. (2004) highlighted the impact of urban sprawl on public health in metropolitan cities. Urban sprawl, characterized by uncontrolled urban growth and lack of accessibility for walking and cycling, has contributed to health problems such as obesity, heart disease, and other health problems, transportation should also be friendly to people with disabilities. In the context of DKI Jakarta, the issue of urban sprawl has been a significant challenge in planning health-based transportation. The availability of physical infrastructure that is friendly to people with disabilities can increase their capability to access public facilities more independently and without barriers. Adequate accessibility not only includes physical access to buildings and facilities but also considers inclusive interior design and adequate public transportation accessibility.

When conducting a deeper study there is a complementary relationship between transportation and health, the purpose of transportation is to help human mobility from one place to another while the goal of health is to improve the quality of human life, health-oriented transportation cycling and walking to public transportation, can provide significant benefits to public health by increasing physical activity and reducing air pollution from motor vehicles study by Nieuwenhuijsen et al. (2016). In discussing health-based transportation in DKI Jakarta, there needs to be synergy between the transportation and health sectors to create an environment that supports active mobility and reduces the negative impact of transportation on public health.

Data-driven policy making

Data-driven policymaking in health-based transportation planning has been a recurring theme in the literature. Pioneering studies by Pucher et al., (2010); and Woodcock et al. (2009) used extensive datasets to assess the impact of transportation strategies on public health. These studies underscore the importance of utilizing data to inform evidence-based policies and interventions. In the discussion of health-based transportation in DKI Jakarta, the importance of data-driven policymaking is highlighted. Two key reference works are studies on the use of data in comparative analysis of walking and cycling across cities, states, and internationally, and the public health benefits of greenhouse gas emission reduction strategies in urban transport. Through the analysis of these two studies, the importance of data-driven policies in designing effective health-based transportation in DKI Jakarta is illustrated.

(Pucher et al., 2010) shows how important it is to use data in designing policies oriented towards active mobility, such as walking and cycling. Data analysis from various city, state, and international levels helps in identifying best practices and effective policies to encourage active mobility in DKI Jakarta. By analyzing data, the government can understand people's preferences and habits in using transportation, so they can design targeted policies to increase participation in the use of public transportation by cycling and walking.

Looking at a strategy when making effective policies, the importance of utilizing data as a basis for decision-making is very important, seeing the positive and negative impacts of transportation can be a reference in driving transformation policies, seeing the benefits of public health from urban gas emission data so that they can find out how to reduce emissions in urban transportation. Through data utilization, the government can see the positive impact of reducing air pollution and motor vehicle emissions on public health in DKI Jakarta Research (Woodcock et al., 2009). By understanding the health benefits of emission reduction strategies, with data the government can strengthen the argument for adopting green transportation to improve public health.

DISCUSSION

Transportation considers how a good transportation system can have a positive impact on public health and create an environment that supports a healthy lifestyle. The DKI Jakarta government is working to improve public transportation infrastructure such as TransJakarta, KRL, MRT, and LRT. Data-based policy making will make development planning stronger, with the increasing mobility of people in the City, especially DKI Jakarta through health-based transportation transformation by planning in transportation, sustainable transportation and the

use of green energy to improve the quality of life of the community is very necessary, see Figure 1.



Figure 1. Health-based Transportation Transformation Strategy

Healthy transportation changes encourage the promotion of healthy lifestyles, good transportation systems can promote healthy lifestyles by forcing people to walk to the train station, cycle to work, or easily access parks and green spaces, and this should be controlled. Better transportation safety, an important part of health, supports strict traffic regulations that can protect public health (Pucher et al., 2010).

Previous research may suggest that the use of health-based modes of transportation, such as cycling or walking, can help reduce air pollution. Air pollution is a major problem in Jakarta and adversely affects public health, including respiratory disease, cardiovascular disease, and other health problems, which affect the social benefits of health-based transportation. These include reducing pressure on roads and public transit, which will help reduce traffic congestion and improve mobility across the city (Mueller et al., 2017). Positive impacts are also seen on public health, this transformation will reduce the stress of traffic congestion. health-based in dense urban environments such as Jakarta. These include the lack of safe bicycle lanes, inadequate road infrastructure, and the need for behavioral changes in choosing active transportation.

Health-based transportation in DKI Jakarta is becoming increasingly important due to population growth, urbanization, and lifestyle changes. Healthy transportation is not only limited to providing opportunities for mobilization but also plays an important role in influencing people's well-being and environmental quality. Health-based transportation in DKI Jakarta is a positive step towards a healthier and more sustainable environment. Efforts include developing infrastructure that supports active movement, reducing air pollution, increasing access to health services, improving road safety, and raising public awareness. By continuing

to invest and start in this direction, DKI Jakarta will be able to achieve its goal of better public health and a higher quality of life.

CONCLUSION

Based on the health-based transportation research in DKI Jakarta above, it was found that community mobilization and use of public transportation, sustainable public transportation, green transportation, urban transportation planning, and data-driven policymaking have an important role in creating health-oriented and sustainable transportation. This research sees that efforts for transformation towards health-based transportation will increase the use of public transportation, and physical activities such as cycling and walking which will be able to provide significant health benefits for the community, gas emission reduction strategies in urban transportation can also provide public health benefits by reducing air pollution, thus this transformation towards health transportation will improve the quality of life of the people of the city and suggestions that can be given :

1. The DKI Jakarta Government needs to improve facilities and infrastructure for safe and comfortable walking, as well as the safety and number of tracks for cyclists that are extended to supporting facilities for people with disabilities on public transportation, this will encourage people to use public facilities and public transportation which has a positive impact on public health.
2. The government continues to improve and develop sustainable and environmentally friendly public transportation systems, such as electric buses and trains. By providing efficient and integrated public transportation, people will be more likely to use public transportation rather than private vehicles, which will reduce air pollution and traffic congestion.
3. In policy-making, the government should increase the use of accurate and relevant data. This data can assist in assessing the effectiveness of existing policies and guide decision-making to design better policies for health-based transportation in DKI Jakarta and improve collaboration between sectors.

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