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Development of non-motorized transportation in Baku City

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EXECUTIVE SUMMARY

Objectives and Methodology of the Study

1. **This study is a first effort at a systemic review of issues related to development of non-motorized modes of transportation (NMT) in Baku City.** The study has been implemented to inform the Government of Azerbaijan about the current status of NMT and associated policy issues, key constraints, and possible ways forward for development of NMT as an independent mode of transportation in the city of Baku.
2. **The study presents a comprehensive analysis of NMT conditions in the Baku metropolitan area.** The diagnostic analysis is based on available data, discussions/interviews held with key government, non-government, and private sector stakeholders focusing on pedestrian and cycling modes of transportation, and the results of a major survey implemented among various groups of city residents.

Summary of Key Findings

3. **Development of NMT is one of the emerging priorities for Baku City. To date, NMT has not been considered an integral part of urban mobility in the city; however, in recent years, it has been receiving growing attention.** The missing institutional arrangements for necessary for the development of NMT have been initiated and implementation of NMT development projects have started in the city. Policy level changes for promotion of NMT are also under way. Some of the recently approved government documents have had a special focus on NMT issues and included important actions to improve mobility and safety for pedestrians and cyclists.
4. **Understanding of urban mobility issues for Baku is largely hindered by the lack of information on public perception and demand for NMT among the city residents.** This study undertook a survey to partially fill the information gap and better understand perceptions among the population concerning NMT. The survey has confirmed the paramount importance of pedestrian mobility for city residents, irrespective of gender, social, and economic status. It has demonstrated that more than 97 percent of city residents undertake at least one pedestrian trip a week. It has also confirmed negligibly insignificant role of cycling in everyday life of city residents. The survey has also helped to identify lack of infrastructure and road safety as main issues making walking and cycling difficult for people.
5. **Identification of key policy objectives is an important prerequisite for development of NMT in Baku City.** Some of the benefits and potential objectives considered in this report include mobility, environmental, social, health, and economic aspects of NMT. Based on the review of the urban mobility situation, the ongoing priorities of the government, and findings of the survey among city residents, the study has formulated the following key objectives for promotion of NMT in Baku: (a) enhancing urban mobility (including alleviating congestion and intermodality), (b) addressing health concerns, and (c) development of tourism. Pursuing these key objectives would also contribute important environmental, economic, and social benefits.
6. **The institutional framework for NMT is weak when it comes to walking as a mode of transportation, an activity that has always been taken for granted. Similarly, cycling has always been considered primarily a leisure activity.** Growing understanding of NMT's role and importance has come with some consolidation of urban mobility functions for the city and establishment of the Baku Transport Agency (BTA). The institutional framework for NMT, however, is still extremely fragmented. The recommendations of the study have been formulated around recognition of the important status of NMT as an urban mobility mode and the need for elimination of fragmentation and supporting an integrated approach to the management of NMT.

7. **NMT, including pedestrian and cycling mobility, should primarily be recognized and institutionalized as an important independent mode of urban mobility.** It should also be prioritized, together with public transport, over other modes of transportation as per the urban mobility hierarchy pyramid approach adopted by most advanced urban centers in the world. The legislative and normative framework, strategy and policy documents, as well as the institutional structure of relevant government organizations need careful review for proper incorporation of NMT development priorities.

8. **It is difficult to underestimate the importance of pedestrian mobility for Baku, but long-standing walking traditions of city residents have been taken for granted for too long.** Institutional responsibilities for pedestrian mobility and infrastructure have been undermined and become dramatically fragmented. Today, different institutions are responsible for roads, pedestrian crossings, overpasses and underpasses, parks and pedestrian zones in the city, and institutional responsibilities for management of such a critical element of pedestrian infrastructure as sidewalks are not clearly defined. As a result of consistent neglect, the pedestrian infrastructure in many parts of the city has deteriorated. This situation needs to be reversed and the city should be able to provide convenient, well-connected, and safe pedestrian mobility for its residents.

9. **The high share of pedestrians among road fatalities (70 percent) is one of the important findings of the study.** Significant vulnerability of pedestrians in Baku should be carefully researched in terms of reasons and potential solutions to the problem. The study recommends focusing on the improved methodologies for identification of locations for safe road crossing facilities and giving serious consideration to reducing speed limits in critical parts of the city to 50 km/h.

10. **The study has reviewed the potential of cycling to become a serious mode of urban mobility in Baku in terms of demand, cultural and behavioural considerations, topographic and climatic conditions, and other factors.** Overall, none of these fundamental factors seem to be overly prohibitive to cycling. Critically, the survey has confirmed there are no major cultural and behavioural hindrances to cycling, 60 percent of respondents expressed willingness to cycle regularly if there were decent and safe infrastructure in place. Lack of cycling infrastructure, insufficiency of norms and standards, and lack of strong traditions have been found to be the major issues impeding development of cycling in the city.

Key Recommendations

11. **The study has provided a set of recommendations for promotion and development of NMT and institutionalization of NMT policies.** The recommendations rely on the best international experience and include priorities, strategies, and policies that are needed for implementation of the proposed reforms. The recommendations are structured around an institutional and normative framework for NMT, the promotion of NMT transportation modes versus individual motorized vehicles, proposed key objectives for development of NMT, and focus on intermodal characteristics of NMT and its potential to become a full-fledged independent mode of transportation.

12. **Establishment of an authority having overall responsibility for coordination of multi-modal urban mobility issues in Baku City, including NMT, is of critical importance.** NMT can only be managed properly if considered together with other urban transport, public transportation, traffic management, and road safety issues. This requires setting up an umbrella institution for all urban mobility modes and informed calibration of existing institutional roles. Institutional solutions for city urban mobility need to involve integration of spatial and urban mobility planning functions.

13. **Urban mobility for Baku is also missing a strategic framework document, which would include development of NMT among the other major modes of transportation in the city.** Overall, a modern

approach to urban mobility strategies requires consideration of all issues related to: (a) land use, (b) urban mobility, and (c) air quality on an integrated and comprehensive basis. The pedestrian and cycling mobility also need to be given due consideration during the ongoing preparation of the Baku City Master Plan.

14. Along with establishment of institutional responsibility and ownership of pedestrian infrastructure, a comprehensive phased program for improving walkability in the city should be adopted. Depending on the immediate objectives, the program could have different characteristics for the central part of Baku, which has high potential for development of tourism, densely populated second layer districts, for which neighbourhood-based programs to improve intermodality and reducing congestion is a priority, and parks and green zones, which need improvements in accessibility and healthy mobility infrastructure.

15. The study has concurred with the implementing government agency on the proposed two-phased gradual approach to development of cycling in Baku, with the pilot cycling routes implemented in the first phase and full-fledged on-road cycling projects in the second phase. Better alignment with the proposed NMT development objectives has been recommended, including reducing congestion, improving intermodality, addressing health concerns, and development of tourism.

16. The pilot projects should be carefully designed to meet a real transport demand and be based on evidence and feedback from actual users. Preparation for the second phase of the program should preferably be launched in parallel with implementation of the initial pilot phase. It could start with identification and analysis of transport demand based on origin-destination and other surveys for defining user preferences and attitudes. The second phase should also be preceded by preparation and approval of the detailed bicycle infrastructure design standards/guidelines and more elaborate regulations, signage and markings for bicycle traffic.

17. Proper public communication and campaigns for promotion of cycling are at least as important as establishment of cycle-friendly infrastructure. Popular and well-recognizable persons could be involved in promotional campaigns to advocate cycling. The examples and appeals of women celebrities could prove especially valuable and help to trigger changes in cultural attitudes and behaviours among females.

18. The summary of recommendations of the study for development of NNT in Baku City can be found in the Annex I.

BACKGROUND AND CONTEXT

19. **Baku is the capital of Azerbaijan and largest city on the Caspian Sea and Caucasus region with over 2.2 million inhabitants.** The city has seen rapid expansion and inflow of population from rural areas over the recent decades and has transformed into a major urban conglomerate spreading over the entire Absheron Peninsula. According to unofficial estimates, the total number of persons permanently residing in the Greater Baku area, currently exceeds 3 million people, almost one-third of the total national population.

20. **Baku is a major regional economic, industrial, political, and cultural center** and accommodates about 1.4 million jobs representing about 45 percent of total employment in the country. Rapid development of petroleum industry and revenues over the recent two decades has resulted in growing job opportunities and increased density of population in the city. A significant part of the new job opportunities in the city is concentrated in the construction sector.

21. **The urban transport system of Baku is experiencing challenges in accommodating the growing population and economic activities.** In particular, traffic management and public transportation systems are under significant pressure. While the city bus transportation system and metro are moving about 1.6 million and 650,000 passengers a day respectively, they are experiencing significant capacity and service quality constraints.

22. **It is estimated that the share of people moved by private transport in Baku is about the same as the public transport.** The number of vehicles in Baku rapidly increased from about 150,000 in 2000 to approximately 750,000 in 2014 and then gradually reduced to about 660,000, due to economic slowdown of recent years. The skyrocketed motorization rates have led to serious traffic congestion in the city, especially during rush hours. This is aggravated by the negative impact on the road safety situation.

23. **The recent booming investments in city infrastructure have also led to some distortions in urban development,** such as uncontrolled construction of high-rise residential and commercial buildings, undersupply of parking spaces, degradation of space for pedestrians, and air pollution. These have mainly resulted from the lack of strategic urban planning, coordination between urban development projects, regulation of construction sector and permits, planning and design of transport infrastructure, and inadequate traffic management.

24. **To improve management and institutional setup of urban transport system, the government established the Baku Transport Agency (BTA) in 2015.** This decision has helped to reduce the fragmentation in the management of urban mobility, but further consolidation of the sector and establishment of public transport authority with comprehensive coordination, planning, and implementation functions is pending. The city is also still missing an approved development strategy document, master plan, and prioritized investment program.

25. **Development of non-motorized transportation, including pedestrian mobility and cycling, has so far not been considered as a separate mode of transportation in the city.** Walking and cycling have so far not been seen as serious transportation modes. As a result, management and planning of these modes of transportation have not been considered as a separate business line and institutionalized.

26. **Walking is a very important and widespread transportation mode in Baku, but there is a tendency to take pedestrians and walking for granted and not to prioritize them.** The long-standing focus on motorized modes of transportation has led to degradation of space for pedestrians, neglected or missing pedestrian infrastructure and, in many cases, use of pedestrian infrastructure by

cars. Existing standards for pedestrian infrastructure are often not followed and pedestrians often do not feel safe.

27. Cycling in Baku is used nearly only for recreational and sports purposes. Cyclists can rarely be seen on the streets of Baku. No cycling infrastructure exists yet on the streets of Baku, even on a pilot basis. Cyclists mostly use dedicated paths in a few recreational areas, parks, or pilot housing zones on the outskirts of Baku. These locations are also the only places to find dedicated bicycle infrastructure.

28. There are strong signs of a growing interest to NMT in Baku. Importantly, BTA has been provided with a mandate to manage and initiate programs for development of non-motorized transportation in Baku City. A comprehensive project has been launched to adjust the existing sidewalks in the city and create new ramps providing better access for disabled and persons with baby strollers. BTA has also started design and implementation of projects for development of cycling in Baku, both for transportation and recreation purposes.

29. Policy-level changes for promotion of non-motorized transportation in Baku and across the country are also under way. ‘The State Road Safety Program for 2019–2023’, recently approved by the President of Azerbaijan, includes a number of specific actions to improve mobility and safety for both pedestrians and cyclists. These, among others, include establishment of dedicated cycling lanes and parking infrastructure on the streets of Baku and other cities.

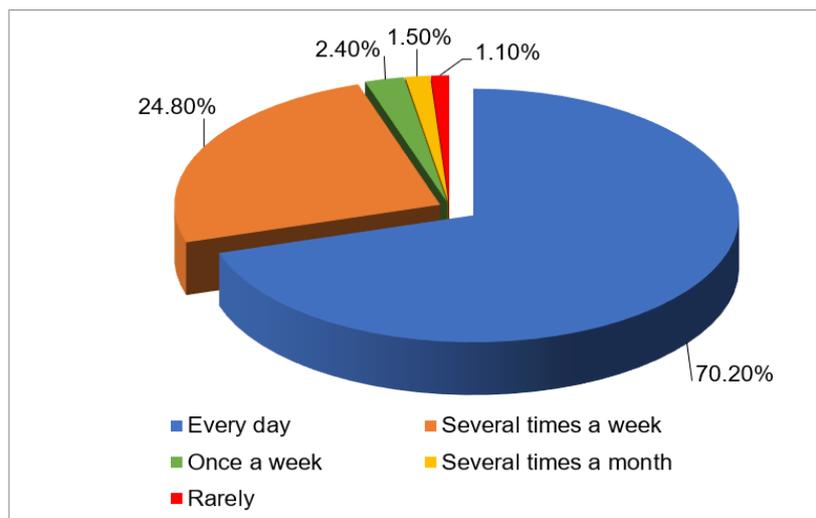
PUBLIC PERCEPTION AND DEMAND FOR NMT

30. Defining public perception and demand for NMT is critical for understanding its prospects in Baku City and identification of policies. Given the lack of relevant information, the study has undertaken a survey to better understand attitudes and demand for NMT, including pedestrian mobility and cycling, among representatives of the general public in Baku City. The survey was designed to understand the frequency and purpose of NMT trips by city residents, as well as their willingness to undertake NMT trips and perceptions of the main obstacles preventing people from such trips. It was also instrumental for understanding various attitudes and patterns toward NMT among different groups of society, including female, male, and people of different ages.

31. The sociological study was conducted based on the quota sampling method among 900 respondents who proportionately represented all city districts, including the villages and settlements of Baku. The sampling considered respondents' age and gender. It was conducted in households among the respondents of 12–24 years, 25–44 years, and 45+ years age groups, with one representative from each family. The number of female and male respondents was equal. Approximately 22 percent of the respondents were high school and university students, 19 percent worked in private companies/institutions, 16 percent worked in public organizations/institutions, 16 percent were housewives, 12 percent were pensioners and/or disabled, 10 percent were unemployed, and 5 percent were involved in freelancing activities.

32. The survey has confirmed the importance of walking in the daily life of city residents. According to survey results, 95 percent of respondents undertake at least several short pedestrian trips during the week and about 70 percent do it on a daily basis. Frequency of such trips is not significantly different between the people of different ages, being slightly higher for younger groups. This demonstrates the importance of walking for all age categories. People are walking for various reasons and it was not easy for them to quickly single out any particular reason. However, shopping, leisure and health, commuting to work/schools and back, taking children to schools/tutors, work-related walking were among the most popular answers.

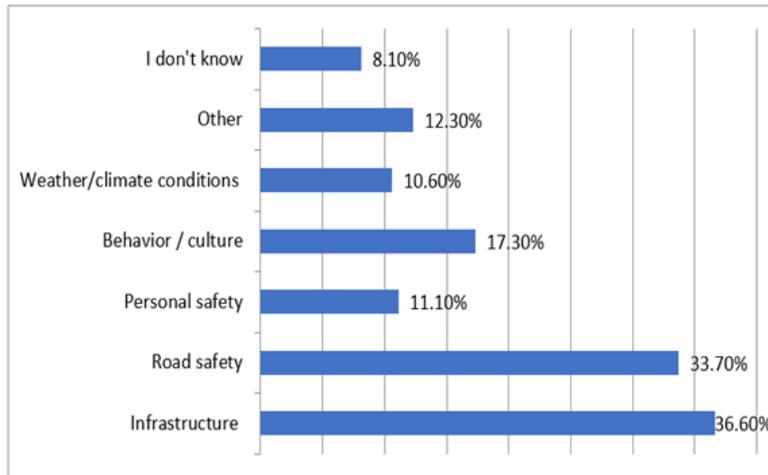
Figure 1. How frequently do you walk?



33. Respondents have indicated lack of infrastructure (36.6 percent) and road safety concerns (33.7 percent) as main issues making walking difficult for people. Other major factors included behavioral/cultural barriers (17.3 percent), personal safety (11.1 percent), and weather/climate conditions (10.6 percent). It is indicative that lack of infrastructure and road safety concerns came up

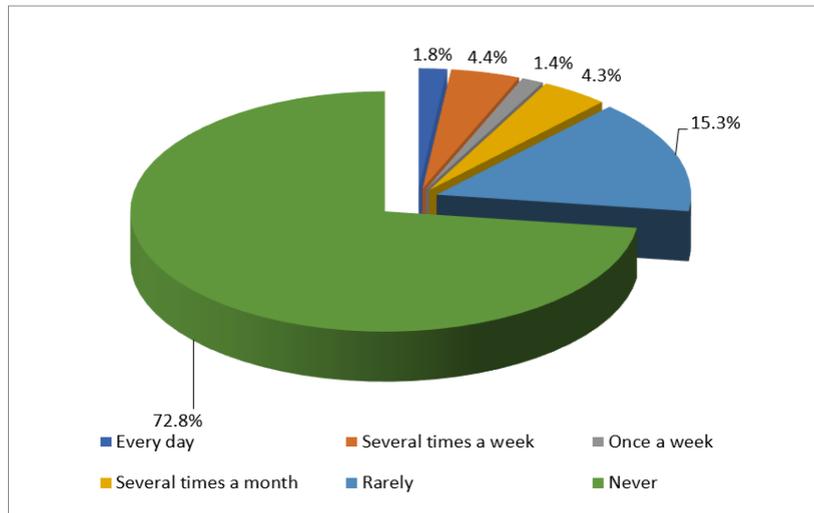
as the most popular reasons making walking difficult for people. These two factors are interrelated and concern lack or poor condition of roads, sidewalks, underground passes/overpasses, pedestrian crossings, and other infrastructure, as well as congestion, driving/walking behavior, regulations, enforcement issues, and so on.

Figure 2. What are the main issues making walking difficult for people?



34. **The survey found that cycling is currently not a popular means of transportation in Baku City.** Only 7–8 percent of respondents use the bicycle at least once a week. Out of these people 70 percent are youngsters. About 95 percent of those who used bicycles did this for leisure and health reasons and less than 5 percent for commuting or shopping. In absolute terms, only about 3 people out of 900 use bicycles for other reasons than leisure and health on a weekly basis. Finally, almost 73 percent of people never rode a bicycle.

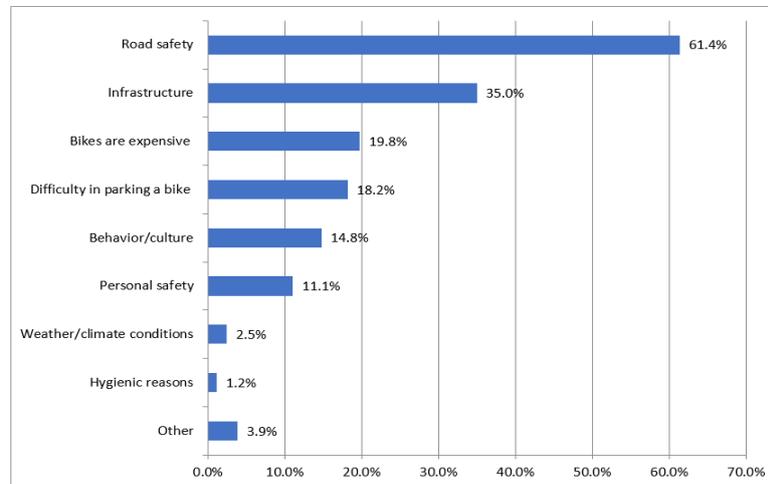
Figure 3. How often do you ride a bicycle?



35. **City residents believe that the main barriers preventing people from cycling are road safety issues and lack of infrastructure (61.4 percent vs 35.0 percent, respectively).** This is in line with the case of pedestrian mobility, but with significantly more people indicating road safety as the main obstacle. Other main reasons cited included high prices for bicycles (19.8 percent), lack of parking facilities (18.2 percent), cultural/behavioral barriers (14.8 percent), and personal safety (11.1 percent). Very low number of people mentioning weather/climate and hygienic reasons (2.5 percent and 1.2

percent, respectively) is likely to be related to the lack of actual cycling experience of people. The top five obstacles were mentioned nearly equally by all age representatives, but concerns about personal safety is more widespread among younger and older people.

Figure 4. What are the main obstacles that prevent people from riding a bike in Baku?



36. One of the important findings of the survey is perceived willingness of very significant part (60 percent) of population to regularly bike if there were decent and safe infrastructure in place. Not surprisingly, the younger people (12–24 years old) prevailed (40 percent) among those who responded positively and older people (45 years and above) were much less enthusiastic (22 percent). Despite the overall high level of openness to bicycling, about 66 percent of respondents who answered positively are ready to bike for leisure and health reasons, while the percentage of those ready to commute and go for shopping is much lower (about 15 percent and 16 percent, respectively). Still, these results can be considered as positive for a city with no biking traditions. Respondents were also supportive to the establishment of separate cycling tracks (57 percent) or cycling lanes on roads (33 percent), while only about 8 percent of people were negative or neutral to the proposal.

37. Gender disaggregation of survey data shows some differences in perceptions and patterns between females and males. While females are overall walking only slightly less than males, their reasons for walking differ. Females are walking slightly less than males (45 percent vs 55 percent) for commuting, leisure/health, and work, but significantly more (61 percent vs 39 percent) for various shopping. Perceptions between females and males regarding main obstacles for walking are mostly similar with the difference that females are a bit more concerned about personal security and road safety. Difference in patterns is much more evident for cycling. Prevalence of males among those who ride at least once a week is overwhelming (about 75 percent vs 25 percent). Females are mostly biking for health and leisure reasons and their share among those who commute or go shopping by bicycle is very low. In terms of difficulties preventing people from biking, females are more concerned about personal security, road safety, and cultural issues. Among those who would ride a bicycle if there were a decent and safe infrastructure (60 percent of total population), females account for 40 percent. In fact, this group represents a significant part of all females (about one-fourth), but they would mostly be ready to bike for leisure and health purposes.

38. The study survey revealed openness and significant interest of the general public in Baku to NMT. People have articulated opinions about key issues preventing or making it difficult for them to walk or cycle—one being road safety and another lack of good infrastructure. It is also clear that the public opinion would obviously be supportive of any reasonable pedestrian and cycling development programs. The survey has also revealed certain behavioral/cultural limitations, which might negatively affect development of NMT modes, but they do not seem to be critical.

NMT POLICY OBJECTIVES FOR BAKU

39. **Enhanced use of non-motorized transport could provide significant benefits to city and its citizens.** Analysis of these benefits provides a background for setting objectives and priorities for development of NMT in Baku. Some of the benefits and potential objectives considered in this report include transportation, environmental, social, health, and economic aspects of NMT as described below.

Figure 5. NMT development objectives



NMT as Means of Urban Mobility

40. **There is a large agenda for improvement of quality, comfort, and accessibility of the entire urban mobility system in Baku, including public transportation and traffic management.** Existing challenges and bottlenecks largely prevent efficient and user-oriented urban mobility. Despite the recent improvements, further optimization of the bus networks and standardization of services, and operationalization of dedicated lanes are among important pending tasks. Intermodality needs further improvement through more and better intermodal facilities, integration of transportation modes, reliable information systems, and innovative solutions to the issue of connectivity between transportation terminals and final destinations. Congestion, which is associated with disproportionate motorization, inadequate traffic and demand management, design issues, and illegal parking, is a big issue for the city. Due to congestion, average traffic speed varies between 10 and 20 km/h in the central part of the city. Public transportation, especially the metro, is also very congested.

41. **Development of NMT can play an important role in alleviation of urban mobility issues in Baku.** Findings of the study survey suggest that residents of Baku undertake millions of pedestrian trips on a daily basis but the use of bicycles is not yet popular. Meanwhile, pedestrians occupy less than a sixth of the space of an average vehicle, and bicycles take up around a third (FIA Foundation 2016). This offers great opportunities for more efficient use of urban space in case of replacement of even small portion of car trips by NMT as occupancy rates of cars in Baku is often small. Because of low traffic speed on the central streets, speed of travel on a bicycle can in many cases be faster or comparable with cars. In fact, given that NMT is mostly used for short-distance trips (for up to 7.5 km by cycles and 2.5 km by walking) and up to 70 percent of cars trips cover less than 5 kms, NMT has important potential to replace car trips (IPCC 2007) and reduce congestion.

42. Another opportunity rendered by improved use of NMT in Baku is its role in facilitating intermodality. The public transportation system in Baku is not yet in a position to provide good accessibility to all the users. Especially, relatively poor people who cannot afford private cars and reside in relatively remote areas of the city, villages of Baku, and informal settlements suffer from the lack of good accessibility and long distances between their houses and bus and metro stations/stops. Promotion of NMT will help fill some of these connectivity gaps, which will require improvements in intermodal infrastructure.

Environmental Benefits

43. Environmental pollution and low air quality are serious problems for Baku. As a party to the Paris Agreement since 2015, Azerbaijan is committed to achieve considerable reduction of GHG emissions (35 percent by 2030), including through interventions in the transport sector. However, the contribution from the transport sector to air pollution in urban areas remains high and reaches 11 percent, as per the findings of the third UNFCCC National Communication Report. This has been the tendency for the last decade and remains so as demonstrated by the findings of the recently conducted monitoring of the air quality in Baku City and its suburbs. The analysis of the air samples indicated that most of the parameters such as benzene (8 times), ozone (1.8 times), nitrogen dioxide (1.1 times), and some others considerably exceed maximum permissible limits in the central districts of the city, where motorized traffic is highly intensive. Besides traffic intensity, there are factors such as old car fleet (about 80 percent of the total fleet is older than 10 years) which does not meet international standards in the level of emissions. There is an overall understanding of the transport sector's contribution to the air pollution level in big urban centers and across the country. To address the issue, Azerbaijan has introduced EURO IV standards, which regulate the emission level of imported cars. As part of its obligations under the Paris Agreement, the country has formulated its Nationally Determined Contributions which call, among others, for the use of environmentally friendly modes of transport.

44. Non-motorized transportation, including walking and bicycling are the most environmentally friendly modes of transportation, as they do not involve consumption of any fossil fuels. Every motorized trip being replaced by NMT benefits the environment in terms of climate protection, local air pollution, energy consumption, and noise reduction. Potential NMT trips for replacement of motorized trips include both short trips and longer trips combined with the use of public transport.

An average passenger car running on petrol and complying with EURO V standards emits approximately 170 grams of CO₂ on a 2-km trip with an 'urban' driving pattern of low speed and frequent stops.

If it is assumed that such trips account for about 10 percent of all trips in Baku, their total number can be estimated at 0.5 million trips (based on figures from an ADB study in 2014 on urban mobility in Baku). If even just 5 percent of these short trips are replaced by NMT, approximately 3.1 tons of CO₂ emissions could be saved on a yearly basis.

Source: Calculations are based on the Danish national emission model TEMA2015.

Economic and Efficiency Gains

45. Promotion of NMT modes of mobility may have significant economic impacts. An increase in NMT and replacement of car trips can contribute to a reduction of the cost of congestion from car traffic. Congestion costs are not known for Baku, but every minute spent in a traffic jam costs money for the residents and city, results in loss of productivity, and increased costs of transporting goods. Meanwhile, recent studies found that in some developed countries, urban residents lose nearly US\$1,000 a year while sitting in traffic. The total economic cost of congestion in the United States,

United Kingdom, and Germany is currently estimated at US\$461 billion (INRIX 2018). The increasing congestion trend in Baku and spreading congestion to parts of the city which have not seen it previously suggest growing economic costs to the city, which can be reduced by promotion of NMT.

46. Evidence from Western European cities shows that NMT users contribute significantly to the commercial turnover in city centers. Figures show that in London, pedestrians spend 40 percent more in the center areas than car drivers and that investments in walking in some streets have led to an increased trade and reduction in retail vacancies.² In Copenhagen, evidence from shopping streets with mixed traffic, which have both car and bicycle parking along the streets, show that pedestrians and bicyclists stand for an equal share of the turnover (approximately one-third each), whereas car drivers stand for approximately 25 percent (COWI 2018). Baku has good historical traditions of very popular pedestrianized trade zones, such as Nizami Street, and could build on this successful experience. Pedestrianized zones in the city center also serve as popular attractions for tourists and should be part of tourism development strategies.

Role in Development of Tourism

47. Tourism is a growing industry in Azerbaijan, and the government is aiming at transforming Baku City into a major touristic destination. Baku has great potential to attract tourists due to its rich historical, cultural, and architectural heritage. Over the recent years, the government has invested a lot into increasing the attractiveness of city, particularly of its central part, for tourists. Based on international experience, good conditions for walking and cycling in cities are among the important factors for a large share of tourists. Many tourists visit Amsterdam and Copenhagen due to their green reputation and plenty of opportunities to cycle and walk. Many other cities in Europe, such as London, Paris, Barcelona, and Milan, have also increased their attention to improving possibilities for NMT. This, among others, helps to address the air pollution issue in these cities.

48. The substantial potential of Baku to develop tourism is, currently, not fully utilized. Design and implementation of more tourist-friendly NMT policies could help support the sector and promote more advanced tourism products. It could also boost sustainable urban tourism and address the threat to development of tourism from the increasing greenhouse gas emissions from transport.

Health Benefits

49. Health issues play an important role in motivations of Baku residents as per findings of the study survey. With the average life expectancy of 75.4 years (2017), Azerbaijan stands in the middle of the world country rankings, which is a key proxy for health performance of population. Meanwhile, according to the State Statistics Committee of Azerbaijan, circulatory diseases account for about 57 percent and neoplasms (cancer) account for about 15 percent of all death cases. About 243,000 people across the country are treated for diabetes. All these diseases are known to be caused to a significant extent by sedentary lifestyles. According to a UK study¹ (2017), a physically active person reduces the risk of death by 20–35 percent, type 2 diabetes by 35–50 percent, coronary heart diseases by 20–35 percent, colon cancer by 30–50 percent, and so on. Based on the above information, it is difficult to overestimate the potential benefits of an active lifestyle in Azerbaijan by the promotion of walking and cycling.

¹ Healthy Streets for London. Prioritizing walking, cycling and public transport to create a healthy city. Mayor of London and Transport For London, February 2017.

The Mayor of London has a vision of making London the World's most walkable city. Health is one of his major arguments. According to the findings of the study, if all Londoners walked or cycled for 20 minutes a day, this would save £1.7 billion in National Health Service treatment costs over 25 years and would contribute in reduction of 85,000 hip fractures, 19,200 dementia cases, 18,800 depression cases, 16,400 cardiovascular diseases, 67,00 stroke cases, 4,800 type 2 diabetes cases, 1,500 colorectal cancer cases, and 1,300 breast cancer cases.

Source: Healthy Streets for London. Prioritising walking, cycling and public transport to create a healthy city. Mayor of London and Transport for London, February 2017.

Social Interaction

50. Walking or using the bicycle creates social interaction and improves social cohesion and well-being. In an era when social media is replacing face-to-face communication, this becomes an important benefit of NMT. More frequent face-to-face communication has a positive impact on individual's and society's physical and spiritual health. It is proven that social interaction helps to overcome stress and mitigates depression and anxiety. It also helps to better cope with the negative aspects of life and brings a more positive perception of our environment.

Picture 1. Social interaction in pedestrian walk area



Key Objectives for Developing NMT in Baku

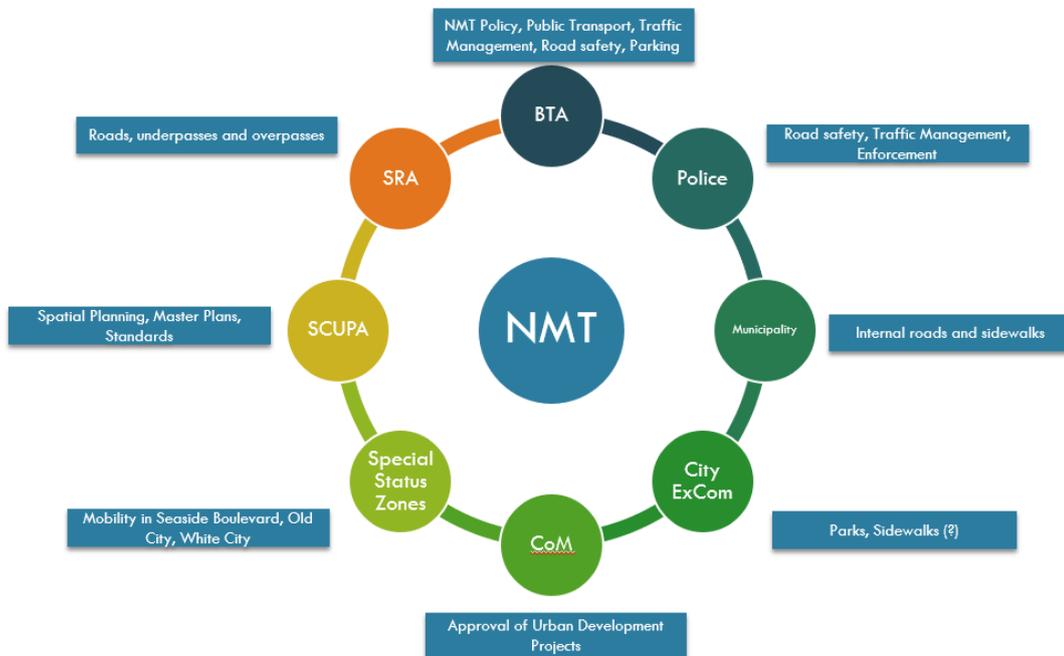
51. The key immediate objectives for promotion of NMT in Baku can be formulated as achieving (a) enhanced urban mobility (including reduced congestion and improved intermodality), (b) addressing the health situation, and (c) development of tourism. This conclusion is based on the review of the urban mobility situation in Baku, ongoing priorities of the government, and findings of survey among city residents. The approach would ensure efficient use of resources and keeping the focus on achievability of results. Pursuing the above key objectives will also bring along important environmental, economic, and social benefits, as discussed above.

INSTITUTIONAL FRAMEWORK FOR NMT

Key Findings on Existing Institutional Framework

52. **Management of NMT in Baku is so far not institutionalized or considered as an independent mode of transportation.** Despite the recent focus on NMT issues, true coordination of investment plans and operational policies based on an approved urban development strategy are currently missing. While the institutional framework for urban mobility in Baku is not well consolidated, management of NMT issues is probably one of the most heavily fragmented elements of urban mobility. The key government stakeholders in charge of NMT issues include BTA, State Committee for Urban Planning and Architecture (SCUPA), State Road Agency (SRA), Baku City Executive Authority, State Road Safety Commission of the Cabinet of Ministers, State Traffic Police, administrations of city zones with special status (Seaside Boulevard, Old City, White city), and municipalities. They have various status and reporting lines to the President, Cabinet of Ministers (CoM), Ministries, and executive authorities.

Figure 6. NMT institutional setup for Baku



53. **Establishment of BTA in 2015 has helped to reduce fragmentation in the management of urban mobility but did not fully eliminate the issue.** BTA is the institution having the broadest responsibility from overall planning to actual implementation of policies. However, BTA does not have an overall mandate to become an umbrella transport agency in charge of coordination, planning, and implementation of overall urban mobility policy.

54. **Main responsibilities of BTA** involve regulation of public transportation services, including bus and taxi services and establishment of public transportation hubs, and participation in organization and regulation of traffic management, including management of ITS system, parking, road signage, and marking. With regard to management of NMT, the BTA Charter mentions that the agency provides opinion on decisions about roads, bus stations and stops, metro exits, overpasses and underpasses, and bicycle lanes. BTA also provides opinion on the spatial planning issues for vehicle and pedestrian mobility. Overall, the normative documents do not establish primary responsibility of BTA for NMT issues. Despite implementation of some NMT development projects, the BTA does not have any

dedicated unit in its organizational structure dealing with NMT and the related tasks are assigned to the unit in charge of management and analysis of traffic flows.

55. BTA is still a young organization and struggles with institutional capacity to deal with their responsibilities. No universities in Azerbaijan provide specialized education in sustainable mobility issues and planning and design for NMT. BTA therefore is facing a challenge to properly educate and train their own staff. So far, BTA has been heavily dependent on an external consultant for management of issues related to the development and promotion of NMT.

56. Baku City Executive Power has very limited responsibilities for urban mobility issues. Since the mid-2000s, the central government made a series of unusual, from the international experience point of view, decisions by which most of related responsibilities were transferred from the city administration to other agencies. The city is currently responsible for maintenance of some NMT-related technical infrastructure, which mainly includes parks and some roads (about 800 km) with associated sidewalks.

57. The State Road Agency (SRA) is responsible for the design, construction, operation, and maintenance of main road infrastructure in the country. Since 2007, the responsibility for management of most roads in Baku was transferred from the city administration to SRA. They are currently in charge of 1,642 km of urban roads while some part of roads (see above) still remains with the city. SRA is currently piloting two roads with combined bicycle lanes on Molla Juma and Mehmandarov Streets. SRA also has responsibility for management and maintenance of all pedestrian overpasses and underpasses in the city.

58. Reshuffling of institutional responsibilities for urban roads has resulted in ambiguous legal status of sidewalks in the city. While urban sidewalks are routinely being constructed/reconstructed as part of road works or retrofitted within dedicated projects by implementing agencies, no agency currently accepts the institutional responsibility for management and maintenance of sidewalk. This leads to erosion of standards and early deterioration of pedestrian infrastructure.

59. State Committee for Urban Planning and Architecture (SCUPA) is responsible for spatial planning in the city. In 2018, all spatial planning and construction permit functions of city administration were transferred to SCUPA. As part of its responsibility, SCUPA has started the preparation of an overall city master plan with a 20-year time horizon, which will include networks for public transport, road traffic, and NMT. The new city master plan is expected to be complete by end-2020. Furthermore, SCUPA is also responsible for technical norms for planning and engineering design, including standards for NMT infrastructure.

60. The Traffic Police used to be a lead road safety agency for the city, but currently has only enforcement functions. The technical and engineering aspects of road safety in Baku have been transferred to BTA, while all decisions and projects related to traffic management, road infrastructure, and road signage and marking should still be agreed with the Traffic Police.

61. Baku has several territorial zones, which have special status and administration powers on NMT-related issues in those areas. These mainly include Seaside Boulevard and Old City. By decisions of government, these administrations have been granted some autonomy in decision making, including planning, design and maintenance, as well as for work with private investors. Seaside Boulevard and Old City are important traditional pedestrian and cycling zones and have huge potential for further development of these modes in the city.

62. Municipalities, as local government bodies, have limited administration authority, but are responsible for basic pedestrian and other infrastructure at the local level. In fact, municipalities

have formal authority over a large number of small local infrastructure, including roads, sidewalks, passages, pedestrian paths, and so on. Due to limited financial capacity of municipalities, this infrastructure is often not well maintained. In many cases reconstruction and maintenance of this infrastructure are financed by city and rayon level executive authorities.

63. The Cabinet of Ministers (CoM) is the highest authority for coordination, review, and approval of major urban development projects. CoM normally performs this function through its Traffic Safety Commission, collegial body with representation of all key related government stakeholders, chaired by the Deputy Prime Minister. Proposals initiated by the government agencies (Traffic Police, BTA, SRA, and so on) are submitted to the Commission, which organizes its review by other stakeholders and makes the final decision.

64. Baku lacks an integrated institutional setup and comprehensive coordination, planning, and implementation functions to deal with all urban mobility modes, including NMT. Development policies do not rely on an Integrated Land Use, Urban Transport and Air Quality Strategy. As a result, the overall city objectives (for example, environment, 'liveability') are not set and aligned with spatial urban planning, urban mobility, and urban transport infrastructure policies.

65. It is difficult to find evidence for planning of NMT as a serious transport mode in Baku. The ability to plan for an efficient urban mobility and NMT requires availability of data and information. Origin-Destination surveys, more basic qualitative information on user preferences and attitudes, as well as high-quality technical maps, which allow for meaningful planning exercise are presently missing.

66. Given the lack of overall objectives, strategy, or planning for NMT, Baku does not have any dedicated or earmarked funding for its development. Financing of fragmented NMT elements is done within a broader urban development and road infrastructure construction projects or within very limited number of pilot projects. Due to lack of financing, maintenance of even basic road safety related pedestrian infrastructure such as painted road crossings is not implemented on a regular basis.

Way Forward and Recommendations to Strengthen Institutional Framework

67. NMT should be recognized and institutionalized as an important independent mode of urban mobility. In fact, NMT should not only be recognized as a stand-alone transportation mode, but prioritized over other modes of transportation as per the approach adopted in most advanced metropolitan centers in Europe and elsewhere in the world. According to this approach, pedestrian mobility comes first at the top of urban mobility hierarchy pyramid, followed by cycling, public transport, commercial vehicles, taxis, and private cars. NMT should be included in the legislative and normative documents, strategies and policies, as well as institutional structure of relevant government organizations as an independent mode of transportation.

68. An institution/authority having the overall responsibility for multi-modal urban mobility issues in Baku City, including NMT, should be established. The institution could be BTA, but this will require decisions on upgrading the organization to the new level and redistribution of roles between some of the present entities. In particular, it would be important to involve integration of spatial planning and urban mobility planning functions. If not a single institution, then a structure with transparent and clear responsibilities between various institutions should be established with common overall objectives for the development of the urban mobility in Baku. This is a critical precondition for promotion of NMT as it should be an integral part of the urban mobility agenda. NMT can only be managed properly if considered together with other urban transport, public transportation, traffic management, and road safety issues.

69. **Baku City should have urban mobility development strategy, which would, among others, include development of NMT as a serious mode of transportation.** Currently, the State Road Safety Program, approved in the end of 2018, is the only high-level document which identifies specific and cross-cutting actions relevant for development of NMT. This important document, however, has a different objective and, is obviously not sufficient. Modern approach to urban mobility strategies requires consideration of all issues related to (a) land use, (b) urban mobility, and (c) air quality on an integrated and comprehensive basis.

70. **The Baku City Master Plan should include development of NMT.** At present, no approved city master plan or regional development plan exists, but work on it has started in 2019. It would be important for the new city master plan to include the overall concept of sustainable urban development with “liveability” principles and specific attention to pedestrian and bicycle friendly approaches as one of the key priorities.

71. **A holistic approach to urban mobility requires serious efforts to improve the overall data availability on both the supply and demand side.** Comprehensive and regularly updated origin-destination surveys are key for availability of data, which could serve as a basis for decision making for all types of urban mobility, including NMT. No such surveys have been implemented for the city recently, which complicates planning, development of reasonable urban mobility strategy, and prioritization of investments. Implementation of such surveys should be institutionalized and done on a regular basis. The issue of availability of professional level digitalized city maps needs to be urgently addressed. Finally, to fill information gaps and allow for operational efficiency, city residents need to be directly involved in providing feedback and information on issues and solutions at local level.

72. **Enhanced approach to NMT as a major urban mobility mode requires sustainable mechanisms for its financing.** Design of dedicated NMT financing mechanisms is important for sustainable financing of investments and maintenance of existing infrastructure. The government could consider earmarking some of the existing or additional revenue sources of the Road Fund for development and maintenance of NMT facilities. Potential sources of funding could also include private finance. Good quality and standardized NMT facilities should become a requirement for private investors and obligatory part of such development projects.

73. **Contractual mechanisms need to be designed and piloted for routine and periodic maintenance of city streets, including all types of roads, sidewalks, road marking, signage, and other infrastructure.** Currently, several stakeholders (BTA, City Administration, SRA, utility companies, and others) are involved in the maintenance of different elements of street infrastructure in Baku, often on a force account basis, which results in lack of ownership and early deterioration. Introduction of performance-based contractual mechanisms and key performance indicators could be piloted and introduced for better management of city infrastructure.

74. **The issue of lack of institutional responsibility for management of sidewalks identified by this study, is a major problem and should be resolved urgently.** Based on the interviews with the key stakeholders, the study could not identify the legal status of sidewalks. This gap in institutional arrangements results in lack of ownership, substandard design and/or construction of sidewalks, lack of maintenance, capture and early degradation of infrastructure.

PEDESTRIAN MOBILITY

KEY FINDINGS

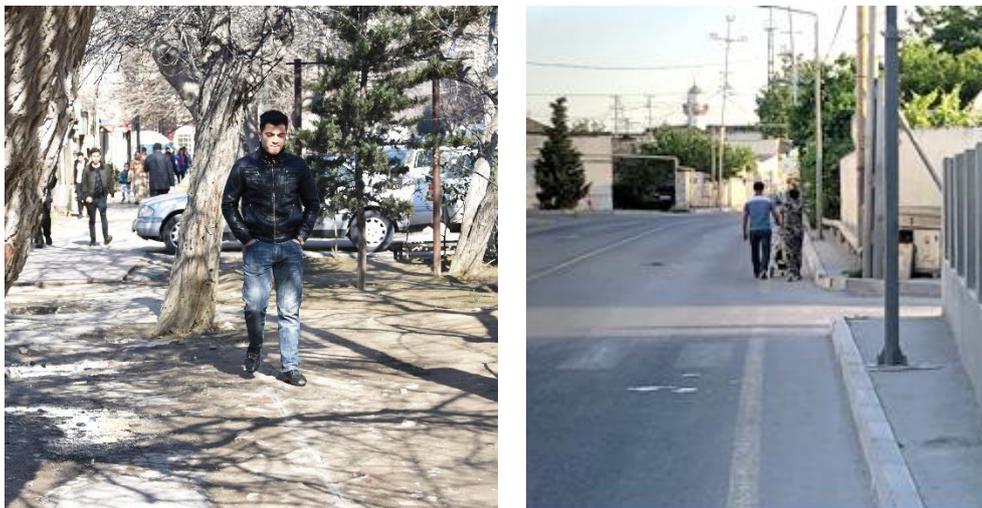
75. **While both pedestrian and cycling mobility are relevant for Baku urban mobility, walking stands out.** Pedestrian mobility is important for everyone regardless of gender, social or economic status and it has always been an essential part of everyday life in Baku. The study survey has indicated that 95 percent of Baku residents walk at least several times a week. The survey has also identified lack of pedestrian infrastructure and road safety as the main barriers for pedestrian mobility.

Pedestrian Infrastructure

76. **Sidewalks are the most critical element of pedestrian infrastructure.** According to standards, they have to be established on both sides of streets (unless one side is not residential) independent of the number of people using them. National standards (AzDTN 2.6-1) as well as interstate (CIS) GOST standards (33150-2014) provide norms for sidewalks. The norms specify, for example, a minimum width of 2.25 m along second category roads and 1.5 m along local roads. Depending on the expected number of pedestrians, modules of 0.75 m are used to increase the width. The two standards, however, have some discrepancies making it unclear which standards prevail.

77. **Sidewalks in Baku are often poorly constructed or maintained.** Currently, the legal status of sidewalks is not clear, and no agency accepts ultimate ownership of sidewalks and responsibility for their maintenance. Sidewalks are often neglected during construction and standards are not always followed depending on other priorities and factors, such as availability of public lands. Until recently, when pedestrian infrastructure started receiving more attention, many sidewalks in the city were fully or partially captured for expansion of adjacent roads or commercial businesses. Finally, given the unclear responsibility for maintenances of sidewalks, many of them can be found in a state of disrepair.

Picture 2. Examples illustrating challenges for sidewalks



*Left: A sidewalk illustrating an example of illegal parking and poor and uneven quality of surfaces.
Right: An example of negligence to sidewalks on this recently reconstructed road in Baku suburb, which puts pedestrians at great risk*

78. **Improvement of sidewalks is receiving growing attention, especially in central parts of Baku, but construction standards vary.** The recent mass introduction of granite polished kerbstones in the city is an example of unsustainable solutions for sidewalks. These expensive and heavy kerbstones cannot be easily repaired in case of damage. Their height (20 cm) is above standards and this has

resulted in poor drainage and early deterioration of street sidewalks in many locations. The slippery nature of these kerbstones leads to a safety risk of falling and a feeling of insecurity, especially during rainy/snowy weather conditions.

79. The ongoing project for retrofitting of sidewalks to the needs of disabled people and strollers is one of the successful ongoing NMT development initiatives. While the introduction of ramps between sidewalks and roads is a first good step, safe design standards need to be applied more consistently. This project could also be followed by a more comprehensive approach when entire routes are upgraded with supportive tactile lanes leading visually impaired persons to the ramps.

Picture 3. Examples illustrating challenges for sidewalks



Top left, some of the new ramps provide good accessibility at intersections. Top right, other new ramps created new risks for safety of pedestrians. Bottom, new very slippery and high granite kerbstones have led to bad accessibility and discomfort for pedestrians.

80. The national standards provide basic norms for location of pedestrian crossings. This includes provision of grade-level pedestrian crossings for each 200–300 m on streets with buildings facing the streets. Standards also envisage grade-separated pedestrian crossings on streets with high-speed roads, tram or railway lines (every 400–800 m), unregulated highways (every 300–400 m) or if pedestrian traffic intensity exceeds 3,000 persons/h. In real life these standards are not consistently applied. Also, limited guidance or standards exist on criteria for choosing the type of crossing or correct location in relation to intersections, bus stops, and so on.

81. Design of regulated and unregulated pedestrian crossings often illustrate lack of pedestrian consideration. Review of pedestrian crossings in the city center has revealed several pedestrian crossings with lack of signage or marking, lack of pedestrian traffic lights in signalized intersections, little consideration on minimum time for a pedestrian to cross a signalized intersection, risky location of crossings with poor visibility, unregulated crossings at roads with a high and fast car traffic as well as too close location of pedestrian crossings to bus stops. The interviews conducted have indicated that in various cases these could be caused by insufficient standards or non-compliance with

standards. Another major problem seems to be related to the limited maintenance budget being allocated for marking and signage of pedestrian infrastructure and overall roads.

82. **BTA has prepared guidance on pedestrian crossings, which illustrate sound and internationally acknowledged principles for planning and design of pedestrian crossings.** It is important that provision of pedestrian crossings was considered in the context of the overall traffic situation. While the guidance is prepared for review of specific locations, they provide good foundation for development of a more general manual and should be taken as a starting point for the new normative documents.

Figure 7. BTA assessment criteria for pedestrian crossings

<p>1. Safety criteria:</p> <ul style="list-style-type: none"> ❖ Traffic speed ❖ Traffic intensity ❖ Pedestrian traffic volume ❖ Road characteristics ❖ Visibility ❖ Road width to cross 	<p>2. Effort criteria:</p> <ul style="list-style-type: none"> ❖ Effort required to cross the road
<p>3. Cost criteria:</p> <ul style="list-style-type: none"> ❖ Design ❖ Construction ❖ Maintenance 	<p>4. Other criteria:</p> <ul style="list-style-type: none"> ❖ Feasibility ❖ Noise ❖ Environmental impact ❖ Comfort ❖ Access for disabled persons

83. **BTA has started applying new principles for design review of major pedestrian crossings in the city.** They were applied during design review of pedestrian crossings at the Statistics Committee junction, Zabrak-Kurdakhani Highway, Nobel-Zigh Highway, Mehdi Huseyn Street, Babek Avenue, and Yusif Safarov Street. While detailed review of specific designs is beyond the scope of this study, in general the new framework is the appropriate step in the right direction for improving walkability in the city.

84. **The grade-separated pedestrian crossings in the city currently include 39 overpasses and 70 underpasses.** The vast majority of them have been constructed by the SRA during recent years and are overall still in good condition. Many of these crossings in the city center are equipped with escalators and maintenance of such underpasses and overpasses represents a challenge. Escalators were produced by different manufacturers and their quality varies. This complicates procurement of spare parts and maintenance works and results in frequent disrepair of escalators.

Parks and Pedestrian Zones

85. **According to the Ministry of Environment and Natural Resources, Baku City has approximately 14,000 hectares of green areas, about 6 m² per city resident.** The planning standards (AzDTN 2.6-1) envisage not less than 10 m² of green area per person for large cities. In recent years, a number of new major parks have been established. These include Qish Parki, Merkezi (Sovetski) Park, Sevgi Parki, Yasamal Parki, and others. Also, the city has built better capacity during last decade for development and maintenance of parks. The new parks have mostly been developed to high standards, including establishment of diverse facilities for kids, elderly, and other groups of population. Together with the Seaside Boulevard, this provides Baku with good opportunities for supporting healthy walking in green areas and parks. The good opportunity for establishment of dedicated bicycle tracks in the parks, however, was not utilized, and bicycle users would still need to use pedestrian paths for cycling.

86. **Accessibility of parks is a challenge in some cases.** To reach most of the green areas and parks, pedestrians must cross heavily trafficked streets. Even though pedestrian underpasses, pedestrian crossings or signalized crossings can be found, access is still limited. Pedestrians often have to detour to reach safe crossings. Also, people with disabilities face major challenges.

87. **The areas around Nizami Street, the Old City, and the Seaside Boulevard offer a good foundation for increasing the walkability.** These areas serve both Baku residents and many visitors and tourists. Visitors are attracted by the shops, cafes, restaurants and, generally, by the atmosphere of car-free areas. The pedestrian streets also accommodate short business trips between work places in the area. Underpasses under Neftciler Avenue connecting the Seaside Boulevard with the central part of the city and a few underpasses for streets crossing Nizami Street facilitate connections between the areas within the central part of the city.

88. **The scarce provision of safe walking at street level to and from the central areas is a major challenge.** The crossing of congested streets is often unsafe or only possible by taking detours. This impedes intermodality, for example, walking to and from the 28 May and Sahil metro stations. Another example illustrating the challenges is that the pedestrianized part of Nizami Street abruptly stops at the intersection with R. Behbudov Street without proper pedestrian crossing facilities.

89. **The lack of proper pedestrian facilities in the central parts of the city makes mobility for tourists even more challenging.** Baku citizens are familiar with the city and issues related to deficient marking and signalization at intersections, whereas tourists quickly feel unsafe and uncomfortable when facing such situations. This negatively affects attractiveness of the city for tourists and revenues from the tourism industry.

Picture 4. Example of unsafe condition for pedestrians



Pedestrians walking between Sahil metro station and Nizami Street are challenged by the congested streets and unsafe walking conditions.

90. **Signposting for tourists has been improved, but remains an overall issue for the city, particularly for its non-central areas.** Improvement project has been implemented for tourists on central walking routes, for example, between the Seaside Boulevard and the pedestrianized area around Nizami Street and the Old City. This represents a good example for development and needs to be replicated and expanded to other parts of the city.

Many cities in the world are working on improving walkability in central city areas. It is important to combine physical improvements with active involvement of the public and local businesses in the process. Istanbul's project for pedestrianization of the historic peninsula is a good example for illustration of a simple concept, understanding the involved issues and challenges, and implementation of the user satisfaction approach. The Istanbul Metropolitan Municipality started the project in 2005 and in 2013–2014, surveys and field interviews were used for evaluating the satisfaction among residents, students, and employees/business owners. The survey showed a satisfaction rate of 80 percent and gave input to further improvements.

Source: The pedestrianization of Istanbul's historic peninsula, Perspectives from local businesses, 2013, published by EMBARQ Türkiye.

Intermodality and Public Transportation Hubs

91. **The pedestrian facilities to and from public transport terminals in many parts of the city need major improvements.** All public transportation trips start and end by walking for a distance of 500–800 m or even longer. This warrants much closer attention of the authorities to this important problem and promotion of intermodality. Currently, in many city locations safe and convenient pedestrian infrastructure for walking from major residential areas to metro stations (Nizami, Inshaatchilar, Neftchilar, Ahmadli, and most of others) and bus stops is missing or in a dilapidated condition. Furthermore, not only the pedestrian infrastructure to/from the terminals, but also the station/hub areas need major intervention. The traffic flow at many public transportation terminals is chaotic and disorganized. This creates an unsafe, inefficient and uncomfortable situation for pedestrians.

Picture 5. Example of unsafe condition for pedestrians



Buses stop on the street and pedestrians must cross cars to reach the sidewalk at 28 May Station.

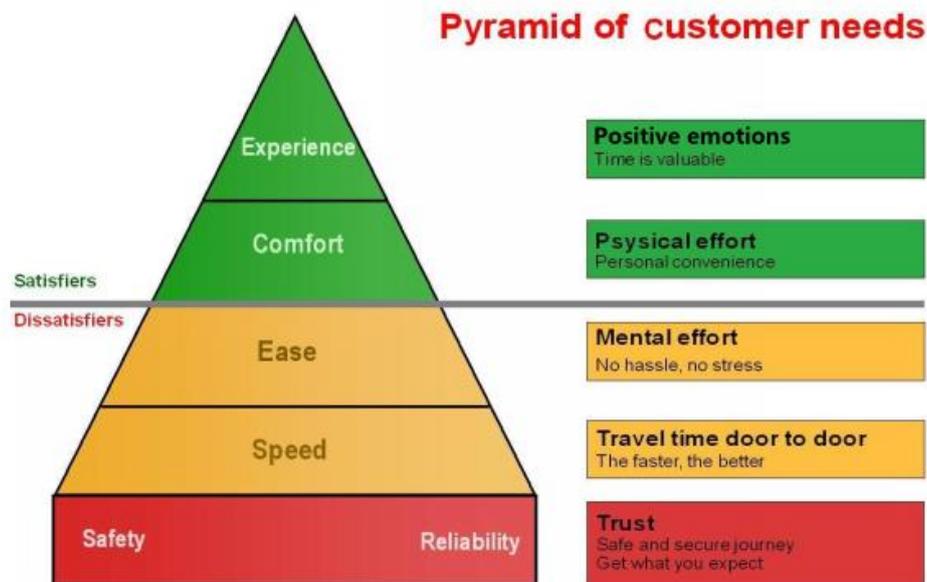
92. **Establishment of several major public transportation hubs in Baku for convenient and well-organized transfers between rail, metro, buses and other transport modes is an important initiative.** In practice, however, the intermodality feature of these hubs needs to be developed further to better incorporate pedestrians, bicyclists as well as private cars in the concept.

93. **The concept of public transportation hubs should be improved to include focus on walkability to and from the hub within a catchment area.** The guidance prepared by BTA includes an "area traffic study", which only deal with motorized traffic for vehicles to access the hub. Pedestrian flows to and from the hub area are not mentioned. Moreover, while, the number of women among pedestrians is nearly equal to that of men, women perceive road safety and security as more important factors than men do. The survey from this study has confirmed this statement and highlighted that focus on safe walking is especially important for women. All these issues are very important and should be covered

by specifications for public transportation hubs. Normally, users should be involved into development of such specifications.

94. **Overall, the concept of public transportation hubs needs more attention to user's perspective.** Figure 8 illustrates the generally accepted user needs, where the safety and reliability are supplemented by speed and ease. From a pedestrian perspective, feeling of safety/security is particularly important. Relevant specific topics also include good visibility and appropriate lighting for both the hub areas and access roads.

Figure 8. Effect of station improvement measures on customer satisfaction

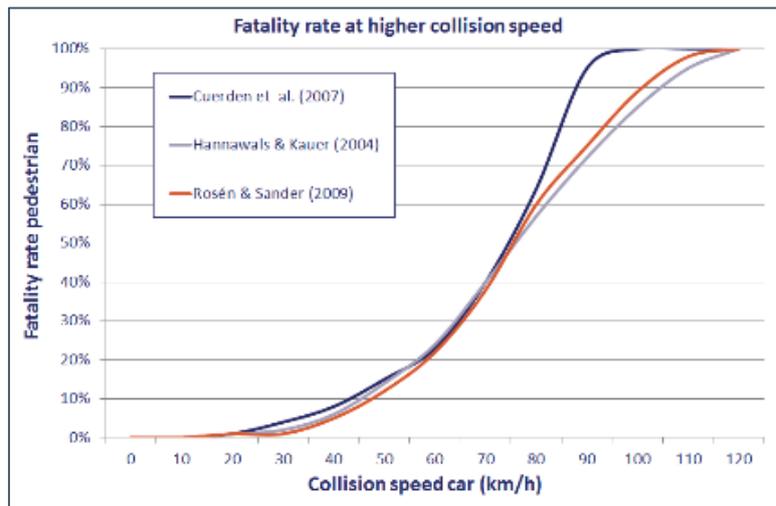


Source: van Hagen, Mark. 2015. "Effect of Station Improvement Measures on Customer Satisfaction." *Journal of Traffic and Transportation Engineering* 3: 7–18.

Pedestrian Road Safety

95. **Pedestrians constitute 70 percent of persons killed in major road traffic accidents in Baku.** According to the State Road Police Department, in 2018, in 619 road accidents in Baku, 212 persons were killed, and 529 persons were injured. Out of these, pedestrian fatalities accounted for 148 cases and pedestrian injuries for 256 cases. These statistics demonstrate significantly higher vulnerability of pedestrians to road accidents, compared to European cities. In the European Union, pedestrians account for 21 percent of all road fatalities (ERSO 2018).

96. **The lack of safe road crossings, illegal parking on the streets and sidewalks, and the current speed limit of 60 km/h are believed to be major obstacles for safe walking in Baku.** The illegal parking forces pedestrians out on streets together with cars and furthermore makes it difficult to achieve good visibility when crossing roads. The car speed is very important risk factor for the pedestrians being killed. In most advanced cities, the general speed limit is 50 km/h, and in many European cities, local streets have a speed limit of 30 km/h.

Figure 9. The correlation between car speed and fatality rate for pedestrians

The correlation between car speed and fatality rate for pedestrians being hit by a car is well recognized. The figure illustrates that from approximately 40 km/h, the risk of a fatality increases significantly even with relatively small increases in speed.

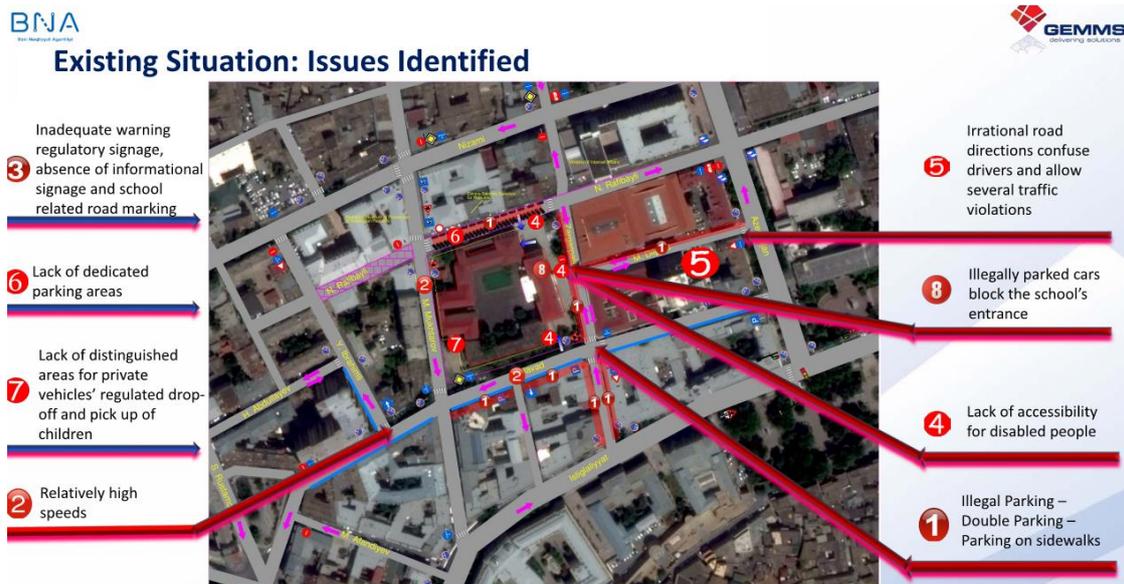
Source: SWOV, Institute for Road Safety Research, the Netherlands.

97. Irresponsible driver and pedestrian behavior are other important reasons for pedestrian casualties. As elsewhere, however, the perceptions of drivers and pedestrians on reasons of pedestrian accidents are biased, as it was also revealed by interviews with stakeholders in Baku. In fact, provision of pedestrian crossings should be based on demand and a professional assessment and all road traffic participants should strictly follow the rules. The overall trend in European cities, however, is that city centers are becoming increasingly NMT dominated and vulnerable road users, such as pedestrians and cyclists, are getting better protected.

98. The new national road safety program highlights safety for pedestrians. The program includes measures targeted at Baku and a complete set of measures targeted at organization and regulation of safe movements of pedestrians. These measures address various challenges, including, safety of children on streets, regulations for establishment of pedestrian crossings, specifications of pedestrian traffic lights and other pedestrian-related practical issues.

99. BTA has started implementation of pilot projects for improved road safety in school areas. The first pilots included changes in traffic directions, new ramps between sidewalks and streets, speed bumps, fencing on sidewalks (to avoid illegal parking and direct pedestrians to safe crossings), road marking and signage, and restrictions on parking. In fact, for many schools in Baku, extensive illegal parking around schools is making it difficult for pedestrians to walk on sidewalks, to cross streets and even to enter the schools. The common challenges also include relatively high vehicle speed on neighboring streets, inadequate signage both for general traffic regulation and for drawing attention of drivers to school children, lack of dedicated parking spaces for drop-off and pick up of children, and so on. It will be important to follow up on implementation of the first pilots to evaluate the impact through user surveys among school children, parents, traffic police and the school administration, and replicate the adjusted efforts in other school areas.

Figure 10. BTA school project findings



The first school project implemented by BTA was based on several identified challenges. Some of the challenges have been tackled and an evaluation could identify further needs for action.

WAY FORWARD AND RECOMMENDATIONS TO PROMOTE PEDESTRIAN MOBILITY

100. **While walking is already an integral part of the everyday life in Baku, there is a substantial room for improvements that can support the achievement of the proposed objectives for development of NMT in Baku,** including reducing congestion, enhancing intermodality, supporting healthy lifestyle, and promoting tourism.

101. **The concept of urban mobility in Baku should recognize, integrate, and prioritize walking as an important mode of transportation.** The study has revealed potential improvements including a mix of infrastructure investments and institutional measures, but their realization can start only with the fundamental shift in the overall approach to the pedestrian mobility. A long-standing tendency of taking pedestrians and walking for granted, which existed and still exists in many cities in the world, should be discontinued. It is critical for Baku to improve the overall planning and design framework for urban traffic areas by integrating pedestrian mobility at least on equal basis with other transportation modes. This involves political will to change priorities and provide pedestrians with more space and time.

102. **The recent commendable pedestrian infrastructure improvement pilots should be evaluated and institutionalized.** Retrofitting of the sidewalks to provide better access for disabled and baby strollers, signposting in central Baku, improved design of pedestrian crossings, better pedestrian conditions around schools, and opening of the new major pedestrian-friendly parks are good steps toward supporting more walking and should not remain as isolated initiatives. It is important to incorporate results and lessons learned from the pilot projects in general practice and commonly used design framework and manuals. Especially, focus on improving regulated and unregulated pedestrian crossings, criteria for selection of pedestrian crossing types, design of sidewalks based on universal access for all, and so on, should be continued and prioritized.

103. **The issue of pedestrian safety and high vulnerability of pedestrians in Baku is critical and should be subject to a more scientific approach to the reasons and solutions to the problem.** International experience from many other cities in the world suggests paying more attention to the rationale behind

people's behavior while crossing roads at locations without safe crossings. Analysis and possible solutions to the issue could focus on more careful identification of locations with a large demand for pedestrians to cross roads and subsequent provision of safe facilities. The government should also consider reducing the speed limits in many parts of the city to 50 km/h and thus reduce the risk of accidents and severity of personal injuries. The traffic rules and enforcement framework should put more responsibility on traffic participants to avoid collisions involving pedestrians. Finally, these measures should be combined with information campaigns to trigger more attention to pedestrians' movements.

104. The tendency of under-financing and deterioration of road safety and pedestrian infrastructure in the city should be reverted. This trend became more evident after the economic and financial slowdown in the country due to reduced oil revenues. In all circumstances, the road safety-related programs cannot be financed on a residual basis. Utilization of at least 10 percent of infrastructure investments for road safety, including pedestrian infrastructure, should be a key governing principle, as per the UN's Global Plan for the Decade of Road Safety Action.

105. A comprehensive phased program for improving walkability in the city should be adopted. Its implementation could start from the center of Baku, which has high potential for developing tourism, reducing congestion, and improving intermodality, and then extended to other centrally located parts of the city. This should start with development of a sound methodology for walkability audit and be informed by surveys among city residents, urban mobility professionals, traffic participants, tourists, and tourism business community. The exercise could involve audit of pedestrian routes between key destinations and major points of interest and identification of challenges (lack of signposting, unsafe road crossing facilities, poor quality of sidewalks, lack of lighting, facilities for disabled, maintenance issues, and so on). Selection and prioritization of improvements should include traffic management measures to achieve, among others, travel time advantages over the private cars.

106. Design and adoption of neighborhood-based programs to improve intermodality and stimulate more active and healthy mobility would be beneficial. The program could include (a) identification of selected neighborhoods for implementation of the program; (b) mapping important pedestrian routes between metro entrances and major public transportation hubs and key residential and other destination areas; (c) audit and identification of potential improvements of walkability with focus on availability and condition of sidewalks and pedestrian paths, pedestrian crossings, lighting, signage, and, possibly, relevant information and education campaigns; and (d) implementation of a remedial improvement program.

107. The enhanced attention to sidewalk assets, as key pedestrian infrastructure, is critical. Primarily, sustained institutional responsibility for management and maintenance of sidewalks should be urgently established. The enforcement of penalties for illegal capturing or degrading existing sidewalks needs to be improved. The control over technical requirements on sidewalks during implementation of new urban development projects should be better exercised. This also requires review and modernization of technical design standards for sidewalks. For example, in the absence of dedicated lanes, sidewalks and other pedestrian infrastructure are increasingly used by bicycles and small-wheeled transport modes, and in some cases design could be easily retrofitted to accommodate combined functions if pedestrian traffic density permits, as is done in many other cities in the world.

Picture 6. Typical Shared Pedestrian and Cycling Lane, Vienna, Austria

108. **The access to parks and green zones should be improved to stimulate their better utilization and more active and healthy leisure time of city residents.** The idea is to develop a ‘connecting the dots’ approach that provides safe, comfortable, and enjoyable walking routes between various parks, as well as between the parks and major dwelling areas, public transport hubs, schools, office areas. This would involve assessment of the sidewalks and pedestrian crossings, identification and prioritization of investments for improving the routes, as well as implementation of improvements and communication campaigns. The pilots, for example, could include connections with Ataturk Park, Dede Gorgud Park, Love Park, Central Park, the Heydar Aliyev Centre area, pedestrianized part of Nizami Street, Seaside Boulevard, and so on. Each link could connect two recognizable destinations. Improvement of certain links is likely to be technically difficult and/or expensive, but some sections could be implemented as part of other urban development projects within a long-term program.

Picture 7. Improved pedestrian crossing facilities in Buenos Aires

Buenos Aires (Argentina) has worked intensely for the last 5–10 years on improving conditions for NMT in the central parts of the city. Pedestrians have been given much more space and better crossing facilities.

CYCLING MOBILITY

KEY FINDINGS

109. Cycling has good potential to become an integral part of the Baku urban mobility and support its overall development objectives. The study survey has confirmed that 60 percent of Baku residents are willing to cycle on a regular basis if decent and safe cycle infrastructure is in place. Today, bicycles in Baku are primarily used for leisure and health purposes in a few areas, including Seaside Boulevard, parks, and specialized areas, but the number of bicycle users is rapidly increasing.

Picture 8. Cyclists are only occasionally seen on the streets and very few cycle racks exist in Baku



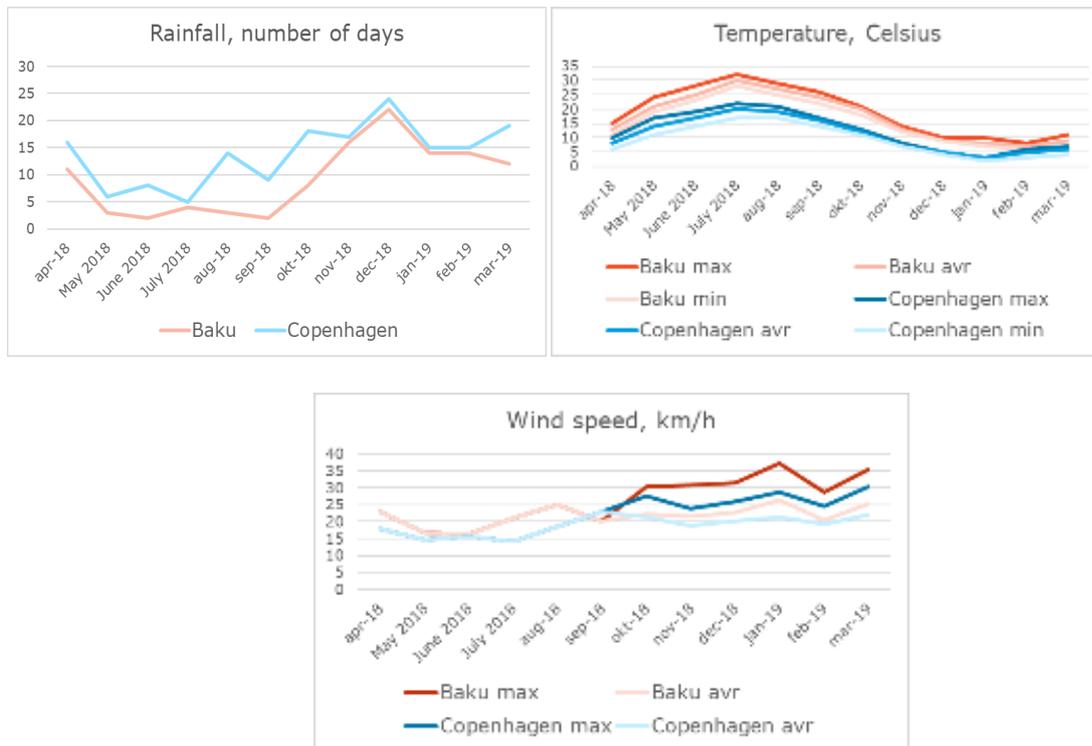
110. Safety is perceived by Baku residents as the most serious potential issue preventing people from cycling. The perception is likely to be based on the complete lack of bicycle infrastructure on the city streets. This perception is also supported by statistics. Despite the very insignificant number of cyclists on the city streets, according to traffic police data, 7 cyclists have been killed and 20 have been injured in road accidents in Baku in the period 2014–2018. Experience from other countries, including Denmark and Sweden, show that such numbers are only ‘the tip of the iceberg’ as many accidents involving injured cyclists are not registered or reported.

111. Baku does not have strong cultural traditions for cycling, but this does not seem to be a major barrier. This is confirmed by findings of the study survey, according to which only 15 percent of city residents have indicated cultural/behavioral issues among major obstacles for cycling in Baku, out of which females and males accounted for 59 percent and 41 percent, respectively. In some rural areas of the country, particularly in the northern regions (for example, Zagatala, Gusar), cycling is widespread, which also shows lack of major barriers in terms of cultural acceptability in the country. There is no doubt that long traditions of bicycling in some of the leading bicycle countries and cities is a crucial element for a positive attitude and general acceptability and use of bicycles. However, many cities with significant bicycle traffic have started promoting cycling only 10–15 years ago from a very low level. In that sense, Baku is not unique and can learn from the experience of such cities as London, Paris, Warsaw, southern European cities, and some cities in the United States.

112. Baku has a hilly topography, which affects the overall potential of the city for bicycling, but allows for its development. The city altitudes range from –28 m at Baku Bay to up to 150–200 m in the higher parts of the city. It is true that countries and regions with the highest bicycle use, such as Denmark, the Netherlands, Germany, Northern Italy, tend to have a flat topography. However, numerous cities with hilly terrain were able to promote bicycle traffic. These include cities in Austria, Norway, Switzerland, and southern European cities like Barcelona and Lisbon. In Baku, steepness of slopes and hilly topography are not a challenge in all parts of the city and the most challenging locations can be handled by technical solutions, such as design of infrastructure and bicycle specifications.

113. Baku has a windy climate and hot summers, which, however, cannot be considered serious barriers for development of cycling. The below graphs compare weather conditions between Baku and Copenhagen, which is recognized as the most bicycle-friendly city in the world. High summer temperatures and strong winds can sometimes negatively affect bicycling in Baku, however, Copenhagen is also famous for its winds and has other disadvantages in terms of lower winter temperatures and much higher number of rainy days throughout the year.

Figure 11. Comparison of weather conditions between Baku and Copenhagen



Source: <https://www.worldweatheronline.com>

Bicycle Infrastructure

114. National standards (AzDTN 2.6-1) and Community of Independent States (CIS) GOST standards (33150-2014) accepted in Azerbaijan, provide basic foundation for development of cycling infrastructure. The AzDTN 2.6-1 specifies a width of 1.5 m for dedicated bicycle lanes. The width of cycle lanes on streets separated from the car traffic with a double line should be minimum 1.2 m, while a cycle lane against the direction of car traffic should have a width of minimum 1.5 m. The GOST standards include some more detailed, but still basic design requirements, such as friction specifications for surface material, heights and clearance requirements, details for space required for cycle parking, road safety considerations, and so on. The GOST standards define car traffic intensity as a key factor for decisions on using cycle lanes or separate tracks for bicycling, whereas international experience also stresses the need to consider traffic speed as an important criterion.

115. The existing standards are very generic and insufficient for planning and design of serious bicycle infrastructure for major cities like Baku. Even though the GOST standards provide some reasonable norms, they fall short of meeting minimum requirements for a major city with a complex traffic system, diverse urban setup and landscape, small distances between intersections, high pedestrian mobility, numerous buildings, parking areas, bus stops, and other infrastructure.

116. The bicycle infrastructure standards for road intersections are particularly limited. The road intersections are the most complex elements of bicycle infrastructure, which pose much higher risks of accidents between cars and cyclists compared to other road segments. The almost complete lack of guidance on design of intersections is, therefore, of major concern. The layout of intersections on main roads in Baku is another challenge for including safe cycle crossings. This includes, for example, major intersections having U-turns instead of signals and one-way streets in the central part of city without pedestrian crossings and thus including potential cycle crossings at each link.

117. The national traffic regulations are short on signage and signalization for bicycles compared to the most of other European countries. This might be justified by the lack of bicycles on the city roads, but also affects the development of cycling practices and culture. If development of cycling is targeted, then gradual introduction of more bicycle-oriented signage on warnings, prohibitions, directions, entrance regulations, cycle paths and shared use, parking, as well as road markings regulating bicycle traffic, is warranted.

118. The parks and green areas in Baku include the provision of pedestrian paths, but dedicated cycle paths are very rare. This includes even parks established very recently, such as Merkezi Park and Gish Parki. Meanwhile, parks and green areas are the most obvious and convenient locations for popularization of bicycles and introduction and development of cycling culture. A few bicyclists in these parks, currently, have to use the pedestrian paths. Importantly, as the layout of the parks is not planned and designed for including cycle routes this may lead to future challenges for supporting cycling routes in parks due to obstacles, such as stairs, narrow passages, playgrounds, and so on. Thus, the lack of dedicated space for cycle infrastructure in the new parks is a missed opportunity for supporting more cycling.

Picture 9. Baku Gish Parki (Winter Park)



Gish Parki is a new major park in Baku. It includes extensive walking paths and the park obviously also has sufficient space for dedicated cycle paths. However, this was not part of the original design and subsequent retrofitting of design is challenging.

119. Small-wheeled vehicles, such as scooters, skates, boards, and two-wheeled transporters, are emerging modes of transportation, which are becoming increasingly popular and competitive. They have also started occupying the streets of Baku. Trips made with small-wheeled vehicles take up less space than bicycles and also do not emit local pollutants. There is a diverse international experience with the use of small-wheeled vehicles. Some cities have supported them by legislation and provided public space to use them. Other cities have been more restrictive due to safety or due to the wish not to have these vehicles filling up sidewalks and other public urban areas. These small vehicles move with a speed more like bicycles than pedestrians. Therefore, as their number on the streets increase,

a decision will need to be made on the infrastructure for them. They may need the same type of infrastructure as bicycles, to become safe modes.

Recent Initiatives for Development of Cycling in the City

120. BTA has been mandated with the development of bicycle infrastructure and promotion of cycling in the city. This should be better reflected in the establishment documents of BTA, though, for firming up the existing institutional arrangements. As part of their mandate, over the recent two years, BTA has developed the draft Conceptual Master Plan for Cycling in Baku, pilot projects for Commuting Cycling Network in the Elmler Akademiyasi area, Development of Potential Pilot Routes in Central Part of Baku and other areas, Development of Cycling Route around Boyukshor Lake, Development of Cycling Network Design for Yasamal Social Housing Area, and undertook other initiatives, which can serve as a good starting point for promotion of cycling in the city.

121. The Conceptual Master Plan for Cycling in Baku (see Annex 1) is a draft framework proposal for the development of a cycling network in Baku for touristic, recreational and commuting purposes. The document suggests a gradual two-phased approach, including (a) development in a short-term perspective of mainly off-road cycling routes in some selected parks and public urban locations, and (b) development in a longer-term perspective of on-road cycling routes, which would connect the off-road pilot areas and then extended to the entire city. The off-road touristic and recreational routes are expected to be low-cost interventions and implemented in a short period of time. They would also help to introduce and popularize cycling among public. The program is suggested to be accompanied by public awareness campaigns about benefits of cycling and improved cooperation between the key stakeholders.

122. The Conceptual Master Plan document suggests prioritization of Seaside Boulevard for development of cycling infrastructure during the first phase. The Seaside Boulevard extends for more than 17km along the sea shore of Baku Bay and is ideally positioned to accommodate bicycle lanes. The Seaside Boulevard currently has the highest concentration of cyclists in the city and already attracts numerous city residents and tourists. Boulevard area can easily be connected by cycle lanes with important city landmarks, such as Old City, Nizami Street and others. Finally, the Seaside Boulevard could serve purposes of all main types of cyclists, including commuters and those riding for recreational and touristic reasons. The proposed plan envisions development of dedicated paths with full-fledged signage and marking, bicycle racks, bike-sharing system, repair and pumping stations.

123. The first phase of the plan also includes establishment of recreational and touristic cycling paths in the so-called ‘low hanging fruit’ areas of parks and sports complexes, where this can be done relatively easily, with minimum costs and efforts. These locations include Boyukshor Lake area, Koroglu Park, Merkezi Park, Dede Gorgud Park, Ataturk Park, Qish Parki, Olympic Stadium, Tofiq Bahramov Stadium, and Heydar Aliyev Sports Center areas. It is proposed to establish dedicated paths where possible and shared pedestrian-bicycle paths with proper signage and marking in areas where space availability is limited.

124. Overall, the work, which has been done so far for preparation of the Conceptual Master Plan for Cycling in Baku is substantial and provides valuable inputs and building blocks for development of bicycle mobility in Baku. In particular, the gradual, two-phased approach for development of cycling network in the city seems to be justified. The draft document, however, needs to be further developed and improved to meet the requirements for the national normative documents, agreed with all key stakeholders and eventually approved and included in the Baku City Master Plan, which is, luckily, under preparation. For that, the document needs to be better integrated in and linked to higher level city objectives, policies and plans.

125. Selection of pilot projects and potential routes for the first phase of implementation is based on a pragmatic approach. Although the approach is overall justifiable, it lacks detailed analysis of route selection and design criteria, such as safety, connectivity, attractiveness and convenience. The first phase sub-projects could be slightly more ambitious and give more focus on providing connections between some important destinations in addition to routes within local areas. For example, provision of short links between Boyukshor Lake area, Olympic Stadium, Athletes Village and Koroglu Station, and/or link between White City and the Seaside Boulevard, could be already considered under the first phase.

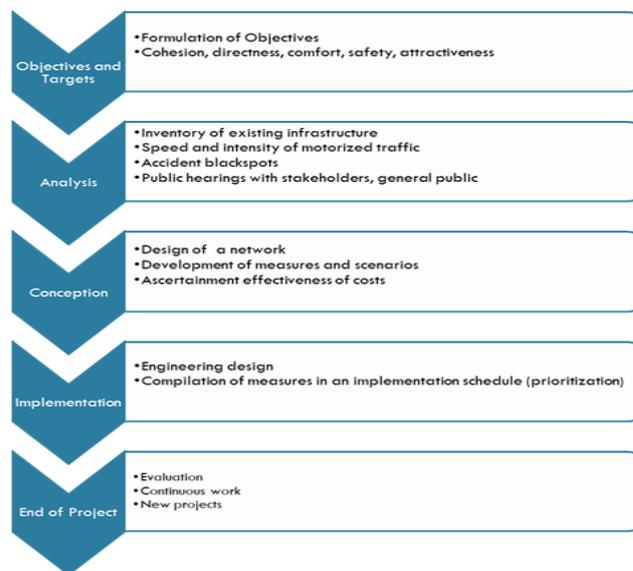
126. The proposed pilot routes on existing streets in central Baku are very ambitious and highlight the need to address some important issues. These include need for proper signage and signalization for cycles in intersections, which seem to be missing in the traffic code, insufficient enforcement of roadside parking, implementation of dedicated bus lanes, signalized intersections for cycles, longitudinal slopes and some others. It is obvious that these concerns, especially design of regulated intersections, are imperative to address in any cycle pilot schemes in central Baku. Important decisions would need to be taken on how to prioritize between pedestrians, cyclists and cars within the traffic management scheme for the area. Also, while the cross-section design proposals from BTA are overall consistent with international experience, they need to include basic description of criteria for application of different design types.

127. The Conceptual Master Plan document is currently focused on the first phase pilot projects and should provide more details on the second phase of developing bicycle network structure for the whole city. This is a complex task, which will require serious urban mobility analysis and justification of needs for connecting various points of the city. This task will also require thorough coordination with the key government stakeholders, especially, those responsible for spatial planning for the city.

WAY FORWARD AND RECOMMENDATIONS TO PROMOTE CYCLING MOBILITY

128. Cycling has significant potential to reduce congestion, enhance transport intermodality, and support recreation and tourism in the city. The challenges for promoting cycling, however, are of profound nature because cycling in Baku is nearly nonexistent, the associated institutional and human capacity are missing, planning and design frameworks are at a rudimentary level. Realization of the existing potential, therefore, will require a comprehensive long-term approach combining hard infrastructure investments and soft measures. Figure 12 is a self-explanatory chart which provides a template for design and implementation of the typical cycling strategy, which is also applicable for Baku.

129. The two-phased approach proposed by BTA for development of cycling, with the pilot cycling routes implemented in a first phase and full-fledged on-road cycling routes at a later stage, overall makes good sense, but its implementation should be better aligned with the NMT development objectives proposed by this study. The focus on locally-oriented pilot projects in selected spots will not contribute to the reduced congestion and intermodality. It is, therefore, recommended that the pilot projects also include some links and connections between important city points to start building relevant real-life experience and learning lessons.

Figure 12. Key considerations for design and implementation of the typical cycling strategy

Source: Handbook on cycling inclusive planning and promotion. Capacity development material for the multiplier training within the mobile2020 project, November 2012.

130. The pilot projects should meet a real transport demand and enable evidence and positive feedback from actual users. The project quality should ensure that negative public opinion and reflections in social and other media are avoided. Negative feedbacks about details like the use of slippery surfaces on lanes making cyclists fall or major obstacles in the middle of the cycle track can easily affect the overall acceptance of the project and willingness to continue investments. Evaluation of the initial pilot projects should demonstrate their relevance and enable consolidation of public opinion. The initial pilot phase should use an approach, which is creative and ambitious and includes achievement of early results and small outcomes on a continuous basis. The creativity will ensure that cycling is well visible and is part of the agenda and news regularly. Effective implementation of pilot schemes and demonstration of results will keep up popularity and the overall public acceptance rates of the program.

131. Preparation for the second phase of the program (city-wide implementation) should not be postponed to the indefinite future, but be launched in parallel with implementation of the initial pilot phase. It should start with identification and analysis of transport demand based on an origin-destination survey as well as surveys for defining user preferences and attitudes on mobility. Identification of potential network of bicycle routes and key destination points, including public transport hubs and other locations with high likelihood of attracting traffic, can be reasonably implemented only after thorough demand analysis. The Master Plan for Baku Cycling Network should be developed based on this preparatory work, approved in coordination with the key stakeholders, and incorporated in the Baku City Master Plan.

132. The second phase construction works should normally be preceded by preparation and approval of the detailed bicycle infrastructure design standards and guidelines. In parallel, the traffic code should also be reviewed and adjusted to include more elaborate regulations, signage, and marking for bicycle traffic. These should be based on international experience and be informed by the lessons learned during the pilot phase. Implementation of construction works is likely to take significant time, so investments should be prioritized by the formally approved action plan. The execution of works should also be accompanied by an evaluation process, analysis of the implementation experience, as well as recording of good practices and case stories to be used during the promotion campaigns.

133. Intermodality schemes combining cycling and public transportation would be relevant candidates for the first-phase pilot projects. This would include establishment of secure bicycle parking area and other facilities (racks, signage, marking, and so on) in the public transportation hub areas and safe infrastructure links between the hubs and selected residential areas (for example, cycle lanes on traffic calmed streets with low speed limits). Given the high density and lack of space in many central areas, it would be appropriate to look for relevant opportunities outside the central parts of Baku and review the major public transport hubs and their catchment areas in the radius of up to approximately 2–3 km. This could be integrated in the work already started by BTA on establishment and improvement of major public transportation hubs.

134. Projects on promoting intermodality could be targeted at neighborhoods with relatively higher poverty rates and be combined with bicycle co-financing or subsidized bike-sharing schemes. This type of project could improve overall mobility in remote neighborhoods and strengthen cycling culture. This should be accompanied by carefully designed information/campaigns to support the scheme.

135. The overall objective to support tourism through promotion of cycling rests on the idea of diversification of tourist experience, showing the city and beyond from a different perspective and enhancing sightseeing by making it more pleasant, enjoyable, and easy. This approach appeals increasingly to tourists across the world. Realization of the task could start with identification of major potential tourist destinations to reach by cycle primarily in the central parts of Baku, for example, the Seaside Boulevard and destinations up to approximately 3 km from the Seaside Boulevard, such as the Old City, Nizami Street, the Heydar Aliyev Cultural Centre, the Highland Park, and others. This would be followed by identification of potential route alignments and design principles, and prioritization of routes to start implementation. The related information campaigns in cooperation with the local tourism business would be another important element of the project.

136. Introduction of comprehensive bicycle rental and bike-sharing systems should be considered as a critical component of the program to support cycling by tourists and city residents. Availability of safe cycle infrastructure and dedicated space for cycle parking is a key precondition of bike rental or bike-sharing schemes. The key features of popular and user-friendly systems are safety, reliability, comfortability, interoperability with various modes of public transport, flexibility in terms of bicycle pick-up and drop-off, and availability of enough cycles at all stations. Bike-sharing schemes exist in many cities worldwide and are mostly provided in partnership with the private sector.

Picture 10. Bike-sharing systems



Many cities have implemented bike-sharing systems and the European Cyclist Federation launched a platform for European bicycle sharing: <https://ecf.com/community/platform-european-bicycle-sharing-systems-pebss>

137. It is difficult to differentiate measures to support the objective on health impacts from the overall approach to support a sustainable mobility or other objectives, as any additional bicycle trip contributes to a better health. Nevertheless, one of the important targets could be children who nowadays suffer from inactive lifestyle, getting less exercise and a growing problem of obesity. Specific actions could be designed toward cycling to/from schools and toward families to use the cycle together for leisure purposes. An approach to reach such goals would include pilot programs with schools and mobilization of local communities to promote cycling. Implementation of family-based promotion activities require basic cycling infrastructure in parks and other suitable areas. Execution of the park infrastructure retrofitting project within the above pilot program and introduction of mandatory basic bicycle infrastructure in the design of all new parks and green areas would help to catalyze the process.

Guidance on Design of Cycling Infrastructure

138. A good cycling network should focus on meeting the requirements for coherence, directness, safety, comfort, attractiveness, and be well linked with public transport (Sustrans Design Manual, Handbook for Cycle-Friendly Design, 2014). This means that the project should provide links to demanded destination, be continuous and recognizable, have consistent standard and be properly marked and signed. It should have minimum detours and provide obvious advantages compared to cars. The route should be safe and secure and have limited potential conflicts with other transport modes. Normally, it should also be interesting and attractive, contribute to good urban design, and illustrate proper maintenance. The infrastructure should be smooth, not slippery, have good drainage, and provide space for maneuvering. Finally, it should also provide good links to major transportation hubs and supply cycle parking spaces at hubs.

Figure 12. Key Requirements Towards Good Cycling Network



Source: Sustrans Design Manual, Handbook for Cycle-Friendly Design, 2014

139. While national normative documents provide some technical standards and design parameters for cycling lanes and tracks, guidance on design of intersections is almost entirely missing.

Intersections are a critical part of bicycle infrastructure as they represent the most complex element of the system and are largely responsible for safety, particularly in mixed traffic. This warrants focus on intersections in the new design standards for bicycle infrastructure, which should be prepared for promotion of cycling in the country.

140. Safety is the most important criteria for design of intersections. To enhance the safety of intersections and avoid potential conflicts, their design should be simple and self-explanatory. The design needs to ensure that cyclists are well visible to cars. The speed difference between cycles and cars should be minimized, which can be ensured by setting low speed limits for cars. The design also needs to make sure that cycling provisions are highlighted through various measures, such as advanced stop lines, painted lanes through the intersection, and others.

141. Right-of-way intersections (intersections without traffic lights) are simple, but should preferably only be used on streets with a low speed limit (for example, 30 km/h) and a low car traffic volume for the street crossing the cycle route. For example, Dutch guidance suggests less than 800 vehicles per hour for right of way intersections. If the road conditions allow it, cyclists can be given priority and special provisions to support and underline their status can be used.

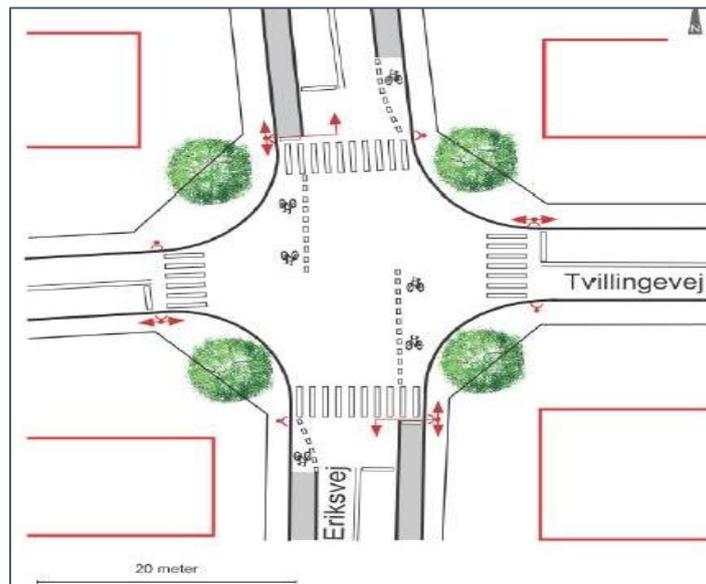
Picture 11. One-way cycle tracks separated from the primary street and having priority over crossing cars from the secondary street



142. Roundabouts can be considered as a subtype of right-of-way intersections and their use demands carefully crafted and location-specific solutions. Overall, in intersections with low traffic intensity and low speed, roundabouts may be a solution if properly designed to underline the low speed. Visibility, low car speed, and overall size of roundabouts are important aspects. Meanwhile, unavoidable complex traffic situations make one-size-fits-all solutions impossible and necessitate alternative options for making them safe for cyclists.

143. Traffic light intersections are preferred at locations with a high car traffic volume like the situation at present in most of the densely built areas of Baku. Important for a cycle friendly and safe design is to make cyclists visible. Figure 13 provides a simple design for one-way cycle tracks through a traffic light intersection. Two simple elements used to make cyclists visible are (a) the stop lines for cars which are 5 m behind the stop line for cyclists and (b) road marking in the intersection used to highlight cyclists, especially for right-turning cars.

Figure 13. Danish road standards for design of urban traffic areas



144. **Two-way cycle lanes/tracks crossing an intersection can create new safety risks.** Car drivers do not expect cyclists from two directions. Special attention is thus needed to alert car drivers by using, for example, vertical signs, cycle symbols and arrow markings on the road. In traffic light intersections, specific traffic lights for cyclists are needed and separate green phases would be an asset.

145. **Pilot routes in central Baku should be based on signalized intersections.** With the present car traffic volume in the streets, only signalized intersections are realistic to use based on road safety and directness (waiting time). To implement such a design, it will most likely be necessary to agree on new types of signals for cyclists and new road marking.

146. **Grade separation with tunnels or bridges are theoretically the safest and sometimes most direct way to cross a very busy road.** It is recommended to consider them on busy streets with a high speed (70 km/h or more), high traffic volume (for example, more than 1,500 cars per hour), and a wide cross section. Underpasses are normally more comfortable for cyclists due to a lower gradient needed. However, NMT overpasses can be more attractive and be potential landmarks as, for example, in some Dutch and Danish cities. Picture 12 illustrates an important cycle bridge in Copenhagen, which created a new direct route and at the same time added something unique to the urban landscape. It is an attraction for many tourists. A creatively designed new NMT bridge crossing Neftchiler Avenue and connecting Seaside Boulevard with the rest of city could be a new attractive landmark in Baku.

147. **In densely built up areas, new underpasses and overpasses can be impossible to implement due to lack of space.** Here, alternatives with traffic calming are needed (lower speed limits, traffic lights, islands in the middle to reduce barrier impact, and so on). Further, badly designed or located under- or overpasses can also lead cyclists and pedestrians to cross on the road instead. Focus must be on creating as attractive passes as possible. This will imply as small height differences as possible, visible and direct entrances maybe from more than one direction and attractiveness (for example, high-quality and vandal-proof lighting in tunnels, handrails at bridges).

Picture 12. 'Cykelslangen' cycle bridge, Copenhagen, Denmark

Soft Measures to Promote Cycling

148. Proper public communication and campaigns for promotion of cycling are at least as important as establishment of cycle-friendly infrastructure. Baku is starting the promotion of cycling almost from scratch. Information activities and awareness-raising campaigns are therefore crucial to trigger attention and create positive curiosity among the public. Such campaigns need to be carefully designed to reach the potential audience and groups of stakeholders. The survey carried out under this study has identified potential cyclists and learned the views of the general public on their perceived priorities and barriers for cycling. This kind of survey provides inputs for targeted campaigns and identification of 'positive' triggers (health, environment, cost savings, time) for different groups of potential users. Table 1 illustrates how different target groups can be addressed so that messages reach their audience.

Table 1. Promotion of cycling for targeted groups

Target group	Examples illustrating potential messages
Children	Cycling is fun, you can go by yourself to school
Commuters	Cycling saves money, it is fast, it makes you healthy
People going for a leisure trip	A relaxing way of seeing more than on a walking trip
Newcomers with no experience	Cycling is quick, healthy, cheap
Females	Cycling illustrates a modern lifestyle, it can shape your body fitness, it can support leisure time with children
Car drivers	Cycling is just as fast and cheaper

Source: PRESTO Cycling Policy Guide, Promotion of Cycling, 2010.

149. Popular and well-recognizable persons have been used elsewhere in the world in successful campaigns to advocate for cycling. It can be movie stars, professional athletes, well-known politicians, famous musicians and writers, whose examples can inspire thousands of people to change their lifestyles and habits. In a city like Baku, there are, apparently, high-level government officials, well-known actors and actresses, show business representatives, and other celebrities, who are already

cycling or are sympathetic to cycling. They could be easily identified and involved in such campaigns. Examples and appeals of women celebrities could be particularly 'contagious' and trigger changes in cultural attitudes and behaviours among females.

150. Cycling campaigns can be especially effective, if they follow popular trends and/or are targeting youth. Since 2002, the European Commission is supporting the European Mobility Week initiative. The initiative encourages motorists to give up their cars for at least one day and instead use other modes of transportation. In 2019, the event takes place between September 16 and 22. Cities from both the Western and Eastern European countries, including Russia, Belarus, Kazakhstan, and Ukraine, have already joined the initiative, which is expanding rapidly. Baku is a good candidate for joining the campaign, particularly as cycling events are already being organized in city on World Health Day in April.

151. Partnerships and cooperation between key stakeholders are crucial to promote cycling. Successful proliferation of NMT requires smart decisions and integration of efforts. It is recommended, therefore, to initiate a unified public consultations platform on NMT issues, involving BTA, bicycle organizations, nongovernmental organizations (NGOs), environmental, health, sports, and youth organizations, tourism business, municipalities, Seaside Boulevard and Old City administrations, local community groups, police, and other relevant government agencies, for enhanced stakeholder coordination and development of common approaches.

ANNEX I: SUMMARY OF KEY ISSUES AND RECOMMENDATIONS FOR DEVELOPMENT OF NMT IN BAKU CITY

NMT Subject Area	NMT Objectives	NMT Issues and Gaps	Key Policy Recommendations and Actions
Strengthening Institutional framework for NMT	Enhancing urban mobility Improving public health Development of tourism	Lack of institutional status of NMT and prioritization policies for development of transportation modes	<ul style="list-style-type: none"> - Recognition and institutionalization of NMT as an important and independent mode of urban mobility - Prioritization of NMT and public transport over other modes of transportation - Separation of NMT as a stand-alone business line in the organizational structure of relevant government institutions
		Fragmented responsibilities and lack of integrated institutional setup for urban mobility and NMT	<ul style="list-style-type: none"> - Establishment of an institution/authority having the overall responsibility for multi-modal urban mobility issues in Baku City, including NMT
		Lack of strategic approach to development of urban mobility and NMT	<ul style="list-style-type: none"> - Development and approval of an integrated Land Use, Urban Transport and Air Quality Strategy for Baku with particular attention to NMT issues - Incorporation of the overall spatial concept for development of NMT in the new city master plan
NMT data and information	Enhancing urban mobility (reduced congestion and improved intermodality)	Unavailability of data and information for management and planning of urban transport and NMT	<ul style="list-style-type: none"> - Implementation and regular updating of a comprehensive Origin-Destination survey - Implementation of basic surveys on user preferences and attitudes - Development of high-quality technical maps
Financing of urban transport and NMT	Enhancing urban mobility Improving public health Development of tourism	Lack of financial sustainability and dedicated sources of financing for urban mobility and NMT	<ul style="list-style-type: none"> - Design of dedicated urban mobility and NMT financing mechanisms, such as municipal taxes or earmarking some of the existing or additional revenue sources of the Road Fund for urban mobility - Utilization of at least 10 percent of total infrastructure investments for NMT infrastructure and road safety - Establishment of strict requirement for privately financed urban development projects on the quality of NMT facilities
Development of pedestrian mobility	Enhanced urban mobility (reduced congestion and improved intermodality)	Insufficient legislative and normative framework, guidance and standards on pedestrian mobility. Pedestrian unfriendly urban infrastructure,	<ul style="list-style-type: none"> - Improvement and expansion of the existing legislative and normative framework for pedestrian mobility - Adoption of a comprehensive phased program for improving walkability in the city

	Development of tourism	which makes walking a challenging experience in many cases	<ul style="list-style-type: none"> - Development of a sound methodology for walkability audit - Better control over technical requirements on sidewalks and other pedestrian infrastructure during implementation of new urban development projects - Establishment of legal consequences for degrading or illegal capturing sidewalks and other pedestrian infrastructure
Development of cycling mobility	<p>Enhancing urban mobility</p> <p>Improving public health</p> <p>Development of tourism</p>	The challenges with promoting cycling in Baku associated with the lack of experience and traditions, missing institutional and human capacity, and rudimentary level of planning and design frameworks	<ul style="list-style-type: none"> - BTA needs to proceed with implementation of the two-phased approach for development of cycling, with the pilot cycling routes implemented in a first phase and more comprehensive full-fledged on-road cycling routes at a later stage - The pilot projects should be carefully designed, meet real demand and include connections between important city points to start building real-life experience, learn lessons, and generate positive feedbacks from users - Preparation of the second phase (city-wide implementation) should start immediately with identification of transport demand based on origin-destination and other surveys, and development of elaborate bicycle infrastructure norms - The Master Plan for Baku Cycling Network should be developed based on the preparatory work, approved in coordination with the key stakeholders, and incorporated in the Baku City Master Plan
Management and maintenance of NMT infrastructure	<p>Enhancing urban mobility</p> <p>Improving public health</p> <p>Development of tourism</p>	Lack of ownership and maintenance of NMT infrastructure	<ul style="list-style-type: none"> - Piloting and introduction of performance-based contractual mechanisms and key performance indicators for better management of city infrastructure - Urgent establishment of institutional responsibility for management and maintenance of sidewalks in the city
Pedestrian and cycling safety	<p>Enhancing urban mobility (reduced congestion and improved intermodality)</p> <p>Development of tourism</p>	Lack of pedestrian/cycling safety, high vulnerability and fatality rates, particularly among pedestrians	<ul style="list-style-type: none"> - Reducing the speed limits in selected parts of the city to 50 km/h - Improved focus on careful identification of locations for pedestrian/cyclist crossings - Enhanced enforcement of rules against irresponsible driver and pedestrian/cycling behaviour

			<ul style="list-style-type: none"> - More awareness and information campaigns on pedestrian/cycling safety issues
Pedestrian and Cycling Intermodality	Enhancing urban mobility (improved intermodality)	Insufficient pedestrian infrastructure and lack of cycling infrastructure between public transportation terminals and major destination areas, as well as within the public transportation hubs	<ul style="list-style-type: none"> - Design and adoption of neighbourhood-based programs to improve pedestrian infrastructure in the catchment areas of public transportation terminals - Improved design of public transportation hubs with more focus on pedestrian and cycling infrastructure and safety - Implementation of pilot intermodality schemes combining cycling and public transportation and retrofitting of the existing public transportation hubs to incorporate cycling facilities and parking - Designing intermodality pilot projects targeted at neighbourhoods with relatively higher poverty rates, including bicycle co-financing or subsidized bike-sharing schemes
Design of NMT infrastructure	Enhancing urban mobility (reduced congestion and improved intermodality) Development of tourism	Limited and generic nature of the existing technical standards for planning and design of NMT infrastructure	<ul style="list-style-type: none"> - Development of cycling infrastructure guidelines with focus on meeting the requirements for coherence, directness, safety, comfort, attractiveness, and good connections with public transport - Preparation of the detailed bicycle infrastructure design standards/ guidelines with special focus on design of intersections - Adjustment of the traffic code to include more elaborate regulations, signage, and marking for bicycle traffic - Incorporation of results and lessons learned from the recent pedestrian pilot projects in general practice, design framework and manuals - Development of technical design standards for shared NMT (pedestrian, cycling, and small-wheel vehicles) infrastructure
Soft measures to promote NMT	Enhancing urban mobility (reduced congestion and improved intermodality)	Lack of public communication and campaigns for promotion of NMT and weak stakeholder coordination	<ul style="list-style-type: none"> - Design and implementation of well-targeted public communication and campaigns for promotion of NMT - Effective use of celebrities, popular and well-recognizable persons in campaigns to advocate for NMT - Encouraging the Baku City to join trendy international initiatives, such as the European Mobility Week, for promotion of NMT and car-free city ideas

			<ul style="list-style-type: none"> - Initiation of a unified public consultation platform for partnership and cooperation between stakeholders to promote NMT
NMT features of parks and green areas	Improving public health	Design and accessibility of parks and green areas are not always NMT-friendly	<ul style="list-style-type: none"> - Development and enforcement of standard requirements towards pedestrian and cycling facilities in the parks and green areas, such as mandatory separate or shared cycling paths/lanes - Design and implementation of remedial action plan for improved NMT accessibility of parks and green areas - Design and implementation of projects with schools and local communities targeted at children to promote cycling to/from schools and families to promote cycling together for leisure/health purposes
Role of NMT in promotion of tourism	Development of tourism	Substantial unrealized potential for promoting tourism through development of NMT	<ul style="list-style-type: none"> - Design and implementation of the tourists-oriented cycling routes in central Baku - Introduction of comprehensive bicycle rental and bike-sharing systems to support cycling by tourists and city residents - Expansion of the implemented tourist signposting projects to other city areas

