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STUDY AND ANALYSIS OF INTERNATIONAL BEST PRACTICES ON COVID19 PREVENTION IN PUBLIC TRANSPORT FOR LUBLIN AND CHIȘINĂU

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LIST OF ABBREVIATIONS

Nr.	ABBREVIATION	
1.	NAPH	National Agency for Public Health
2.	GDSAH	General Department of Social Assistance and Health
3.	ENCPH	Extraordinary National Commission for Public Health
4.	ECPH	Extraordinary Commission for Public Health
5.	CPH	Center of Public Health
6.	MoH	Ministry of Health
7.	AURIs	Acute upper respiratory infections
8.	SARI	Severe acute respiratory infections
9.	COVID-19	Coronavirus Disease 2019
10.	PT	Public transport

INTRODUCTION

Chisinau City Hall initially started the project DEVELOPMENT OF A STUDY AND ANALYSIS OF INTERNATIONAL BEST PRACTICES FOR COMBATING COVID19 IN PUBLIC TRANSPORT under the program “Move it Like Lublin - a Chisinau Sustainable Development Initiative” (in partnership with Lublin City Hall). Within the scope of this project JSC “Gaučë ir Ko” has been appointed by City Hall of Chisinau Municipality to:

- prepare Analysis Report of best practices response on public health emergencies and protection in order to provide a safer public transport in Lublin and Chisinau
- develop an implementation guideline for the public measures in Public Transport (hereinafter - PT);

The Study can be described in two main phases, as presented in table below.

Table 1: Activities and tasks of the Study

Phase	Tasks
1 - Current situation assessment	<ul style="list-style-type: none"> ● Identification of the key stakeholders, data needed, agreement on methodology, timeline and scope of the project. ● <u>Inception report</u> ● Interviews with stakeholders ● Analysis of current statistics ● Analysis of current methodology and practice ● International benchmarking ● Identification of the specific areas and drafting service delivery standards ● Draft of the guidelines and recommendations ● <u>Interim Report</u>
2 - Conceptual phase	<ul style="list-style-type: none"> ● Prepare the agenda and information for the workshops with PT authorities ● Conduct and moderate discussions ● Prepare Report on the findings of the workshop ● Guidelines for safer public transport ● <u>Final Report</u>

The Final Report is the third and final deliverable of the contract. The purpose of this report is to:

- Present the executed Study - desk review results, collected data review, stakeholders’ involvement results;
- Highlight key findings and main constraints regarding safer public transport in Chisinau and Lublin;

- Present Roadmap for combating COVID 19 in public transport;
- Present sufficiently detailed description of protection measures (see Annexes 2-3);
- Present implementation guidelines - technical specifications (see Annexes 2-3).

The Study is executed according to the framework, proposed and approved in the Inception Report.

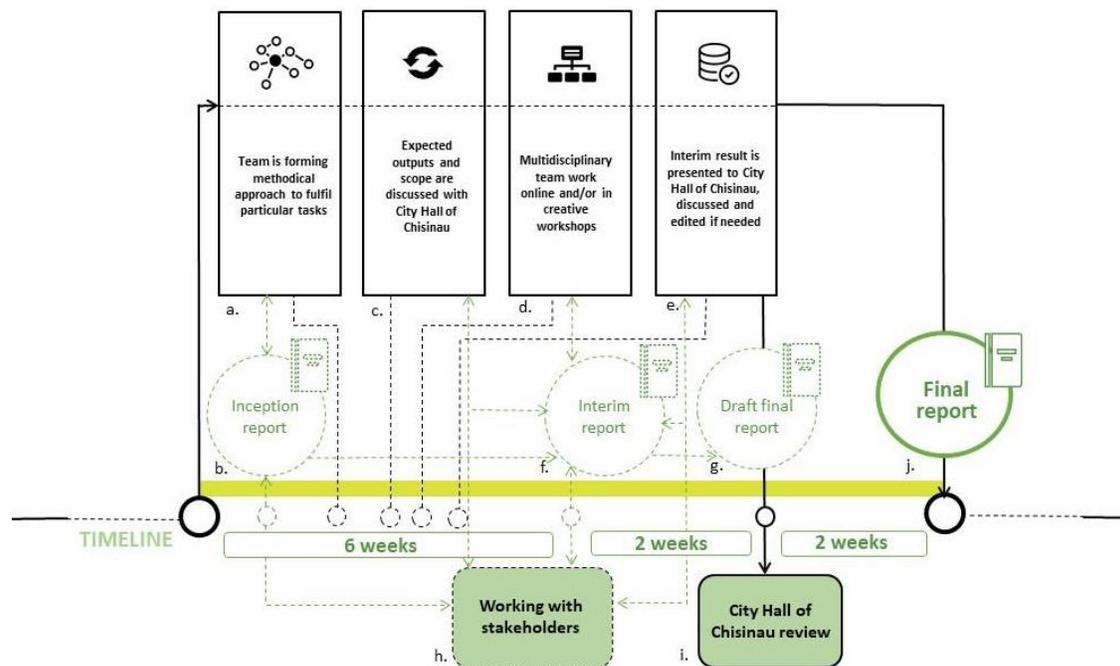


Figure 1: Framework of the Study

At this stage of the project following activities are implemented:

- **Desk review** of provided statistical data and relevant documents with intention to set State of the art, identify how are the responsibilities for public transport and public health divided among national, regional authorities and local public transport/local health agencies and what kind of partnerships are possible, identify if Chisinau is already integrating health-safety measures to the existing public transport system and what kind of digital services are available to substitute services requiring close contact and to answer other relevant questions coming out of the data analysis.
- **Stakeholders' involvement** through regular meetings with Project team from Chisinau and Lublin bilateral discussions to gain the whole view on the situation in Chisinau and Lublin and discuss the findings and initial thoughts from Experts' team and cross-sectoral discussion on interim results and proposed measures with Chisinau Public Health and Public transport authorities.
- **Roadmap** for combating COVID 19 in public transport is prepared. Roadmap contains the set of measures and requirements for public transport service provision and recommendations for improvements not only in the public transport sector, but in overall mobility management as well. The Roadmap is complemented with final technical specifications for Study findings on best practices for combating COVID 19 pandemic adverse effects on public transport.

- Last changes in Final report reflecting received comments from Project team.

I. CURRENT SITUATION ANALYSIS REPORT

1. STAKEHOLDERS' INVOLVEMENT RESULTS

Stakeholders' involvement was implemented through:

- 4 meetings with Project implementation team;
- Requests and provision of data needed for the Study;
- Numerous bilateral discussions among experts and different sectors' representatives;
- 1 round table discussion with public health authorities;
- 1 round table discussion with public transport authorities;
- 1 cross sectoral discussion on the interim results of the Study and proposed measures.

The minutes of all meetings are provided in the Annex No. 1. The results of the stakeholders' involvement are presented below.

1.1. PROJECT IMPLEMENTATION TEAM INVOLVEMENT

3 meetings with the Project team to discuss project progress in line with inception and interim reports were held to this day (see minutes in Annex 1.):

- inception meeting - team introduction, agreement of data needed, list of stakeholders and etc. (see also presentation, Annex 4.);
- progress meeting - work plan updates, sharing expectations regarding project content and details;
- conceptual meeting - presentation and discussion of measures recommended (see also presentation, Annex 5.).

1.2. STAKEHOLDERS' FROM PUBLIC HEALTH SECTOR INVOLVEMENT

Key actors in Public Health Sector. Public Health system in the Republic of Moldova has undergone various reforms since 1992, as a part of wider health sector reform. The inherited sanitary-epidemiological service was transformed into a broader public health service. An extended network of 37 public health institutions has presented Moldova's Public Health Service, which included the National Centre of Public Health, 34 districts (rayon) Centers of Public Health and two municipal ones (Chisinau and Balti).

A new reorganization process of the public health system started in 2017, at both national and regional levels (GD #1090/18.12.2017).

National Agency for Public Health (NAPH) has a status of public, scientific and practical institution, with a methodological role in the State Public Health Service of the Republic of Moldova. NAPH ensures the specialized activity in the development and implementation of strategies, policies according to the international requirements as follows: supervision and evaluation public health risk management, health protection, disease prevention, control and surveillance, and health promotion.

The mandate covers the national level by the Agency itself, while 10 Regional Public Health Centres cover the regions. Chisinau municipality kept the role of one of 10 pillars in the Moldavian Public Health structure, being represented within the national body by Chisinau Public Health Centre, but also within the Municipal Local Authority by the General Department of Social Assistance and Health (GDSAH).

NAPH aims to strengthen the institutional framework, to build a system that can address and respond to the challenges caused by both communicable and non-communicable diseases having in the organigram specific departments responsible for Health Protection, Prevention and Control of communicable diseases, Management of Public Health Emergencies, Laboratory Diagnosis in Public Health Service.

Leadership in disease prevention, health promotion, good governance and public health communication in relation with regional public health structures (including Chisinau municipality) and other actors from relevant sectors at national and local levels is crucial for participatory mode of Health in all policies approach.[1]

Short review of Public Health stakeholder involvement activities and findings. During the round table discussion main topic was - risk communication and community involvement. ECPH Chisinau, jointly with the Public Relations and Civil Budget Department of the City Hall Chisinau municipality have been assigned as coordinators of communication for public health matters with other central public authorities where certain responsibilities were delegated within the limits of the competences. This ensured vertical communication within the health system at the municipal level, as well as within other municipal subdivisions involved in organisation/implementation of public health measures.

The existing risk communication plan aims to involve all sectors of the municipality in the organisation of response measures. Usually, the communication measures are organised by the Department of Public Relations of the City Hall Chisinau. GDSAH and CPH Chisinau support the activities and interventions in this regard as for e.g.:

- Communication with the population involves multiple pre-established media tools and channels like web page of the City Hall of Chisinau (where all ECPH Chisinau Decisions are posted), websites of City Hall subdivisions, social networks and the hotline "COVID-19 Chisinau" for communication with the population where all the concerns are addressed.
- For operational communication, daily information on the epidemiological situation and recommendations on prevention and control of COVID-19 are presented by representatives of CPH Chisinau and GDSAH jointly with other local stakeholders involved in response measures.

Based on the analysis of COVID-19 related indicators, it was developed and implemented a mechanism of adaptation of public health measures. Municipality goes through the adjustment of actions on risk communication about the COVID-19 infection and on health measures for behaviour change in population. Usually this covers adaptation of recommendations issued by the ENCPH for different population groups and epidemiological situation (promoting safe behaviours; avoiding and combating myths and misinformation related to the COVID-19; developing relevant info materials for different population categories, e.g. general population, groups at high risk of children, medical workers, etc., with the messages adjusted to combating myths and preventing panic, fear and stigma. In the context of adapting health measures, in particular those aimed at ensuring urban mobility (transport operators), reopening food establishments, farmers' markets, etc.).

1.3. STAKEHOLDERS' FROM PUBLIC TRANSPORT SECTOR INVOLVEMENT

Public transport sector involvement was organised through:

- Provision of statistical data. None of important indicators can be recalculated out of the data received, thus it leads to interim conclusions and suggestions for monitoring public transport performance.
- Meetings and discussion of interim project results.

Both bus and trolleybus operators were involved in to the Study preparation process. The meeting was held at the stage when the draft set of measures was already developed, thus the format of the meeting was - presentation of proposed measures (see Annex No.6) and parallel discussion. Alongside Healthcare Departments' managers (doctors from PT entities) presented the more detailed information regarding overall situation in public transport system in Chisinau than it was provided with requested data previously.

According to the stakeholders some presented measures are already being implemented in Chisinau public transport. The employees are equipped with masks, gloves and other supplies for personal health protection. At the beginning of the pandemic conductors were obliged to work in full-body protective coveralls, masks, goggles and gloves. However, to work in such apparel was quite hard and got even harder in summer, thus it was decided to keep only masks and gloves as mandatory. At the same time employees were instructed on wearing masks, keeping social distance, personal hygiene and encouraged to get vaccinated (only slightly more than a half of employees are vaccinated at the time discussion was held).

Public transport in Chisinau is very popular and is quite overcrowded, especially at peak hours. Public transport operators stated that the system is operating on almost 100 percent of its capacities. To reduce risk of COVID 19 spread in the beginning of the pandemic the number of passengers per vehicle was limited and flows were regulated with the help of carabinieri (no municipal police in Chisinau). However, this caused many conflicts and resulted in a very negative passengers' reaction. At the moment flows of passengers are almost on pre-COVID 19 level and public transport system capacity still is the same, this results in strong concerns from public transport operators regarding re-introducing passengers' flows' limitation.

The cleaning routine also was changed and enforced, but no special equipment is used for the disinfection. Operators are open to adopt the effective and accessible options present on the market. The recirculator with UV lamps by local producer was presented as one of the options - this equipment was tested in Chisinau buses used for vaccination purposes and was found very easy to install, maintain and use (it may operate all the time, even then the passengers are in vehicle). Other disinfection methods presented by the Experts' team were perceived cautiously - operators had many questions regarding costs, maintenance and use.

DMT (bus operator) presented the list of items they would like to be included in the technical specifications of the Study. Trolleybus operator stated that they already have some necessary equipment and items to combat COVID 19 but the measures proposed in the Study could be an addition to their measures. The meeting ended with agreement on additional meeting where public transport stakeholders would present the insights on the whole set of measures presented in the Interim report.

1.4. DISCUSSION ON THE INTERIM RESULTS OF THE STUDY AND PROPOSED PREVENTION MEASURES

Cross-sectoral discussion on the interim results of the Study and proposed measures was the last meeting with the relevant stakeholders. The main purpose of the meeting was to gain clarity on the key characteristics of the Study, to define the difference between existing situation and proposed solutions and to achieve joint understanding and agreement on the key elements and future implementation process through the discussion.

During the meeting the comments and insights for Final report were gathered. Those were:

- Sets of measures is to be provided for Chisinau overall public transport system, bus operators, trolleybus operators and Lublin (separately if needed).
- The measures have to have clear prioritisation.
- Final report has to contain minimum set of technical requirements.
- Easy to implement and cheap to purchase measures (such as stickers) should be set as the highest priority measure.
- Cashless ticket machines are not the priority measure.
- Measures and priorities stated by DMT (bus operator) is to be included in the technical specification.

All the insights received during this and previous meetings are incorporated in this report (see Annexes 2-3).

1.5. REFLECTIONS ON THE FINAL RESULTS OF THE STUDY

Meeting with Project team to discuss received comments for the draft Final report and outline the changes to be included to the Final report. Minutes of the meeting are presented in the Annex No. 1.

2. MAIN CONSTRAINTS IDENTIFIED FOR A SAFER PUBLIC TRANSPORT

In this chapter overview of urban, PT and public health situation in Chisinau is presented as well as desk review of legal acts, normatives and other relevant to the assignment documents. Based on the results of the assessment, main constraints for a safer PT are identified.

2.1. PUBLIC TRANSPORT SYSTEM AND THE CHALLENGES DURING THE COVID 19

According to spatial characteristics and features, the city of Chisinau is divided into four separated residential regions, which are presented below in Fig. 1 (the source of this analysis is project "Strategic vision and roadmap for further expansion of dedicated bus lanes network in Chisinau").

Daily journeys within the city and its suburbs are mostly influenced by the concentration and distribution of workplaces as well as specific objects (schools, kindergardens). The distribution of workplaces is analysed and discussed in the Schemes of Transport, which are in the Comprehensive Planning design part, and the Scheme of Transport Regions in Municipality.

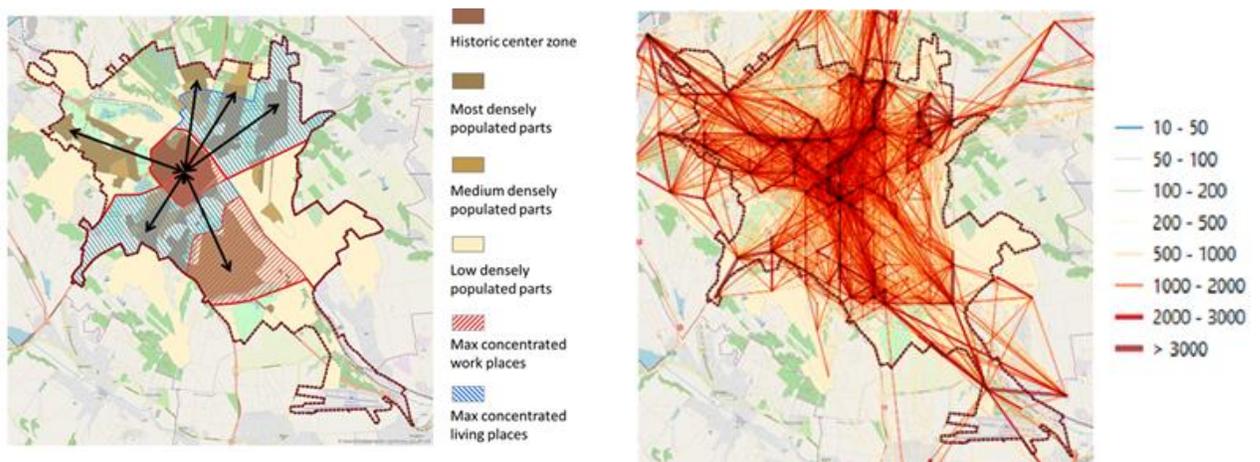


Figure 2: Chisinau city zoning and travel matrixes

Source: Strategic vision and roadmap for further expansion of dedicated bus lanes network in Chisinau; Author: Dr Kristina Gauče

According to the Schemes, it was identified where the highest density of population as well as concentration of workplaces are. Also, it allowed identify corridors which were estimated to be the most popular among citizens for their daily needs.

The tendencies of daily traffic are represented and similarly debated during the preparation stage of the Chisinau Mobility Project in 2020 May (initiated by UNDP Moldova). During the implementation of the Chisinau Mobility Project, the investigations on citizen mobility were organized, resulted as a travel matrix (Fig 2.).

Schemes below show the heatmap of PT routes and the streets, where due to overall street intensity PT has experienced high time loss, which is a very important indicator in terms of fighting COVID 19-related public health issues.

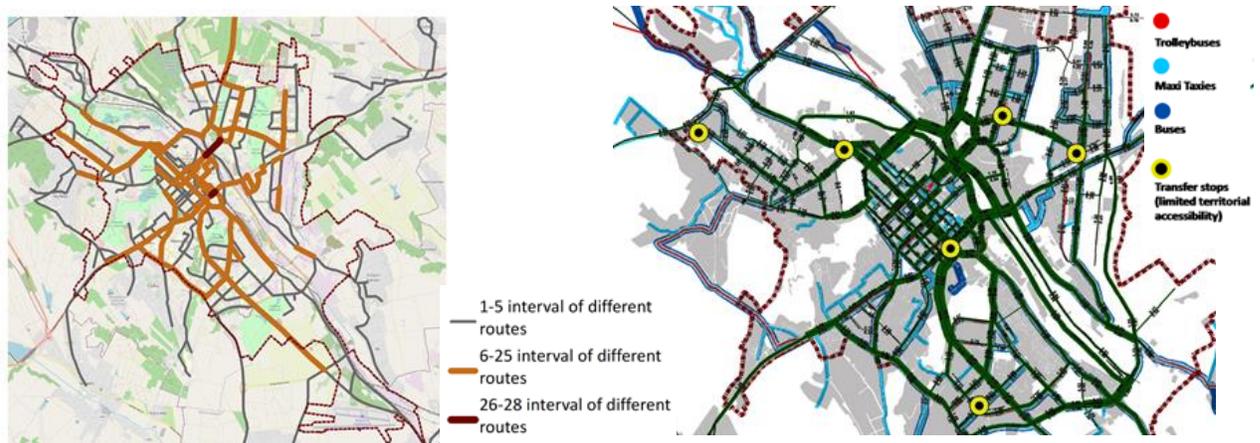


Figure 3: Public transport routes and transport intensity in Chisinau city

Source: www.eway.md; Comprehension Transport Schemes; Author: Dr Kristina Gauče

COVID 19 significantly changed PT system role and perception in the whole world. In order to identify the need and direction of the measures to prevent COVID 19 in Chisinau public transport, the overall impact on the PT system of the situation should be assessed.

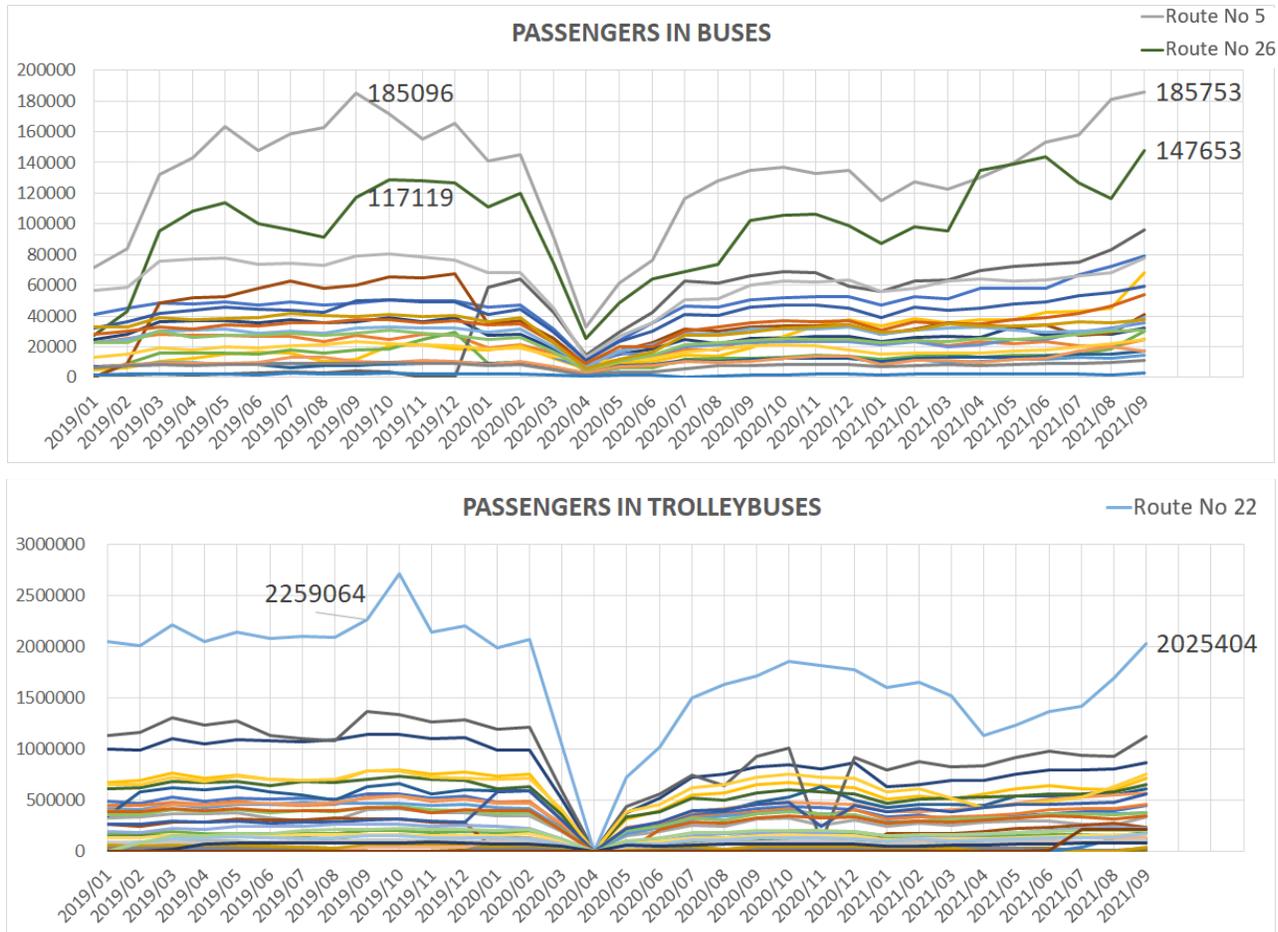


Figure 4: Number of passengers transported by public transport in Chisinau city, Source: City Hall of Chisinau; Author: Dr Kristina Gaučė

The data provided by PT operators (see Fig. 3) shows, that use of PT is almost on pre-COVID 19 level. In September, 2021 the number of transported passengers compared to September, 2019 was only 6 % lower. Buses in September 2021 transported even almost 200 thousand passengers more than in September, 2019.

The number of buses on duty changed from 94 in 2019 to 110 in 2021, the number of trolleybuses - between 318 to 331. One bus according to the provided technical documentation can transport 107 passengers, the fleet of trolleybuses is more versatile and the number of passengers vary from 85 to 96. Knowing this would be possible to calculate actual occupancy of each vehicle, but for this passengers' flows are needed. It is important to calculate the number of passengers off- and during peak hours, unfortunately PT operators are collecting and provided only monthly passengers (or to be precise sold tickets), thus authors couldn't indicate current number of passengers in sq. m during peak hours. However, the assessment of the most popular lines showed that the correlation between transported passengers and number of vehicles dropped. Basically, it was because of increased number of vehicles, as for the trolleybus - the number of passengers still is less than in pre-COVID-19 times.

The statistics on COVID 19 infected personnel is not fully accessible, as there is no data regarding place and circumstances, they were infected (on duty or not). In the bus operator company in 2020 a total of 126 people were infected (39 drivers, 49 ticket sellers and 38 other personnel). In 9 months of 2021, the numbers are a little lower, yet: 21 drivers, 39 ticket sellers and 10 others. The operator of the trolleybus company provided the data only about the ticket sellers - 52 were infected in 2020, 38 - in 9 months of 2021. This is 7.1% and 5.7% of the whole ticket sellers' staff. The data shows that ticket sellers possibly are the most vulnerable link of the PT system in terms of exposure to COVID 19 or other infections.

2.2. CUSTOMIZATION OF PUBLIC TRANSPORT SYSTEM HEALTH REQUIREMENTS FOR LOCAL NEEDS

The Republic of Moldova faced similar challenges as the entire World regarding Early Preparedness and Rapid Response to COVID-19[1]. Supported by donor organizations, Moldova mobilized the epidemiological and decision-making forces to analyse the documentation of best practices and challenges, but also recommendations for the response to the COVID-19 pandemic situation. Since March 2020, when first cases of COVID-19 infection were reported, the Government of Moldova has responded with several public health and social measures to control transmission of the new virus. Actions have been synchronized based on risk communication, community engagement, case investigation, contact tracing, laboratory system, infection prevention and control. The above mentioned, but also case management, knowledge sharing about innovations/latest research and essential health services maintenance during the COVID-19 outbreak allowed the Public Health authority to modify and harmonize public health response.

Some Public Health interventions were successfully implemented at the municipal level involving public transport operators as well. These measures have been customized in line with public health requirements for COVID-19 prevention. The GDSA of mun. Chisinau generated and proposed measures based on national and international recommendations and best practices. Some examples:

1. The local structure was created to respond to COVID-19 challenges (ECPH Chisinau) and to provide decisions for the health protection, health promotion & behaviour change in population.
2. It was increased the number of transport units/vehicles for traffic fluidization.
3. There were developed and made available the Timetables for public transport in the stations.
4. There were resources allocated to ensure the equipment for disinfection in transport units.
5. Conductors have been trained in COVID-19 preventive measures and protective behaviour.
6. Local authorities introduced enforcement elements in the bus stations in order to ensure the adherence to the COVID-19 prevention and protection requirements imposed by authorities (*carabineers*).

Despite all the implemented measures, the current situation shows worsen epidemiological data with a strident increase in COVID-19 cases. In Chisinau, the total number of confirmed COVID-19 cases is 132,057 as of November 8th, with total of 2,211 deaths. The incidence of new cases is high compared to other geographical regions of the country and is growing - 281 per 100.000 population (www.ansp.md). Thus, Moldovan Public Health Authorities are coherent with restrictions stated in the national and local regulatory documents with clear requirements towards the protective public health measures to control COVID-19 spread in the population.

Current restrictions continue to include the requirement for people to wear masks (covering nose and mouth) in public places including public transport, waiting stations, outdoors where the physical distance of 1 m cannot be ensured, but also regulates the participation in entertainment activities.

The growth in COVID-19 cases has accelerated significantly. Currently there are recorded a cumulative 347,105 cases with 8,144 deaths as of 8th of November 13[2], while vaccination efforts have still are going

slowly. Only slightly above 30 percent of the country's population is fully vaccinated, despite the Government and Public Local Authorities efforts to make vaccines available and accessible.

2.3. MAJOR CHALLENGES FOR PUBLIC TRANSPORTATION PRACTICE IN TERMS OF INSTITUTIONAL ROLES AND RESPONSIBILITIES, COORDINATION, SERVICE PROVISION AND PREVENTION MEASURES DURING PUBLIC HEALTH EMERGENCIES

The structure of Moldova's Public Health Service has undergone some changes, but its capacity and competences, as well as its still traditionally oriented activities such as the prevention and control of infectious diseases, the regulation of exposure to risk factors, and the supervision of the application of the legislation at the objectives of the national economy remain below the expectations.

Within the current structure of the health system, at local (administrative) level, some gaps are essential, especially concerning the coordination in implementation of public health policies, programmes and their monitoring when facing the new health challenges of the society.

There is a poor involvement of local (community) institutions, including healthcare ones, of other central and local authorities/services and NGOs. Their institutional roles and responsibilities are unclear due to the discrepancies in the national and local policy paper, specific regulations. Another challenge would be the inconsistencies in National Regulations, plans, etc. and Territorial/local possibilities for transferring into practice at the implementation stage.

There is a strong need for a coordinated and comprehensive approach to address public health issues at all levels, including a clear delineation of responsibilities among key stakeholders.

Improved cooperation between the national institutions and local authorities, with their health representatives (NAPH, CPH Chisinau and Health and Social Department from City Hall), for achieving common objectives could lead to cost-effective interventions with impact on health outcomes in the municipality.

The legal basis for Public Health provisions in the country is the Law Nr. 10 issued 03-02-2009[3]. This law regulates the organisation of State Surveillance of Public Health, establishing general, public health requirements, rights and obligations of private and legal persons/entities, and how to organise the System of State Surveillance of public health.

We would like to emphasize the specific designed statements in Chapter II and Articles 11, 12, 13, 14 from the mentioned above Law, which has a direct impact on the subject of the project. This ensures an effective mechanism for coordination, implementation and evaluation of health prevention, protection and promotion measures, oriented to reducing the impact of risk factors, preventing diseases and improving the health of the population in urban transport networks.

Other relevant documents for health protection and disease prevention measure, including COVID-19, with impact on health outcomes could be considered:

- Decisions of the ECPH (National and Chisinau).
- MoH and NAPH conducted the Workshop on the Surveillance and Control of Influenza, IACRS, SARI and COVID-19, in order to increase preparedness and response in the disease's surveillance and control. The multidisciplinary teams and participatory approach were ensured by MoH Decree nr. 562-d, issued 26.07.2021[3], to strengthen the capacities for current COVID-19 infection along with others, but also to build confidence for future pandemics.
- The Ministry of Health, Labour and Social Protection Order nr. 268, issued 31.03.2021.[4]
- The Ministry of Health, Labour and Social Protection Order nr. 269, issued 31.03.2021.[5]

- *These two above documents establish the clinical guidance and protocols for doctors on management of COVID-19.*
- The Ministry of Health, Labour and Social Protection Order nr. 474, issued 25.05.2021. [6]
- *This Order will lead to some essential changes in the normative document e.g. Law nr. 186/2008, which defines the occupational health and safety [7], Health regulation on health surveillance of persons exposed to occupational risk factors, GD Nr. 1025 issued 07.09.2016,[8] operational changes in the practical guidelines regarding health of the employers in the working space.*

In order to identify all major challenges during public health emergencies, not only legal acts and normatives regarding public health, but also regarding transport should be reviewed. Following documents were identified as relevant to the topic and analysed:

- Government Decision No. 827 of 28-10-2013, regarding the approval of the Transport and Logistics Strategy for the years 2013-2022
- Ministry of Regional Development and Constructions Order No. 141 of 02-10-2013 regarding the approval of the normative document CP D.02.02-2013 „Organizing the execution of works for road maintenance and repair. Roadmaster's Guide"
- Ministry of Regional Development and Constructions Order No. 72 of 05-05-2014 regarding the approval of the normative document CP D.02.11-2014 "Recommendations regarding the design of streets and roads in urban and rural localities"
- Government Decision No. 91 of 21-02-2017 regarding the approval of the Regulation for the issuance of the urbanism certificate for design and of the construction / demolition authorization for the public utility works of national interest
- Parliament Code No. 150 of 17-07-2014 Road Transport
- Government Decision No. 1491 of 28-12-2001 on the Concept of sustainable development of the localities of the Republic of Moldova
- Parliament Law No. 163 of 09-07-2010 regarding the authorization of the execution of construction works
- Parliament Law No. 131 of 07-06-2007 on road traffic safety
- Parliament Law No. 509 of 22-06-1995 roads
- Ministry of Regional Development and Constructions Order No. 3 of 11-02-2015 regarding the approval of the normative document NCM D.02.01: 2015 "Design of public roads"
- Ministry of Economy and Infrastructure Order No. 489 of 15-10-2018 regarding the approval of the normative document NCM D.02.03: 2018 "Normative for the arrangement of level intersections on public roads"
- Normative in constructions NCM B.02.01 - 2006. Infrastructure, parking.
- SNiP 2.07.01-89 „Urbanism. Planning and development of urban and rural settlements "
- Normative in constructions NCM B.01.05: 2019 Urbanism. Systematization and planning of urban and rural localities.
- Government Decision No. 357 of 13-05-2009 regarding the approval of the Road Traffic Regulations.
- Ministry of Regional Development and Constructions ORDER No. 72 of 05-05-2014 regarding the approval of the normative document CP D.02.11-2014 "Recommendations regarding the design of streets and roads in urban and rural localities".

Below the review of principles and normatives directly relevant to public transport system development and improvement in COVID 19 context is presented:

- **Transport and Logistics Strategy for the years 2013-2022** is a country-oriented document where several basic principles relevant to COVID 19 situation are presented:
 - *The transport system should be beneficial for all users, regardless of the type of transport;*
 - *Safety in all modes of transport needs to be improved in such a way as to at least match the level of the new EU member states until 2022;*
 - *Investments to maintain existing infrastructure are preferable to the investments in new construction;*
 - *In the case of capital investments in the infrastructure, it is necessary to consider the expected investment return.*

- **CPD.02.11-2014 Recommendations regarding the design of streets and roads in urban and rural localities** is focusing mainly on technical design aspects of roads and streets. Despite it, there are some transport network design-related recommendations provided as well, which could be included as a measure to improve the organisation of traffic and traffic safety and are relevant to the public transport (hereinafter - PT) network development and improvement of services. The recommendations provided below could reduce travel time and health risks:
 - *Recommendations on development/improvement of transport network - street categories' hierarchy, effective and safe connectivity by different means of transport in different street categories.*
 - *Recommendation on traffic flows management include priority for the PT, which should be ensured by traffic lights' management, restriction for traffic or parking of other means of transport on the whole PT route or in some parts of it, dedicated lanes, development of pedestrian-public transport streets.*

- **NCM B.01.05:2019 Urbanism. Systematization and planning of urban and rural localities** sets requirements for the transport system in general - maximum time of journey from residence to work, bandwidth of the street network, single streets and intersections etc. In this document, requirements for PT services are elaborated - there are requirements for the density of the public transport network, capacity of the fleet, reach to the nearest stop etc. provided. F. e. density of the PT network should be 1,5 - 2,5 km/sq. km and can be increased up to 4,5 km/sq. km in the central part of big cities.

Despite rich list of legal acts to describe smooth design and operation of public transport, there are no direct messages or measures enforcing passengers and employees' safety in public transport. The only possible indicator to evaluate (recommended capacity and occupancy) of vehicles doesn't match WHO recommendation regarding keeping social distances therefore is not elaborated any further. Therefore, in terms of transit transportation - priority to public transport (so decreased length of trip), sufficient frequency (so decreased time for waiting) and increased fleet (so decreased occupancy per one transport unit) can combat with risk of COVID-19.

2.4. MUNICIPALITIES' AWARENESS AND IMPLEMENTATION LEVEL ON PUBLIC HEALTH REGULATIONS AND GUIDELINES PREPARED BY NATIONAL AND INTERNATIONAL ORGANIZATIONS

The General Department of Social Assistance and Health of Chisinau Municipality (GDSA), representing Public Local Authority at the mun. Chisinau level for health sector, took appropriate decisions in

developing awareness measures and implementing adapted interventions, based on the Public Health Regulations and national paper requirements.

At the local level was developed the "Response and control plan for the new type of coronavirus infection (COVID-19)" in mun. Chisinau (Plan). This Plan is based on the prototype document developed by the Preparedness and Response to Coronavirus infection of new type (COVID-19), approved by the Decision of the Extraordinary National Commission for Public Health (ENCPH) no. 30 of 11 September 2020 and approved by the Extraordinary Commission for Public Health (ECPH) of mun. Chisinau.

Thus, the ECPH of mun. Chisinau, currently, is a coordinating body, created to ensure adequate preparedness for public health emergencies and their management at the level of municipality. The President of the Commission is the Mayor General of the municipality Chisinau. The representative of the General Department of Social Assistance and Health (GDSAH) provides the secretariat.

The Plan is regularly updated, according to the epidemiological situation in Chisinau municipality. The Plan describes the response actions of the municipal authorities and subordinate institutions, as well as the responsibilities to ensure a systemic, coordinated and effective response to the COVID-19 pandemic control. The aim of the Plan is to prevent and control the spread of SARS-CoV-2 in the mun. Chisinau, to ensure the appropriate inter-sectoral response to the pandemic situation in order to protect the population, to minimize the health, social and economic impacts related to the spread of the novel coronavirus COVID-19.

The main objectives of this work document are as follows:

- To monitor the epidemiological situation, assess risks and impact of public health measures;
- To stop the epidemic process by implementing health measures public health measures to prevent the rapid spread of infection;
- To ensure public health measures for the prevention of COVID-19 by widespread vaccination of the population to ensure immunity collective immunity;
- To ensure an adequate level of health care for the population of the municipality Chisinau for COVID-19 testing and treatment of confirmed patients with coronavirus;
- To ensure inter-sectoral coordination of the response to COVID-19 pandemic;
- To make optimal use of available resources and those to be made available in the COVID-19 response;
- To ensure effective cooperation between relevant central and local structures involved in the implementation of the response and control actions to COVID-19;
- To communicate risks and to involve the community in the implementation of response measures to the COVID-19 pandemic.

The delineation of public health measures in the mun. Chisinau are based on indicators and criteria for assessing the situation epidemiological situation of COVID-19 at national and territorial-administrative level, where GDSAH, jointly with the CPH Chisinau communicate to the authorities and structures in the field, information on the epidemiological situation and public health measures applied in municipality.

Public health measures are implemented on the basis of a set of criteria and indicators as follows: epidemiological situation, health criteria and public health surveillance and health care system criteria.

The indicators are identified by the CPH Chisinau, in collaboration with the Ministry of Health (MS) and the National Agency for Public Health Agency (NAPH) and are presented to the ECPH Chisinau.

Depending on the results of the evaluation of the health surveillance criteria the epidemiological situation and the health care system the risk level is assigned (very high, high, moderate and low).

Public health measures at the level of administrative localities of the mun. Chisinau are implemented based on a set of indicators as follows: epidemiological situation, public health surveillance criteria and health care system, calculated for the municipality.

If the epidemiological situation in mun. Chisinau gets worse, ECPH Chisinau will meet to adjust prevention, control and response measures on COVID-19.

Given, that in terms of transit transportation - priority to public transport (so decreased length of trip), sufficient frequency (so decreased time for waiting) and increased fleet (so decreased occupancy per one transport unit) can combat with risk of COVID-19, additionally strategical documents prepared for Chisinau were reviewed:

- Transport Strategy of Chisinau Municipality;
- Chisinau transport infrastructure development concept;
- UNDP Roadmap for General department of public transport and roads.

The main goal of this analysis is to find-out is there a room for public transport improvements programmed in main city documents. Relevant to the assignment aspects (from these documents) are provided below and shows well - written municipality awareness:

- **Transport Strategy of Chisinau Municipality** has multiple objectives set. General policy objective is, within the existing financial constraints, to improve the accessibility of the municipality's population and local businesses, in a way that ensures environmental protection. Among the main objectives relevant for the topic of the assignment are:
 - A commercial speed of at least 18 km/h for the entire network should be reached by 2020 in the City Centre and by 2025 in the entire city.
 - A commercial speed on the BRT/LRT lines should reach at least 20 km/h by 2025.
 - The reliability of the services will reach the level of 90% of all trips made with a maximum delay of 6 minutes and 95% with a delay of maximum 3 minutes and only 1% of all public transport trips will be cancelled by 2020.
 - All BRT vehicles, trolleybuses, buses, minibuses and minibuses will be integrated into a single toll system, allowing the passenger to switch between routes and means without paying additional fees until 2017.
 - Implementation of a sales system attached to the taxation system, implemented through BOT, until 2017.
- **Chisinau transport infrastructure development concept** has the analysis performed within with main findings, problems and conclusions related to PT system. For PT services improvement, a complex of managerial and promotional measures was made up with high emphasis on deviation from traffic. However, in PT service terms it is worthwhile considering other aspects as well:
 - Deviation from time schedule it is not that painful if transport and transfers are very frequent.
 - It is important to have tools for real time trips planning, showing possible delays and suggesting different routes too.

- Talking about deviation - it is acceptable for public transport to have some delays; much bigger problem occurs if transport left the stop earlier (with objective to compensate possible traffic losses further in the route) than it has been scheduled.
- **UNDP Roadmap for General department of public transport and roads** developed several actions which can be used to address health safety goals as well. These are:
 - Strengthening institutional capacity: development of the Sustainable Urban Mobility Plans (SUMP), SUMP approval, development of SUMP implementation plan.
 - Public services quality's enhancement and performance monitoring: develop the centralized traffic control concept, testing dedicated bus lanes, developing Chisinau transport network optimization plan, implementation of priority system for public transport (GPS guidance/monitoring, intelligent traffic lights, dedicated lanes).

All above listed goals and measures are welcoming increased safety and convenience of public transport. Unfortunately, not all of programmed goals were implemented by 2020 and could correspond to overall combating COVID-19 process. Moreover, there are no sufficient data to monitor evidence of benefits to public transport and public health after those improvements were implemented. Once again, for making decisions in due time - data from all related sectors is needed very much.

3. INTERNATIONAL POLICIES' AND GUIDELINES' ANALYSIS

3.1. MANAGEMENT OF COVID-19, GUIDELINES FOR PUBLIC TRANSPORT OPERATORS, FACTSHEET BY ADVANCING PUBLIC TRANSPORT, FEBRUARY 2020

The objective of these guidelines - to assist PT operators in tailoring business continuity plans responding to the specific challenges of communicable diseases. The guidelines contain a set of recommendations oriented to ensure smoother PT system work in the COVID-19 times.

Document stresses that it is important to acknowledge that pandemic planning is not a stand-alone project, but should be integrated with existing crisis management structures and procedures in order to be effective. It is crucial to involve business units directly into this planning, as they know best themselves, which are critical supplies, personnel or functions. It is advisable to involve unions into the planning and decision-making process at a very early stage; their true involvement can help to achieve an understanding and support for less popular measures.

To be prepared for the pandemic situation it is advised to identify essential functions within the responsible organisations, ensure backup for critical positions, availability of essential protection and cleaning equipment and supplies, review stock and supply chains and keep staff well informed on the present situation. Communication with the responsible authorities is strongly advised as well to stay informed on latest advice.

Personal protection is another topic stressed in the guidelines. As a general measure it is advised that staff should be reminded of required basic rules of personal hygiene, which includes to regularly wash hands, to sneeze and cough into the elbow and to use paper towels. Information bulletins are widely available and should be displayed throughout the premises. Also, premises used by staff should be equipped with hand disinfectants and paper tissues, cleaning routines may have to be adapted and

increased focus should be put on disinfecting common surfaces and spots to touch as well as waste disposal. For working places, where no cleaning may be possible between shifts, employees should be equipped with the necessary means and be made responsible to remove any waste and disinfect surfaces before taking over as part of the routine. Staff that has to tend sick travellers, clean body fluids or potentially contaminated items and surfaces, should wear disposable gloves. As the effect of respiratory masks is debated, public transport operators should obtain local and/or national advice on the use of masks and recommended types of masks.

Reduction of contact measures are recommended if the risk level is high, for example confirmed outbreak in the area or a decision by the competent authorities. Whilst hard to realise in the operational environment, the following options proposed to be considered to reduce the exposure of public transport staff: customer service staff should only be available in information booths or desks with sufficient distance to passengers, rear door boarding may temporarily replace the front door access of buses, in order to protect drivers that have no separate cabins, the need for ticket inspection during an outbreak should be challenged (ticket inspectors would be exposed to a very high risk of getting infected, whilst they may be valuable back-up staff for other critical positions), remote working should be considered for activities that could be carried out without physically being present in company premises, replacing meetings by telephone conferences should reduce contact between employees, the closing of canteens may be considered.

Reduced service measures may be required if the risk level is high, for example a confirmed outbreak in the area or a decision by the competent authorities. If staff availability becomes too low to sustain regular operation, service should be reduced throughout the network as a pandemic is expected to affect a region without focus. It should be noted that such reduction of service will likely correspond with a reduced travel demand due to closing of schools and general advice to stay at home if possible. Operators have good experiences with the adoption of the weekend timetable as passengers are used to it and necessary announcements are already prepared, thus the service amendment might cause minimal confusion. Maintenance routines for equipment and rolling stock should be reviewed in order to identify the potential for advancing or delaying inspections. Operators should seek contact with local authorities to align crisis plans as an epidemic might lead to limited availability on their side.

3.2. IMPACTS OF COVID-19 AND SMART TRANSIT TRENDS, STUDY BY MASS TRANSIT, NOVEMBER 2020

The document is reviewing the results of a survey regarding views and insights of **PT industry managers and executives** on a COVID-19 related situation. This survey is a source of insights on the situation in PT systems in other countries, the ways the professionals expect the situation to escalate and deal with it.

Respondents expect COVID-19 to have moderate to severe financial and operational impacts and these impacts to last a year or even longer. The vast majority of respondents currently have face covering requirements, extensive disinfecting procedures, and social distancing requirements in place at the time of the survey.

Multiple objectives in COVID-19 presence are stated as important:

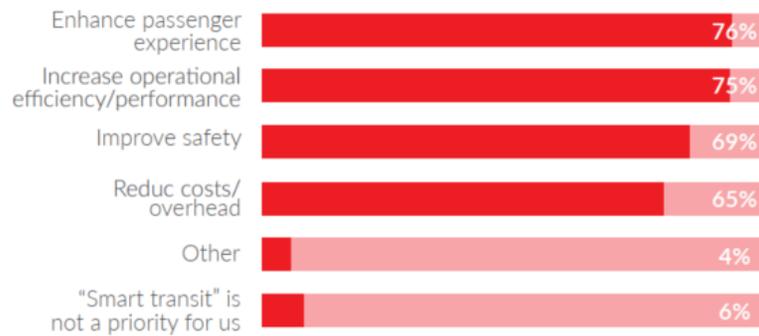


Figure 5: Smart transit objectives

Source: Impacts of COVID-19 and Smart Transit Trends, study by Mass Transit

In the new services topic contactless and/or automated fare payments are most interesting to respondents. A majority are interested in passenger volume control to enable social distancing and half are interested in dynamic scheduling based on real time or predicted demand.

3.3. POLICY AND EXPERIENCE TO BE TRANSFERRED FROM PARTNERING COUNTRY/CITY (POLAND/LUBLIN)

Poland is one of the last European Union countries to have experienced the outbreak of COVID-19 pandemic. The epidemic status in Poland is relatively mild. The Polish government restrictions severity and stringency are comparable to those of the other countries affected by the coronavirus. A combination of government lockdown and social fears of contracting and spreading COVID-19 has caused a substantial reduction in passengers' public transport demand in Poland.

In order to assess changes in mobility in public transport in Poland, as a consequence of the development of the COVID-19 pandemic, the study¹ was performed. From the country as well as voivodeship perspective, the study confirms the statistically significant negative relationship between changes in mobility in public transport and the stringency level of Polish government anti-COVID-19 policy.

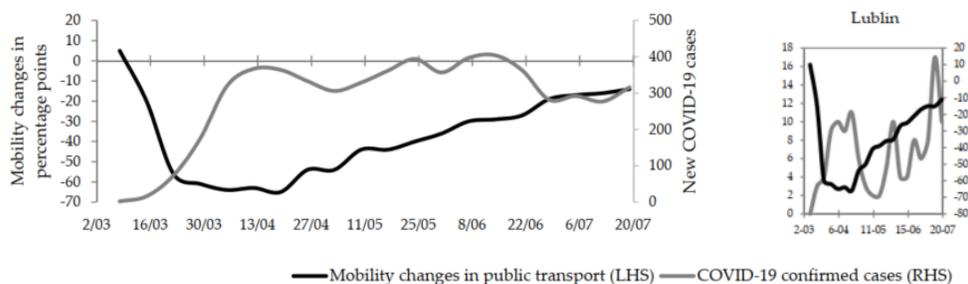


Figure 6: Mobility changes in public transport and new laboratory-confirmed cases of COVID-19 from 2 March to 19 July 2020, in Poland and Lublin

Source: Article "Decline in Mobility: Public Transport in Poland in the time of the COVID-19 Pandemic", 2020

¹ Article "Decline in Mobility: Public Transport in Poland in the time of the COVID-19 Pandemic" by Michał Wielechowski, Katarzyna Czech and Łukasz Grzeda. Published: 29 September 2020. JEL Classification: I18; O18; R40; L90

Anti - COVID 19 measures in Lublin

According to the information, provided by partners, from the beginning of the appearance of the coronavirus in the world, the PT Authority in Lublin, together with MPK Lublin and private carriers, has been conducting preventive activities in the event of a possible coronavirus threat in Poland.

From 5 March 2020 the "warm button" (the system of opening the doors by passengers by pushing the button) function was suspended in public transport vehicles. At stops, drivers opened all doors in the vehicle to ensure airflow in buses and trolleybuses and at the same time to limit passenger contact with buttons. Carriers continued the disinfection of the interior of the vehicles, i.e. handrails, validators and ticket machines. The carrier also handed out hand disinfection gels to its drivers. The airing of the vehicles on the loops during the standstill was also started by opening all the doors. Basic information on the coronavirus and methods of preventing infection, passengers could find on advertising media available in the space related to PT. Hygiene spots were displayed in the vehicles. Posters with the same subject matter also appeared at the bus stops. It was part of a nationwide educational campaign on the coronavirus conducted by the Ministry of Health.

With the appearance of the first confirmed cases of coronavirus infection in the Lubelskie Voivodeship, on 12 March 2020, ZTM in Lublin has taken further preventive measures to counteract the spread of the virus. Following the example of other cities, the sale of tickets by drivers in public transport has been suspended. The decision was made primarily on the request of the drivers and passengers and was aimed at minimizing the contact between vehicle service and passengers. At the same time, recommendations were made to limit personal visits to the Customer Service Office and ZTM Ticket Sales Points in Lublin. If it is necessary to settle matters in the above-mentioned institutions, Lublin is encouraged to take advantage of the possibility of arranging them by e-mail or by phone. In addition, in the interests of the safety of drivers and passengers, special zones have been separated in each bus and trolleybus, covering the area around the cabin, the first door and the first seats. The fact that this is a separate zone in which passengers should not stay was indicated by special signage.

The separation of the zone in the area of the driver's cab resulted in the inability to get in and out for passengers through the first door. First, buffer zones appeared in vehicles that did not have closed cabins. Other cities, such as Wrocław, Kraków and Kielce, have also chosen such solutions as Lublin.

On 16 March 2020, due to the epidemiological situation, the ZTM Ticket Sales Point in Lublin at street Zielona 5, and from 17 March 2020 direct customer service at points located at street Nałęczowska 14 (Customer Service Office and Ticket Sales Point) has been limited to designated hours during the day.

From 18 March 2020 due to the state of epidemic threat announced by the Minister of Health and the clearly reduced demand for services provided by public transport, which was confirmed by the observations of ZTM employees in the city, a special timetable was introduced, similar to the one that was in force during the winter holidays. The operation of the night lines N1, N2 and N3 was also suspended.

In connection with the Regulation of the Minister of Health of 24 March 2020 introducing restrictions on movement, including public transport, public transport vehicles in the vicinity of the door have been marked with special stickers informing about the prohibition of entering the vehicle in the event of exceeding the maximum number of people who can be in the vehicle. Depending on the bus and trolleybus model, this number was variable and indicated on the sticker.

On the same day, 24 March 2020, ZTM in Lublin decided to implement a procedure, introduced in an exceptional mode, aimed at compensating passengers for temporary restrictions and allowing the continuation of travel by public transport after the situation has normalized. The action was addressed

to people who, due to the difficult and unfavorable situation resulting from the coronavirus epidemic, could not use public transport in full, despite having long-term tickets. It ended on 30 June 2020.

On 27 March 2020 the Public Transport Authority in cooperation with the Municipal Police Headquarters in Lublin launched an information campaign encouraging residents to continue the "Stay at home" campaign. Voice messages with an appropriate appeal were broadcast on buses and trolleybuses. In addition, at stops, through the monitors of dynamic passenger information, the rules that help to avoid the risk of contamination were reminded. Similar content has been published on electronic displays inside vehicles, the so-called "Beads". For the purposes of the campaign, LCD monitors installed in vehicles and a wi-fi network available in the MPK Lublin rolling stock were also used. All this to remind residents of the safety rules during the coronavirus epidemic and encourage them to stay at home.

On 10 April 2020 meeting the requests of passengers, Lublin joined the cities that decided to turn off air conditioning in public transport. The Public Transport Authority asked the carriers that operate Lublin's public transport to turn off the air conditioning and ventilation systems of vehicles. Carriers were obliged to turn off the systems forcing air circulation, i.e. air conditioning, ventilation, cooling and heating in vehicles where it is technically possible. At the same time, the windows in the passenger compartment were unlocked so that the passengers could open them by themselves.

From 16 April 2020 the decision of the Minister of Health introduced the obligation to cover the mouth and nose in public spaces. Thus, from that date, when traveling by public transport, passengers were obliged to comply with this provision.

On 4 May 2020, the Mayor of the City of Lublin applied to the Prime Minister, Mr. Mateusz Morawiecki, to ease the applicable limits on public transport. In addition, in a joint letter of May 7, the presidents of the Chamber of Commerce for Urban Transport, the Polish Association of Public Transport Employers and the Union of Polish Metropolises called for an increase in the permissible number of passengers in public transport vehicles and financial support for the public transport industry. In order to attract the attention of decision-makers, special graphics have been developed that show, with a grain of salt, the non-life of the current regulations.

On 13 May 2020 the government presented the third stage of the return to the "new normality", including the much-anticipated changes in public transport. The permissible capacity of vehicles has been changed. Thus, since 18 May 2020, the number of passengers in Lublin buses and trolleybuses has increased by half - to 30% of the total number of seats and standing places.

On 20 May 2020 a decision was made to open a ZTM Ticket Sales Point in Lublin at street Zielona 5 at strictly defined hours and in compliance with the safety rules and direct protection against infection, and from May 25 this year. direct service was extended at all ZTM points in Lublin.

From 1 June 2020 the passenger limit on public transport has been increased. At that time, it amounted to 50% of the number of all sitting and standing places.

From the night of 18/19 June 2020, night bus routes have returned. During the holiday season, night lines ran every 60 minutes on the nights from Thursday to Friday, from Friday to Saturday and from Saturday to Sunday.

From 22 June 2020, the air conditioning and ventilation systems were successively re-enabled in buses and trolleybuses. The decision to restart the systems was made on the basis of the position of the Chief Sanitary Inspector regarding air conditioning in the public transport fleet and in response to passenger requests. The Sanitary Inspection stated that the air conditioning could be safely switched on in public transport, which will certainly affect the comfort of travel at higher and higher temperatures. The

activation was preceded by works related to the inspection and servicing of ventilation and air-conditioning systems of vehicles as well as their disinfection. Their aim was to comprehensively prepare the cooling systems for restarting, so that they could safely serve the passengers.

As of 29 June 2020, zones designated for drivers were no longer valid. However, the impossibility of purchasing a ticket from the vehicle driver was still maintained. The abolition of special separate zones resulted in an increase in the space available for passengers and the number of seats. The first doors of the vehicles were opened again.

In July, MPK Lublin Traffic Supervision together with the Municipal Police handed out protective masks in public transport vehicles to passengers. The action was carried out on the main communication lines and was informative. The aim was to remind passengers of the obligation to cover their mouths and nose in public transport vehicles.

From 3 August 2020 the working hours of the ZTM Ticket Sales Points in Lublin, located at Nałęczowska street and Zielona street and the Customer Service Office were extended.

At the beginning of the school year, due to the return of students to classroom classes, new timetables, similar to those in force until 16 June 2020, came into force.

In October 2020, due to the growing scale of the disease, and above all, out of concern for the safety of drivers and passengers in buses and trolleybuses of Lublin public transport, special zones in vehicles were re-established. They cover the area around the cabin and the first door. The fact that this is a separate zone in which passengers should not stay is indicated by special signage. In October, MPK Lublin Traffic Supervision, together with the Municipal Police, again handed out protective masks to passengers of public transport.

From 17 October 2020, Lublin was in the red zone. The limit of passengers in public transport has been tightened again to 30% of the total number of seats and standing places (with a limit of occupying 50% of seats). In order to maintain the restrictive limits, it was necessary to launch the so-called "Encore courses" - two vehicles serving the same course arrive at the bus stop at the same time.

Due to the introduction of further restrictions, such as remote teaching in schools and universities and remote work, among others in public administration, there was a clearly reduced demand for services provided by public transport. This situation was confirmed by the observations carried out in the city by ZTM employees. Therefore, from November 12, a new timetable came into force, similar to the one that was in force at the beginning of September this year.

From 6 June 2021, passenger limits in vehicles have changed. The permissible number of people in the vehicle is 75% of all seats and standing places in the vehicle, with 25% of the seats unoccupied. People vaccinated against COVID-19 are not counted.

From 26 June 2020, due to the implementation of the next stage of defrosting the economy and the abolition of limits in public transport, the functionality of the „hot button” (the system of opening the doors by passengers by pushing a button) and stops on request is restored, and special zones in vehicles are dismantled. The requirement to cover the mouth and nose in vehicles is still in force. The limits on public transport vehicles are lifted - 100% occupancy of buses and trolleybuses is possible. During the journey, passengers are still obliged to cover their mouth and nose.

Advanced measures introduced in Poland

Apart from management and other simply implemented measures, presented above, there are new methods of disinfecting vehicles to fight the COVID 19 spread used in Lublin:

- Mobile trolleys with UV lamps. The UV-IGNIS is a powerful solution for decontamination of vehicles and public areas by using UV-C radiation with the broadest possible biocidal spectrum. The biocidal spectrum of the UV-IGNIS includes SARS-CoV-2 and the variety of other pathogens (viruses, bacteria, fungi, molds, pathogenic microorganisms), both on surfaces/materials and airborne as well - the UV-IGNIS may be considered as a huge air filter. More detailed technical data of this device is presented at <https://in-lab.eu/uv-ignis/>. MPK has four UV-IGNIS MT1 mobile trolleys with UV lamps (the general rule is: one trolley per one door in a bus).
- Multifunctional ozone generator LP-24. The generator is suitable for purify the air, remove mould, unpleasant smell, refresh facilities, kill bacteria, spores, viruses, microorganisms, in vehicle disinfection should be used as a last stage of cleaning. The device operation depends on working environment, humidity, temperature, vehicle size. More detailed technical data of this device is presented at <https://o3ozon.pl/ozone-generator-lp-24-p-48.html>. MPK has three such devices.
- UV-C lamps installed in air conditioners. This measure is being installed in 250 public transport vehicles. It is an effective system of continuous disinfection of the air flowing through the air conditioning and air distribution systems in buses and trolleybuses, using UV-C radiation with the broadest biocidal spectrum. Thanks to the solution used, viruses, including SARS-CoV-2, as well as bacteria, fungi and molds are destroyed. The principle of operation is based on the emission of UV-C radiation with an appropriately selected wavelength. The air from the passenger compartment is sucked in, then decontaminated thanks to UV-C radiation, and then returns to the passenger compartment of the vehicle. The system shows high neutralization efficiency and is completely safe for humans. Thanks to special covers, it does not direct UV-C radiation into the passenger compartment. Therefore, it can be safely operated during everyday transport tasks and the presence of passengers in the vehicle.

In **Łódź** carriers tested the ceiling-mounted, glowing green anti-microbial + prototype air purifier was provided by the STER Group. The device captures - according to the manufacturer - 99.995% of harmful bacteria, viruses and fungi, as well as suspended dust and allergens such as animal hair and dust.

The purifier uses HEPA filters and UV-C radiation. Its design forces air to circulate continuously (according to the manufacturer, the air in the bus can be completely cleaned every 6 minutes). The device also disinfects surfaces thanks to the automatic ozonation process that takes place during an overnight stop at the depot. The operation of the purifier starts when the bus is started and continues until the engine is turned off.

This device is used to increase the safety of passengers while traveling - not only in the current epidemic situation, but in all other seasons of the year. The HEPA 14 filters installed in it filter almost 100% of all impurities - says Marcin Szulawy from the STER company. Inside, there are two ozone generators that work exactly like the ozone generated naturally during a storm. Thanks to corona discharges, ozone is created from oxygen and, after the disinfection process, it naturally breaks down - it replenishes.

Kraków carrier decided to use a new disinfection method, the supplier of which is the company "EKO-TECHNIKA" Jędrzej Zawadzki. It uses in its "UVC PERUN" sterilizers the same radiators that are already used, among others in hospitals and treatment rooms and have proven effectiveness in destroying bacteria and viruses. UV lamps with a wavelength of 254 nm are attached to special structures.

Four such sets with eight UV lamps were inserted, among others, to the NGT6 wagon at the Podgórze tram depot. The wagon was disinfected in two stages due to its length of 26 meters. First, the lamps were placed in the front part of the tram, also in the area of the driver's cabin. After the lamps were turned on, the disinfection process took 7 minutes. Then the same steps were repeated in the other part of the vehicle. During this disinfection, the car had to be placed in a separate part of the hall so that no one had access to it. During the operation of the radiators, no person could be in the vicinity of the tram, so as not to be exposed to the harmful effects of ultraviolet waves (e.g. on the skin and eyes).

PT authority in **Wrocław** uses cleaning, disinfection and ozonation. Since its inception, the municipal company has already spent over PLN 360,000 on preparations for decontamination, disinfection and protective measures (gloves, masks, helmets) for employees. Among other more traditional measures, every week each vehicle is electrostatically cleaned with a virucidal agent. At least once a month comprehensive washing takes place. Now statistically vehicles go through it every two weeks. Then it is washed "from head to toe" - from the floor through the seats, handles to the ceiling.

In **Chrzanów** every day, after the end of the transport work, each bus is washed inside and out with water and detergent and disinfected with a suitable preparation, in particular handles, handrails, buttons, ticket machine casings and screens. The interiors of the buses are then disinfected using the DS 80 RHR ozone generator. Thanks to the high ozone output of 80 g / h, this process takes only 5 minutes. During this time, the bus door is closed to ensure effective decontamination.

In **Częstochowa** additional disinfection of their buses and trams is carried out with the use of specialized equipment and a chemical mixture, by the method of fogging the interior of vehicles. This allows, in addition to the daily disinfection of surfaces in vehicles by the services of the municipal carrier, to achieve sterility of the common spaces inside each bus and tram.

Stops also are being disinfected all around Poland - in Poznań, Przemyśl, Kielce and etc.

3.4. OTHER CASES AND PRACTICES

Vilnius, Lithuania

The smooth and safe movement of public transport was ensured during the whole quarantine in Vilnius. This service did not stop in the city for a moment, only night buses were cancelled. Passenger flows were closely monitored daily. Compared to the volume of people movement before quarantine, the flows during the 1st wave of quarantine decreased by 65-78 percent. From May 11, 2021 when easing quarantine after the 2nd wave began in Lithuania, the number of trips on weekdays has increased about 20% in Vilnius.

During the quarantine, various necessary measures and solutions were applied in the city to ensure maximum safety for passengers and PT drivers, not forgetting travelling convenience. Passenger flows have been and are constantly monitored, schedules are being flexibly adjusted, while passengers are regularly reminded of the basic rules - to keep distance, wear protective masks, disinfect hands. During the time of harder restrictions passengers are allowed to travel only when free seats are available in the vehicle. In addition to the ticket verification function, during the quarantine period public transport controllers coordinated passenger flows.

The information for passengers is provided on the vehicles (stickers besides the doors outside), digital screens with real-time information on stops and in the vehicles (on screens and through audio announcements).

All vehicles are ventilated and disinfected much more often than usual; PT stops are being disinfected too.

Drivers' workplaces are separated from passengers by special lanes and glass shields, they are provided with all necessary disinfectants, and drivers do not sell one-time paper tickets on the bus. To prevent the disease spreading PT personnel is divided into non-interacting groups by the order of PT organizer. Other organisational measures regarding the specific COVID 19 situation are also introduced in the same order (backup for critical positions, provision and management of supplies etc.).

Great attention and help are being given to doctors, health staff and hospital workers in general. Vilnius organizes free public transport routes for them. The routes, called „COVID HEROJAMS”, take all hospital workers to work and back home. About 6,000 medical staff and workers have travelled on these routes since mid-March 2020. Vilnius PT organizers have combined their efforts with other transportation, car rental and sharing service companies. Many of them have also contributed to the transportation of medical staff.

Finally, traveling around the city on environmentally friendly vehicles (bicycles, scooters) is also increasing. Possibilities for combined trips (public transport and walking) are emphasized.

PT fleet is also provided for vaccination purposes. In April, 2021 two new bus routes were introduced. These routes are designed to transfer citizens from the most densely populated areas to the vaccination center. In the summer of 2021 several buses became the facilities for vaccination - “SKIEPOBUSAS”. These vehicles were equipped with all the necessary equipment for the vaccination procedure, thus vaccination was available in very convenient places, such as parking lots of shops, near the PT stops etc.

More detailed information on campaigning and mobility management (specifically - encouragement of walking) from Vilnius is provided in Annex No. 7.

Helsinki, Finland

During COVID 19 outbreak in Helsinki several crisis management committees were quickly created within the transport authority in early February 2020. Plus, a crisis group composed of transport planners, public relation experts, safety coordinator, mid-level managers. Clear consultation, action formulation and endorsement processes were defined from an early stage. The Board of Directors has been working remotely since March 2020 and the CEO has been granted wider mandate to make decisions and take special actions.

The services were set at 90% for buses and 60% for trams. PT authority has directed additional funding into vehicles and interchange cleaning. PT vehicles are cleaned more frequently and thoroughly than usual, not only at the depot but also at bus terminals. Special attention is paid to surfaces that are touched regularly. Stations are also cleaned more efficiently.

There are hand sanitizer dispensers at several Metro stations and at the Helsinki Central Railway Station. Extra service introduced: masks and Personal Protective Equipment (PPE) have been provided for free or made available in vending machines.

All ticket sales with cash, credit/debit cards, gift cards and commuter vouchers are suspended. Tickets can be purchased at other ticket sales points and ticket sales machines.

The Finnish PTA association has been regularly reporting to the national government on subjects such as the operational and economic situation of the sector and the level of patronage. The association has acted on behalf of different authorities, raised contradictions to national guidelines and helped to set a special crisis legal framework.

Frankfurt, Germany

A wide range of health and safety measures has been put into place throughout Frankfurt and the Rhine-Main region to safeguard the population as best possible from the Covid-19 virus. Public transportation networks are doing everything they can to ensure safe and worry-free travel to Frankfurt and within the city.

Medical masks must be worn on busses, trains and trams, in the train stations themselves and on the platforms. The same applies to bus and tram stops, subway, and commuter train stations.

In busses, acrylic panels fixed at the driver's cabin help to protect both passengers and the driver. Moreover, the driver automatically opens the doors of all means of transport (excluding older trams).

Railway carriages and frequently used subway stations are being cleaned and sanitised more often, while emergency call boxes and ticket vending machines are also being disinfected more regularly. Tickets are purchased from ticket vending machines in the stations, but may also be purchased contact-free via smartphone.

Similar health and safety measures have also been put into place on the regional and long-distance transport networks.

Disinfectant stations are placed at various locations throughout Frankfurt Main Train Station. Masks must be worn throughout the station's reception hall and in the platform areas.

To make taxi rides as safe as possible, many vehicles have been fitted with transparent partition panels between the front and back seats. Both drivers and passengers must wear medical facemasks in taxis at all times. The vehicles are regularly aired out and the key contact areas are disinfected after every ride.

Information on whole communication campaign regarding COVID19 management implemented in Germany is provided in Annex No. 8. Frankfurt public transport operators are actively involved in the vaccination campaign offering the designated transport units that are following a pre-established and previously announced route - the information regarding this activity is provided in dedicated issue provided in Annex No. 9.

London, UK

In London PT is treated with an enhanced cleaning regime, hospital-grade cleaning products, widely available hand sanitiser (more than 1,000 sanitiser points) and UV light fittings on escalator handrails to kill viruses. London PT authority - Transport for London - prepared safer travel guidance with information on safety and hygiene, traffic changes, travel advice, quieter times and places to effective trip planning and other useful information concerning COVID 19-related issues (available here: <https://tfl.gov.uk/campaign/safer-travel-guidance>).

London PT authority set up specific scenario for the future towards a 'new normal' by engaging into a transformation of their sustainable urban mobility plan. At one stage road congestion charging schemes were paused in London during the pandemic as road traffic decreased. However, charging has since been reintroduced in efforts to curb overall congestion and poor air quality.

London PT authority has been working with third parties or contractors without the usual degree of formality. They have managed to unlock certain clauses of their contracts with operators: Restrictions on service level or funding possibilities were levied.

On a country level there is a guidance "Coronavirus (COVID-19): safer travel guidance for passengers" prepared with advice on walking, cycling and travelling in vehicles or on public transport during the coronavirus outbreak. Another guidance especially important for PT system is "Coronavirus (COVID-19): safer transport guidance for operators and people who work in or from vehicles", which contains safer working principles and risk assessment for transport operators and organisations, and people who work in

or from vehicles, including couriers, mobile workers, lorry drivers, on-site transit and work vehicles. Mentioned guidelines and are available on the official site of United Kingdom government:

<https://www.gov.uk/government/publications/coronavirus-covid-19-safer-transport-guidance-for-operators>

<https://www.gov.uk/guidance/coronavirus-covid-19-safer-travel-guidance-for-passengers>

“Coronavirus (COVID-19): safer travel guidance for passengers” guidelines are also provided as an Annex No. 10.

To address the needs of vulnerable groups West Midlands Railway lifted restrictions to help pensioners and disabled access essential supplies. Pensioners and disabled passengers who are members of the English National Concessionary Travel Scheme can now use their local train service for free before 9.30am after West Midlands Railway lifted ticket restrictions. With many supermarkets across the region reserving the first hour of the day for vulnerable shoppers, the rail operator is playing its part by allowing pass holders to travel for free at any time. The move comes as West Midlands Railway begins running a revised timetable in response to the coronavirus epidemic.

II. SERVICE DELIVERY STANDARDS. RECOMMENDATIONS AND REQUIREMENTS FOR COMBATING COVID-19 IN PUBLIC TRANSPORT

Based on the desk review results and best practices assessment, the requirements for successfully combating COVID-19 in public transport were prepared by project experts. The focus is given to short term measures, which could be easily purchased / provided by external suppliers without necessity to modify existing legislative base, decision-making structure and practice. These could be easily grouped in to 4 categories, which allows implementation group to assign certain measures to certain stakeholders:

- Recommendations and requirements for transport units;
- Recommendations and requirements for personnel working to serve mass transit needs;
- Recommendations and requirements for passengers;
- Recommendations and requirements for mobility management.

1. RECOMMENDATIONS AND REQUIREMENTS FOR TRANSPORT UNITS

Regarding fleet management:

- To increase capacity of services (increase the number of units/vehicles);
- To increase frequency of services on demand (through revised timetables and in response to vulnerable passengers' groups);
- To decrease occupation per vehicle;
- To dedicate transport for a particular target groups and destinations (e.g. doctors, pupils, travelling to vaccination);

Regarding vehicles during the duty:

- Ensure proper ventilation in the vehicle at all times and avoid recirculating air. Encourage the use of an open windows;
- Placement of hand sanitizers where suitable (availability of product and fix-station for the device);
- Placement of panel as a separator for drivers' cabin (plastic glass);

Regarding vehicles after the duty:

- Inside cleaning and disinfection procedures in the transport unit at the end-rout station - depot (availability of products and equipment for the person who will execute the requirement). The waste disposal procedure should be developed and implemented as well;
- Use of UV light for air disinfection in the transport units (buses/ trolleybuses).

2. RECOMMENDATIONS AND REQUIREMENTS FOR PERSONNEL

Routine procedures for all:

- Monitoring health indicators among personnel: it is important to know how many drivers and conductors have been tested during covid-19 period, how many of them have been infected on a job and who is providing the epidemiological-measures, how many of them are already fully vaccinated (being considered or not the precipitant category of workers);
- Active testing among personnel as a routine procedure before going into the shift;
- Shifting pre-established teams (no mix among personnel for clear contacts tracing and quarantine measures, but also the continuation of services delivery);
- Reduced time of exposure (reduced working hours);
- Replacement of the teams with covid detected case, without interrupting the service delivery;
- Categorisation of employees and different treatment/follow up after infection (including their families).

Special recommendations for conductors' safety:

- Wearing the protective equipment by conductors (gloves and mask that covers nose & mouth);
- To consider extending contactless ticket payments pilot project in Chisinau and/or spreading it in other PT routes;
- To identify other feasible solutions for purchasing the travel tickets by passengers and provide more possibilities to buy tickets cashless so decreasing the need of physical contact with conductor.

3. RECOMMENDATIONS AND REQUIREMENTS FOR PASSENGERS

To be done/enforced by municipality/public transport operator:

- To dedicate seats for passengers keeping social distance;
- To dedicate waiting areas for those with and no masks.
- To ensure physical distancing in station and in the transport unit (on every second chair can be placed the warning sign) -weakness- for the local authorities- to identify the enforcement mechanisms in order to ensure the implementation of taken decisions and imposed measures by the authorities);
- To ensure free mask distribution when needed (by conductor or providing masks' vending machines);
- To disseminate information about the symptoms of covid 19 and measures that are implemented;
- To disseminate information e.g., flyers, infographics on the doors, for displays in the vehicle, in the waiting areas, explaining the importance of physical distancing, hand hygiene, respiratory etiquette, and the appropriate use of face masks.

Obligatory for passengers:

- To wear protective surgical/ffp2 masks covering nose and mouth (surgical, ffp2, ffp3 and kn95/n95 masks are more effective in terms of protection than community masks and were, until now, reserved for medical and nursing staff as well as risk patients). If they seal tightly onto the face, ffp2, ffp3 and kn95/n95 masks especially not only protect against droplet infection, but also provide a high level of protection against aerosols).

4. RECOMMENDATIONS AND REQUIREMENTS FOR MOBILITY MANAGEMENT

Reduced travel time:

- To implement the dedicated bus lanes network expansion according to the document *Strategic vision and the Roadmap for further expansion of the dedicated bus lanes network in Chisinau*.

Communication campaign. Clear, accessible and easy to understand information is the key element for smooth and effective adjustment of PT system services:

- Guidelines for PT passengers - these guidelines could contain the information on overall situation, latest requirements for passengers (masks, maximum number of passengers in the vehicle etc.), recommendations on how to plan the safe journey, useful links and other relevant information;
- Infographics (behavioural/promotional) and short updates - this information could be presented through mass media, municipal channels, also in PT hubs and stops, in the vehicles etc;
- The campaign might also address the personnel of the PT system, to keep them updated with the current situation and to provide latest recommendations (both non-related and related to work).

Reduced activity/mobility:

- To prepare “Safer travel guidance for passengers”;
- To prepare recommendations encouraging traveling if possible;
- To encourage to work full or part-time from home (teleworking - municipality and its enterprises could show the example of remote working).

Management of the flows. Decrease of occupation per vehicle can be reached not only through timetable changes or the extension of the fleet. Some actions can help effectively redistribute passenger flows, especially during peak hours. These actions might be:

- Real time information about occupation of the stops online or the statistical information (incorporated to the communication campaign package) with usually less busy timeframes in different stops or city areas. This way people can in advance adjust the start and finish of the journey according to less busy times.
- Incentives for the passengers that are flexible to use PT during off-peak hours rather than during the peaks.
- Initiate the shift of start and end of working hours between the employees of a municipality and its enterprises, educational entities and to encourage other businesses whose employees cannot work remotely to certain flexibility as well.

Increased walkability. Promotion of walking as a safe and healthy alternative to other means of transport is a very important measure complementing other PT-related goals (for example reduced PT occupation during peak hours). This could be implemented through:

- encouragement of multimodality (PT + walking “first/last mile”);
- spreading the information about convenient pedestrian routes and comfortable distances;
- promotion of healthy lifestyle.

5. METHODOLOGY OF THE IMPLEMENTATION GUIDELINES

Based on the overall findings from interviewing stakeholders, analysing existing data and practise in Chisinau, learning from foreign lessons and recommendations - distinguished list of measures was delivered above. For better uptake of general suggested delivery standards and implementation guidelines - “Technical specifications for implementation of research findings on best practises for combating COVID-19 pandemic adverse effects on public transport” were prepared and presented in Annex 2 (for Chisinau) and Annex 3 (for Lublin). Each recommendation or requirement given below was “translated” into particular actions with supplementary information:

- priority (1 -6, where 1 is the highest priority and 6 is the lowest);
- subjects for procurements;
- the preliminary scope of the procured subject;
- the preliminary technical specification (parameters marked red are to be adjusted according to the specific local needs);
- suggested stakeholders to be responsible for implementation.

For implementors convenience there is also associative pictures and references to cases elsewhere provided.

The actions are compiled into sets where all actions are important to implement together to gain the best results in combating COVID 19. However, regarding budget and time-related constraints, in each set actions are presented in priority order to provide clear structure of implementation steps. Some of the measures have multiple options for procurement subject - these measures are marked with additional letter, identifying that one of the presented options is to be chosen.

6. KEY FINDINGS

- The Public Health System had mobilized the possible resources to respond to COVID-19 through different interventions and taken measures, but in the limits of the mandate of the responsible stakeholder.
- Insufficient communication and cooperation between different stakeholders decrease the impact of inter-sectoral consensus on the decision-making process leading to inconsistency between the imposed requirements and their outcomes in the population. By developing better communication and cooperation mechanisms, stakeholders will be able to address the weaknesses within, but also among the state/municipal structures, which will lead to clear roles and better resource allocation.
- Lack of Monitoring and Evaluation system to follow up on the Decisions of different directive bodies and commissions e.g. Extraordinary Public Health Committee (at national and municipal levels) with defined escalation mechanism.
- Ambiguity in the definition of enforcement and controlling structure/roles/measures as an appropriate mechanism to ensure the implementation of Directives from national and local levels. Lack of designated structures, clear regulations and procedures, limited proper tools for e.g., penalties, bans, regulation, precautionary measures/education, ordering action to restore compliance with the established rules, but also preparedness of capabilities lead to non-compliant behaviour of population regarding the established anti COVID-19 rules/requirements and as a result, to the failure of expected health and social outcomes.
- National legal acts and normatives related to PT topic are not significant to the public health topic as they only give reference that safety should be ensured (health safety as well).
- Lower-level transport- and mobility-related documents are more relevant to the assignment topic as they contain objectives, measures and actions that can contribute to health insurance in the PT system. These documents may be adjusted in order to reflect the present situation - as an option specific scenario could be included with new goals and tasks to fulfil public health recommendations.
- In terms of transit transportation - priority to public transport (so decreased length of trip), sufficient frequency (so decreased time for waiting) and increased fleet (so decreased occupancy per one transport unit) can combat with risk of COVID-19. But yet there are no sufficient data to monitor evidence of benefits to public transport and public health after those improvements were implemented. Once again, for making decisions in due time - data from all related sectors is needed very much.
- Based on the overall findings from interviewing stakeholders, analysing existing data and practise in Chisinau, learning from foreign lessons and recommendations - distinguished list of measures was delivered above. For better uptake of general suggested delivery standards and implementation guidelines - "Technical specifications for implementation of research findings on best practises for combating COVID-19 pandemic adverse effects on public transport" were prepared and presented in Annex 2 (for Chisinau) and Annex 3 (for Lublin).

LIST OF ANNEXES

- Annex No. 1: Minutes from the project meetings (presented in separate file)
- Annex No. 2: Implementation Guidelines for Chisinau (presented in separate file)
- Annex No. 3: Implementation Guidelines for Lublin (presented in separate file)
- Annex No. 4: Presentation of Inception report (presented in separate file)
- Annex No. 5: Presentation of recommended measures (presented in separate file)
- Annex No. 6: Presentation of for meeting with public transport authorities (presented in separate file)
- Annex No. 7: Vilnius case: COVID-19-related campaigning and mobility management. Measures to increase walkability (presented in separate file)
- Annex No. 8: Germany case: COVID-19-related campaigning (presented in separate file)
- Annex No. 9: Frankfurter COVID-19. IMPF - EXPRESS (presented in separate file)
- Annex No. 10: UK case: Safer travel for passengers. Easy read guide (presented in separate file)
- Annex No. 11: Romania case: COVID-19-related campaigning (presented in separate file)
- Annex No. 12: Compilation of pictures used in the Final report (presented in separate file)

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