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Making Transport in Low-Income Countries Resilient to Pandemics: A Planning Guide

COVID-19 Research & Response Transport Recovery Fund

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Abstract

Transport response to the COVID-19 pandemic has witnessed a host of short-term actions and policy measures across high, middle and low-income countries. For these short-term actions to be more effective in the long-term, the transport and health sectors need a more integrated approach to make transport more resilient to future pandemics.

This Planning Guide supports decision makers and practitioners in transport and public health planning and provides specific advice for different groups of transport stakeholders, including national ministries, road and rail infrastructure managers, public and private sector transport operators, and freight and logistics organisations. It describes operational planning measures that all transport organisations should take in order to prepare for a pandemic; and describes key long-term measures that national, urban and rural transport agencies should follow to better plan for pandemics.

The Guide can be used by LIC governments and development partners to help plan investments in sustainable transport networks that are resilient to pandemics and that provide mobility for all.

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ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
COVID-19	Coronavirus Disease 2019
GDP	Gross Domestic Product
GRA	SuM4All Global Roadmap of Action Towards Sustainable Mobility
HIC	High Income Country
HIV	Human Immunodeficiency Virus
HVT	High Volume Transport
ICT	Information and Communications Technology
IRF	International Roads Federation
ITF	International Transport Forum
LIC	Low Income Country
LMIC	Lower Middle Income Country
NGO	Non-Governmental Organisation
PIARC	World Road Association
PPE	Personal Protective Equipment
SSATP	Africa Transport Policy Programme
SuM4All	Sustainable Mobility Program for All
TIR	Convention on International Transport of Goods
TRB	Transportation Research Board (United States)
TUMI	Transformative Urban Mobility Initiative
UIC	International Union of Railways
UITP	International Association of Public Transport
WHO	World Health Organisation

OVERVIEW

Transport response to the COVID-19 pandemic has witnessed a host of short-term actions and policy measures across high, middle and low-income countries (LICs). For these short-term actions to be more effective in the long-term, the transport and health sectors need a more integrated approach to make transport more resilient to future pandemics.

During a pandemic transport is critical to maintaining access to vital services that support economic activities and livelihoods. However, transport acts as a vector that spreads contagious diseases, and until recently most transport policies and strategies paid little heed to public health. Accordingly, the transport sector in urban and rural areas must plan to increase its resilience to future pandemics and do as much as it can to constrain the spread of pandemics.

This Planning Guide is based on a literature review of international good practice of transport agencies around the world in their response to COVID-19, as well as to other pandemics and natural disasters.

The Guide supports decision makers and practitioners in transport and public health planning and provides specific advice for different groups of transport stakeholders from national ministries, road and rail infrastructure managers, public and private sector transport operators, and freight and logistics organisations.

- Part 1 provides an overview of the impact of recent pandemics on the transport sector around the world. It demonstrates the importance of the transport sector during pandemics and highlights why improving resilience is so important.
- Part 2 describes operational planning measures that transport organisations should take in order to prepare for a pandemic. Preparedness for future pandemics can be improved by clear operational guidance on the health and safety of key workers, transport workers and the travelling public, and the continued provision of key services during pandemic restrictions.
- Part 3 describes key long-term planning measures that national, urban and rural transport agencies can take to better plan and prepare for pandemics. It focuses on the integration and coordination of planning across the transport and health sectors and wider government. These long-term measures also align transport resilience to pandemics with global sustainable transport mobility goals.
- Part 4 summarises the operational and long-term planning measures that governments and stakeholders in LICs can use to update transport and health policies for increased resilience to future pandemics.

The Guide can be used by LIC governments and development partners to help plan investments in sustainable transport networks that are resilient to pandemics and that provide mobility for all.

1. HOW PANDEMICS CREATE A TRANSPORT CRISIS

COVID-19 and government measures to curb its transmission disrupted transport services around the world. Transport services underpin national economies, provide access to jobs, health, education and other services fundamental to social wellbeing, livelihood and development. Disruptions arose from the cancellation or suspension of public bus and rail transport, taxi services and logistics services. These reductions in service reduced mobility and caused delays in the movement of freight within countries and across borders. Bus companies, haulage companies and railways lost revenue, and budgets for maintaining road and rail infrastructure were reduced due to lower tax revenue or toll incomes. Commerce and the economy declined, livelihoods were threatened, and forecasted mobility and long-term transport demand became uncertain. Thus, there is an urgent need for an integrated planning approach to make transport more resilient to future pandemics.

1.1 How pandemics disrupt transport

Public transport services reduced, transport workers and traveling public at risk

Government efforts to stop the spread of COVID-19 included full or partial lockdowns that restricted people's travel to work, schools, hospitals and shops. However, even under lockdown, certain key transport services are vital for the economy and society to function. Operators providing essential transport services, for instance, along toll roads, at bus and railway stations, and in long-distance transport rest areas must still work. However, transport workers because of their interaction with the public are at a high risk of exposure to COVID-19. Therefore, transport companies quickly adapted their services and implemented new public health measures. These measures included physical distancing and distribution of personal protective equipment (PPE) for workers and the travelling public. In some cases, the wearing of face masks was mandatory. Body temperature testing devices for the detection of fever were deployed at train and bus stations in many countries including China, Malaysia and Nepal. Despite these measures, many workers simply stayed at home, hindering transport's role in the provision of essential services.

Freight services suspended or delayed

Many national and city authorities placed restrictions on the movement of freight, only allowing essential goods such as food or medical supplies to be moved or restricting their movement to weekends. However, these restrictions on movement of non-essential goods caused congestion in ports and warehouses in some countries including Malaysia and Nigeria, which delayed the movement of essential goods through the ports. These delays reportedly contributed to price rises in some countries such as Nepal.

Border crossing operations disrupted

Many African and Asian countries closed their borders or restricted border opening times, whilst introducing mandatory COVID-19 testing of drivers and travellers. A limited availability of PPE at ports or borders, incidences of COVID-19 among border control agents, and staff absenteeism delayed the clearance of freight and passengers. These disruptions created traffic tailbacks of more than 20 km at some borders, doubling or even trebling border transit times.

Experience from the HIV/AIDS epidemic and Ebola outbreaks showed infection rates to be higher around border crossings and identified long-distance transport as a vector that spreads viruses along strategic transport corridors. Transaid, an international transport non-governmental organisation (NGO), reported that truck drivers in Africa were consequently facing public hostility at border and transit rest stops.

Toll road revenues take a hit

Lockdowns and travel restrictions resulted in a dramatic fall in toll road revenues. In Mexico and Malaysia, revenues dropped by up to 40%. In India, Colombia and Argentina tolls were suspended on national highways for several weeks, significantly reducing annual revenue. On road networks and on major bridges where "shadow pricing" is used, such as in UK, operators foresee substantially lower revenues due to reduced traffic flows. Toll road concessionaires in India called for an extension of concession periods. In other countries, toll road associations are calling for short-term financial support.

Road fatalities decrease but not to same degree as traffic volumes

Dramatic reductions in traffic volumes during COVID-19 restrictions led to lower road fatalities in many countries [1]. However, based on preliminary data in Europe, reductions in road fatalities were not in proportion to lower traffic volumes. This anomaly was due to increased traffic speeds resulting in higher-impact crashes and thus fatalities.

In other countries, such as Chile, reports show that emergency services took longer to respond to road crashes because COVID-19 cases were given priority. Delays in treating road crash victims could increase the impact of injuries and lead to higher fatalities.

Motorbike and bicycle taxis become less popular

Motorbike and bicycle taxi operators also registered a reduction in passenger numbers and revenues as people avoided taxis due to perceived health risks. Other shared mobility services suffered during COVID-19 with the

suspension of many ride-share and bike-share services and cancellation of e-scooter rentals.

Walking and cycling increase in popularity

The walking and cycling components of active travel increased during the COVID-19 pandemic. Many cities in High-Income Countries (HICs) including Berlin, California, Barcelona, Paris, and London observed an increase in people walking or cycling to avoid the perceived health risks of public transport. All these cities initiated or expanded pop-up infrastructure or pedestrian zones to set aside safe spaces for walking and cycling. Similar smaller-scale initiatives already operating in some African cities, including Addis Ababa and Kigali expanded during COVID-19.

Asset maintenance brought forward

National road and rail agencies in Chile and Mexico, taking advantage of lower traffic conditions, brought forward asset maintenance programmes that also formed part of a wider employment stimulus when other economic sectors were mothballed. Some cities including Lalitpur in Nepal and Kochi in India also implemented programmes for the maintenance of footpaths, or removal of obstacles from footpaths, to facilitate active travel.

1.2 How transport disruptions impact the economy, commerce and livelihoods

Transport disruptions had significant economic, commercial, and social impacts in many countries as set out below, and more so in LICs.

Economic impact

COVID-19 has disrupted all economies worldwide. Transport has been affected in a variety of ways, which has had a knock-on effect on economies. Transport services have reduced almost everywhere. The resultant drop in business incomes and delays in long-distance transport reduced commercial trade and exacerbated economic issues in developing regions. Sub-Saharan Africa experienced its first recession in 25 years, exports dropped by 35% and foreign investment decreased between 5% and 15%. City administrations are under serious financial stress, with some African cities estimating revenue losses of 50-70%. Latin America has seen a relatively smaller decline of approximately 7% in economic activity.

Although all sectors of the economy experienced economic shocks, some have responded better than others. Labour-intensive sectors such as construction, textiles and retail have suffered most. Sectors that depend on e-commerce, including some retail services such as food and drink, have benefited most during lockdown and restrictions. All these sectors depend on transport to some extent, so any disruption of the availability and efficiency of transport services directly affects the economy.

LIC economies may be more vulnerable to pandemics due to limited Information Communications and Technology (ICT) infrastructure including e-commerce. This can mean less scope for home working, less opportunity for businesses to respond via e-commerce solutions, and less opportunity for workers to make a living without travelling to work.

In LICs, where personal car ownership is low, people rely heavily on public transport. Therefore, disruptions to public transport that limit people's ability to travel to work has a significant impact on the economy and affects poorer economies disproportionately.

Commercial impact

The International Transport Forum (ITF) predicted in May 2020 that due to COVID-19 global freight transport volumes would fall by more than one third. These falls included significant regional differences of up to 50% for ASEAN countries, Russia/Central Asia and India, 40% in Europe and the Americas, and between a half and a third in African countries. Consequently, many countries experienced significant reductions in customs revenues from this decline in trade.

It has been estimated in South Africa that 50% of jobs may be lost in the road freight industry because of COVID-19, and the closure of freight businesses will have a long-term impact on freight capacity [2]. Many formal and informal public transport companies in Africa are experiencing serious financial stress, and many are on the verge of bankruptcy, according to the African Transport Policy Program (SSATP) [3].

Urban freight levels are generally forecast to reduce slightly, but inter-urban freight levels are projected to reduce more. Reductions in urban freight are lower due to the growth of on-line

shopping during lockdown resulting in more goods vehicles circulating, although overall urban traffic levels have reduced. Cross border freight traffic has reduced.

Travel and tourism have suffered greatly due to bans on international travel and people's reluctance to visit other countries. Tourism is the third largest export sector of the global economy and relies heavily on all modes of transport. Losses from tourism revenue as a result of COVID-19 are estimated to be up to 2.8% of global GDP. Travel and tourism will take longer to rebound than most sectors. LICs that depend heavily on tourism and air transport, such as Madagascar and Kenya where tourism represents 16% and 9% of GDP respectively, will likely experience serious impact and take longer to recover.

Livelihoods under threat, gender and inclusion harder hit

Reductions or suspensions of public transport services had a profound social impact, particularly on the poor who have fewer alternative means of access to jobs, health services or food supplies. Public transport fares in many cities increased as companies compensated for reduced ticket revenue and the extra costs of sanitary measures. Transport costs in LICs account for a high proportion of daily expenditure, so higher fares are an additional burden for low-income households.

COVID-19 can have a disproportionate impact on women, because women in LICs rely more on public transport than men and therefore face higher exposure to COVID-19. Women also are over-represented in customer service or cleaning roles in transport that are generally lower paid jobs, which means women often cannot pay the higher fares resulting from COVID-19 transport disruptions.

Persons with disability are especially vulnerable during pandemics. Physical distancing is particularly challenging on public transport, on which a high proportion of persons with disability rely. In some LICs, there are limited disabled infrastructure and services, and often little or no information on how to access these services. Disruptions to transport have compounded the problems that persons with disability already face.

1.3 Long-term impacts on transport demand

Pandemics may influence permanent changes in behaviour and transport demand in the long term. Full and partial lockdowns reduced public and private transport usage fuelled by a perceived public health risk. COVID-19 has heightened the health risk of travelling on overcrowded buses, minibuses and trains, and this could lead to a behavioural shift in transport choices. Yet, vaccination campaigns that increase immunity and thus reduce perceived health risks could result in a recovery in public transport demand.

Evidence from HICs emerging from COVID-19 lockdowns and from previous pandemics and recessions indicates that total transport demand may bounce back quickly. In most countries, total travel demand is anticipated to return to pre-COVID-19 levels within 6 – 12 months. However, evidence from LICs post-COVID-19 is yet to emerge.

1.4 An integrated planning approach for a transport pandemic plan

A pandemic is different from a disaster. Most disasters that have major impacts on transport systems are caused by severe weather - typhoons or hurricanes - or geological events - earthquakes or volcanos. These disasters cause physical damage to people and infrastructure in localised areas over a relatively short time, measured in days or weeks. Pandemics, however, are global public health emergencies that impact primarily on individual health and wellbeing, no infrastructural damage occurs. A pandemic can last many months and its impact varies during its lifetime. Therefore, transport organisations must prepare for different challenges that require short-term actions and long- term recovery strategies. Formulating a transport pandemic plan creates ethical, logistical, and operational challenges that demands the involvement of a wide range of policy makers across the public and private sectors to develop an integrated planning approach.

The World Health Organisation (WHO) has historically prepared country and technical

guidance on pandemics. In 2005, for example, the WHO strongly urged every country to develop or update a national influenza preparedness plan [4]. It recognised the importance of inter-sectoral planning among government departments including agriculture, transport, trade, labour, defence, education and the judiciary. It concluded that although it may not be feasible to halt the spread of a pandemic virus, it should be possible to minimise its consequences through advance preparation.

The Transportation Research Board (TRB) in United States in 2014 published guidance for public transportation planning and response to pandemics [5]. The TRB guidance focused on small urban and rural transit agencies/ organisations and advocated several important policy measures for public health in transport.

The WHO in 2020 established a COVID-19 publications hub [5] which includes country and technical guidance ranging from protection and support to health workers, assessment tools for medical laboratories, preparing countries for vaccines, stockpiling of personal protective equipment (PPE), triage and patient care, and communications and public education. But it does not provide specific guidance for the transport sector.

The HVT programme in 2020 published a Call for Collective Action for international transport stakeholders to respond to COVID-19 [7]. It identified some of the efforts of multinational stakeholder organisations in their responses to COVID-19 as it affected their missions. Those organisations include the International Association of Public Transport (UITP) [8]; the International Union of Railways (UIC) [9]; the International Roads Federation (IRF) [10]; and the World Road Association (PIARC)[10]. Initiatives such as the Transformative Urban Mobility Initiative (TUMI) [11] and Sustainable Mobility for All (SuM4All) [12] also publish findings and recommendations relating to COVID-19. The International Transport Forum (ITF) consolidates national government responses to COVID-19 for member countries [13].

The WHO reiterated the need for linkage between health and transport through their publication in 2020 on Supporting Healthy Urban Transport and Mobility in the Context of COVID-19 [14]. It emphasized the need for governments, public health authorities, transport providers and local communities to work together to ensure the health and safety of travellers and transport workers. It also noted that governments plan a key role in creating the policy frameworks for promoting safe active mobility, including through safe infrastructure for pedestrians and cyclists, reallocation of public space and enforcement of road safety measures.

Therefore, this Guide outlines an integrated planning approach for preparing a transport pandemic plan to maintain transport's vital role in the economy and society during pandemics.

2. PLANNING GUIDANCE FOR TRANSPORT ORGANISATIONS

Part 2 of the Guide sets out operational measures that transport organisations should take to increase transport resilience to future pandemics. This guidance is for public and private road and rail transport managers, haulage companies, logistics companies, port and border post officials, transport infrastructure authorities and transport agencies at national and local government level.

To help private and public sector managers implement these measures, the ministry of transport must lead, and work with other government departments to ensure that effective and efficient policy and regulatory frameworks are in place. The measures transport managers need to take are set out below.

2.1 Planning for transport service managers

Protect the health and safety of workers

Protecting the health and safety of workers is the foundation of a pandemic transport plan. Taking steps to stem the transmission of coronavirus among workers will increase company confidence, will help to reduce absenteeism, and will enable reduced transport services to function. The measures can include:

- Provide physical barriers between public-facing staff and public
- Provide hand sanitisers and PPE

- Implement strict health checks and sanitisation procedures, including mandatory wearing of PPE
- Provide training to recognise COVID-19 symptoms among staff and the travelling public, and how to isolate them
- Implement new workforce rules such as fixing the maximum number of persons sharing company vehicles, allowing vulnerable staff (for example, those over age 60) to stay at home, and the staggering of working hours
- Minimise travel to work by accommodating staff at work, for example, at construction sites, port and border posts
- Minimise physical contact by communicating with staff via electronic means – intranet, email, SMS, screensavers, hotlines, phone, video, and noticeboards.

Protect the health and safety of the public

Public transport managers running bus companies and taxi firms, railway station managers, and transport agencies with public-facing operations must stem the transmission of coronavirus among the travelling public. Mitigation measures will increase public confidence in travelling on public and private transport, will allow key workers to travel to work and will enable reduced transport services to function. The measures include:

- Implement strict health checks including, for example, passenger temperature testing, if appropriate
- Implement strict sanitisation procedures including regular sanitisation of vehicles and public areas
- Provide hand sanitisers and PPE
- Remove seating to ensure physical distancing between passengers on buses and trains.

Develop contingency plans for absenteeism

All organisations must develop contingency plans for absenteeism so that essential transport services run during pandemics. These plans should include measures to:

- Develop staff inventory and identify backup personnel for key roles
- Develop streamlined procedures where regular staffing levels are reduced
- Develop systems and procedures for remote handling of enquiries from the public and increase administrative staffing to handle increased enquiries.

Provide public information about services

Keeping the public informed of rapidly changing circumstances is paramount for the smooth running of essentials transport services during pandemics. Therefore, managers must:

- Inform the public through internet, social media, print media, radio and TV about any changes to procedures and any operational restrictions to minimise travel time for work, shopping and other vital services.

2.2 The planning role of the ministry of transport

The ministry of transport's role is to create a national transport pandemic plan.

The plan sets out the enabling policy framework and regulations to facilitate the operational planning measures for transport managers described in section 2.1. It must clearly assign the responsibilities and operational roles of all transport organisations and agencies. In updating the plan, the ministry should take account of the long-term measures described in Part 3 of this Guide. The steps to create the transport pandemic plan are set out below.

Lead and coordinate key government departments and NGOs

- Work with key government departments to ensure that legal and policy frameworks of the transport plan are in place that allow transport managers to respond quickly and efficiently to pandemic disruptions.
- Work with the national health department to establish clear lines of communication and responsibilities for implementing all public health measures on transport. These include physical distancing, information dissemination, procurement and distribution of PPE, testing, hazardous waste management, and training.
- Work with NGOs and use their disaster relief, logistics and public health expertise to reach

small rural communities affected by disrupted transport services.

Designate transport workers as key workers

- Work with transport managers and government departments to establish key worker status for transport staff and operators to run essential transport services during a pandemic. Key workers may include bus drivers, train drivers, truck drivers, warehouse and logistics staff.

Designate transport services as key services

- Work with transport managers and government departments to establish key service status for essential transport services to operate during a pandemic. This may include services on specific bus, taxi, train or freight routes, with distribution mechanisms for essential goods (food, medicines, fuel); service stations; vehicle repair shops; and active travel services.

Provide transport services for key workers

- Work with transport authorities, including city authorities, and transport managers to provide transport services for key workers, for example, those working in health and agriculture, and in the emergency services. This may include free or subsidised services for designated key workers.

Review customs and staffing arrangements at ports and borders

- Work with agencies to review and modify procedures at ports and border posts. Modified procedures could include fewer staff on duty at any one time while extending opening hours to facilitate physical distancing among officials, reducing customs inspections for certain key goods, and fast-tracking the movement of key personnel, for example, medical workers and truck drivers.

Reschedule asset management programmes

- Work with infrastructure agencies including road and rail agencies and urban authorities to bring forward asset maintenance or construction programmes that can be carried out safely within public health restrictions.

Review and update regulations for vehicles and vehicle use

- Review and enforce vehicle regulations on physical distancing, protection of drivers and staff, and the travelling public.
- Temporarily suspend vehicle licensing or taxation requirements to allow transport services to continue functioning during a pandemic when licensing or taxation offices may be closed. This can help when government staff are unable to travel to their offices or are unable to work from home. It also reduces the potential interactions among people, thus reducing the risk of disease spreading.
- Review exclusion times for freight delivery within cities to enable smooth and efficient movement of essential goods.
- Review speed awareness and enforcement during lockdown or travel restrictions. Evidence from UK shows that with lower traffic levels, more people exceed speed limits, so enhanced awareness and enforcement will help to maintain road safety levels.

Develop contingency plans for sourcing essential goods and services

- Engage with key transport associations, including logistics companies, on specific measures to:
  - Identify resources critical to transport, such as fuel or spare parts, and consider increasing inventories and finding additional supplier sources
  - Set out critical supply chains across various transport modes - aviation, maritime, rail, and road
  - Identify availability of drivers, trucks, vehicles, warehousing space, suppliers and producers, capturing market demand, inventories and producers through a networking approach [15].

Foster awareness training

- Work with transport organisations to conduct, awareness training so all stakeholders are aware of their roles and responsibilities in a future pandemic.

3. LONG-TERM PLANNING FOR PANDEMICS & SUSTAINABLE TRANSPORT

Part 3 of the Guide sets out planning measures to address long-term transport issues associated with pandemics. These are set in the context of the policy goals of the SuM4All Global Roadmap of Action towards Sustainable Mobility (GRA) [16]. The GRA policy goals are universal access, efficiency, safety and green mobility. The Guide, therefore, incudes planning measures associated with these goals for inclusion in transport pandemic plans that will make transport more resilient to pandemics and more sustainable.

Therefore, Part 3 provides guidance for planning departments and transport agencies at national, city and local government levels. City authorities with sustainable urban mobility plans should be able to move quickly to design and implement urban transport pandemic plans. All agencies should use this long-term planning guidance to carry out research that determines resilient measures aligned to GRA goals to update transport pandemic plans and national and city-level sustainable transport plans.

3.1 How improving resilience to pandemics aligns with universal access goals

Universal access connects people in urban and rural communities to social and economic opportunities. Embedding the principles of universal access in transport plans will increase resilience to pandemics. These measures can include:

- Restrict the movement of people and goods is a primary pandemic response. However, implementing this policy response must be seen as transparent, proportionate, relevant and mode-specific, and non-discriminatory. Any accompanying restrictions should minimise the continuity of economic activity.
- Develop rationing and distribution systems for essential goods is necessary in pandemics, and these systems should be fair, equitable and non-discriminatory.
- Provide support and relief measures to transport providers and operators during a pandemic – including through changes to road taxes, rail taxes, fuel taxes, loans, subsidies, toll road franchises. If such measures are applied, it is important that recipients are identified and supported equitably and consistently.

COVID-19 financial support to the transport sector

COVID-19 restrictions stifle commercial activities, reduce business revenues, and threaten jobs in all transport companies. And, the longer the pandemic lasts the greater the risk of bankruptcy. Therefore, many governments have provided financial support to companies and furloughed employees to allow transport companies to operate basic services. This means transport companies remain viable and the sector retains transport service capacity, post-pandemic.

The Asian Development Bank set up a policy measures database listing measures that member countries have taken in response to COVID-19 [18]. These include short-term and long-term lending, equity support, income support, budget reallocation and other economic measures. Support for these measures is a mix of national and international finance.

The World Bank provided emergency funding to support essential public transport operators in LICs [19]. The African Development Bank provides a COVID-19 Response Facility to assist regional member countries in fighting the pandemic [20].

In Africa, Ivory Coast provided financial compensation to bus operators. Ghana facilitated local transport associations in Kumasi City to access national stimulus packages. Senegal allocated part of its national COVID-19 fund to support public transport operators with assistance from the European Investment Bank.

- Provide support and relief measures that include basic social protection measures for transport workers, including those in the informal transport sector.
- Consider government subsidies to support active travel and alternative transport modes, as part of a wider sustainable transport strategy. For example, drones are

used to deliver medical supplies to remote rural areas in Rwanda and Malawi. In Ethiopia, a multidisciplinary COVID-19 Emergency Response team explored e-payments to reduce physical contact and promote and expand cycling.

- Consider subsidies for certain groups, such as key health workers or persons with disability, through waiving of or reducing public transport fares.
- Develop inclusion policies and programmes for vulnerable public transport users. Persons with disability, for example, can be disadvantaged because of the absence of personal help and perceived lack of information.
- Establish specific training programmes for transport workers covering guidance on health, safety and security. Such training programmes should include workers in the informal transport sector.
- Develop emotional support programmes for transport workers. Transport workers are especially vulnerable due to their contacts with the public.

3.2 How improving resilience to pandemics aligns with efficiency goals

Efficiency is the optimisation of the predictability, reliability and cost-effectiveness of mobility. Many measures to increase transport resilience to pandemics are similar to the GRA recommendations to improve efficiency. These measures can include:

- Strengthen coordination between governments and officials at the local level on measures to allow borders to remain open for trade while instituting effective measures to contain the spread of pandemics. These measures cover streamlining systems, practices and procedures at ports and borders by expediting the movement, release, and clearance of goods, including goods in transit. Examples of good practice include the TIR (Convention on International Transport of Goods) or similar systems present in many trade and transport regional agreements, such as the Common Market for Eastern and Southern Africa, and the Northern Corridor Transit and Transport Agreement in East Africa. Fast and efficient movement of essential goods and services can be key during pandemics and is an important component of efficiency [17].
- Implement e-procurement systems to keep parts of the economy moving during a pandemic. For government procurement these systems avoid bidders travelling to submit physical bids, allow officials to evaluate bids and award contracts remotely, thus keeping the economy moving by procuring infrastructure and services. E-procurements also help key staff in government agencies to better adhere to physical distancing and contribute to improving efficiency in government procurement.
- Implement e-payment systems including online bookings or payments to eliminate cash payments that reduce the risk of exposure to contagion. An alternative for some companies would be fixed fares to reduce cash handling. Both measures contribute to improving efficiency in public transport systems.
- Introduce information systems using digital technology such as variable messaging signs to inform road users of specific pandemic mitigation measures, or to provide secondary messaging to raise awareness on related issues such as speed limits.
- Develop metrics to measure resilience across the transport sector with a focus on efficiency. Metrics or indicators could include, for example, sales of e-bikes or scooters, revenue from e-mobility services, or use of contactless payments on public transport. These indicators would monitor the change in transport usage and demonstrate how transport services are changing.

3.3 How improving resilience to pandemics aligns with safety goals

Safety, in the GRA, covers fatalities, injuries and crashes and this Guide extends safety to include public health as part of long-term planning for sustainable transport. Measures that identify and mitigate risks to public health during pandemics, and contribute to wider safety goals, can include:

- Reform the contractual arrangements between public transport authorities and companies to establish codes of conduct to protect the health and welfare of the travelling public and transport workers.
- Update health and safety standards for vehicles, such as the installation of air filters on public transport, and the installation of visors and screens to protect drivers.
- Consider governments loans and grants to transport companies to retrofit vehicles with improved health and safety measures such as visors, screens, air filters, CCTV or other equipment for protection against, or to monitor the impact of, a pandemic in terms of the number of people using public transport and how closely they adhere to regulations. This information can be used to adjust and improve the regulations or guidance to focus loans and grants on the most effective measures.
- Update safety standards for infrastructure. This can include so-called pop-up infrastructure such as bicycle lanes, pedestrian zones, and signage on public footpaths.
- Identify critical safety systems assets that need to be kept operational for purposes of pandemic resilience. For example, signalling systems on railways where failure would dramatically reduce operational capacity. Keeping critical assets operational may necessitate increasing spare parts inventories and identification of key operational personnel.
- Implement systems for monitoring physical distancing in transport hubs and on public transport, for example, CCTV installations. Such tools will help the transport manager or facility manager to monitor implementation of physical distancing measures and assist public health officials in advising on additional measures. Such technology would also help to create safe environments for women and vulnerable people.

3.4 How improving resilience to pandemics aligns with green mobility goals

Green mobility minimises the environmental footprint of mobility - GHG emissions, noise and air pollution. Measures to increase resilience to pandemics also contribute to wider green mobility by taking the following measures:

- Construct assets to support active travel. Bicycle lanes, pedestrian zones and e-bike infrastructure that have been part of the response to pandemics, and all contribute to green mobility.
- Reapportion road space to cycling and pedestrians on urban streets to provide safe space for recreational and utilitarian travel during pandemics. This improves public health, supports transit, and reduces GHG emissions and hence contributes to green mobility.

3.5 How improving universal access can contribute to resilience to pandemics

Measures that have long been considered to improve universal access could also contribute to increased transport resilience to pandemics. COVID-19 offers renewed impetus in the following areas:

- Urban planning: Adopt integrated land use planning to support transit-oriented development, promote mixed land use and compact city planning that limits urban sprawl, and integrate road and rail network development in urban planning. Putting people and services closer together will reduce travel and improve access to vital services during a pandemic.
- Rural planning: Gear all future rural roads planning and development to improving connectivity to local markets, trading centres, schools, and health facilities. Increased connectivity, the development of logistics infrastructure (collection points, sorting, grading, and storage/cold storage) will also reduce post-harvest losses and compensate for reduced transport services during a pandemic.
- Implement multi-modal network planning: In addition to being key to universal access, multi-modal planning allows other transport modes to carry traffic from modes impaired by a pandemic and move people and goods where they need to go.

4. INTEGRATING OPERATIONAL AND LONG-TERM MEASURES FOR PANDEMIC RESILIENT TRANSPORT

Part 4 of the Guide brings together, in three tables, the measures to make transport more resilient to pandemics. Table 1 provides a checklist of operational planning measures, Table 2 provides a checklist of long-term planning measures, and Table 3 provides a checklist of long-term planning measures to support universal access in pandemics. Tables 2 and 3 apply the GRA policy goals to align resilience to pandemics with sustainable transport mobility goals.

The first column in each table lists measures to improve resilience to pandemics. Subsequent columns show the different types of agency in the transport sector. The organisation with primary responsibility to develop and implement the measures is indicated by a full circle (●). A hollow circle (○) indicates the organisation with secondary responsibility or that provides a supporting role. The measures and responsibilities are advisory and should be reviewed and adapted to individual country needs/situations as part of its pandemic planning for the transport sector.

Table 1: Operational planning measures

Operational planning measures in response to pandemics	Health Agencies	Transport Ministries	City Transport Authorities	Infrastructure Agencies	Public Transport Operators	Freight Operators	Warehousing and Logistics	Toll Road Operators	Border Crossing Agencies	Other transport service providers (e.g. bus / train station / rest area operators)	Driver and Vehicle Licensing Agencies
All transport organisations											
Protect health and safety of workers		●	●	●	●	●	●	●	●	●	●
Protect health and safety of the public		●	●	●	●	●	●	●	●	●	●
Develop contingency plans for absenteeism		●	●	●	●	●	●	●	●	●	●
Provide public information about services		●	●	●	●	●	●	●	●	●	●
National Transport Ministry											
Development of transport plan for pandemics	○	●	○	○	○	○	○	○	○	○	○
Lead and coordinate key government departments and NGOs	○	●	○	○	○	○	○	○	○	○	○
Designate transport workers as key workers		●	○	○	○	○	○	○	○	○	○
Designate transport services as key services		●	○	○	○	○	○	○	○	○	○
Provide transport services for key workers	○	●	●			○	○	○	○	○	○
Review customs and staffing arrangements at ports and borders		●							○		
Reschedule asset management programmes		●	●	●				●			
Review and update regulations for vehicles and vehicle use		●									○
Develop contingency plans for sourcing essential goods & services		●				○	○		○		
Foster awareness training	○	●	○	○	○	○	○	○	○	○	○

Table 2: Long-term planning measures linked to GRA goals

Long-term measures to improve resilience to pandemics	Health Agencies	Transport Ministries	City Transport Authorities	Infrastructure Agencies	Public Transport Operators	Freight Operators	Warehousing and Logistics	Toll Road Operators	Border Crossing Agencies	Other transport service providers (e.g. bus / train station / rest area operators)	Driver and Vehicle Licensing Agencies
Universal Access											
Develop policies to restrict the movement of people and goods		●	●	○	○	○		○	○	○	
Develop rationing and distribution mechanisms for essential goods		●	●			○	○	○	○		
Consider government subsidies, grants and loans to transport providers and operators		●	●		○	○		○			
Set up basic social protection measures for transport workers		●	●	○	○	○	○	○	○	○	○
Consider government subsidies, grants and loans to support active travel and alternative transport modes		●	●								
Consider subsidies for groups such as key health workers or persons with disability	●	●	●								
Develop inclusion policies and programmes	●	●	●	●	●	●	●	●	●	●	●
Establish training programmes for transport workers covering health, safety and security	○	●	●	○	○	○	○	○	○	○	○
Develop emotional support programmes for transport workers	○	●	○	○	○	○	○	○	○	○	○
Efficiency											
Strengthen and adapt border crossing procedures		●			○	○	○	○	○		
Implement e-procurement systems		●	○	○	○	○	○	○	○	○	○
Implement e-payment systems		●	○		○	○	○	○	○	○	
Implement information systems for public messaging		●	○	○	○	○	○	○	○	○	○
Develop metrics for resilience		●	○	○	○	○	○	○	○	○	○
Safety											
Reform codes of conduct for transport operators		●			●	●					
Set up health and safety standards for vehicles		●									
Consider loans or grants to transport companies to retrofit vehicles to improve health and safety		●			○	○					
Update safety standards for infrastructure		●	●	●							
Implement systems to monitor physical distancing		●	●		●						
Green Mobility											
Construct assets to support active travel		●	●	●	○	○					
Reapportion road space to cycling and pedestrians		●	●	●	○	○					

Table 3: Long-term planning measures specific to universal access

Long-term measures to improve resilience to pandemics	Health Agencies	Transport Ministries	City Transport Authorities	Infrastructure Agencies	Public Transport Operators	Freight Operators	Warehousing and Logistics	Toll Road Operators	Border Crossing Agencies	Other transport service providers (e.g. bus / train station / rest area operators)	Driver and Vehicle Licensing Agencies
Universal Access											
Urban Planning		●	●	●	●	●		●			
Rural Planning		●	●	●	●	●		●			
Integrated multi-modal transport planning		●	●	●	●	●		●			

APPENDIX 1: RESOURCES

The following are key resources that have been referred to from this Guide which give key operational and long-term measures for consideration in future transport plans for pandemics.

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[20] World Bank, “Pandemic Emergency Financing Facility,” 2020. [Online]. Available: https://www.worldbank.org/en/topic/pandemics/brief/fact-sheet-pandemic-emergency-financing-facility. [Accessed January 2021].

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