



FINAL REPORT: Evaluating the Economic Impact and Infection Control Measures of COVID-19 in the Public Transport Sector in Nepal

COVID-19 Response & Recovery Transport Research Fund

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Author(s)	Dr. Jagadish C. Pokharel, Kishore Thapa, Dr. Sagar Prasai, Dr. Prastuti Sharma, Dr. Ajay C. Lal, Ranjan Bhatta, Richa Dhungana, Ankit Karna
Lead contact	Dr. Jagadish C. Pokharel
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Abstract	
This study assesses the economic impact of infection control measures, including lockdowns, adopted after the outbreak of the pandemic and evaluates relative risks of exposure across five vehicle types in Nepal's transportation sector. We evaluate the risks in reference to advisories and recommendations issued by national and international public health regulatory agencies. We provide a list of recommendations intended for vehicle operators and regulatory agencies in Nepal that are intended to foster a speedy financial recovery of the sector and enhanced safety in the use of public vehicles. We believe that our findings and recommendations will be applicable in other LICs where the vehicle mix is similar.	
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ACRONYMS

CBS	Central Bureau of Statistics
COVID-19	Coronavirus Disease
DoTM	Department of Transport and Management
FNTE	The Federation of Nepali National Transport Entrepreneurs
FCDO	Foreign, Commonwealth & Development Office
FY	Fiscal Year
HVT	High Volume Transport Applied Research Programme
ILO	International Labour Organisation
IMC	IMC Worldwide Ltd
IMF	International Monetary Fund
INGO	International Non-Governmental Organisation
KII	Key Informant Interview
LIC	Low-income country
MBT	Motorbike Taxi
MOPIT	Ministry of Physical Infrastructure and Transport
NGO	Non-Governmental Organisation
NPC	National Planning Commission
PCR	Polymerase Chain Reaction



PPE	Personal Protective Equipment
SARS-COV-2	Severe Acute Respiratory Syndrome Coronavirus 2
UNDP	The United Nations Development Programme
WHO	World Health Organisation



EXECUTIVE SUMMARY

In response to surging Covid-19 infections, Nepal went into a complete lockdown from 24th March to 20th July 2020. Public transportation resumed service from 23rd July 2020, with limited guidelines issued by the Department of Transport Management (DoTM). But the service was halted for a second time from 20th August to 9th September 2020. From 10th September, only half the vehicles could operate as the government issued an odd-even rule, which allowed odd number plates to ply on odd dates and even number plates to ply on even dates. Due to the two lockdowns and the odd-even rule that followed, the sector has suffered huge financial losses. Companies and owner-operators are pressured by revenue losses, loan repayments, and underutilised assets; drivers and operators have lost jobs; and the entire sector continues to suffer from a prolonged drop in commuter demand.

There are significant concerns from an epidemiological angle as well. Bus, mini-bus, micro-bus, tempo (three-wheelers), taxi, and motorcycle taxis are the dominant vehicle types in Nepal. Each vehicle has different boarding and unboarding systems, seat arrangements, ventilation and air-circulation systems, and length of routes. All of these factors make each vehicle represent different levels of epidemiological risks, but neither the government nor the public is aware of relative risk exposure in choosing different types of vehicles available in the mix. This study fills that crucial gap.

Data and Methodology

A set of primary data was collected through a survey, supplemented by key informant interviews (KIIs) with sectoral experts, epidemiologists, government agencies, public vehicle associations, and private sector vehicle operators. The survey of vehicle-owners and operators' generated data on the financial health of public transportation companies, impact on the livelihoods of the workers, types of assistance programs desired by the operators, the scale of the economic assistance required, financial coping strategies of the operators during the lockdown and other relevant information on the impact of the lockdowns. The survey of passengers generated data on passenger's choice of transport mode and frequency of travel before and after COVID-19, journey time, safety measures in the vehicle, and passenger behaviour in relation to the recommended precautionary measures.

Secondary data was drawn from the Central Bureau of Statistics (CBS), financial institutions, and regulatory agencies including Ministry of Physical Infrastructures and Transport (MOPIT) and Department of Transport Management (DoTM) to determine the types and numbers of vehicles operating in the sector, economic output of the sector, total employment generated by the sector, total population served by the sector and other macro-level data to describe broad sectoral dynamics of public transportation system in Nepal.

Major Findings

Fleet size before and after lockdown

It is our current estimate that the effective fleet size of the public transport sector in Kathmandu is at around 55 percent of the pre-lockdown number. This indicates that the sector continues to suffer from underutilisation of assets even as it struggles to cope with the revenue losses of the lockdown period.

Estimating revenue losses in the sector

Our survey shows that only 37.5% of commuters currently prefer using public transport. The reduced commuter demand and fleet size has resulted in reduced revenue for the public transport operators. When calculated on a daily basis (counting only those vehicles that are plying) revenue loss amounts to little under 30% for buses, around 42% for taxis and micro-buses, and just over 36 percent for tempos. The only vehicle type that shows a trendline in the other direction is the motorbike taxi (MBT). MBTs are not regulated in Nepal but have gained in popularity rather rapidly.

Job losses in the public transport sector

The National Planning Commission in 2020 has estimated a total number of job losses of 1.56 million due to Covid-19 pandemic. In the transportation sector 315,000 people may have lost their job. Similarly, there has been a significant drop in vehicle registration which is likely to reduce the job in this sector. Our study suggest that the sector may have shrunk in value by approximately 30 percent at this point of time. The financial



upheaval that individual companies have gone through will leave some of the entrepreneurs in the sector bankrupt and unable to utilise their assets. This may drag the sector's recovery further.

Public transport entrepreneur's demands on the government

The Federation of Nepali National Transport Entrepreneurs (FNANTE) has put forth a list of demands with the government to revive the sector. The FNANTE wants the government to bear the costs of all infection control measures that they are mandated to adopt, subsidise health insurance coverage, refinance loans at a subsidised rate, defer registration fees, defer monthly loan servicing payments, and waive route permit fees.

Government response to the transport sector demands

For its part, the government has recognised the sector as one of the "most affected sectors" in its budget speech of FY 2020/21. In terms of addressing the demands of the entrepreneurs, no special treatment has been accorded to the sector. The entrepreneurs in this sector are eligible to apply for national low-interest refinancing facility through their respective banks. The government has also deferred registration fees and local taxes by a period of four months.

Evaluating relative risks across vehicle types

Awareness Levels

The survey shows that only 25% of the bus and micro-bus operators and 15.69% of the tempo operators are aware of government guidelines. On the other hand, 100% of the taxi and motorbike taxi operators reported that they were aware of the guidelines. Buses, micro-buses, and tempos are normally operated by larger companies; taxis and motor-cycle taxis tend to be operated by owner-operators.

Disinfection Procedure

The survey showed that most of vehicles (69.2% of buses, 83.3% micro buses, 42.86% of tempos, 64.71% taxis) are sanitised with disinfectants, whereas 100 % of MBTs operators sanitise with soap water. This shows that disinfection of vehicles has not been followed as per the Government guidelines, which requires disinfecting seats and touched surfaces after each trip and prior to the dispatch from the parked garages.

Boarding and un-boarding practice

From field observations, it was found that passengers attempt to maintain a certain distance at stops, though standing in an orderly queue is not practised. But as the vehicle approaches, there is a crowding to board the vehicles. This phenomenon is observed in vehicles with fixed routes (Bus, Micro Bus and Taxi). Use of masks was found to be followed extensively by the passengers as well as vehicle staff. It was mandatory for the passengers to wear a mask whereas 100% micro bus, tempo, taxi and motorbike taxi require their passengers to wear masks. Hand sanitisation and temperature checks prior to boarding was, however, not as common.

Seating Arrangements

Seating arrangements are different across five vehicle types. Initially, the guidelines developed by DoTM required keeping alternate seats empty to maintain distance between the adjacent passengers. Compliance on this guideline should have been higher than what it is as there was no extra cost incurred in complying with this norm and the operators were allowed to charge double the fare from passengers while the restrictions were in place.

Ventilation

Various studies carried out in different parts of the world suggest that the risk of transmission is higher in closed, confined places with poor ventilation. The survey revealed that 94.2% of the bus operators and taxi operators who have attempted to increase internal ventilation did so by keeping the windows open all times. In micro-buses and tempos, 100% reported that they keep their ventilation open all times as an attempt to minimise the risk of virus transmission.



Evaluating relative risks across vehicle types

Based on our survey findings, KIIs, and field observations, we have developed a matrix of relative exposure risks across the five different vehicle types. Each vehicle is compared along four factors: seating, ventilation, sanitisation, and boarding and unboarding practices. We have rated each factor as high risk, medium risk or low risk. It has been found that motorbike taxis (MBTs) are the safest, followed by taxi cabs, and followed by tempos, bus, and microbus.

Policy recommendations

NIURS has assessed and illustrated the economic impact of COVID-19 infection control measures on the public transport sector in Kathmandu Valley. Reflecting on the findings, this study makes the following recommendations to the government and public transport operators.

Recommendations to the regulators:

1. **Provide incentives to the public transport sector.** The report demonstrates that, depending on the vehicle type, about 15-55% percent of the vehicles are currently under-utilised in the sector. Small incentives such as deferring fees and taxes by additional six months or opening new routes or reducing taxes on diesel for a short period of time can potentially incentivise companies.
2. **Create funds for operationalizing the policies and guidelines.** Costs of complying with the government-issued guidelines is a major factor for non-compliance. If the government institutes a system of reimbursing this cost back to the operators, the compliance on mandated practices such as sanitisation will readily increase.
3. **Create monitoring mechanisms to enforce guidelines and directives.** The current enforcement mechanism on infection control measures is grossly inadequate for a city of 3.5 million people. If the enforcement becomes stronger, public confidence on the safety measures will grow and commuter demand will grow. This will help revive the sector faster.
4. **Promote the type of vehicles that the public is willing to use.** Motorbike taxis (MBTs) are growing in popularity with demand almost doubling in the pandemic. This segment of the market has not been regulated or promoted by the government in any way. The government may not be able to accord a “preferential” treatment to a particular vehicle type but temporary measures to promote the use of MBT will reduce infection rates.
5. **Create reliable database of public transport.** It is quite extraordinary that we had to resort to extrapolative calculations and use various assumptions to arrive at a number that best estimated the current fleet size of the five types of public vehicles operating in Kathmandu. This kind of data should be ordinarily available with the regulators. We strongly recommend that the government increases the data and research budget starting from the coming fiscal year and sustains the investments over time.

Recommendations to the public transport operators:

1. **Vehicle operators, not the government, form the perception of public safety.** The vehicle operators have to do their part in instilling public confidence in the safety measures employed in the vehicles. The fastest way of reviving fallen commuter demand is by increasing public confidence in the public transport sector.
2. **Scale-up innovations when they are identified.** Both vehicle operators and passengers have individual initiatives to enhance their safety such as tempos using plexiglass dividers between the driver’s seat and the passenger cabin. Even when such measures are not epidemiologically proven to work, the optics matter. Such steps go a long way in building passenger and operator confidence in the system.
3. **Prepare for markets that are opening up.** The current slump in commuter demand is partially a function of some sectors of the economy not opening up. As the government prepares to open up additional activities, the transport entrepreneurs should prepare to deploy additional vehicles. If the supply-demand equation fails, overcrowding will follow, which will in turn erode public confidence in the transport system.



1. Background

The COVID-19 pandemic led to extended lockdowns in many Low-Income Countries (LICs). As with other businesses, the lockdowns have had a crippling effect on the public transportation sector. Across LICs, the public transport sector has been struggling with the financial impact of the lockdown as well as safe re-opening of the services. In most LICs, there are a mix of private and public sector operators segmented by routes and vehicle types. Nepal's situation is somewhat unique. The entire public transportation sector in Nepal is privately financed and operated. The government regulates the sector but provides no subsidies. This makes a return to financial viability of individual transport operators a crucial precondition to the post-pandemic revival of the sector.

Nepal went into a complete lockdown from 24th March 2020 to 20th July 2020. Public transportation resumed service from 23rd July 2020 with very limited guidelines issued by the Department of Transport Management (DoTM). But the service was halted for the second time when prohibitory orders were issued in the Kathmandu Valley from 20th August to 9th September 2020. From 10th September, only half the vehicles could operate as the government issued an odd-even rule, which allowed odd number plates to ply on odd dates and even number plates to ply on even dates. That lasted for 98 days or until 18th December 2020. Currently, the odd-even rule has been lifted but commuter demand on most routes has not climbed back to pre-pandemic levels.

Due to the two lockdowns and the odd-even rule that followed, the sector has suffered huge financial losses. Companies and owner-operators are pressured by revenue losses, loan repayments, and underutilised assets; drivers and operators have lost jobs; and the entire sector continues to suffer from a prolonged drop in commuter demand. There are significant concerns from an epidemiological perspective as well. Bus, mini-bus, micro-bus, tempo, taxi and motorcycle taxis are the dominant vehicle types in Nepal. The passenger carrying capacity of buses ranges from 26 to 55 depending on its size while the capacity of micro bus, tempo, taxi and motorcycle taxi are 13, 11, four and one respectively. Each vehicle has different boarding and unboarding systems, seat arrangements, ventilation and air-circulation systems, and length of routes. All of these factors make each vehicle represent different levels of epidemiological risks, but neither the government nor the public is aware of the relative risk exposure in choosing different types of vehicles available in the mix. This study fills that crucial gap.



2. Methodology

2.1 Data collection

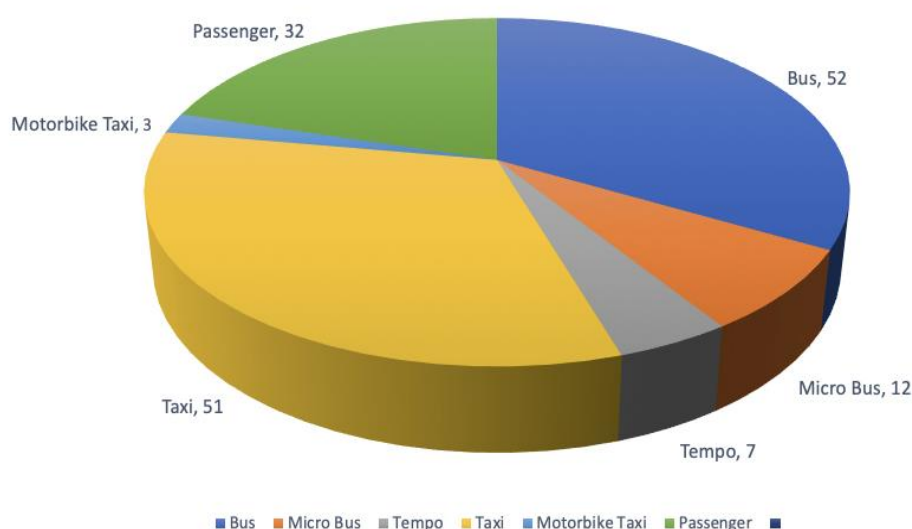
A set of primary data was collected through a survey of 157 respondents, supplemented by key informant interviews (KIIs) with sectoral experts, epidemiologists, government agencies, public vehicle associations, and private sector vehicle operators. A total of 125 vehicle-owners and operators were surveyed while the number of passengers surveyed was 32. The number of sample vehicles selected was based on the passenger carrying capacity and the total number of registered vehicles plying in Kathmandu valley. The sample is stratified across intra- and inter-city routes, peak and off-peak hour traffic, and vehicle types. The survey was carried out only in bus stations so that the respondent has enough time to answer the survey questions. In addition, gender representation was also assured as far as possible.

Figure 1: Survey of taxi driver in Lalitpur, Nepal



The survey of vehicle-owners and operators' generated data on financial health of public transportation companies, impact on the livelihoods of the workers, types of assistance programs desired by the operators, scale of the economic assistance required, financial coping strategies of the operators during the lockdown and other relevant information on the impact of the lockdowns. The survey of passengers generated data on passenger's choice of transport mode and frequency of travel before and after COVID-19, journey time, safety measures in the vehicle, and passenger behaviour in relation to the recommended precautionary measures. The questionnaire of the primary survey is presented in Annex A.

Figure 2: Sample size and distribution





2.2 Secondary data

Secondary data was drawn from the Central Bureau of Statistics (CBS), financial institutions, and regulatory agencies including Ministry of Physical Infrastructures and Transport (MOPIT) and Department of Transport Management (DoTM) to determine the types and numbers of vehicles operating in the sector, economic output of the sector, total employment generated by the sector, total population served by the sector and other macro-level data to describe broad sectoral dynamics of public transportation system in Nepal. In addition, we reviewed documents, reports, research articles and guidelines issued by national and international public health regulators on the nature of the virus, its modes of transmission, international practices in attempt to safe re-opening of public transportation and the effectiveness of such measures.

2.3 Key informant interview

A set of Key Informant Interviews (KII)s were carried out with vehicle entrepreneurs, transport associations representatives, epidemiologists, experts and government. Since COVID-19 is still a new disease and, as in other LICs, reliable data and documentation in Nepal is difficult to obtain, the KII were extremely helpful in obtaining on-going assessment of the spread and impact of the pandemic. The list of the interviewed individuals/agencies is presented in Annex B.

2.4 Field observation

To observe actual practices of vehicle operation, passenger handling, behaviours and attitudes, field observations were carried out by the research team during different time periods (peak office hours and off-peak hours). Photographic documentation of boarding-unboarding, physical distancing, uses of masks and sanitisers, ventilation and other related practices were collected.

2.5 Review of exposure science and recommended practices in infection control

According to the World Health Organisation (WHO), coronavirus (n-Cov-SARS-2) that causes COVID-19 is transmitted primarily when a person comes in direct/indirect or close contact with an infected person. The transmission commonly occurs through respiratory droplets deposited on surfaces ejected when an infected person coughs or sneezes. (1) A study shows that under controlled laboratory environments of relative humidity of 40-65% and temperature of 21-23 degree Celsius, the virus can stay for four hours in copper, 24 hours in cardboard surfaces and two to three days in plastics and stainless-steel surfaces. (2) It has also been found that the non-porous surfaces like doorknobs, desktops and vehicle seats are more likely to hold viruses for longer time than porous surfaces such as paper money or human hair. (3) WHO recommends avoiding the 3C's to minimise the risk of coronavirus transmission. The 3C's include:

- Crowded Places (with many people nearby);
- Close-contact Settings (especially where people have close-range conversations);
- Confined and enclosed spaces (with poor ventilation).

Public vehicles are enclosed areas where larger masses of people transit at a time and often have limited ventilation and multiple touched-surfaces like handrails, doors and seats. It is also likely that asymptomatic patients travel in public vehicles for longer hours in close contact with non-infected persons. An early study in Ningbo showed that 4.11% of the 2,147 closed contacts during follow-up were found to have caught the infection from asymptomatic patients. (4) The combination of 3C's, nature of the surfaces and chances of asymptomatic patients travelling in public vehicles altogether make the public transportation sector a relatively 'High Risk Zone' of transmission, at least theoretically. A study based on thousands of Chinese high-speed train travellers suggested that a person sitting next to an infected person has 0 to 10% chances of being infected depending upon the length of travel and closeness of contact. (5) However, it has been found out that public transportation does not contribute to transmission of the viruses as high as it had been expected previously. A study in France which included 150 infection clusters could not trace even a single transmission cluster related to transport. (6) Similarly, the city of Manhattan with one of the highly dense subways also had the lowest cases of COVID-19. (6) A virologist and public health expert at Tohoku University, Hitoshi Oshitani said that research has not shown even a single cluster of transmission from public transport. (7) But still, public transport contains



multiple touched surfaces and a large mass of people because of which the risk is always there. WHO has published certain guidelines to be followed during use of public transportation to minimise the risk. It can be said that it is not the public transportation that increases the chances of transmission rather the discipline followed during the travel that is responsible for the COVID-19 transmission in public transport. Some of the measures adapted to minimise the risk in public vehicles can be listed as:

- Maintaining physical distance by keeping alternate seats empty or seating with back face if keeping alternate seats empty is not possible;
- Regular disinfection of touched-surfaces such as handrails, seats, doors;
- Keeping windows open for air circulation or installation of exhaust fans;

A research in Japan conducted using high definition cameras and laser lighting showed that the micro-droplets from infected people can stay in air for 20 minutes in enclosed spaces. The same study showed that the virus was quickly swept when a window was opened and that the wearing of masks greatly reduced the spread of micro-droplets. (8)

- Use of quality masks by vehicle operators as well as passengers;
- Use of alcohol-based sanitisers (60% alcohol as suggested by World Health Organisation) prior operation for operators and prior boarding for passengers;
- Limiting the travel time.

Several countries have adopted different measures as an attempt to minimise the exposure risk in public vehicles and to ensure passengers their health safety.

- The measures such as cleaning and disinfecting buses, ventilating the air, measuring the temperatures of staff members and ensuring staff working with face masks have been adopted by Beijing Public Transport Corporation to minimise the spread of coronavirus in public vehicles. (9)
- Moscow city of Russia introduced Early Bird Ticketing Program (which was conceived prior outbreak of COVID-19 but recently announced officially) to decrease the crowding inside vehicles during office hours. (10)

Review of government policies and guidelines

After the lockdown was lifted, Government of Nepal issued Public Transport Operation Guidelines 2020. As we show in the report, the compliance on these recommended measures have been uniformly low in Nepal. Some of the provisions required added cost to operators and some operators have been reluctant to comply with the guidelines because commensurate increases in passenger fares were not allowed by the Government. The most important factor perhaps is the change of behaviours and attitudes of operators and passengers, but the Government so far has not taken adequate measures in fostering behaviour change or enforcing compliance to the guidelines. The main highlights of the guidelines are as follows:

a) For transport owners

- Increase level of awareness among vehicle staff as well as passengers;
- Disinfect the vehicle after each trip;
- Maintain proper social distancing when passengers are seated and display such information in visible spaces of the vehicle;
- Conduct temperature check of the vehicle staff by provisioning at least two thermal guns per vehicle;
- Make available sanitisers to passenger prior to boarding the vehicle;
- Use digital payment systems as far as possible;
- Keep open all ventilators or install exhaust fans as needed;
- Separate of passenger and driver seats with the help of ply boards, glass or fibre-board or thick plastic sheets;
- Keep a trash bin with lids in each vehicle and clean after every trip by the vehicle staff; and
- Keep information signs and notices pasted on the walls of vehicles.



b) For vehicle staff

- Vehicles can stop in designated stations only;
- Vehicle drivers and staff should mandatorily use masks, gloves and visors;
- Passengers should be encouraged to follow social distancing;
- Clothes and safety gears worn should be washed properly with soap water and dried in sunny space;
- Fares to be collected in a box or passengers should be encouraged pay in precise change;
- Vehicles to be disinfected after parking in the garage prior to the next use;
- No smoking in the garage area;
- ID card to be mandatorily used by the vehicle staff as well as drivers; and
- Avoid use of air conditioning even if it has been installed in the vehicle.

c) For passengers

- Remain aware of the safety protocols to be followed during the use of public vehicles;
- Use public transport only when unavoidable;
- People with illness or low immunity should avoid the use of public transport as far as possible;
- Use masks prior boarding to the vehicles;
- Avoid eating in the bus stops or garages; and
- Follow health protocols inside vehicles when seated and encourage other passengers to do the same.



3. Economic impact of COVID-19 in public transport sector

This chapter assesses financial losses incurred by the public transport sector in Nepal due to COVID-19 pandemic and ensuing infection control measures adopted by the Government of Nepal.

3.1 Background

The size of Nepal’s economy in 2019 was USD 30.6 Billion. When the country went into a lockdown in March 2020, all economic activities barring those associated with essential services came to a grinding halt. Trade, tourism, transportation, aviation, manufacturing, and construction sectors were particularly hit hard. While estimates vary, the lockdown may have initially caused 4 million job losses in a country of 29 million, although the number continues to come down following the easing of the lockdown. The International Monetary Fund (IMF) estimates that Nepal’s economic growth rate will be 1.2% in 2020 (down from 5.7% in 2019).

It is estimated that total investment in the public transportation sector in Nepal is approximately USD 830 million, of which 80 percent is financed through commercial banks. A sudden and complete immobilisation of the asset has created significant job losses and mounting debt servicing burden on the transport operators. An estimated 211 thousand people have lost their jobs and as per our calculation daily revenue loss in the public transport sector is \$1,142,240.

The lockdown was first introduced on March 24, 2020. It was partially lifted on July 21. It was re-imposed in August and continued till September 9, 2020. All together the lockdown in Kathmandu (the location of this study) lasted for 175 days. During this period, all vehicles were totally grounded. Some parts of Nepal underwent lockdown for 120 days only and started to operate their business using safety measures suggested by the government. During this period, the government took various decisions to control the spread of infections which directly affected the public transport sector. Table 1 below provides a brief chronology of important decisions taken by the Government of Nepal.

Table 1: Government decisions related to public vehicle in Nepal

Date	Government of Nepal Decisions and Impact
24 th March 2020	Vehicular movement on long and short routes were closed (11)
9 th July 2020	Resumption of short-route public transportation within Kathmandu Valley. For Taxis, only two persons and the driver were allowed. Buses and Micro Buses could operate with 50% capacity and fares could be charged 50% higher than normal. (12)
10 th July 2020	The Federation of Nepali National Transport Entrepreneurs put forth various preconditions (economic assistance programs) for the resumption of public transportation citing extensive financial losses. (13) The government does not respond immediately.
16 th July 2020	Limited number of companies resume services despite lack of response from the government. (14)
21 st July 2020	All companies prepare to resume public transportation from 23rd July after a meeting with the government. (15)
17 th August 2020	Plan to resume long-distance routes from 17th August across the country is withdrawn due to rise in infection rates. (16)
20 th August 2020	Lockdown is reimposed in Kathmandu Valley till 26th August (17)



Date	Government of Nepal Decisions and Impact
9 th September 2020	Authorities end the lockdown in Kathmandu Valley. (18)
10 th September 2020	The odd-even rule for the vehicles for both private and public took effect in the Kathmandu Valley. (19)
14 th September 2020	The government decides to resume domestic flights and long-haul public transportation from 21st September. (20)
13 th October 2020	Public vehicles are allowed to carry passengers at full capacity but only 25% vehicles could actually operate because of decreased commuter demand and/or financial problems in public transport companies. (21)
19 th October 2020	The authorities restore regular fare rates for public transportation after a meeting with operators held on 12th October. (22)
18 th December 2020	The odd-even rule is withdrawn. (23)

3.2 Estimating the scale of economic impact on the public transportation sector

As mentioned at the outset, Nepal’s public transportation sector is perhaps unique in the sense that the entire sector has no government investment. All public vehicles are either privately owned or owned by cooperatives and there are hundreds of such companies operating in any large city. These companies are registered in different administrative jurisdictions, sometimes within the same city. Kathmandu Valley, which has now become a large contiguous urban sprawl is made up of five separate municipal jurisdictions, criss-crossed by 110 public transport routes. The number of vehicles that ply on each of the routes is determined by passenger demand. These factors make it very difficult to precisely count how many public vehicles are on the road in Kathmandu on any given day. We have therefore relied on estimates cited in different reports and used reasonable extrapolations, where necessary, to calculate the total size of the fleet.

To assess the net impact of the lockdown, we have used survey data and KIIs, and compared the situation before the lockdown and after the lockdown. In the sections below, we present the comparisons on three accounts: effective fleet size before and after the lockdown, daily revenue before and after the lockdown, and number of jobs generated before and after the lockdown (job losses). Together, these variables give us a good estimate of the scale of the impact on the transportation sector in Kathmandu.

Effective fleet size before lockdown

The DoTM maintains data on all registered vehicles in the country. While the registration is marked by administrative jurisdictions, we cannot be fully certain that the vehicles operate where they were registered. We have, therefore, assumed at least 10% of the vehicles operate outside of the registered jurisdiction, in this case, Kathmandu. We have further assumed that at least 20% of the vehicle must be garaged at any given time, for repairs, because of demand fluctuations, or for administrative reasons. Assuming 70% of the registered vehicles actually operate on the streets and based on earlier estimates from different sources including newspaper reports we have used the following as the baseline totals across vehicle types: 5664 buses, 11000 taxis, 749 minibuses, 700 tempo and 3500 motorbikes. The number of Motor Bike Taxi (MBT) has grown in a very short time, which makes it difficult to settle on a number of MBTs. We have used data from two app-based operators to come up with the baseline number.



Table 2: Number and Vehicle Types

Vehicle Type	Number of vehicles
Bus	5,664
Taxi	11,000
Microbus	749
Tempo	700 ¹
Motorbike Taxi	3,500

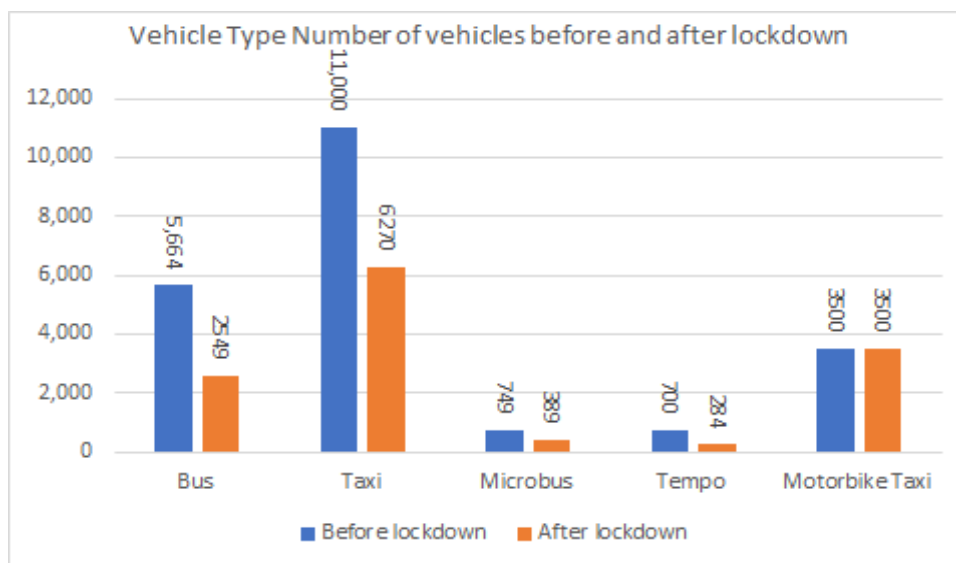
Sources: (24, 25)

Effective fleet size after lockdown

As shown in Table 1 the lockdown was eased in an incremental manner. Initially, vehicular traffic was opened using an odd-even rule (odd plates ply on odd dates, even plates ply on even dates) at 50% occupancy. Then the 50% rule was withdrawn. Finally, the odd-even rule was withdrawn. Our survey is from the period when the odd-even rule was in place and so was the 50% occupancy rule. Each rule has had an impact on the effective fleet size. Our estimates, in that sense, portray the picture of a particular time period in the process of reopening the sector. Our survey shows that there is 55% decrease in the operation of buses, 48.78% decrease in operation of micro buses, 59.46% in Tempos. Less than 50% of the taxis are currently operating in Kathmandu. Interestingly the share of Motorbike Taxis in the effective fleet has sharply increased during this period. Passengers feel safer in MBTs than in multi-seater vehicles because of the open, ventilated ride and better protections used by the driver (MBT drivers use full-suit PPEs). There are indeed limitations to the MBTs including the discomfort they pose in rains and colder days but positive safety perception and their accessibility to inner parts of the city makes them a preferred mode of transport during a pandemic.

The government imposed a 50% occupancy rule with an intention to control infection. As the government did not provide any compensation to the operators to make up for this loss, the operators responded by grounding the vehicles or by defying it. Under pressure from the operators, the Government allowed service providers to increase fares by 50% of the pre-lockdown rate. Even this amendment failed to restore the effective fleet size.

Figure 3: Average number of vehicles plying on different routes before and after lockdown



¹ The number of tempos is obtained from telephonic conversation with president of Electric Vehicle Association of Nepal



It is our current estimate that the effective fleet size of the public transport sector in Kathmandu is at around 55 percent of the pre-lockdown number. This indicates that the sector continues to suffer from underutilisation of assets even as it struggles to cope with the revenue losses of the lockdown period.

Estimating revenue losses in the sector

Our survey shows that only 37.5% of commuters currently prefer using public transport. The reason, as most of them cite, is fear of infection. While no study in Kathmandu has yet conclusively established that using public transport vehicles is riskier than other activities such as eating in a restaurant or sharing an office room with other colleagues, the perception that public vehicles are risky persists. When asked whether their position has changed with the introduction of safety measures such as the use of sanitisers, masks, and social distancing in public transport 15.6% of the commuters responded “no”.

The reduced commuter demand and fleet size has resulted in reduced revenue for public transport operators. A bus with 26-56 seating capacity used to have a turnover of \$1254/ month; that has currently come down to \$ 376/month. This is largely because each bus not only gets a lower number of passengers when it is operating, it also spends more time in the garage than on the streets. When calculated on a daily basis (counting only those vehicles that are plying) the revenue loss amounts to little under 30% for buses, around 42% for taxis and micro-buses, and just over 36 percent for tempos (See Table 3 below).

Table 3: Comparing changes in income of different vehicle type before and after the lockdown

Average daily Income before and after lockdown			
	Before lockdown	After lockdown	% Change
Bus	\$ 30	\$ 21	29.97%
Taxi	\$ 24	\$ 14	42.12%
Micro bus	\$ 33	\$ 19	42.11%
Tempo	\$ 19	\$ 12	36.36%
MBTs²	\$ 0.90	\$ 0.90	-

The only vehicle type that shows a trendline in the other direction is the motorbike taxi (MBT). MBTs are not regulated in Nepal but have gained in popularity rather rapidly. The fact that MBTs are unregulated and are growing rapidly both make it difficult to obtain accurate and reliable data. Two app-based companies--Pathao and Tootle--have currently captured over 95 percent of the market. After the onset of the pandemic, their growth has become exponential. Based on news sources (see table 4 below), the companies have claimed doubling of the number of rides in the month of December compared to pre-pandemic months. The tables below show the daily revenue estimates for MBTs.

Table 4: Changes in income of vehicle type (MBTs) before and after the lockdown

Vehicle Type: Pathao (MBT)	
Average amount per ride	\$0.90
No of rides daily	15,000
Average daily revenue	\$ 13,543

² For MBTs, the average amount per ride was taken from news articles and an interview given by Ashim Man Singh Basnyat, the regional director of the Pathao to online magazine.



After Lockdown:

Average amount per ride	\$ 0.90
Number of rides daily (After lockdown)	30,000
Average daily revenue	\$ 27,086

Sources: (26, 27, 28)

The growth in MBT revenues, however, cannot make up for the losses in other categories. An MBT trip carries one passenger whereas a 50-seater bus often carries 60-65 passengers including standing passengers. The two vehicles operate at different scales. The impact of the sector-wide slump in demand runs deep and currently monthly revenue losses in the sector may be hovering around 30-35 percent.

Job losses in the public transport sector

The National Planning Commission in 2020 has estimated a total number of job losses of 1.56 million (domestic 924000 and 640000 abroad) due to COVID 19. In the transportation sector 315000 people have lost their job (29). Similarly, there has been a significant drop in vehicle registration which is likely to reduce the job in this sector. The average vehicle registration over the past five year was 367092. This year's 8 months average is 223828, a nearly 63% drop due to COVID-19. Earlier reports have estimated higher numbers--three in five employees (29). If we assume initial job losses were as high as three in five employees (60%) that would translate into 211 thousand jobs lost in the transportation sector (30).

Table 5: Job-loss and average daily revenue losses due to COVID-19

Job loss (Due to COVID-19)	60%
Average revenue loss daily due to COVID-19	\$298,725

Average daily revenue losses due to COVID-19		
	Before Lockdown (in \$)	After Lockdown (in \$)
Bus	169920	118944
Taxi	264000	154000
Micro	24717	14231
Tempo	13300	8400
MBT	3150	3150
Total	475087	298725

Decreased by 37.12%

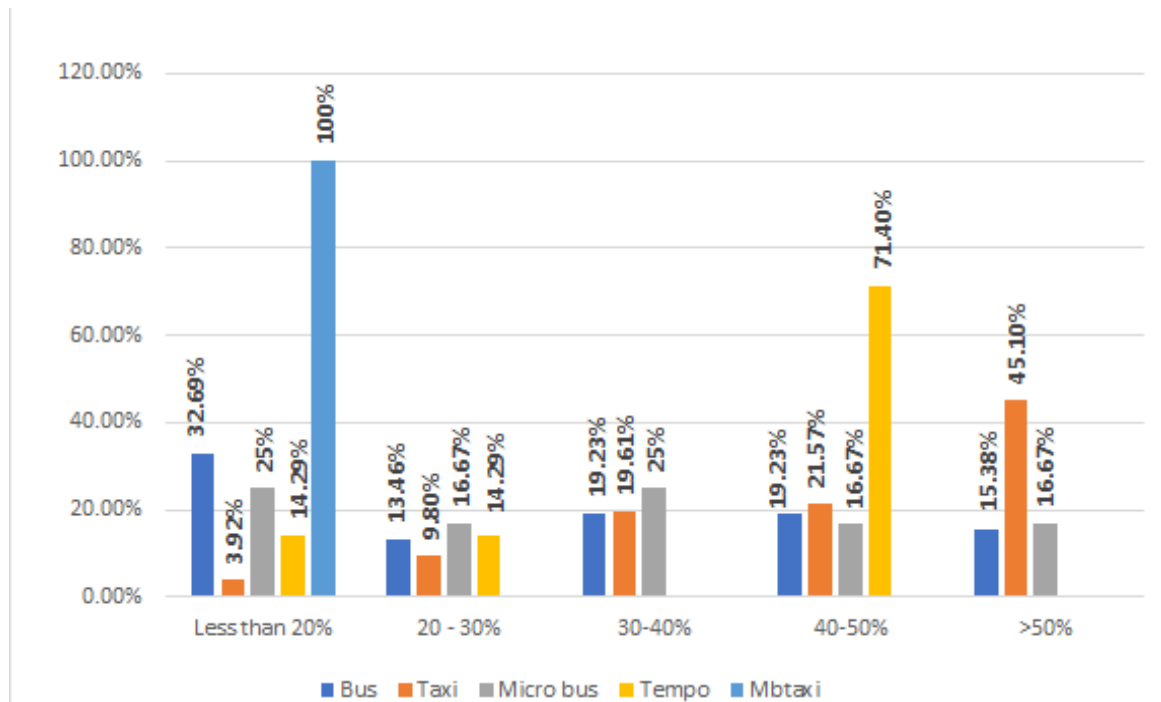
Our survey, however, suggests that the numbers may not be as high as 60%, at least at the time of conducting the survey or early November. When asked "in your estimate, what percentage of your colleagues have lost jobs since the start of the lockdown?" those opting to say "more than 50%" were 45 percent among taxi drivers and around 16 percent for bus and microbus drivers. This suggests that the actual figure might be lower and from our calculation around 25-30 percent might be a reasonable assumption.

The impact of this job loss in society will vary. As per ILO, which estimated over 7.08 million people employed in various occupations in Nepal, projected that nearly 2.0 million jobs would be disrupted due to COVID-19. According to the same study approximately 5.7 million or 80.8 percent of workers in Nepal have informal jobs and they are the most at-risk workers together with around 1.4 million home-based workers, mostly women. The same study estimated a total of 631,000 female jobs at risk in the higher impact scenario, compared to 1.3 million jobs for men. Based on the higher-impact scenario, the jobs disrupted included nearly 780,000 workers in wholesale and retail trade, 446,000 in manufacturing, 404,000 in construction, 211,000 in transport and



62,000 in accommodation and food service activities and 83,000 in other services, real estate and administrative activities (30).

Figure 4: Response on percentage of colleagues losing their jobs since the start of lockdown



While we are unable to put a currency figure on the impact of the pandemic on the public transportation sector in Nepal solely on the basis of our survey, we are able to suggest that the sector may have shrunk in value by 30-40 percent at this point of time. With the easing of the lockdown two months ago and gradual reopening of other sectors of the economy including aviation, domestic tourism, manufacturing, and construction the sector is gradually growing back. The financial upheaval that individual companies have gone through will leave some of the entrepreneurs in the sector bankrupt and unable to utilise their assets. This may drag the sector’s recovery on for longer.

Public transport entrepreneur’s demands on the government

The Federation of Nepali National Transport Entrepreneurs (FNNTE) has put forth a list of demands with the government to revive the sector. The FNNTTE wants the government to bear the cost of all infection control measures that they are mandated to adopt, subsidise health insurance coverage, refinance loans at a subsidised rate, defer registration fees and local taxes, defer monthly loan servicing payments, and waive route permit fees.

Government response to the transport sector demands

For its part, the government has recognised the sector as one of the “most affected sectors” in its budget speech of FY 2020/21. In terms of addressing the demands of the entrepreneurs, no special treatment has been accorded to the sector. The entrepreneurs in this sector are eligible to apply for national low-interest refinancing facilities through their respective banks, a total of USD 650 million has been allocated for this purpose. This is, however, not partial to the public transport sector, all firms operating in the country are eligible to apply.

For the transport sector in general (not just public transport), some special provisions have been extended. Late registration fines for vehicles, including private vehicles, have been deferred; interest payments on late Equalised Monthly Payments (EMIs) have been granted a grace period of four months; and a moratorium on foreclosures has been provided for four months. The World Bank has signed a \$450 million support in the road sector, which will generate long-term benefits to the sector and help generate employment in the short-term.



Some major sectors which are critical for the revival of the transport sector remain closed, the demand slump in the public transport sector will fully revive only when the entire economy opens up. These areas include educational institutions, training centres, commercial malls, cinema halls, entertainment-parks, large public gatherings, and religious places. As of writing this report, many of the restricted activities have been allowed to resume or are in the process of resuming normal operations.



4. Evaluating relative risk exposure in different vehicle types in Nepal's public transportation sector

This chapter evaluates relative risk exposure in different types of vehicles used in Nepal's public transportation system. We have examined five different types of vehicles: large buses (bus), micro-buses, three-wheelers ("Tempo"), taxi cabs, and motor-bike taxis (MBT). We compare each vehicle on four variables: sanitisation practices, seating, ventilation, and boarding and unboarding procedures. In addition, since personal awareness of infection control measures and individual behaviours also matter significantly in the spread of infection, we have surveyed the preferences, behaviours, and attitudes towards recommended practices such as wearing masks, maintaining social distances, and hand sanitisation. We present our findings below and recommend risk mitigation measures for each type of vehicle. We also provide policy recommendations to the government and vehicle operators in the culminating chapter.

4.1 Background

As is the case in most LICs, wage rates in Nepal are low. The current minimum wage in Nepal is fixed at USD 4.40 per day. This forces the public transportation sector to keep commuter costs as low as possible. One of the ways in which this is achieved is by using low quality vehicles. None of the public vehicles in Nepal, for instance, has air-conditioning. On the other hand, for the operators, the profit margin on a per passenger basis is very thin. This forces the operators to look for higher volumes of passengers on every trip. Full capacity in this context is not just filling all the available seats but filling the aisles with standing passengers as well. These conditions increase the risk of infection further. It is, therefore, important to evaluate exposure risks and recommend mitigation measures by vehicle types.

A second factor that becomes important in assessing the risk is the quality of enforcement of the guidelines issued by the government across vehicle types. Earlier in the paper (See Review of government policies and guidelines, Ch.2, Section 5), we had observed that the guidelines issued by the government are comprehensive, but the enforcement has been weak. As we discuss in the coming sections, this has been confirmed by survey as well. Once the enforcement is weak, we have to rely on the level of awareness that passengers and operators show and, consequently, the voluntary changes they bring to existing practices. We have accordingly measured these "behaviour change" elements in the survey as well.

In the coming sections, we discuss our survey results as they relate to awareness levels and practices like sanitisation, seating, ventilation, and boarding and unboarding procedures.

4.2 Survey Findings

Awareness Levels

The survey shows that only 25% of the bus and micro-bus operators and 15.69% of the tempo operators are aware of the government guidelines. On the other hand, 100% of the taxi and motorbike taxi operators reported that they were aware of the guidelines. Buses, micro-buses, and tempos are normally operated by larger companies; taxis and motor-cycle taxis tend to be operated by owner-operators. The gap in awareness levels between these two categories show that the enterprise level awareness does not percolate down to the staff on its own accord. It is perhaps important to put in place deliberate practices such as training and periodic coaching, particularly, in larger companies to ensure that all operators are aware of the safety measures and guidelines in public health emergencies of this kind.

The failure of the government in widely disseminating the guidelines and other public service announcements is also noticeable. According to Dr. Loknath Bhusal, Information Officer at DoTM, the budget allocated for orientation and training of public vehicle operators was significantly cut and reallocated to the health sector in FY 20-21 due to the pandemic. In fact, the department has not conducted even the normal training and orientation programs for this year because of the budget cuts. While the budget constraints at a time of emergency is fully understandable, the cuts in the preventive measures will probably prove counter-productive.



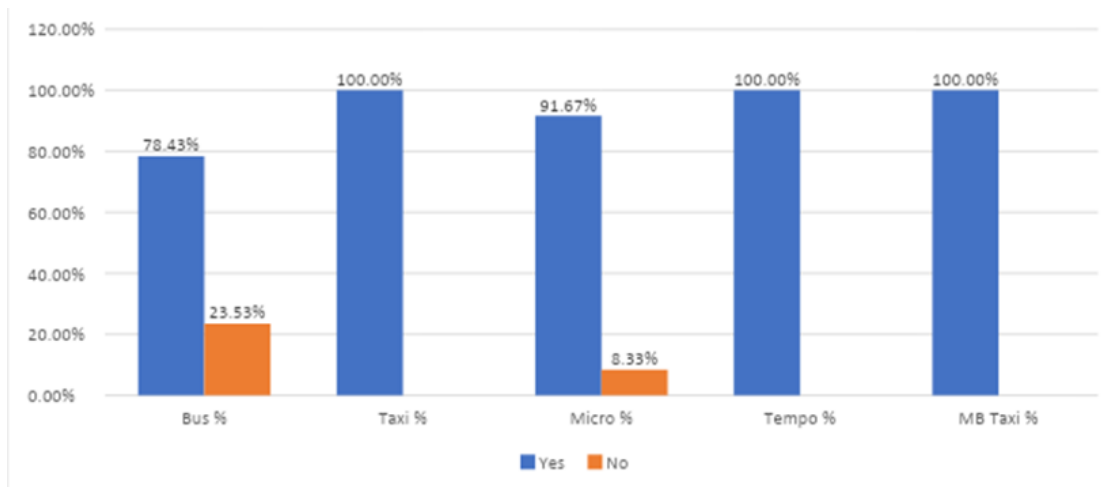
Figure 5: Precautionary advisory notice for passengers in buses



Disinfection Procedure

The survey found that 100% of the vehicles with small capacity (Tempo, Taxi and MBTs) sanitise their vehicles compared to vehicles with bigger capacity. That said, the figures for larger vehicles are not starkly different. About 9 in 10 microbuses and 8 in 10 larger buses sanitise their vehicles regularly.

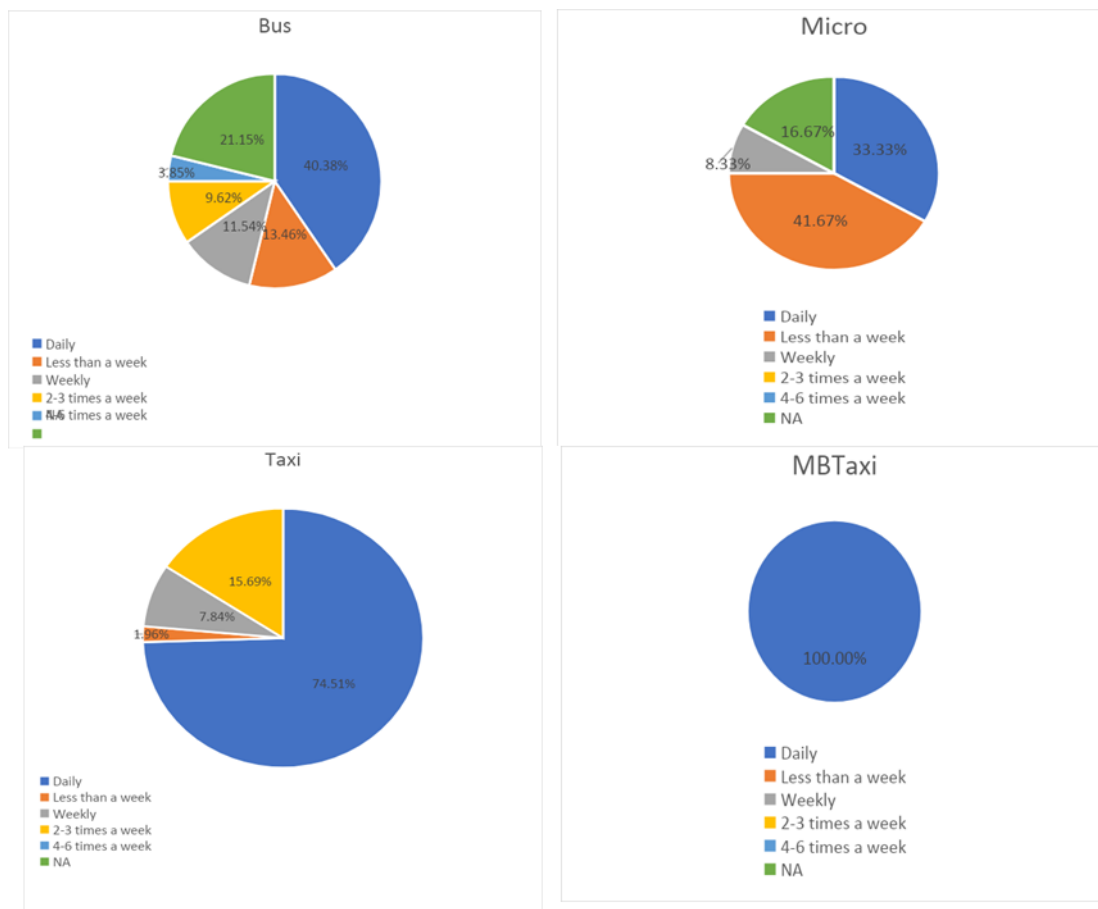
Figure 6: Sanitisation in different vehicle types



When asked about the frequency of sanitisation, the responses show a pattern similar to the one above - smaller vehicles are more frequently sanitised than the larger ones. For example, 100% of the MBTs and 85.71% and 74.51% of the taxis are sanitised daily; whereas, as only 33.3% of the micro bus operators and 40.4% of the buses sanitise their vehicles daily.



Figure 7: Disinfection frequency in different vehicle types



The survey showed that most of the vehicles (69.2% of buses, 83.3% micro buses, 42.86% of tempos, 64.71% taxis) are sanitised with disinfectant whereas 100 % of MBTs operators sanitise with soap water. It shows that the disinfection of vehicles has not been followed as per the Government guidelines, which requires disinfecting seats and touched surfaces after each trip and prior to the dispatch from the parked garages.

Most of the vehicle operators and staff reported sanitising their hands prior to the operation. Once on the driving seat, however, drivers find it difficult to find hand-washing facilities along the route. There is a shortage of water and public toilets for vehicle operators. They are forced to rely on tea shops or restaurants for responding to using the toilet and washing hands. Public hand washing stations put up by the local authorities are not convenient for drivers and helpers due to their locations. Provisioning temporary hand-washing stations at bus stops may be helpful here.

Boarding and unboarding practice

From the field observations, it was found that passengers attempt to maintain a certain distance at stops, though standing in an orderly queue is not practised. But as the vehicle approaches, there is a crowding to board the vehicles. This phenomenon is observed in vehicles with fixed routes (Bus, Micro Bus and Taxi). One of the possible reasons behind this is the poorly managed vehicle stops that are not sufficiently spacious for passengers to stand in a queue while maintaining a safe distance.

From the survey and observation, it was found that checking of temperature prior to boarding is practised only in 7.69% of the cases in buses whereas, 100% of the micro bus, tempo, taxi and motorbike taxi operators do not check the temperature of the passengers prior to boarding.

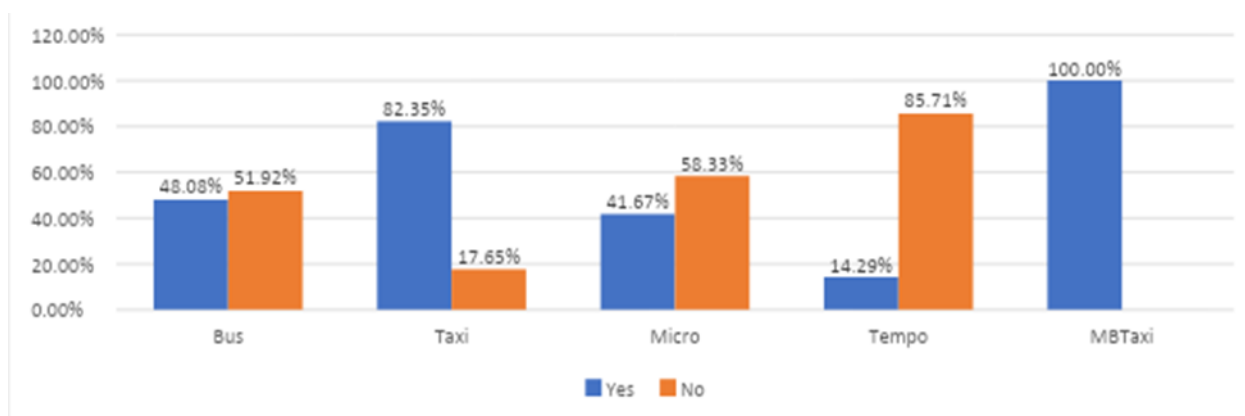


Figure 8: Passengers boarding a public bus



The hand sanitisation of passengers is also widely practiced in taxis and MBT driven by owners. The survey showed that 100% of the MBTs operators and 82.35% of the taxi operators ask their passengers to sanitise their hands before entering into the vehicles. This practice is followed in only 48.08% of buses, 41.67% of micro buses and 14.29% of the tempos.

Figure 9: Percentage of vehicle operators asking passengers sanitise their hands prior to boarding

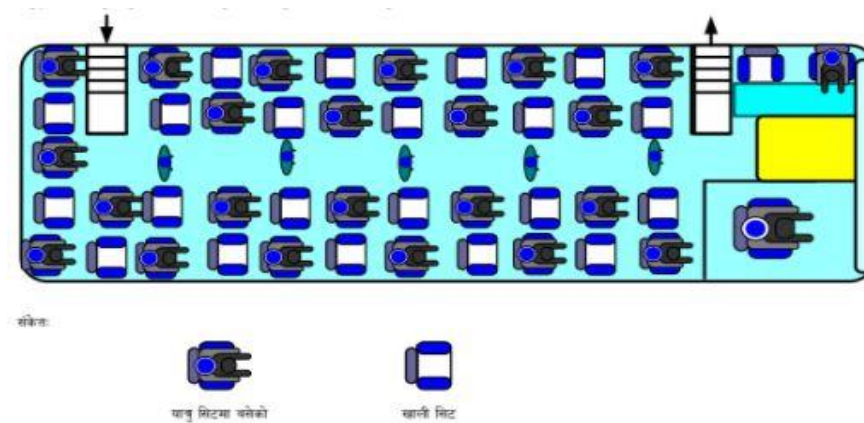


Use of masks was found to be followed extensively by the passengers as well as vehicle staff. This observation has been supported by both the survey as well as our field observation. In 88.6% of the buses, it was mandatory for the passengers to wear a mask whereas 100% micro bus, tempo, taxi and motorbike taxi require their passengers to wear masks. Hand sanitisation and temperature checks prior to boarding was, however, not as common. The operators tend to be confident that passengers are taking necessary precautions to avoid infection.

Seating Arrangements

The seating arrangements are different across five vehicle types. Initially, the guidelines developed by DoTM required keeping alternate seats empty to maintain distance between the adjacent passengers. An illustration of the recommended seating arrangement valid at the time of our survey is shown below. This arrangement, however, has now been withdrawn as the infection rates have come down.

Figure 10: Initial seating arrangement as suggested by DoTM guidelines



We found that 50% of the buses have changed their seating arrangements. Out of them 40.4% kept their alternate seats vacant, 3.8% had reduced their vehicle occupancy by a certain percentage, and others had improvised minor changes in the seating arrangements as per the passenger load. In micro buses, 50% have made some kinds of changes in the seating arrangement; of which, half kept the alternate seats vacant, while 25% reduced their occupancy. In tempos, 50% have made changes in their seating arrangements. For taxis, this figure is 52.9%. The compliance on this guideline should have been higher than what it is as there was no extra cost incurred in complying with this norm and the operators were allowed to charge double the fare from passengers while the restrictions were in place.

Ventilation

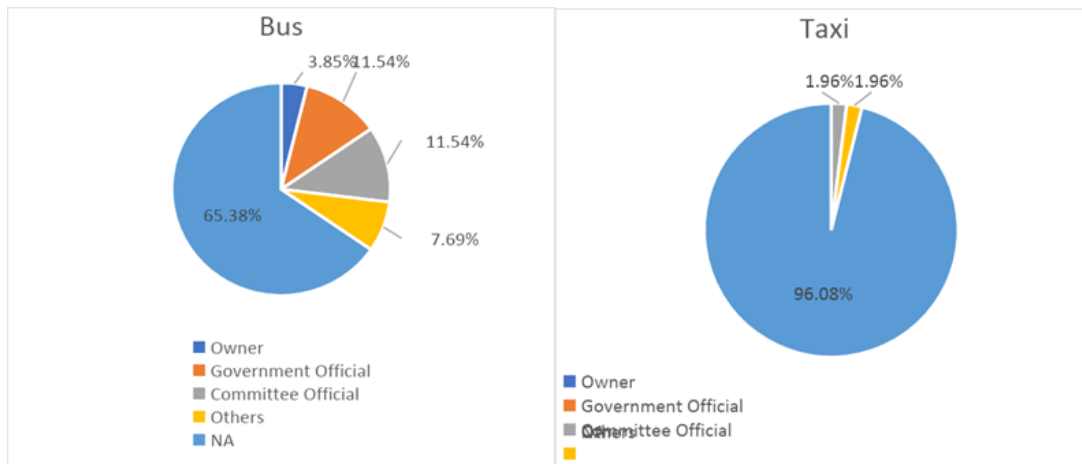
Various studies carried out in different parts of the world suggest that the risk of transmission is higher in closed, confined places with poor ventilation. The survey revealed that 94.2% of the bus operators and taxi operators who have attempted to increase internal ventilation did so by keeping the windows open all times. In micro-buses and tempos, 100% reported that they keep their ventilation open all times as an attempt to minimise the risk of virus transmission. But, from field observation it has been found that the windows remained mostly closed in mornings and evenings and only partially opened during daytime. This is perhaps because the passengers themselves close the windows when it is cold or when the vehicle travels on dusty roads. Dr. Sameer Mani Dixit, a public health expert we consulted, mentioned that it was fortunate that public vehicles do not have central heating/cooling systems otherwise there would be greater reluctance to keep the windows open.

Inspection by Authorities

As per the DOTM guidelines the compliance monitoring should be conducted by a team of officials from the DoTM, Local Office of Transport Management, and Traffic Police. We tested the enforcement arrangement in our survey. The survey revealed that only 11.54% of the buses, 8.3% of the micro-buses, 1.96% of the taxis, and 11.54% of the tempos were inspected by a government official. Interestingly, 100% of the MBTs reported that there was no monitoring or inspection by any government authority. When we approached the DOTM, the officials of DoTM reported that there are only six inspectors at their disposal. Considering the number of public vehicles plying in the roads of Kathmandu this number is grossly inadequate.



Figure 11: Inspection of sanitising by authorities other than operators



Perception of safety

Vehicle operators

The survey found that 78.85% of the bus operators did not feel safe operating their vehicles during the pandemic. Similarly, 91.67% of the micro-buses, 76.47% of the taxis, and 85.71% of the tempo operators did not feel safe operating their vehicles under current conditions. On an average less than 20% of the multi-seater passenger vehicles felt safe. On the contrary, 100% of the motorbike taxi operators felt safe. It shows that operators of motorbike taxis i.e. vehicles with proper cross ventilation feel safer compared to other vehicles. It also appears from the data that the perception of safety for vehicle operators is at least partially dependent on the level of ventilation inside the vehicle. To enhance their own safety, some vehicle operators have come up with innovative ways of separating themselves from the passengers with plastic films and restricting passengers in the cabin area.

Figure 12: Plastic barrier in tempo to separate cabin from the passenger compartment



Passengers

Only 9.4% of the total passengers surveyed felt safe to travel in public transportation. However, only 18.8% of the passengers had changed their mode of transportation for the fear of getting infected. Together with the findings above, neither passengers nor vehicle operators feel safe using public transportation. Just as vehicle operators have looked for additional protection by adaptive means, passengers too tend to find ways of greater protection for themselves. In our field observation, we noticed that the passengers chose to sit in a single-seat rather than a bench-seat and pick to sit on the window side whenever they have a choice. Perhaps for these reasons, the use of masks has been prominent among the passengers.



4.3 Evaluating relative risks across vehicle types

Based on our survey findings, KIIs, and field observations, we have developed a matrix of relative exposure risks across the five different vehicle types. Each vehicle is compared along four factors: seating, ventilation, sanitisation, and boarding and unboarding practices. We have rated each factor as high risk, medium risk or low risk. We have provided in Table 6 the factors we considered while rating the risk. We have also weighted the four factors in a scale of 0-10, the scale zero indicating no risk and 10 indicating the highest risk level. The weightage is given through a risk assessment workshop organized to assign weightage. The participants of the workshops were epidemiologist, medical professionals, experts, urban planners, private sector representatives and public vehicle passengers. From Table 6, we can confidently posit that motorbike taxis (MBTs) are the safest, followed by taxi cabs, and followed by tempos, bus, and microbus. Since this is not an epidemiological study, we cannot conclusively establish the order of risk. For instance, by cabin volume, ventilation being the same, a microbus can be riskier but only epidemiological research can establish the risk order at that level of precision.



Table 6: Comparing risk level with different vehicle type

Vehicle/ Practices	Seating	Ventilation	Sanitisation	Boarding and Unboarding
Bus (28.7)	High Risk (8.3) No physical distancing. Full occupancy. Standing is allowed.	Moderate Risk (6.1) As per primary survey, 92.3% agreed to have taken measures, but from field observation proper ventilation was not seen.	High Risk (7.3) Multiple touchable surfaces exist. Sanitisation after each trip is not possible.	High Risk (7.0) No thermal screening. No provision of sanitising in all vehicles. Same door is used for boarding and unboarding
Micro bus (31.7)	High Risk (9.3) Similar to bus.	High Risk (8.0) 100% of the respondents stated that they keep their windows open but mostly the vehicles' windows were closed during observation.	High Risk (7.0) Practice of sanitisation is high but frequency is low. Multiple touchable surfaces exist No sanitisation after each trip	High Risk (7.4) No thermal screening. The least provision of sanitising the passengers (41.67%). Wearing mask strictly enforced.
Tempo (23.9)	High Risk (8.0) Similar to bus and microbus.	Moderate Risk (5.1) Practice of keeping the ventilation open most of the time.	Moderate Risk (5.0) Daily sanitisation not practiced in Only 42% vehicles use disinfectant	Moderate Risk (5.8) Similar to that of microbus.
Taxi (12.2)	Moderate Risk (4.0) Risk caused due to no separation between driver and passenger Limited number of passengers. No standing possible.	Low Risk (3.0) Generally, taxis are not used in shared basis, so ventilation is completely under control of a single passenger.	Low Risk (2.8) Sanitisation rate is 100% daily. Limited number of passengers. Practically possible to sanitise after each trip (although not seen to be practised from survey).	Low Risk (2.4) Good rate of sanitising passengers (82.35%). Easy to enforce mandatory mask (found to be 100% from survey).
Motorbike taxi (4.5)	Low Risk (2.5) Only two people in full occupancy. Vehicle not enclosed so it can be considered relatively safer.	Low Risk (0.3) No ventilation required as the vehicle is not enclosed.	Low Risk (1.0) Minimal surface of contact which can be completely avoided as per personal choice.	Low Risk (0.7) 100% practice of sanitising passengers and use of masks.



4.4 Gap analysis and recommended mitigation measures across vehicle types

Going beyond the relative risk rating, we have compared the government-recommended practice with the *de facto* practice on public awareness building, seating arrangements, sanitisation, temperature checks, social distancing, use of masks, and ventilation across the five vehicle types. The epidemiologist in the team has then compared the gaps between the government-recommended practices and *de facto* practices as they were documented in our survey and field observations. Table 7 details the observations. We further provide recommendations on how the gaps can be filled.

To summarise Table 7, we see major gaps emerging from three different factors. First is the propensity on the part of regulators to recommend best practices without assessing their practicality or investing in the support infrastructure or program such as training of public vehicle operators. A number of examples pop out: for instance, asking large buses to sanitise after every trip without considering the availability of washing areas or public washer-hoses within the city and recommending mandatory hand sanitisation, reduced occupancy, and installation of ventilation-improving fans without compensating for the added costs or allowing operators to hike the fares. In our interviews with the operators, it was clear that the key reasons for non-compliance have been lack of training, unaffordable costs, or lack of infrastructure such as sanitization stations in terminals.

A second factor is expecting compliance without putting up a robust enforcement mechanism. As reported earlier in this chapter, depending on the type of vehicle, almost 89-100% of the fleet has not been inspected for compliance of the government guidelines. For a city of 3.5 million residents, there are six officials available to conduct the inspections. The level of commitment on enforcement being as low as it is, it is a surprise that we see 100 percent compliance on certain recommendations such as sanitisation, on certain vehicle types like taxicab. On the other hand, our field observation documents that none of the taxicab operators ask the passenger to sanitise their hands, which is a key recommendation in the government guidelines.

A third factor is under-investing in public awareness campaigns and targeted training for operators. In the absence of an effective compliance-cost compensation mechanism or a compliance enforcement mechanism, the best option could be to mount an effective public awareness campaign, supplemented by training to the vehicle operators, that could achieve comparable results through behaviour change instead. In Nepal's case, however, even the public awareness campaign has been weak.


Table 7: Measures for risk mitigation

Vehicle type/ risks	Risks	Mitigation measures as suggested by epidemiologist	Suggested mitigation measures based on government guidelines and directives	Currently practiced by vehicle operators	Gaps
Bus	Lack of awareness	Commercial vehicle operators must be provided with basic awareness programs and other educating strategies should be developed.	Guidelines issued by DoTM includes raising awareness level among vehicle staff as well as passengers.	Awareness level is found to be very low (25%).	Communication gap between government agencies and transport owners. Negligence of bus staff.
	Disinfection	Disinfection of commonly touched surfaces in the vehicle at the beginning and end of each shift using 60% alcohol or diluted household bleach.	Disinfection of the vehicle after each trip.	None of the buses were found to be sanitised after each trip. Forty percent were found to be sanitised daily.	No proper following of vehicle operators. Lack of awareness among operators.
	Seating arrangements	Limiting the number of passengers to half the capacity. Back to back or side to side sitting arrangement must be made rather than face to face.	Encourage passengers to follow social distancing.	Full occupant vehicles. No changes in seating arrangement.	Inadequate number of public vehicles on the road.
	Temperature monitoring	Every vehicle must have a thermal gun and temperature screening must be done while boarding every single passenger.	Every vehicle must have at least two thermal guns and temperature monitoring of every passenger prior boarding.	Only 7.6% buses were monitoring temperature using thermal guns.	Vehicles are not provided with thermal guns. May be due to additional cost.
	Use of mask and sanitiser	Every passenger as well as vehicle operators must wear a mask. Policy of refusal by passenger to ride if driver is unmasked and vice versa should be practised. Sanitiser to be placed mandatorily in all vehicles.	Vehicle drivers and staff compulsorily use masks, gloves and visors. All passengers should use masks prior to the boarding.	Mask policy was somehow followed in the bus (86%).	Quality of masks worn by vehicle staff.
	Social distancing	Limiting the number of passengers to half of the capacity, keeping the adjacent seat unoccupied. Keeping physical distance of 1.5-2m.	Encourage passengers to follow social distancing.	No social distancing in buses as well as bus stops. Full occupancy of vehicles. Standing is allowed, that adds to further overcrowding	Vehicles cannot operate economically with half capacity or when standing not allowed
	Ventilation	All the windows should be completely open throughout the trip or exhaust fan should be installed in case windows cannot be kept open.	All ventilation to be kept open or installation of exhaust fans accordingly.	Although awareness level regarding proper ventilation was high, but due to weather	Alternative for open windows is missing due to weather and road conditions.



Vehicle type/ risks	Risks	Mitigation measures as suggested by epidemiologist	Suggested mitigation measures based on government guidelines and directives	Currently practiced by vehicle operators	Gaps
Micro-bus	Awareness level	Same as bus		conditions (cold weather), it was not practised.	
	Seating arrangements	Same as bus			
	Temperature measuring	Same as bus			
	Regular inspection by authorities	Same as bus			
Tempo	Awareness level	Same for all			
	Seating arrangements	Same as bus and micro bus			
	Temperature measurement	Same as bus and micro bus			
	Internal re-arrangement	Fitting of protective screens between the passenger and driver, and for the passenger seating areas, removal (or cordoning out of use) of seats or spacing out of seats that are left in use.	Separation of passengers and drivers with the help of ply-boards, glass or fibre-board or thick plastic sheets.	None of the vehicles have changed their internal arrangement as per the guidelines.	Lack of awareness and additional cost are the reasons for not following this rule.
	Regular monitoring by authorised body	Same as bus and micro bus		Only 14% of the vehicles were regularly inspected	Inadequate staff at regulating authorities.
Taxi	Awareness level	Same as above			
	Temperature measurement	Same as above		100% of the taxi operators did not check temperature of their passengers prior boarding	
	Seating arrangement	Avoid taxi sharing with strangers. If not possible, the number of passengers should be limited to two.	No such specific guideline.	Only 52.9% taxis were following the guideline, out of which 25.55% kept alternate seats vacant and 6% reduced	



Vehicle type/ risks	Risks	Mitigation measures as suggested by epidemiologist	Suggested mitigation measures based on government guidelines and directives	Currently practiced by vehicle operators	Gaps
	Interior rearrangement	Fitting protective screens between the seating areas.	Separation of passengers and drivers with the help of ply boards, glass or fibre board or thick plastic sheets.	the capacity of the vehicle to half. None of the vehicles changed their internal arrangement as per DoTM guidelines.	Additional cost.
	Proper ventilation	Same as tempo.			
Motorbike Taxi	Temperature measurement	Same as taxis.			
	Sanitisation and disinfection			All the MBTs were sanitised daily using soap and water.	Low awareness on hygiene and sanitation.



5. Recommendations

We have assessed and illustrated the economic impact of COVID-19 infection control measures on the public transport sector in Nepal. We have discussed the general exposure risk in the public transport system and evaluated the relative risk across five different vehicle types that are operated in Nepal. Reflecting on our findings, we make the following recommendations to the Government and public transport operators in Nepal:

5.1 Recommendations to the Government of Nepal

Even minor incentives can bring some of the underutilised assets in the public transport sector to full functionality. The report shows that, depending on the vehicle type, about 15-55% percent of the vehicles are currently under-utilised in the sector. The more vehicles begin to ply on the routes, the faster the sector revives. While the government may not be able to provide large subsidies to the entire sector, small incentives such as reimbursing infection control costs to the operators or deferring fees and fines by additional six months or opening new routes or reducing taxes on diesel for a short period of time can potentially incentivise companies that are already thinking of re-entering the market. Over longer-term, however, subsidizing fossil fuel might inhibit market viability of cleaner options such as electric buses and subsidies should not be maintained beyond 3-6 months. Once more vehicles begin to operate, passenger load on individual vehicles decreases, commuters feel safer, and a virtuous cycle of growth will initiate.

Unfunded mandates don't work. The costs of complying with the government-issued guidelines is a major factor for non-compliance. An assessment of the compliance cost will reveal that the actual costs involved are not very high and the government can afford to set up a reimbursement system for all operators without taking on a large budgetary burden. If the government institutes a system of reimbursing this cost back to the operators, the compliance on mandated practices such as sanitisation will readily increase.

Without significantly ramping up enforcement, compliance on the guidelines will not improve. As we have highlighted, the current enforcement mechanism is grossly inadequate for a city of 3.5 million people. These human resources dedicated to compliance checks needs to be increased. If the enforcement increases and brings about visible changes in the procedures (sanitising, distancing, ventilating, seating), public confidence on the safety measures will grow, commuter demand will grow, and the prospect of the sector reviving quickly will improve significantly.

Promote the type of vehicles that the public is willing to use. We have noted in the report that motorbike taxis (MBTs) are growing in popularity with demand almost doubling in the pandemic. This segment of the market has not been regulated or promoted by the government in any way. Since the public prefers this mode of transport, the government can get behind the public choice and promote the sector through new regulations and incentives at least during the pandemic. We understand that the government may not be able to accord a “preferential” treatment to a particular vehicle type under normal circumstances, but a temporary intervention and promotion is likely to help in controlling infection risks during a pandemic.

Fill the data and research gaps at the earliest. It is quite extraordinary that we had to resort to extrapolative calculations and use various assumptions to arrive at a number that best estimated the current fleet size of the five types of public vehicles operating in Kathmandu. This kind of data should be ordinarily available with the regulators. Similarly, estimating total commuter demand prior to the start of the lockdown was equally onerous. The Government of Nepal should at least maintain fleet size, commuter volume, route volume, and peak demand data so that policies related to the sector can become more evidence-based. In addition, a crisis of this scale cannot be tackled without reliable, policy-relevant research. We strongly recommend that the government increases the data and research budget starting from the coming fiscal year and sustains the investments over time.

5.2 Recommendations to the public transport operators

Vehicle operators, not the government, form the perception of public safety. The vehicle operators have to do their part in instilling public confidence in the safety measures employed in the vehicles. The fastest way of reviving fallen commuter demand is by increasing public confidence in the public transport sector. Vehicle



operators should focus on improving the perception of safety in their vehicles, even if it costs a bit and requires additional effort. It is our estimate that the cost of improving sanitization of surfaces, dispensing sanitizers to the passengers, putting up public notices in cabins, and enforcing no entry without masks rules, for instance, will be around \$8-12 per day for buses and lower for smaller vehicles. These steps will on the other hand go a long way in improving the perception of safety and compliance of the government guidelines.

Scale-up innovations when they are identified. As noted in the report, both vehicle operators and passengers take individual initiatives to enhance their safety. Vehicle drivers and cabin operators have created improvised barriers, changed behaviours, and adopted other innovations to lower exposure risks. For example, some of the Tempo drivers have sealed the driver cabin with Plexiglass, some of the buses have locked the windows in open position, and some of the taxis insist on mobile-based payments to avoid touching cash or passengers. Such practices, when they come to notice, should be picked up and scaled up across the sector. Even when they are not epidemiologically proven to work, the optics matters. Such steps go a long way in building passenger and operator confidence in the system.

Prepare for markets that are opening up. The current slump in commuter demand is partially a function of some sectors of the economy not opening up. As the government prepares to open up additional activities, the transport entrepreneurs should prepare to deploy additional vehicles. If the supply-demand equation fails, overcrowding will follow, which will in turn erode public confidence in the transport system. An important case in point is educational institutions. As schools and colleges begin to open (travel for education makes 15% of the passenger volume), transport entrepreneurs should deploy more vehicles, train their staff better, and improve compliance. These steps can help to retain and grow the passenger volume.



References

1. Bhardwaj R, Agrawal A. [Internet].; 2020 [cited 2020 12 29. Available from: <https://aip.scitation.org/doi/am-pdf/10.1063/5.0020249>.
2. Shen J, Duan H, Zhang B, Wang J, S. Ji J, Wang J, et al. Prevention and control of COVID-19 in public transportation: Experience from China. Environmental Pollution. 2020 Nov; 266(2).
3. Moffit M. Sfgate. [Online].; 2020 [cited 2020 12 20. Available from: <https://www.sfgate.com/science/article/How-long-coronavirus-lasts-on-hard-surfaces-15118173.php>.
4. Yi C, Aihong W, Bo Y, Keqin D, Haibo W, Jianmei W, et al. yiigle.com. [Online].; 2020 [cited 2020 12 24. Available from: <http://rs.yiigle.com/yufabiao/1186223.htm>.
5. Rettner R. Livescience. [Online].; 2020 [cited 2020 12 22. Available from: <https://www.livescience.com/covid19-risk-train.html>.
6. Gomez AA. World Bank Blogs. [Online].; 2020 [cited 2020 12 22. Available from: <https://blogs.worldbank.org/transport/fight-against-covid-19-public-transport-should-be-hero-not-villain>.
7. Joselow M. Scientific American. [Online].; 2020 [cited 2020 12 22. Available from: <https://www.scientificamerican.com/article/there-is-little-evidence-that-mass-transit-poses-a-risk-of-coronavirus-outbreaks/>.
8. Broom D. World Economic Forum. [Online].; 2020 [cited 2020 12 24. Available from: <https://www.weforum.org/agenda/2020/04/coronavirus-microdroplets-talking-breathing-spread-covid-19/>.
9. Xinhua. Xinhuanet. [Online].; 2020 [cited 2020 12 29. Available from: http://www.xinhuanet.com/english/2020-02/03/c_138752973_2.htm.
10. Intelligent Transport. Intelligent Transport. [Online].; 2020 [cited 2020 11 12. Available from: <https://www.intelligenttransport.com/transport-news/110651/moscow-metro-to-test-early-bird-ticketing-discounts-to-ease-crowding/#:~:text=Moscow%20Metro%20is%20set%20to,to%20test%20such%20a%20programme>.
11. Wikipedia. COVID-19 pandemic in Nepal. [Online].; 2020 [cited 2020 11 17. Available from: https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Nepal.
12. The Himalayan Times. Nepal govt decides to resume public transportation, taxi service, within districts. [Online].; 2020 [cited 2020 11 17. Available from: <https://thehimalayantimes.com/kathmandu/govt-decides-to-resume-public-transportation-taxi-service-in-short-routes/>.
13. My Republica. Entrepreneurs set various preconditions to resume public transportation. [Online].; 2020 [cited 2020 11 17. Available from: <https://myrepublica.nagariknetwork.com/news/entrepreneurs-set-various-preconditions-to-resume-public-transportation/>.
14. My Republica. Sajha Yatayat to resume service in Kathmandu Valley. [Online].; 2020 [cited 2020 11 17. Available from: <https://myrepublica.nagariknetwork.com/news/sajha-yatayat-to-resume-service-in-kathmandu-valley/>.
15. My Republica. Entrepreneurs all set to resume public transportation from July 23. [Online].; 2020 [cited 2020 11 17. Available from: <https://myrepublica.nagariknetwork.com/news/entrepreneurs-all-set-to-resume-public-transportation-from-july-23/?categoryId=opinion>.



16. XINHUANET. Nepali gov't to resume domestic flights, long-haul public transportation services. [Online].; 2020 [cited 2020 11 17. Available from: http://www.xinhuanet.com/english/2020-09/15/c_139369576.htm.
17. Nepali Times. Kathmandu Valley back to lockdown. [Online].; 2020 [cited 2020 11 17. Available from: <https://www.nepalitimes.com/banner/kathmandu-valley-back-to-lockdown/>.
18. GARDAWORLD. Nepal: Lockdown extended in Kathmandu Valley until September 9. [Online].; 2020 [cited 2020 11 17. Available from: <https://www.garda.com/crisis24/news-alerts/375366/nepal-lockdown-extended-in-kathmandu-valley-until-september-9-update-23>.
19. Onlinekhabar. Odd-even rationing on vehicles in Kathmandu, already defunct, is officially over now. [Online].; 2020 [cited 2020 12 23. Available from: <https://english.onlinekhabar.com/odd-even-rationing-on-vehicles-in-kathmandu-already-defunct-is-officially-over-now.html>.
20. XINHUANET. Nepali gov't to resume domestic flights, long-haul public transportation services. [Online].; 2020 [cited 2020 11 17. Available from: http://www.xinhuanet.com/english/2020-09/15/c_139369576.htm.
21. The Himalayan Times. Public vehicles allowed to run at full capacity. [Online].; 2020 [cited 2020 12 5. Available from: <https://thehimalayantimes.com/nepal/public-vehicles-allowed-to-run-at-full-capacity/>.
22. My Republica. Govt restores regular fare rates for public transportation. [Online].; 2020 [cited 2020 12 5. Available from: <https://myrepublica.nagariknetwork.com/news/govt-restores-regular-fare-rates-for-public-transportation/>.
23. District Administration Office. Important Notice from the District Administration Office. 2020. The Kathmandu District Administration Office has decided to call off the odd-even rule for vehicles plying the city streets.
24. Ministry of Physical Infrastructure & Transport. Vehicle Registered in Bagmati Zone in Fiscal Year 072-73. Minbhawan, Kathmandu: Department of Transport Management; 2075/76.
25. The Himalayan Times. Cabbies continue fleecing passengers in Kathmandu valley. [Online].; 2020 [cited 2020 12 17. Available from: <https://thehimalayantimes.com/kathmandu/cabbies-continue-fleecing-passengers-in-kathmandu-valley/>.
26. ICT Frame. Tootle vs Pathao: Which One To Choose? [Online].; 2019 [cited 2020 12 17. Available from: <https://ictframe.com/tootle-vs-pathao-which-one-to-choose/>.
27. The Annapurna Express. Ride-sharing vehicles safer than other means of public transport. [Online].; 2020 [cited 2020 12 17. Available from: <https://theannapurnaexpress.com/news/ride-sharing-vehicles-safer-than-other-means-of-public-transport-2621>.
28. Ujyaaloonline. [Audio recording].; 2020 [cited 2020 12 17. Available from: <https://ujyaaloonline.com/show/9656>.
29. National Planning Commission. Socio-economic impact on the nation due to Covid-19 pandemic. Unpublished Report; 2020.
30. International Labour Organisation. COVID-19 labour market impact in Nepal; 2020. | Available from: https://www.ilo.org/kathmandu/whatwedo/publications/WCMS_745439/lang--en/index.htm



Appendix A: PRIMARY SURVEY QUESTIONNAIRE

a. Interview Questionnaire with Vehicle Driver, Cabin Operator and Vehicle/Company Owner

Evaluating economic impact and infection control measures of COVID-19 in the public transport sector in Nepal

Interview Questionnaire with Vehicle Driver, Cabin Operator, and Vehicle/compacy Owner

Introduction:

Salutation

My name is, The government of Nepal like other countries across the world imposed severe lockdown on March 11, 2020 to control the aggressive spread of Covid 19 pandemic. It hit the public transportation deeply and their recovery remains a challenge for the nation. With the support of UK aid the research is being conducted around two key challenges ie how the public transportation sector can recover from the economic impact of the pandemic and second, how to ensure safety in public transportation system. NIURS is conducting this research and has asked me to meet you so that I can ask a few questions about your experiences of operating public transportation in Covid19 pandemic situation. If you agree, I can assure you that all answers will be confidential and that your name will never be associated to any specific information in the report produced. The objective of this important interview is to better understand how transportation sector

Do you have any questions? Yes No

Do you agree to the interview and its recording? Yes No

Thank you for agreeing to the interview

Respondent's Name:

Vehicle Route:

Position: Vehicle Driver Cabin Operator Vehicle owner

Age: **Sex:** M F

Residence (locality only, not address):

Education : Literate Secondary Above Secondary

1. What is the monthly operating cost of your vehicle?

Fuel Cost Staff Cost Maintenance Cost Registration Cost

2. What is the daily average revenue?

Before lock down After lock down

3. How many vehicles of your type are plying on your route?

Before lock down After lock down

4. How many of your colleagues lost their job since the start of lockdown? By percentage

<20% 20 to 30% 30 to 40% 40 to 50% >50%

5. Are you aware of any government guidelines issued on how to operate vehicles during Covid-19 spread?

Yes No

6. Do you sanitize the vehicle?

Yes No

If yes, what is the frequency?

Daily less than once a week Weekly
2-3 times a week 4-6 times a week

7. What Chemical do you use

Soap Water Disinfectant
Can you name the disinfectant

8. Does anybody apart from you check the vehicle for sanitization

Yes No

if Yes, who?



Owner Govt Official Committee Official
 Others Specify:

9. Do you or somebody else check(s) body temperature before operating the vehicle?

Yes No

if Yes, who?

Owner Govt Official Committee Official
 Others Specify:

10. Do you sanitize your hand before operation the vehicle?

Yes No

11. Are all the passengers made to sanitize their hands prior to boarding?

Yes No

12. Is it mandatory for passengers to wear masks in your vehicle?

Yes No

13. Have you made changes in the seating arrangement?

Yes No

If Yes, how?

Keeping alternate seat vacant
 Reducing passenges by a certain percent
 Others Specify:

14. Have you taken any measures to change the ventillation in your vehicle?

Yes No

If Yes, how?

By keeping windows open at all times
 By Other means, specify

15. With the measures you have taken, do you believe you will be able to avoid infection in your vehicle?

Yes No

16. How safe do you feel operating the vehicle?

Very Unsafe Unsafe Safe Very safe
 Don't know

17.a Have you been sick with flu like sypmtoms or isolating (due to your household) having COVID19 symptions since COVID 19 started?

17.b How many of your colleagues (that you know of) have been infected so far?

17.c How many of your colleagues have reported sick (with flu-like symptoms) in the last month?

18. In your opinion how does Covid-19 spread?

By air By water By touching surfaces

19. Were you given any instruction/orientation on how to prevent infection in your vehicle?

Yes No

If yes, by whom?

Owner Govt Official Committee Official
 Others Specify:

Thank you for your Time, Namaste



b. Interview Questionnaire with public vehicle passenger

Evaluating economic impact and infection control measures of COVID-19 in the public transport sector in Nepal

Interview Questionnaire with public vehicle passenger

Presentation:

Salutation

My name is, The government of Nepal like other countries across the world imposed severe lockdown on March 11, 2020 to control the aggressive spread of Covid 19 pandemic. It hit the public transportation deeply and their recovery remains a challenge for the nation. With the support of UK aid the research is being conducted around two key challenges ie how the public transportation sector can recover from the economic impact of the pandemic and second, how to ensure safety in public transportation system. NIURS is conducting this research and has asked me to meet you so that I can ask a few questions about your experiences of operating public transportation in Covid19 pandemic situation. If you agree, I can assure you that all answers will be confidential and that your name will never be associated to any specific information in the report produced. The objective of this important interview is to better understand how transportation sector could be supported to recover from the sock of Covid19 pandemic.

Do you have any questions? Yes No

Do you agree to the interview and its recording? Yes No

Thank you for agreeing to the interview

Respondent's Name:

Age: Sex: M F

Boarding Station:

Unboarding Station:

1) Have you stopped using any of the following transport modes due to Covid-19 (please select those you have stopped using):

Bus Micro Bus Tempo Taxi Motorcycle Taxi

2) If they have stopped using any of them why?

3) How frequently are you travelling per week using the public transportation: pre COVID and post COVID?

4) Have you changed the mode of transport due to COVID-19?

If yes why?

Availability of transport mode availability of route fear of infection other: specify

5) Is your journey time increased since pre COVID-19?

Yes No Don't know

if increased, by what amount of time

up to 15 min longer 16-30 min longer 31 minutes to one hour More than one hour

6) What precautions do you normally take when travelling in public vehicles?

Mask Sanitize your hands Social distance | Other- Specify

7) In your opinion, how does the Covid-19 infection spread?

By air By water By surfaces

8) Were you offered sanitizer in the vehicle you just unboarded from?

Yes No



9) Were you asked to leave a seat empty?

Yes No

10) Did you feel unsafely crowded in the vehicle you just unboarded from?

Yes No

11) How safe or unsafe do you feel travelling in public vehicles?

Very unsafe Unsafe Safe Very safe

12) Did other passengers make attempts to maintain social distance, wear masks for you to feel safe?

All did Only some did Most did Nobody did

13) Are you allowed to open and close windows when you feel like it?

Yes No

14) Is there a seat that you feel safer sitting on while on the vehicle you just unboarded from?

Yes No

window seat Aisle seat Near the door

Thank you for your Time, Namaste



Appendix B: LIST OF KII INTERVIEWEES

S.N.	Name of Person/Agency	Sector/ Expertise
1.	Dr. Padma B Shahi	Transportation Expert
2.	Dr. Sameer M Dixit	Public Health Expert
3.	Dr. Sharad Onta	Public Health Expert
4.	Dr. Loknath Bhusal	Information Officer, Department of Transport Management
5.	Mr. Saroj Pradhan	Joint Secretary, Ministry of Physical Infrastructure and Transport
6.	Mr. Saroj Sitaula	General Secretary, Federation of Nepalese National Transport Entrepreneurs
7.	Mr. Hom Prasad Adhikari	Chairman, Saarwajanik Yatayat Kendriya Mahasang Nepal
8.	Dr. Subarna M Dhital	Public Health Expert
9.	Unam M Pradhan	Urban Transport Planner
10.	Om D Rajopadhyaya	Urban Policy/Governance
11.	Samikchya Baskota	Urban Law
12.	Om Rajbhandary	Private Sector Representative

Nepal Institute for Urban and Regional Studies (NIURS)

Chakupat, Patandhoka, Lalitpur

Nepal

Tel: +977-1-5542410

Email: contact@niurs.org.np | jagadish@pokharel.net

Web: www.niurs.org.np