

Transport Starter Data Kit: Historical socio-transport data for Zimbabwe

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Abstract

Data on transport activity is an important element for the development of national transport decarbonisation strategies. By having freight and passenger transport information, the impacts on vehicle and fuel consumption changes from replacing internal combustion engine vehicles with electric vehicles can be calculated. The development of a national decarbonisation strategy requires significant efforts. However, access to data is often a barrier to starting transport system modelling in developing countries, thereby causing delays. This article provides data that can be used to support a model for Zimbabwe, which may act as a starting point for further model development and scenario analysis. The data are collected entirely from publicly available and accessible sources, focusing on national reports, statistical yearbooks, and academia.

Keywords

U4RIA

Transport data

Transport modelling

MAED

Zimbabwe

Specifications Table

| | |
|---------------------------------------|--|
| Subject | Transport |
| Specific subject area | Transport Data |
| Type of data | Tables Graphs |
| How data were acquired | Literature survey (databases and reports from international organisations; journal articles) |
| Data format | Raw and analysed |
| Parameters for data collection | Data collected based on inputs required to create an energy system model for Zimbabwe |
| Description of data collection | Data were collected from the websites, annual reports and databases of international organisations, as well as from academic articles and existing modelling databases. |
| Data source location | Not applicable |
| Data accessibility | With the article and in a repository. Repository name: Zenodo. Direct URL to data: https://doi.org/10.5281/zenodo.6540080 |

Value of the Data

- The data can be used to develop national transport demand models to inform national investment outlooks and decarbonisation strategies.
- The data are useful for country analysts, policy makers, and the broader scientific community, as a zero-order starting point for model development.
- This data could be used to examine a range of possible transport pathways, in addition to the examples given in this study, to provide further insights into the evolution of Zimbabwe's transport system.
- The data can be used both for conducting an analysis of transport activity and emissions, but also for capacity building activities.
- The data can be used as a call to action in addressing transport data gaps and establishing parameters for data collection to improve the consistency of transport-climate research in these countries.

1. Data Description

The data provided in this paper can be used to support the development of a transport model for Zimbabwe. The data provided were collected from publicly available sources, including statistical yearbooks, transport ministry reports, statistics from national authorities and affiliated research institutions, academia, and journal articles. Global datasets (primarily from the World Bank) were only consulted if severe data gaps existed. The dataset includes parameters on passenger and freight transport

activity, disaggregated by transport mode (road, rail, aviation, etc.) and geographic scale (inter-city or inner-city), if available. The dataset also covers the size of the vehicle fleet, disaggregated by vehicle types. The data coverage and subtypes vary among the parameters. The overall ambition is to include the most recent available year(s).

| <i>Item</i> | <i>Description of Content</i> |
|-------------|--|
| Figure 1 | A graph showing total population (million people), as well as the share of urban and rural population in Zimbabwe. |
| Figure 2 | A graph showing total GDP (million USD in 2015), as well as the share of the different sectors contributing to GDP in Zimbabwe: agriculture, construction, mining, manufacturing, service, and energy. |
| Table 1 | A table showing passenger transport activity in Zimbabwe for the most recent year data was available. The data are curated from national statistics agencies or other government-affiliated agencies. |
| Table 2 | An additional table showing passenger transport activity in Zimbabwe based on UN DESA Statistics Division data (see explanation below). The data feature information for 2018. |
| Table 3 | A table showing freight transport activity in Zimbabwe for the most recent year data was available. |
| Table 4 | An additional table showing freight transport activity in Zimbabwe based on UN DESA Statistics Division data (see explanation below). The data feature information for 2018. |
| Table 5 | A table showing vehicle fleet data in Zimbabwe for the most recent year data was available. |

For the parameters on passenger and freight transport activity, an additional dataset was included in Table 2 and Table 4. The UN DESA Statistics Division modelled passenger activity and freight activity for every country in support of SDG Indicator 9.1.2¹. Passenger activity data provide information for road, rail, and air transport. Freight data cover road, rail and inland water, and aviation. The passenger-km and tonnes-km data originate from the Open SDG Data Hub. In this dataset, only the data for International Transport Forum (ITF) (representing mostly OECD countries) and UNECE countries (mostly European countries) are based on national reporting. For non-ITF/UNECE countries, the data are estimated using the ITF model, which uses several covariates such as GDP, population, and transport network coverage. A description of the model can be found in the ITF Transport Outlook 2017.

1.1 Population

Population data including total population, population growth, and split by rural or urban was gathered from

¹ Freight: <https://www.sdg.org/datasets/undesa::indicator-9-1-2-freight-volume-by-mode-of-transport-tonne-kilometres/about> ;

Passenger: <https://www.sdg.org/datasets/undesa::indicator-9-1-2-passenger-volume-passenger-kilometres-by-mode-of-transport/about>

The World Bank Open Data platform². Figure 1 displays the total population disaggregated by urban and rural in Zimbabwe.

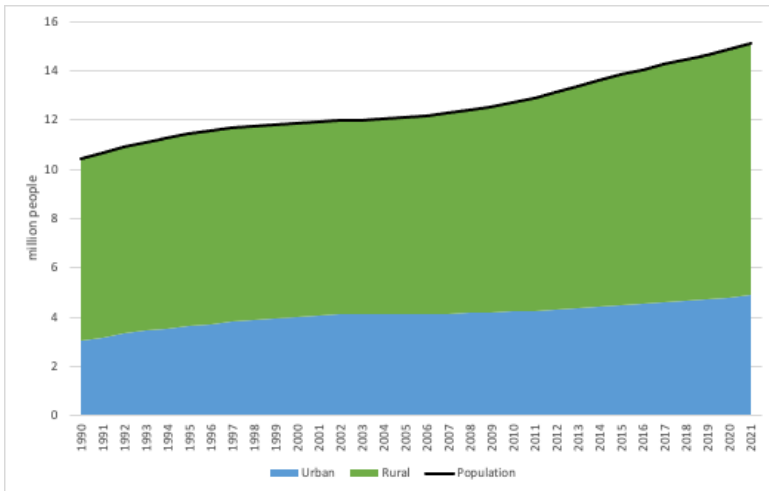


Figure 1: Total population (million people) disaggregated by urban and rural in Zimbabwe

1.2 Gross domestic product (GDP)

GDP data including total GDP, GDP growth, and GDP share by sector (agriculture, manufacturing, service) was collected from The World Bank Open Data platform². Where data was not available, data processing was done. Figure 2 shows the total GDP, as well as the share by sector, in Zimbabwe.

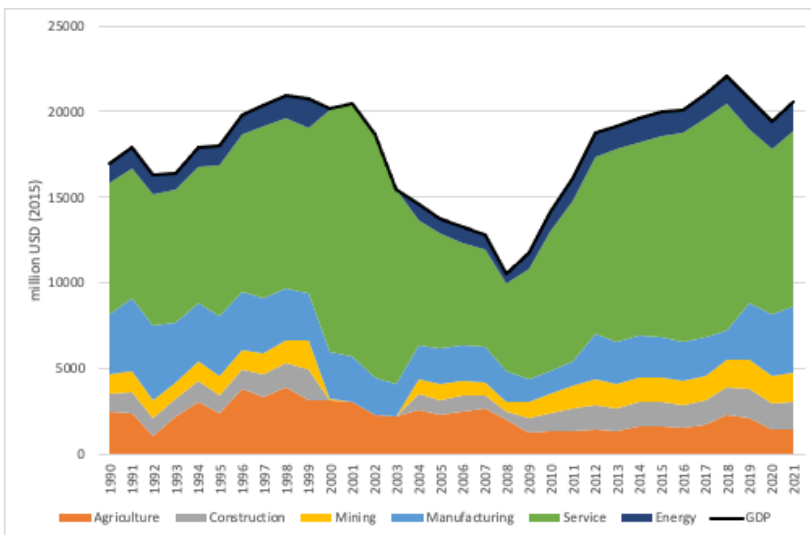


Figure 2: Total GDP (million USD in 2015) disaggregated by share in Zimbabwe

² <https://data.worldbank.org/>

1.3 Passenger transport activity

Information on passenger transport activity in Zimbabwe is only captured through rail transport. The rail passenger activity was 651.4 million passenger-km in 1994. A decrease in rail passenger activity was recorded from 1990 to 1994. The data was provided by the World Bank.

Table 1: Recorded passenger transport activity (million passenger-km) in Zimbabwe

| Mode | 1990 | 1991 | 1992 | 1993 | 1994 |
|------|---------|--------|---------|---------|---------|
| Rail | 781.459 | 571.41 | 659.826 | 588.149 | 651.421 |

Source: World Bank, 2022, Railways, passengers carried (million passenger-km) - Zimbabwe, <https://data.worldbank.org/indicator/IS.RRS.PASG.KM?locations=ZW>

There are severe challenges to obtain updated information for Zimbabwe, as well as detailed information for passenger activity for other transport modes than rail. The rail passenger activity is very outdated.

According to the UN DESA data, it is estimated that the passenger activity in Zimbabwe is 8524.1 million passenger-km in 2018. Most of the passenger activity is conducted through road transport. Compared to the data in 1994, the rail passenger transport activity is estimated to be extremely low.

Table 2: Modelled passenger transport activity (million passenger-km) in Zimbabwe

| Mode | 2018 |
|----------|-------------|
| Aviation | 171.543067 |
| Rail | 0.00156 |
| Road | 8352.566324 |

1.4 Freight transport activity

Information on freight activity for Zimbabwe has been retrieved for rail, with 1580 million tonnes-km transported in 2007. There is a large gap in data from 1994 to 2007. Between 1994 and 2007, the statistics record a strong decrease in rail freight activity. The data is curated by the World Bank.

Table 3: Recorded freight transport activity (million tonnes-km) in Zimbabwe

| Mode | 1990 | 1991 | 1992 | 1993 | 1994 | 2007 |
|------|------|------|------|------|------|------|
| Rail | 5590 | 5394 | 5644 | 5466 | 4327 | 1580 |

Source: World Bank, 2022, Railways, good transported (million ton-km) - Zimbabwe, <https://data.worldbank.org/indicator/IS.RRS.GOOD.MT.K6?locations=ZW>

Zimbabwe faces challenges to record and provide updated and detailed information for freight activity. The data is only available for rail and its most recent entry is for 2007. There is no available information for road, aviation, or water transport.

According to the UN DESA modelled data, freight activity for 2018 in Zimbabwe is 9168.3 million tonnes-km. Freight transport is mostly achieved through rail (5275 million tonnes-km) and road transport (3368 million tonnes-km). The estimates show that the rail network is mainly used for good transport.

Table 4: Modelled freight transport activity (million tonnes-km) in Zimbabwe

| Mode | 2018 |
|------------------|-------------|
| Aviation | 0.665035 |
| Inland waterways | 523.466704 |
| Rail | 5275.365427 |
| Road | 3368.828236 |

1.5 Vehicle fleets

Zimbabwe has a total of 968186 vehicles, as of 2011. Official records only indicate the total vehicle fleet from 1998 to 2011. During this period, the total vehicle fleet grew by 34%. The vehicle fleet data is sourced from the National Statistics Agency. There is a clear lack of data because it does not disaggregate by vehicle type and there is no information for more recent years.

Table 5: Vehicle fleet numbers in Zimbabwe

| Mode | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Total vehicle fleet | 721254 | 735556 | 760162 | 794092 | 668904 | 688415 | 707136 | 733523 | 752062 | 775544 | 798964 | 859519 | 904679 | 968186 |

Source: National Statistics Agency, 2018, Zimbabwe Statistics 2010,

<https://zimbabwe.opendataforafrica.org/awadaad/zimbabwe-statistics-2010>

2. Methodology

The focus is on national data for passenger activity (passenger-km), freight activity (tonnes-km) and modes of transport (number of vehicles). The priority is to collect data released by national governments, government-affiliated organisations, or country-specific studies. The research identifies the most recent available data and any data available from 1990 onwards. The priority was for any data after 2010, because transport is a very dynamic growth sector and anything before 2010 adds limited value to understanding the current real-world situation.

Desk research is the main data collection approach for the Transport Starter Data Kits. The desk research examined annual yearbooks, transport statistics, country reporting, and any national statistical portals. Websites of the national government, transport ministries, statistical institutes and other related authorities were examined. Only when severe data gaps exist, global datasets are consulted. In some cases, World Bank data³ on rail passenger and rail freight is included.

³ Rail passenger data: World Bank, 2022, Railways, passengers carried (million passenger-km), <https://data.worldbank.org/indicator/IS.RRS.PASG.KM>; rail freight data: World Bank, 2022, Railways, goods transported (million ton-km), <https://data.worldbank.org/indicator/IS.RRS.GOOD.MT.K6>

Each Transport Data for Starter Data Kit set contains an additional dataset, which is sourced from the United Nations Department of Economic and Social Affairs (UN DESA) Statistics Division. It is included as a secondary priority because this dataset is the result of a modelling exercise and covers every country. The UN DESA modelled passenger activity and freight activity has the purpose to support the Sustainable Development Goal Indicator 9.1.2⁴. The passenger activity provides information for road, rail, and air transport. Freight data covers the road, rail and inland water, and aviation. The passenger-km and tonnes-km data originate from the Open Sustainable Development Goals (SDG) Data Hub. In the UN DESA dataset, only the data for countries participating in the International Transport Forum (ITF) (representing mostly member countries of the Organisation for Economic Co-operation and Development (OECD)) and the United Nations Economic Commission for Europe (UNECE) (mostly European countries) are based on national reporting. For non-ITF/UNECE countries, data are estimated using the ITF model, which uses several covariates such as gross domestic product, population, and transport network coverage. A description of the model can be found in the ITF Transport Outlook 2017⁵. The UN DESA dataset is included in the Transport Data for Starter Data Kits as additional tables to fill in the incomplete picture that most countries present. The UN DESA modelled data is less accurate and it shall only be regarded as offering the wider picture of transport activity in the country.

The collected data have been shared with a group of relevant SLOCAT partners to validate and explore any additional sources. The SLOCAT partners were selected based on their actions to lead projects in the region and their involvement in data-focused knowledge products or projects. The consultation involved ten anonymous organisations.

Desk research is an approach that limits the research to material available on the internet, accessible through search engines and linked to government and statistical institutes' websites. However, this does not pose a major limitation to obtaining data. Nearly every country has functional websites for statistics and transport authorities. In a few cases, websites are not well maintained, resulting in missing or broken hyperlinks to reports. By using services that provide access to archived websites, some of these broken pages can be retrieved. The collected information has been shared with partners and no additional information has been received.

While over 1,500 languages are spoken across Sub-Saharan Africa, government datasets are generally published in a smaller subset of languages including English, French, Portuguese and others. Nonetheless, language is not a barrier to navigating through the material and identifying the relevant parameters. The involved team members can navigate through reports in such languages. If needed, automatic translation tools were used.

The World Bank's data platform provided GDP share by sector for agriculture, manufacturing, and services. However, GDP share by construction, mining, and energy was also needed to align the data structure with

⁴ UN DESA, 2021, Indicator 9.1.2: Freight volume by mode of transport (tonne kilometres): <https://www.sdg.org/datasets/undesa::indicator-9-1-2-freight-volume-by-mode-of-transport-tonne-kilometres/about> ;

UN DESA, 2021, Indicator 9.1.2: Passenger volume (passenger kilometres) by mode of transport: <https://www.sdg.org/datasets/undesa::indicator-9-1-2-passenger-volume-passenger-kilometres-by-mode-of-transport/about>

⁵ ITF, 2017, ITF Transport Outlook 2017, <https://www.itf-oecd.org/transport-outlook-2017>

the MAED tool. To address the lack of data available for these sectors, the authors assumed that construction, mining, manufacturing, and energy all fall within the industry sector. Thus, to obtain data for the three remaining sectors, the remaining percentage after considering agriculture, manufacturing, and services from The World Bank's data platform, was divided by three. It is therefore assumed that the GDP share of the construction, mining, and energy sectors are the same.

3. Ethics Statement

Not applicable.

4. CRediT Author Statement

Naomi Tan: Investigation, Conceptualisation, Methodology; Data Collection; Visualization, Writing and Editing; **Robert Ambunda:** Data Collection; Investigation; Writing and Editing; **Nikola Medimorec:** Conceptualisation; Methodology; Data Collection; Investigation; Writing, Review & Editing; Supervision; **Angel Cortez:** Data Collection; **Agustina Krapp:** Data Collection; **Erin Maxwell:** Data Collection; **John Harrison:** Supervision; **Mark Howells:** Supervision

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Declaration of Competing Interests

The authors declare that they have no known competing financial interests or personal relationships which have or could be perceived to have influenced the work reported in this article.

