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

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Abstract

Eritrea is a low income country in the horn of Africa region, located in eastern Africa. Eritrea covers a land area of 117600 square kilometres and has a population of 3.62 million inhabitants. The country is bordered by Ethiopia to the south, Sudan to the west and by Djibouti to the southeast. Eritrea's coastline forms the northeastern edge of the country, and extends for approximately 1000 km to the north, separating the Red Sea from the Gulf of Aden in the south. Agriculture is by far the most important sector of the country's economy, providing a livelihood for about four-fifths of the population and accounting for a large portion of Eritrea's exports.

Transport infrastructure is outdated with an ageing railway system. Around a quarter of highways are paved. There are no cross-border connections via rail.[1] However, the first Nationally Determined Contribution by Eritrea intends to construct 400 km of rail infrastructure.[2]

Transport demand modelling can be used to assess the implications of different scenarios and support improved policymaking. 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 Eritrea, 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.

[1] https://en.wikipedia.org/wiki/Transport_in_Eritrea

[2] https://changing-transport.org/ndc_country/eritrea/

Keywords

U4RIA

Transport data

Transport modelling

MAED

Eritrea

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 Eritrea
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.7998054

Value of the Data

- These data can be used to develop national transport demand models to inform national transport investment outlooks and policy plans, as well as provide insights on the evolution of total final energy demand.
- The data are useful for country analysts, policy makers, and the broader scientific community, as a zero-order starting point for model development.
- These 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 the country's power system.
- The data can be used for conducting an analysis of transport activity and capacity-building activities. Additionally, the methodology of translating the input data into modelling assumptions for a demand projection tool is presented in this article, which is useful for developing a zero-order national transport demand model. This is consistent with the U4RIA goals.

- The data can also 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 as input data to develop transport demand models for Eritrea. The data provided in this paper can be used to support the development of a transport model for Eritrea. 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 sub-types vary among the parameters. The overall ambition is to include the most recent available year(s).

Item	*Description of Content*
Figure 1	A graph showing total population (million people), as well as the share of urban and rural population in Eritrea.
Figure 2	A graph showing total GDP (million USD in 2015), as well as the share of the different sectors contributing to GDP in Eritrea: agriculture, construction, mining, manufacturing, service, and energy.
Table 1	A table showing passenger transport activity in Eritrea based on UN DESA Statistics Division data (see explanation below). The data feature information for 2018.
Table 2	A table showing freight transport activity in Eritrea based on UN DESA Statistics Division data (see explanation below). The data feature information for 2018.
Table 3	A table showing the energy intensity levels (MJ per passenger-km) for urban transport in 2013. It is based on a study for Cape Town (South Africa) and it is intended to support estimations for this parameter in the country.
Table 4	A table showing load factors (average number of people per vehicle) for urban transport in 2013, based on the same study for Cape Town (South Africa).
Table 5	A table showing vehicle fleet data in Eritrea for the most recent year data was available.

For the parameters on passenger and freight transport activity, a dataset was included in Table 1 and Table 2. The UN DESA Statistics Division modelled passenger activity and freight activity for every country in support of SDG Indicator 9.1.2[3]. Passenger activity data provide information for

[3] UN DESA (2020), Indicator 9.1.2: Freight volume by mode of transport (tonne kilometres), https://unstats-undesa.opendata.arcgis.com/datasets/4a5d7189e27148c48f045729ef9e40c8_0/about;
UN DESA (2020), Indicator 9.1.2: Passenger volume (passenger kilometres) by mode of transport, https://hub.arcgis.com/datasets/undesa::indicator-9-1-2-passenger-volume-passenger-kilometres-by-mode-of-transport-

road, rail and air transport. Freight data cover road, rail and inland water, 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 The World Bank Open Data platform[4]. Figure 1 displays the total population disaggregated by urban and rural in Eritrea.

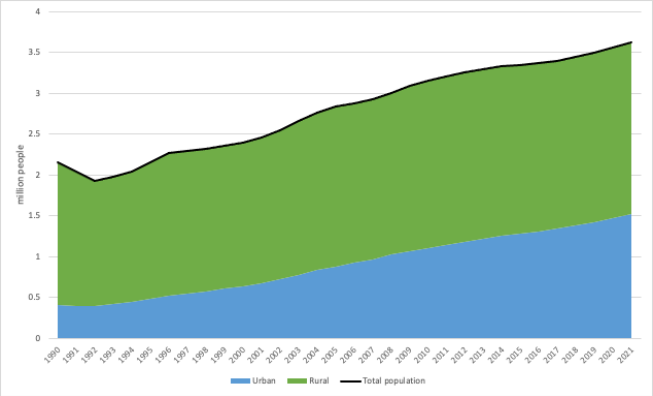

Figure 1: Total population (million people) disaggregated by urban and rural in Eritrea

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 platform[4]. Where data was not available, data processing was done. Figure 2 shows the total GDP, as well as the share by sector, in Eritrea.

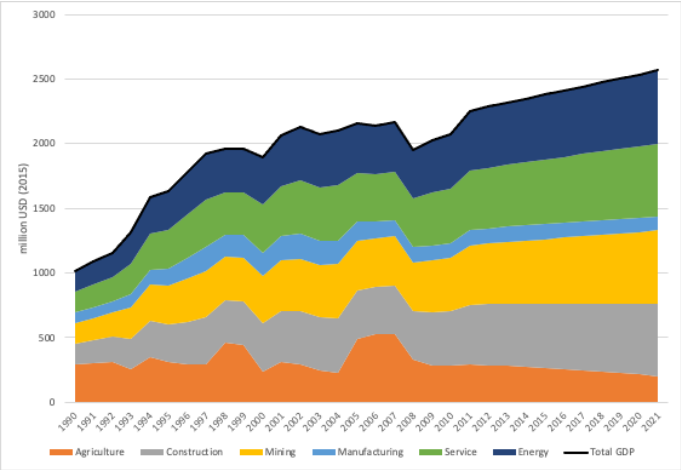

Figure 2: Total GDP (million USD in 2015) disaggregated by share in Eritrea

5/about

[4] https://data.worldbank.org/

1.3 Passenger transport activity

Eritrea has severe data gaps. The country reporting does not cover any of the data points. Information on passenger transport activity in Eritrea is not released by country statistics. The World Bank Data Portal does not either provide information on rail passenger activity.

According to the UN DESA modelled data for 2019, it is estimated that the passenger activity in Eritrea recorded over 9105 million passenger-km for road, 12.6 million passenger-km for rail and 75 million passenger-km for aviation. The large majority of passenger activity is conducted through road transport.

Table 1: Modelled passenger transport activity (million passenger-km) in Eritrea

Mode	2019
Aviation	75017341
Rail	12.6
Road	9105.036364

Source: UN DESA (2020), Indicator 9.1.2: Passenger volume (passenger kilometres) by mode of transport, https://hub.arcgis.com/datasets/undesa::indicator-9-1-2-passenger-volume-passenger-kilometres-by-mode-of-transport-5/about, last accessed April 2022.

1.4 Freight transport activity

Freight transport activity is not reported by any of the relevant sources for any of the modes.

The UN DESA modelled data estimates that freight activity through roads surpasses 476 million tonnes-km for 2019. Rail is assumed to transport 0.0322million tonnes-km in 2019.

Table 2: Modelled freight transport activity (million tonnes-km) in Eritrea

Mode	2019
Rail	0.032206
Road	476.8

Source: UN DESA (2020), Indicator 9.1.2: Freight volume by mode of transport (tonne kilometres), https://unstats-undesa.opendata.arcgis.com/datasets/4a5d7189e27148c48f045729ef9e40c8_0/about, last accessed April 2022.

1.5 Energy intensities for transport

To further understand the efficiency of the transport system, information on the transport energy intensity is relevant. It is together with load factors (see *1.4 Load Factors*) inputs to MAED. However,

such information is difficult to retrieve and there were no values available for this country. A study on urban transport in Cape Town (South Africa) provides estimates for some road transport modes.[5]

Table 3: Energy intensity levels (MJ per passenger-km) for urban transport

Mode	MJ per passenger-km for 2013
Electric Car	0.55
Hybrid Car	1.56
Petrol Car	2.22
Minibus taxi (petrol)	0.66

Source: Kane, L. (2016), What do we mean by low carbon transport: Understanding how people move in Cape Town, https://www.researchgate.net/publication/308899067_What_do_we_mean_by_low_carbon_transport_Understanding_how_people_move_in_Cape_Town

1.6 Load factors

The load factors in the Starter Data Kits for Transport focuses on the average number of people transported by one unit in each transport mode. For example, for a bus, it is the average number of people per trip. In some cases, it might be also referred to as 'occupancy levels' for passenger transport. There were no values available for the country, but a study for urban transport in Cape Town (South Africa) provides some insights that can support estimating values in other cities or countries.

Table 4: Load factors

Mode	Load factors for 2013
Electric Car	1.4
Hybrid Car	1.4
Petrol Car	1.4
Minibus taxi (petrol)	7.8

Source: Kane, L. (2016), What do we mean by low carbon transport: Understanding how people move in Cape Town, https://www.researchgate.net/publication/308899067_What_do_we_mean_by_low_carbon_transport_Understanding_how_people_move_in_Cape_Town

[5] Kane, L. (2016), What do we mean by low carbon transport: Understanding how people move in Cape Town, https://www.researchgate.net/publication/308899067_What_do_we_mean_by_low_carbon_transport_Understanding_how_people_move_in_Cape_Town

1.7 Vehicle fleet

Eritrea has a total of 68370 road vehicles in use, as of 2016. The vehicle fleet data is sourced from the IRF World Road Statistics 2022.

Table 5: Vehicle fleet in Eritrea

Mode	Number of vehicles
Passenger Cars In Use	42468
Buses and Motor Coaches In Use	4765
Lorries and Road Tractors In Use	21137
Total Vans, Pickups, Lorries and Road Tractors In Use	21137
Total Vehicles In Use	68370
Motorcycles and Mopeds In Use	4035

Source: IRF (2023), World Road Statistics 2022, International Road Federation, https://worldroadstatistics.org/

2. Experimental Design, Materials, and Methods

The above data were gathered through extensive desk research. This included material from international organisations, journal articles, and media reports. Due to missing values in the country's historical GDP data, extrapolation between available years was done by the authors to address this. 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 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. The transport data was also compiled, presented, and discussed with local stakeholders to reach a consensus on the main data and assumptions.

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.