

Transport Starter Data Kit: Historical socio-transport data for Burkina Faso

Authors

Naomi Tan^{1,2}, Robert Ambunda³, Nikola Medimorec³, Angel Cortez³, Agustina Krapp³, Erin Maxwell¹, John Harrison¹, Mark Howells^{1,2}

Affiliations

1. Centre for Sustainable Transitions: Energy, Environment and Resilience, Loughborough University
2. Centre for Environmental Policy, Imperial College London
3. SLOCAT Partnership on Sustainable, Low Carbon Transport

Corresponding author(s)

Naomi Tan (n.tan@lboro.ac.uk)

Abstract

Burkina Faso is a landlocked country in western Africa (Sahelian), covering an area of 274 200 square kilometres, with 22.1 million inhabitants (48 inhabitants per square kilometre). Burkina Faso is bordered by Mali to the north and west, Niger to the northeast, Benin to the southeast, and Cote d'Ivoire, Ghana and Togo to the south. Burkina Faso is one of the [least developed countries](#), ranked 184th out of 191 countries in the 2021-2022 [Human Development Index Report](#) of the United Nations Development Programme (UNDP), with a GDP of \$16.226 billion, and an economy largely based on agriculture.

Transport in Burkina Faso is seen as highly underdeveloped but the existing road infrastructure is seen as relatively good with several cross-border connections to Ghana, Ivory Coast, Mali, Niger and Togo.¹ For railways, there is only a rail connection to the Ivory Coast but rail connections to other countries have been proposed in the past.² Burkina Faso aims to improve urban transport and to modernise existing transport services as part of their climate strategy.³

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 Burkina Faso, which may act as a starting

¹ https://en.wikipedia.org/wiki/Transport_in_Burkina_Faso

² https://en.wikipedia.org/wiki/Rail_transport_in_Burkina_Faso

³ https://changing-transport.org/ndc_country/burkina-faso/

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

Burkina Faso

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 Burkina Faso
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.7998168

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 Burkina Faso. The data provided in this paper can be used to support the development of a transport model for Burkina Faso. 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).

<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 Burkina Faso.
Figure 2	A graph showing total GDP (million USD in 2015), as well as the share of the different sectors contributing to GDP in Burkina Faso: agriculture, construction, mining, manufacturing, service, and energy.
Table 1	A table showing passenger transport activity in Burkina Faso 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 Burkina Faso for the most recent year data were available. The data are curated from national statistics agencies or other government-affiliated agencies.
Table 3	A table showing freight transport activity in Burkina Faso based on UN DESA Statistics Division data (see explanation below). The data feature information for 2018.
Table 4	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 5	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 6	A table showing vehicle fleet data in Burkina Faso for the most recent year data were available.

For the parameters on passenger and freight transport activity, an additional dataset was included in

Table 2 and Table 3. The UN DESA Statistics Division modelled passenger activity and freight activity for every country in support of SDG Indicator 9.1.2⁴. Passenger activity data provide information for 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 platform⁵. Figure 1 displays the total population disaggregated by urban and rural in Burkina Faso.

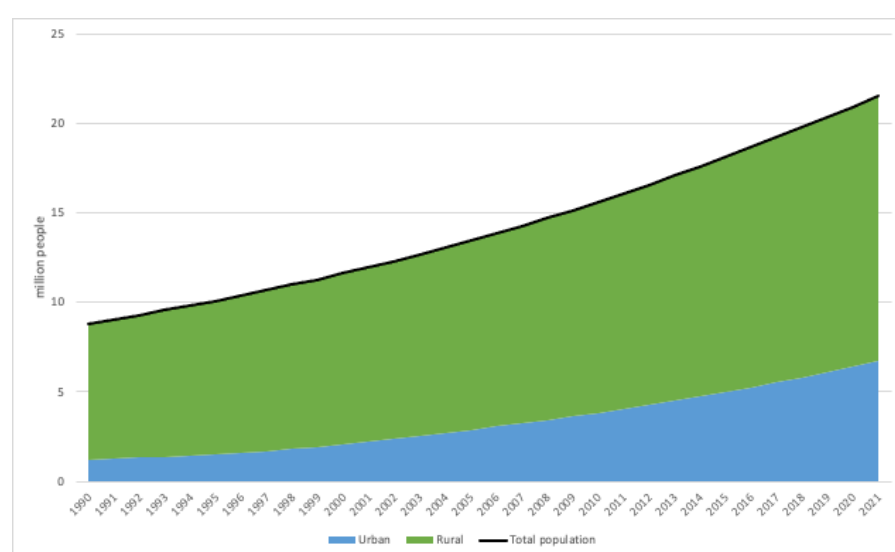


Figure 1: Total population (million people) disaggregated by urban and rural in Burkina Faso.

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 platform⁵. Where data was not available, data processing was done. Figure 2 shows the total GDP, as well as the share by sector, in Burkina Faso.

⁴ 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-5/about>

⁵ <https://data.worldbank.org/>

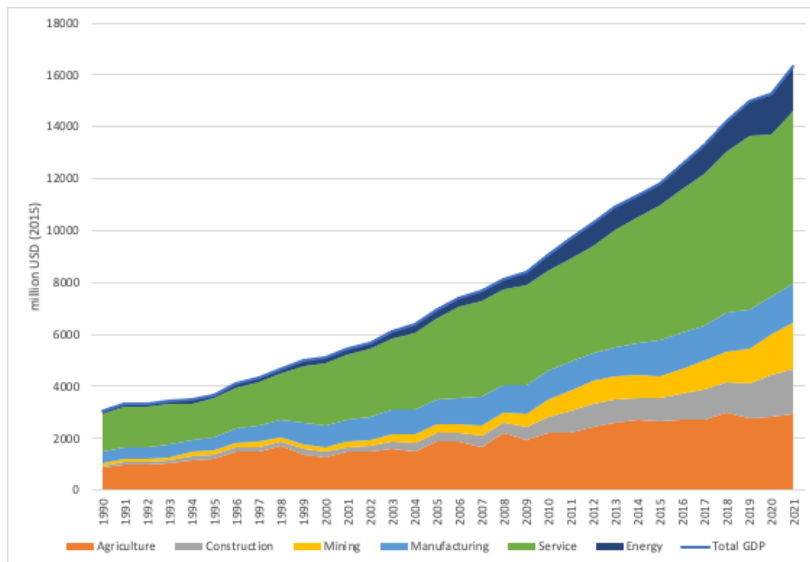


Figure 2: Total GDP (million USD in 2015) disaggregated by share in Burkina Faso.

1.3 Passenger transport activity

Burkina Faso has severe data gaps. The country reporting does not cover any of the data points. Information on passenger transport activity in Burkina Faso is not released by country statistics. The World Bank Data Portal does not either provide information on any passenger activity (rail, road or aviation). The country has a single railway line which runs (622 km of metre gauge railway) from Kaya to the border with Ivory Coast, via the capital Ouagadougou and Banfora⁶. There are also 15000 km of roads in Burkina Faso, of which 2500 km are paved ⁷.

According to the UN DESA modelled data, it is estimated that the passenger activity in Burkina Faso recorded over 17750 million passenger-km for road, 1209 million passenger-km for rail and 169 million passenger-km for aviation in 2019. The large majority of passenger activity is conducted through road transport.

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

Mode	2019
Aviation	169.04
Rail	1209.1
Road	17750.29

⁶ Wikipedia, 2022, Rail Transport in Burkina Faso, https://en.wikipedia.org/wiki/Rail_transport_in_Burkina_Faso#:~:text=There%20are%20622%20kilometres%20of,of%20the%20Abidjan%2DOuagadougou%20railway.

⁷ Wikipedia, 2022, Transport in Burkina Faso, https://en.wikipedia.org/wiki/Burkina_Faso#Transport

Source: UN DESA (2021), Indicator 9.1.2: Passenger volume (passenger kilometres) by mode of transport, Open SDG Data Hub, <https://www.sdg.org/datasets/undesa::indicator-9-1-2-passenger-volume-passenger-kilometres-by-mode-of-transport/about>, last accessed April 2022.

1.4 Freight transport activity

Burkina Faso was also found to have severe data gaps for freight transport. The latest available information on freight activity for Burkina Faso has been retrieved for rail and domestic aviation. The latest available rail freight information indicates that a total of 1 million tonnes-km rail activity in 2007, with a total of 0.06 million tonnes-km aviation freight activity in 2013 recorded. The data for both rail and aviation was provided by [African Development Bank Group Data Portal](#).

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

Table 2: Freight transport activity (million tonnes-km) in Burkina Faso

Mode	Value (Year)
Aviation	0.06 (2013)
Rail	1 (2007)

Source: World Bank (2014), World Development Indicators (WDI), November 2014, <https://drcongo.opendataforafrica.org/fiyipde/world-development-indicators-wdi-november-2014>

The UN DESA modelled data for 2019 estimates that freight activity through roads surpasses 7473 million tonnes-km. Rail is assumed to transport 2199 million tonnes-km. Freight activity by aviation is estimated to be 0.107 million tonnes-km for the same year.

Table 3: Modelled freight transport activity (million tonnes-km) in Burkina Faso

Mode	2018
Aviation	0.107468
Rail	2199.2
Road	7473.8

Source: UN DESA (2021), Indicator 9.1.2: Freight volume by mode of transport (tonne kilometres), Open SDG Data Hub, <https://www.sdg.org/datasets/indicator-9-1-2-freight-volume-by-mode-of-transport-tonne-kilometres-5?geometry=-79.979%2C-66.041%2C82.443%2C82.647>, 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.⁸

Table 4: 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

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 5: Load factors

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

1.7 Vehicle fleet

Burkina Faso has a total of 2.7 million road vehicles, as of 2017. Official records cover information from 2008 to 2017. During this period, the total vehicle fleet grew from 616,000 in 2008 to 2.7 million in 2017. The largest growth was recorded for motorised two-wheelers.

Table 6: Vehicle fleet in The Country

Mode	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Private Cars	103,623	110,931	120,209	131,452	146,076	162,417	179,832	198,488	217,331	238,180

⁸ 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

Small vans	24,576	26,130	27,949	30,134	32,915	35,285	37,493	39,491	41,304	43,504
Public transport	6,678	7,034	7,494	8,032	8,816	9,615	10,296	10,952	11,596	12,383
Heavy vehicles	33,819	35,712	38,962	43,559	49,474	55,542	61,440	67,794	73,567	80,708
Other automobiles	316	324	328	331	338	343	379	386	386	388
Motorised two-wheelers	447,426	551,252	689,808	868,088	1,072,966	1,282,706	1,521,048	1,789,181	2,051,103	2,329,427
Total	616,438	731,383	884,750	1,081,596	1,310,585	1,594,908	1,810,488	2,106,292	2,395,287	2,704,590

Source: <https://www.ssatp.org/sites/ssatp/files/publication/Country-Assesment-report-Burkina%20Faso-En.pdf>

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.