

Reproducibility Package for “Economics of Household Cooking Using Electricity in Nepal”

README file

This paper analyzes data collected from several sources, including the National Population and Housing Census (NPHC) 2021 and several issues of the Water and Energy Commissions Secretariat (WECS), as well as other secondary sources compiled through a comprehensive desk study, review of relevant peer-reviewed articles, and government and non-government published documents, reports, and articles.

All analysis is carried out in Excel. All calculations begin in the ‘input’ sheet, which contains the datasets.

I. Content of the package

The package contains 1 PDF file (README.pdf, this document) and 1 Microsoft Excel file with 24 Excel sheets. Excel sheet names of WPS 11157 - Reproducible Research Repository 08052025.xlsx:

1. Input
2. Table 1
3. Figure 1
4. Table 2
5. Table 3
6. Table 4
7. Table 5
8. Table 6
9. Figure 2
10. Table 7
11. Table 8
12. Table 9
13. Table 10
14. Table 11
15. Table 12
16. Figure 3
17. Table 13
18. Table 14
19. Figure 4
20. Table 15
21. Figures 5 and 6
22. Table A1
23. Table A2
24. Table A3

II. Description of input, and exhibits sheets

a. Statement about Rights

I certify that the author(s) of the manuscript have legitimate access to and permission to use the data used in this manuscript.

b. Data Description

The description of all 23 sheets (input and exhibits) of the Microsoft Excel file is explained below:

Sheet name	Description	Data source
Input	Dataset and assumptions	<p>Cell range D4:G15 Data sources: AEPC (2016), Gautam et al. (2021), Malla (2022), WECS (2022,2023) *</p> <p>Cell range C27:N29 Data sources: NSO (2023) and own estimation. *</p> <p>Cell range C32:N36 Data sources: WECS (2010, 2024a) *</p> <p>Cell range C39:H51 Data sources: WECS (2010, 2024a) *</p> <p>Cell range C53:K65 Data sources: NSO (2023), WECS (2021, 2022a, 2024a) *</p> <p>Cell range C76:H91 Data sources: WECS (2024b, 2022c, 2023) *</p> <p>Cell range C93:M104 Data source: NSO (2023) *</p> <p>Cell range C106:H117 Calculated based on cell range C93:M104 *</p> <p>Cell range C166:F170 Data source: EPIC India (2018) *</p> <p>Cell range C188:J218 Various. See the input sheet. *</p> <p>D119:H127 Data sources: Weyant et al. (2019), Yawale et al. (2023) *</p> <p>Cell range D222:L228 Assumption *</p> <p>Cell range D230:L238 Assumption *</p> <p>Cell range D241:L246 Assumption *</p>

		<p>Cell range D249:L255 Assumption *</p> <p>Cell range D272:DH280 Data source: IHME (2024) *</p> <p>Cell K4:L15 Assumption *</p> <p>O18:P25 Data source: WECS (2024a) *</p> <p>Cell range CJ5:CT16 Same as cell range Z24:AJ35 with unit converted to thousands. *</p> <p>Cell range CX27:DG39 Based on cell range CJ5:CT16 and BP5:BY20 *</p> <p>Cell range CW41:CZ52 Based on cell range CW24:DG24 and CK21:M117 *</p>
Exhibit/Sheet name		
Table 1	It shows the Nepalese households' availability/accessibility of cooking/heating energy consumption pattern by urbanization and ecological region.	Own visual illustration.
Figure 1	It shows the trend of residential LPG, electricity, and fuelwood consumption from 1996 to 2023	<p>WECS (2024a) http://wecs.gov.np/source/ESR_2024.pdf (compiled from energy balance tables)</p> <p>WECS (2010) http://www.wecs.gov.np/storage/listies/October2020/snyopsis.pdf (compiled from energy balance tables)</p> <p>Linked to the input sheet</p>
Table 2	This table presents residential and total final energy consumption in 1996 and 2023	<p>WECS (2024a) http://wecs.gov.np/source/ESR_2024.pdf (Extracted from Table 6.2, pp 84)</p> <p>WECS (2010) http://www.wecs.gov.np/storage/listies/October2020/snyopsis.pdf (Extracted from pp 115)</p> <p>Linked to the input sheet</p>
Table 3	This table presents province-level residential cooking energy consumption	<p>NSO (2023) https://censusnepal.cbs.gov.np/results/files/national/csv/NR_Hhld07_TypeOfCookingFuel.csv (For the number of households and urban households)</p> <p>WECS (2024a) Energy Consumption and Supply Situation in Federal System of Nepal http://www.wecs.gov.np/pages/reports-and-publications?lan=en&id=199</p>

		<p>(For Gandaki, Lumbini, Karnali, and Sudurpashchim provinces)</p> <p>WECS (2022a) https://wecs.gov.np/source/Bagmati%20Province.pdf (For Bagmati province)</p> <p>WECS (2021) http://wecs.gov.np/source/Final%20Report_Province%201.pdf (For Koshi province) http://wecs.gov.np/source/Final%20Report_%20Province%202.pdf (For Madhesh province)</p> <p>Linked to the input sheet</p>
Table 4	This table presents selected city-level residential cooking energy consumption and fuel/cooking technology stacking.	<p>WECS (2024b) http://wecs.gov.np/source/Cooking_Biratnagar_final_report.pdf (For Biratnagar)</p> <p>WECS (2022c) http://wecs.gov.np/source/Status%20of%20Clean%20Energy%20Cooking%20Technologies%20Used%20in%20major%20cities%20of%20Nepal%20(%20Pokhara%20and%20Butwal)%20(1).pdf (For Pokhara and Butwal)</p> <p>WECS (2023) http://www.wecs.gov.np/storage/listies/March2024/present-status-and-future-plan-of-clean-cooking-technologies-in-kathmandu-valley.pdf (For Kathmandu)</p> <p>Linked to the input sheet</p>
Table 5	This table presents the share of households by type of fuel usually used for cooking by region	<p>NSO (2023) https://censusnepal.cbs.gov.np/results/files/national/csv/NR_Hhld07_TypeOfCookingFuel.csv</p> <p>Linked to the input sheet</p>
Table 6	This table presents total deaths and the percentage of deaths from diseases attributable to HAP from solid fuels in 2021	<p>Data source: IHME (2024) https://vizhub.healthdata.org/gbd-results/ https://vizhub.healthdata.org/gbd-compare/#</p> <p>These data are restricted and require email registration. Total deaths (column 2 is estimated by dividing 1000 by the total deaths reported in the IHME (2024) dataset. Share of HAP (column 3 is estimated by multiplying by 100 to make it a percentage from the IHME (2024) dataset. Rank of top 10 causes of death (Column 4 is estimated from the percent of total deaths) from the IHME (2024) dataset.</p>
Figure 2	It presents a framework for estimating the household-levelized cost of cooking (LCOC). It is a self-explanatory table.	Own illustration.
Table 7	The table represents a list of key parameters and data used in the study. It is a self-explanatory table.	<p>Own estimation.</p> <p>Based on the data from the Census data NSO (2023) and WECS (2024a).</p>

Table 8	It shows the input data used in estimating LCOC in the study. It has been collected from various sources. It is a self-explanatory table.	Data compiled from various sources. (AEPC, 2016; Gautam et al., 2021; Malla, 2022; WECS, 2022, 2023). See the URL link in the reference section at the end. Linked to the input sheet.
Table 9	It shows the input data used in estimating LCOC in the study. It has been collected from various sources.	NEA, 2023a,b; NOC, 2025; Kathmandu Post, 2015; WECS, 2010, 2023 See the URL link in the reference section at the end.
Table 10	It shows the input data used in estimating LCOC in the study. It has been collected from various sources. It is a self-explanatory table.	Own estimation. Index calculated based on the input sheet.
Table 11	It shows input data on emission factors from cookstoves and social cost factors.	Weyant et al. (2019); Yawale et al. (2023); EPIC INDIA (2018) See the URL link in the reference section at the end.
Table 12	This table presents the calculated LCOC values by device type.	Own estimation. Calculated based on device cost (cell range BO5:BY20) and yearly fuel cost (cell range CJ6:CT15) from the input sheet.
Figure 3	It shows LCOC with fuel stacking.	Own estimation. See input sheet (cell range CZ43:CZ52)
Table 13	This table presents the estimated values of annual emissions of selected household air pollutants from cooking by region in 2021 (kg/household/year)	Own estimation. See input sheet (cell range C143:AU150)
Table 14	This table presents estimated values of external costs of PM2.5 and CO2 emissions of cooking in Nepal (thousand NRs/household/year)	Own estimation. See input sheet (cell range O169:Y185)
Figure 4	It displays estimated values of social costs (private and external) associated with cooking using selected fuels/technologies by region.	Own estimation. See Figure 4 sheet for the data used in the figure.
Table 15	This table shows the input data and assumptions for estimating the economic spillover effects of substituting LPG with electricity for household cooking in Nepal.	See input sheet (cell range C188:F218)
Figure 5	Total annual levelized cost of cooking with varying fuelwood prices compared with electricity and LPG cooking by region	Own estimation. See input sheet (cell range C220:L255)
Figure 6	Total annual levelized cost of cooking with varying LPG prices compared with electricity by region	
Table A1	Province-level household structure and their main source of cooking fuel in 2021	Data source: NSO (2023)
Table A2	Household size and useful energy requirement for cooking by region in Nepal	Poudel et al. (2023), WECS (2024a) and NSO (2023).
Table A3	Household's annual final energy consumption by region across the country (GJ/household/year)	Own estimation. See input sheet (cell range D153:N164)

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