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# References

These are the references I have used throughout my project, organized by the section they feature in.

## Theoretical Framework

These are sources I looked through to determine adequate sub-indices and indicators from expert analysis of migration. For the most part, skimmed through the literature to analyse the frequency of certain indicators under determined sub-index categories.

* Dunn, J. (2020). *\*Handbook on Constructing Composite Indicators METHODOLOGY AND USER GUIDE\** [online]. Available from: https://www.researchgate.net/publication/343404133\_Handbook\_on\_Constructing\_Composite\_Indicators\_METHODOLOGY\_AND\_USER\_GUIDE [accessed 15 March 2025].
* World Bank Group. (2025). *\*World Development Indicators | DataBank\** [online]. Available from: https://databank.worldbank.org/source/world-development-indicators [accessed 1 May 2025].
* Gemini. (2025). \*Gemini - Country Attractiveness Index Data Sources\* [online]. Available from: https://g.co/gemini/share/83a744e98278 [accessed 22 March 2025].
* Adewale, JG. (2005). \*Socio-Economic Factors Associated with Urban-Rural Migration in Nigeria: A Case Study of Oyo State, Nigeria\* [online]. Available from: https://www.researchgate.net/profile/Jacob-Adewale/publication/267716974\_Socio-Economic\_Factors\_Associated\_with\_Urban-Rural\_Migration\_in\_Nigeria\_A\_Case\_Study\_of\_Oyo\_State\_Nigeria/links/61dffae74e4aff4a643bb5b4/Socio-Economic-Factors-Associated-with-Urban-Rural-Migration-in-Nigeria-A-Case-Study-of-Oyo-State-Nigeria.pdf [accessed 15 April 2025].
* Fouarge, D. Ester, P. (2007). \*Factors determining international and regional Migration in Europe\* [online]. Available from: https://cris.maastrichtuniversity.nl/ws/portalfiles/portal/913803/guid-bc2ecf8e-2d2e-4747-b70a-bf0bd8e1d9b6-ASSET1.0.pdf [accessed 15 April 2025].
* Ishtiaque, A. Ullah, S. (2013). \*The Influence of Factors of Migration on the Migration Status of Rural-Urban Migrants in Dhaka, Bangladesh\* [online]. Available from: https://www.researchgate.net/profile/Asif-Ishtiaque/publication/258847945\_The\_Influence\_of\_Factors\_of\_Migration\_on\_the\_Migration\_Status\_of\_Rural-Urban\_Migrants\_in\_Dhaka\_Bangladesh/links/0deec5293b7fc7bcdb000000/The-Influence-of-Factors-of-Migration-on-the-Migration-Status-of-Rural-Urban-Migrants-in-Dhaka-Bangladesh.pdf [accessed 15 April 2025].
* Jónsson, G. (2010). \*The environmental factor in migration dynamics – a review of African case studies\* [online]. Available from: https://ora.ox.ac.uk/objects/uuid:cece31bd-0118-4481-acc2-e9ca05f9a763/files/m201a6e7e1e22129ba8734247dff9dbb0 [accessed 15 April 2025].
* Parkins, NC. (2010). \*Push and Pull Factors of Migration\* [online]. Available from: https://arpejournal.com/article/119/galley/114/view/ [accessed 15 April 2025].
* Urbański, M. (2022). \*Comparing Push and Pull Factors Affecting Migration\* [online]. Available from: https://www.mdpi.com/2227-7099/10/1/21 [accessed 15 April 2025].
* Ayarza, A. (2025). \*Determinants of Migration Choices: The Role of Beliefs about Career and Non-Career Outcomes\* [online]. Available from: https://www.alaitzayarza.com/uploads/ayarza\_determinants\_migration.pdf [accessed 15 April 2025].
* Dustmann, C. (2001). \*Return migration, wage differentials, and the optimal migration duration\* [online]. Available from: https://www.ucl.ac.uk/~uctpb21/Cpapers/returnmigrationwage.pdf [accessed 15 April 2025].
* European Commission. (2017). \*lagging\_regions report\_en.pdf\* [online]. Available from: http://ec.europa.eu/regional\_policy/sources/studies/lagging\_regions%20report\_en.pdf [accessed 15 April 2025].
* Fafchamps, M. Shilpi, F. (2008). \*Determinants of the Choice of Migration Destination\* [online]. Available from: https://economics.ucr.edu/wp-content/uploads/2019/11/Fafchamps-paper-4-24-09.pdf [accessed 15 April 2025].
* Gemini. (2025). \*Gemini - Economic Migration Study Search Plan\* [online]. Available from: https://g.co/gemini/share/b6488c714b49 [accessed 15 April 2025].
* Gibson, J. McKenzie, D. (2009) \*The Microeconomic Determinants of Emigration and Return Migration of the Best and Brightest\* [online]. Available from: https://openknowledge.worldbank.org/server/api/core/bitstreams/e45fe478-6222-5460-a9ee-5084d5dc784e/content [accessed 15 April 2025].
* Grogger, J. Hanson, GH. (2010). \*Income maximization and the selection and sorting of international migrants\* [online]. Available from: https://www.sciencedirect.com/science/article/pii/S0304387810000647 [accessed 15 April 2025].
* Gubhaju, B. Jong, GFD. (2009). \*Individual versus Household Migration Decision Rules: Gender and Marital Status Differences in Intentions to Migrate in South Africa\* [online]. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC2727691/ [accessed 15 April 2025].
* Olney, WW. Thompson, O. (2024). \*THE DETERMINANTS OF DECLINING INTERNAL MIGRATION\* [online]. Available from: https://www.nber.org/system/files/working\_papers/w32123/w32123.pdf [accessed 15 April 2025].
* Stark, O. Bloom, DE. (1985). \*The New Economics of Labor Migration\* [online]. Available from: https://www.jstor.org/stable/1805591 [accessed 15 April 2025].
* Walker, JR. Kennan, J. (2003). \*THE EFFECT OF EXPECTED INCOME ON INDIVIDUAL MIGRATION DECISIONS\* [online]. Available from: https://www.nber.org/system/files/working\_papers/w9585/w9585.pdf [accessed 15 April 2025].
* Walker, JR. Kennan, J. (2012). \*Modeling Individual Migration Decisions\* [online]. Available from: https://users.ssc.wisc.edu/~jkennan/research/MigIzaR2.pdf [accessed 15 April 2025].
* De Haas, H. and Fransen, S. (2018). \*Social Transformation and Migration: An empirical inquiry\* [online]. Available from: https://heindehaas.org/wp-content/uploads/2018/06/wp-141-1.pdf [accessed 27 April 2025].
* Gemini. (2025). \*Gemini - Social Factors in Migration Studies\* [online]. Available from: https://g.co/gemini/share/7e2a1bcf42cc [accessed 27 April 2025].
* Heins, F. degli Uberti, S. Bonifazi, C. Crisci, M. & Paparusso, A. Pelliccia, A. De Rocchi, D. Vitiello, M. (2023). \*Drivers of International Migration\* [online]. Available from: https://www.researchgate.net/publication/372768394\_Drivers\_of\_International\_Migration [accessed 27 April 2025].
* Helliwell, J. Wang, S. Xu, J. (2015). \*How Durable are Social Norms? Immigrant Trust and Generosity in 132 Countries\* [online]. Available from: https://www.researchgate.net/publication/280482491\_How\_Durable\_are\_Social\_Norms\_Immigrant\_Trust\_and\_Generosity\_in\_132\_Countries [accessed 27 April 2025].
* Lorincz, L. Brigitta, N. (2022). \*How Social Capital is Related to Migration Between Communities?\* [online]. Available from: https://www.researchgate.net/publication/363583702\_How\_Social\_Capital\_is\_Related\_to\_Migration\_Between\_Communities [accessed 27 April 2025].
* Manchin, M. Orazbayev, S. (2018). \*Social networks and the intention to migrate\* [online]. Available from: https://growthlab.hks.harvard.edu/files/growthlab/files/cidrfwp90.pdf [accessed 27 April 2025].
* Poros, M. (2011). \*Migrant Social Networks: Vehicles for Migration, Integration, and Development\* [online]. Available from: https://www.migrationpolicy.org/article/migrant-social-networks-vehicles-migration-integration-and-development [accessed 27 April 2025].
* Salemo, J. (2016). \*Migrant decision-making in a frontier landscape\* [online]. Available from: https://sites.warnercnr.colostate.edu/jdsal/wp-content/uploads/sites/127/2020/09/Salerno-2016-Env-Res-Lett.pdf [accessed 27 April 2025].
* ScienceDirect. (2025). \*Institutional Trust - an overview | ScienceDirect Topics\* Available from: https://www.sciencedirect.com/topics/computer-science/institutional-trust [accessed 27 April 2025].
* Urbański, M. (2022). \*Comparing Push and Pull Factors Affecting Migration\* [online]. Available from: https://www.mdpi.com/2227-7099/10/1/21 [accessed 27 April 2025].
* Zanabazar, A. Kho, NS. Jigjiddorj, S. (2021). \*The Push and Pull Factors Affecting the Migration of Mongolians to the Republic of South Korea\* [online]. Available from: https://www.researchgate.net/publication/348301781\_The\_Push\_and\_Pull\_Factors\_Affecting\_the\_Migration\_of\_Mongolians\_to\_the\_Republic\_of\_South\_Korea [accessed 27 April 2025].
* - Adserà, A. Boix, C. Guzi, M. and Pytliková, M. (2016). \*Political Factors as Drivers of International Migration\* [online]. Available from: https://epc2016.eaps.nl/papers/160868 [accessed 28 April 2025].
* - Bergh, A. Mirkina, I. and Nilsson, T. (2015). \*Pushed by Poverty or by Institutions? Determinants of Global Migration Flows\* [online]. Available from: https://www.ifn.se/media/2gjjr1er/wp1077.pdf [accessed 28 April 2025].
* - ChatGPT. (2025). \*Political Factors Migration Studies\* [online]. Available from: https://chatgpt.com/share/6812a065-e1a0-800c-b6f6-6643e8025412 [accessed 30 April 2025].
* Harding, L. and Panzaru, C. (2024). \*How Transit Countries Become Refugee Destinations: Insights from Central and Eastern Europe\* [online]. Available from: https://arxiv.org/pdf/2411.08350 [accessed 30 April 2025].
* Helliwell, J. Wang, S. Xu, J. (2015). \*How Durable are Social Norms? Immigrant Trust and Generosity in 132 Countries\* [online]. Available from: https://www.researchgate.net/publication/280482491\_How\_Durable\_are\_Social\_Norms\_Immigrant\_Trust\_and\_Generosity\_in\_132\_Countries [accessed 27 April 2025].
* Poprawe, M. (2015). \*On the relationship between corruption and migration: empirical evidence from a gravity model of migration\* [online]. Available from: https://link.springer.com/article/10.1007/s11127-015-0255-x [accessed 30 April 2025].
* Rosenblum, MR. (2003). \*The Political Determinants of Migration Control: A Quantitative Analysis\* [online]. Available from: https://www.scielo.org.mx/scielo.php?pid=S1665-89062003000100007&script=sci\_arttext [accessed 30 April 2025].
* Urbański, M. (2022). \*Comparing Push and Pull Factors Affecting Migration\* [online]. Available from: https://www.mdpi.com/2227-7099/10/1/21 [accessed 28 April 2025].

## Data Selection

* [1] ChatGPT. (2025). \*Selenium SVG Scraping\* [online]. Available from: https://chatgpt.com/share/68135847-fa4c-800c-b609-f99a78e8db85 [accessed 1 May 2025].
* [2] ChatGPT. (2025). \*WB DataBank Variable Search\* [online]. Available from: https://chatgpt.com/share/6818a98a-773c-800c-89ac-61c1ea283782 [accessed 5 May 2025].
* World Bank Group. (2025). \*World Development Indicators | DataBank\* [online]. Available from: https://databank.worldbank.org/source/world-development-indicators [accessed 5 May 2025].
* International Labour Organization. (2020). \*Statistics on social dialogue - ILOSTAT\* [online]. Available from: https://ilostat.ilo.org/topics/industrial-relations/ [accessed 1 May 2025].
* UCDP. (2023). \*UCDP - Uppsala Conflict Data Program\* [online]. Available from: https://ucdp.uu.se/year/2023 [accessed 1 May 2025].
* World Bank Group. (2024). \*Home | Worldwide Governance Indicators\* [online]. Available from: https://databank.worldbank.org/source/worldwide-governance-indicators# [accessed 5 May 2025].
* World Justice Project. (2024). \*WJP Rule of Law Index\* [online]. Available from: https://worldjusticeproject.org/rule-of-law-index/global/2024/Fundamental%20Rights/table [accessed 1 May 2025].
* World Values Survey Association. (2022). \*WVS Database\* [online]. Available from: https://www.worldvaluessurvey.org/WVSOnline.jsp [accessed 1 May 2025].
* International Labour Organization. (2025). \*ILOSTAT Data Explorer\* [online]. Available from: https://rshiny.ilo.org/dataexplorer4/ [accessed 1 May 2025].
* International Monetary Fund. (2024). \*World Revenue Longitudinal Database\* [online]. Available from: https://www.imf.org/en/Topics/fiscal-policies/world-revenue-longitudinal-database [accessed 1 May 2025].
* International Telecommunication Union. (2024). \*Population coverage, by mobile network technology - ITU DataHub\* [online]. Available from: https://datahub.itu.int/data/?i=100095 [accessed 1 May 2025].
* marcelobatalhah. (2025). \*Quality of Life Index by Country 🌎🏡\* [online]. Available from: https://www.kaggle.com/datasets/marcelobatalhah/quality-of-life-index-by-country?resource=download [accessed 1 May 2025].
* World Population Review. (2025). \*Crime Rate by Country 2025\* [online]. Available from: https://worldpopulationreview.com/country-rankings/crime-rate-by-country [accessed 1 May 2025].
* Jadhav, V. (2022). \*python - Pandas dataframe to specific sheet in a excel file without losing formatting - Stack Overflow\* [online]. Available from: https://stackoverflow.com/questions/71527992/pandas-dataframe-to-specific-sheet-in-a-excel-file-without-losing-formatting [accessed 2 May 2025].
* waitingkuo. (2013). \*python - How can I iterate over rows in a Pandas DataFrame? - Stack Overflow\* [online]. Available from: https://stackoverflow.com/questions/16476924/how-can-i-iterate-over-rows-in-a-pandas-dataframe [accessed 1 May 2025].
* jL4. (2017). \*arrays - Making equal size lists in Python - Stack Overflow\* [online]. Available from: https://stackoverflow.com/questions/43336837/making-equal-size-lists-in-python [accessed 1 May 2025].
* Akram. (2021). \*python - How to determine whether a Pandas Column contains a particular value - Stack Overflow\* [online]. Available from: https://stackoverflow.com/questions/21319929/how-to-determine-whether-a-pandas-column-contains-a-particular-value [accessed 1 May 2025].
* ChatGPT. (2025). \*Updating dataframe issue\* [online]. Available from: https://chatgpt.com/share/68143640-b6b8-800c-9ff5-0f44f2d2b684 [accessed 2 May 2025].
* Nelamali, N. (2024). \*Pandas Write to Excel with Examples - Spark By {Examples}\* [online]. Available from: <https://sparkbyexamples.com/pandas/pandas-write-to-excel-with-examples/#:~:text=Use%20pandas%20to_excel()%20function,sheet%20name%20to%20write%20to> [accessed 5 May 2025].

## Imputation of Missing Data

* Herbst, S. (2022). \*Imputing Missing Values with Machine Learning-Based Approaches | by Sabrina Herbst | Medium\* [online]. Available from: https://medium.com/@sabrinaherbst/imputing-missing-values-with-machine-learning-based-approaches-373219dba314 [accessed 7 May 2025].
* Schwartz, D. (2022). \*How to Drop Rows of Pandas DataFrame Whose Value in a Certain Column is NaN\* [online]. Available from: https://www.aporia.com/resources/how-to/drop-rows-pandas-dataframe-column-vamue-nan/ [accessed 7 May 2025].
* [1] Saturn Cloud. (2023). \*How to Find All Rows with NaN Values in Python Pandas | Saturn Cloud Blog\* [online]. Available from: https://saturncloud.io/blog/how-to-find-all-rows-with-nan-values-in-python-pandas/#:~:text=To%20find%20all%20rows%20with%20NaN%20values%20in%20a%20Pandas,where%20NaN%20values%20are%20present [accessed 7 May 2025].
* [2] Saturn Cloud. (2023). \*How to Concatenate Rows of Two DataFrames in Pandas | Saturn Cloud Blog\* [online]. Available from: https://saturncloud.io/blog/how-to-concatenate-rows-of-two-dataframes-in-pandas/#:~:text=Concatenating%20rows%20of%20two%20dataframes%20in%20Pandas%20is%20a%20simple,index%20values%20that%20may%20arise [accessed 7 May 2025].
* Gemini. (2025). \*Gemini - Imputing Missing Tax Values with K-Means\* [online]. Available from: https://g.co/gemini/share/61eb79bc1e48 [accessed 7 May 2025].

## Multivariate Analysis

* [1] ChatGPT. (2025). \*Multivariate scatterplot function\* [online]. Available from: https://chatgpt.com/share/681442d6-6df8-800c-8f0c-e37562646711 (accessed 2 May 2025).
* Gemini. (2025). \*Gemini - Project Analysis: P-Values and Correlations\* [online]. Available from: https://g.co/gemini/share/3dfb4f0ac478 (accessed 2 May 2025).
* [2] ChatGPT. (2025). \*File Writing in Python\* [online]. Available from: https://chatgpt.com/share/6814f4af-05c0-800c-9800-bafaa72ab149 (accessed 2 May 2025).

## Normalization

* ChatGPT. (2025). \*Multivariate scatterplot function\* [online]. Available from: https://chatgpt.com/share/681442d6-6df8-800c-8f0c-e37562646711 (accessed 2 May 2025).

## Weighting and Aggregation

* References used

## Links to Other Indicators

* No references used for this section specifically, though technically this would feed back to the following reference in the “Data Selection” step, where I retrieved the net migration indicator:
  + World Bank Group. (2025). \*World Development Indicators | DataBank\* [online]. Available from: https://databank.worldbank.org/source/world-development-indicators [accessed 5 May 2025].

## Visualization of the Results

* Data with Dylan. (2023). \*How to Create INTERACTIVE MAPS in Python\* [online]. Available from: https://www.youtube.com/watch?v=\_xeoUYUO8Lo (accessed 4 May 2025).
* opendatasoft. (n.d.). \*World Administrative Boundaries - Countries and Territories — Opendatasoft\* [online]. Available from: https://public.opendatasoft.com/explore/dataset/world-administrative-boundaries/export/ (accessed 4 May 2025).
* Şahbaz, K. (2020). \*merge - Merging a geodataframe and pandas dataframe based on a column - Geographic Information Systems Stack Exchange\* [online]. Available from: https://gis.stackexchange.com/questions/349244/merging-a-geodataframe-and-pandas-dataframe-based-on-a-column (accessed 4 May 2025).
* Plotly. (2025). Radar charts in Python [online]. Available from: https://plotly.com/python/radar-chart/ [accessed 8 May 2025].