Quantifying Labour Shortages in Central and Eastern Europe: Standardized Methodologies for Sustainable Solutions

Cristina LINCARU[1]
Adriana GRIGORESCU[2]
Gabriela TUDOSE[3]

Abstract

Over the past two decades, Central and Eastern Europe has been significantly impacted by labour shortages, primarily caused by the migration of workers to Western Europe. In response to these shortages, many countries in the region, including Romania, have increasingly relied on migrant workers from outside Europe. In this context, using standardized methodologies for quantitatively measuring labour shortages becomes essential for developing effective public policies.

This presentation explores the applicability of the labour market diagnostic tools developed by the World Bank, such as the Job Generation and Growth Decomposition Tool, the Jobs and Structural Change Excel Tool (JSCS), and the Jobs Group Demography Tool, to accurately assess labour market needs. Through these tools, we will analyze the impact of labour shortages on Romania's labour market, the contribution of migrant workers, and data-driven solutions aimed at ensuring labour market sustainability in the face of growing migrant inflows. Additionally, we will discuss the feasibility of attracting native workers from the diaspora as an alternative solution.

Keywords: *Labor shortages, Migrant workers, Quantitative methodologies, Labor market diagnostics, Central and Eastern Europe*

JEL classification: E2, J2, J6, J7

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1. Introduction

Over the past two decades, workforce migration has become a significant global phenomenon, driven by various economic, social, political, and environmental factors. Labour shortages have become a critical challenge for

[1] Cristina Lincaru, National Scientific Research Institute for Labour and Social Protection (INCSMPS), Bucharest, Romania, cristina.lincaru@incsmps.ro

[2] Adriana Grigorescu, National University of Political Studies and Public Administration (SNSPA), Bucharest, Romania, Academy of Romanian Scientists (AOSR), National Institute for Economic Research" Costin C. Kiritescu" (INCE) – Romanian Academy, adriana.grigorescu@snspa.ro

[3] Gabriela Tudose, National Scientific Research Institute for Labour and Social Protection (INCSMPS), Bucharest, Romania, gabriela.tudose@incsmps.ro

Central and Eastern Europe (CEE), particularly in Romania, where demographic decline and emigration of skilled labour have severely impacted the economy. Between 2007 and 2022, Romania experienced a significant outflow of workers (World Bank, 2022). This outflow has resulted in a workforce gap, Romania facing challenges in maintaining a sufficient workforce to sustain its economic growth (European Commission, 2023).

In recent years, Romania has increasingly relied on migrant workers from non-European countries such as Nepal, Sri Lanka, and India to fill labour shortages. This trend highlights the need for data-driven strategies and innovative policy measures to address the interplay between demographic trends, migration flows, and economic demands (World Bank, 2022; European Commission, 2023).

The study on which the present paper relies explores these standardized diagnostics tools to examine how labour market needs can be accurately assessed and how strategic policy measures can be designed to ensure workforce sustainability, providing actionable insights for Romania and the broader CEE region.

2. Literature review

Migration plays a significant role in shaping Romania's demographics (Pripoaie et al., 2022). In the last 30 years, Romania has faced one of the most significant migration phenomena globally, losing over two million inhabitants according to official statistics. In recent years, Romania has witnessed massive emigration of the workforce, especially of skilled young individuals. That had an important contribution to the push and pull factors that have led to labour shortages, especially in Romania.

Labour shortages in Central and Eastern Europe (CEE) have been **extensively documented** in the context of demographic challenges and economic transitions. Previous studies highlight that population decline, emigration of skilled workers, and structural shifts in the economy are the primary drivers of workforce shortages in the region (World Bank, 2022; European Commission, 2023). These factors have exacerbated disparities in labour market dynamics, with significant regional variations observed within countries like Romania (Ionescu et al., 2021).

Several international organizations, such as the World Bank and the International Labour Organization (ILO), have developed diagnostic tools aimed at measuring labour market gaps. For instance, the **Job Generation and Growth Decomposition Tool** and the **Jobs and Structural Change Excel Tool (JSCS)** have proven effective in identifying workforce needs and growth patterns in emerging economies (ILO, 2021).

A key research gap lies in the lack of integration between quantitative labour market diagnostics and the formulation of targeted policy interventions. While existing studies provide valuable insights into macroeconomic trends, there is insufficient emphasis on the granular, sector-specific analysis required to address regional labour shortages effectively. Furthermore, **limited data** on the impact of

migrant workers and the potential contribution of returning diaspora further constrains the development of comprehensive labour market strategies (OECD, 2020).

An important issue is related to another phenomenon impact of massive emigration from Romania, whose trend seems to be prolonged in the coming years, impacting on the development of the future workforce, respectively on children from transnational families. Protecting the rights of children left behind, becomes a complex task for policymakers, who need to develop appropriate tools to quantify the phenomenon and enable them to carry out the functions of transnational families (Aniela Matei & Cristina Stroe, 2022).

Lately, specific policies addressing the migrant population have been built at the level of the EU to create close synergies with existing and upcoming EU strategies to foster equality and social cohesion to ensure everyone is fully included and participates in European societies. "Action Plan for Integration and Inclusion 2021-2027" was elaborated to promote inclusion of migrants and highlights that fully integrating migrants into the labour market could generate up to € 3.500 increase in the average net fiscal contribution of each migrant by 2035.

This present research seeks to fill these gaps by applying advanced labour market diagnostic tools to Romania's workforce. Focusing on quantitative methodologies, it aims to provide actionable insights that bridge the divide between academic research and practical policymaking, ensuring a sustainable and inclusive approach to addressing labour shortages. It is built upon existing research on labour shortages and workforce dynamics in Central and Eastern Europe (CEE). Previous studies, such as those by the World Bank (2022) and OECD (2020), have shown the need for comprehensive labour market diagnostics to address the growing mismatch between workforce supply and demand. These works highlight the importance of data-driven approaches to identify labour market trends, regional disparities, and sectoral needs. While tools such as the **Job Generation and Growth Decomposition Tool** and the **Jobs and Structural Change Excel Tool (JSCS)** have been successfully applied in various global contexts, their application in Romania remains underexplored. Recent advancements in demographic and labour market analytics provide an opportunity to adapt these tools to local realities, offering a more granular perspective on workforce challenges (International Labour Organization, 2021).

Additionally, this study complements ongoing research by integrating the contributions of migrant workers and the potential role of returning diaspora into the analysis. While prior research has addressed migration flows and their macroeconomic impacts (European Commission, 2023), there is limited focus on how diagnostic tools can quantify and predict these trends at a regional level.

3. Methodology

The research is guided by the following question:" How **can labour shortages in Romania and the CEE region be quantitatively measured using**

the labour market diagnostic tools developed by the World Bank, such as the Job Generation and Growth Decomposition Tool, the Jobs and Structural Change Excel Tool (JSCS), and the Jobs Group Demography Tool?"

In this paper, the authors used only the **Jobs Group Demography Tool**, elaborated by World Bank. This tool analyzes workforce demographics by leveraging automated population and data labour:

- **UN Population Database**: Supplier demographic breakdowns by age, gender, and education, are critical for assessing workforce sustainability (United Nations, 2023).
- **Eurostat Migration Statistics**: Track inflows and outflows of migrant workers, providing essential data on migration patterns (Eurostat, 2023c).
- **Romanian National Institute of Statistics**: Offers granular demographic data at the regional level, ensuring detailed insights into workforce composition (Romanian National Institute of Statistics, 2023b).
- **ILO Population and Labour Force Projections**: Provides future trends for labour market sustainability analysis, offering projections for policymaking (International Labour Organization, 2023).

The use of **automated data sources** provides several advantages for analyzing labour market dynamics and addressing labour shortages, such us:

- **Access:** Automated data sources ensure up-to-date insights into labour market dynamics. For instance, the World Bank's Data API provides continuous updates on sectoral growth and workforce trends, enabling timely decision-making (World Bank, 2023a, 2023b). Similarly, Eurostat's live database supports real-time analysis of regional labour market conditions (Eurostat, 2023a).
- **Consistency:** Standardized international datasets, such as those provided by ILOSTAT and the United Nations Population Database, reduce discrepancies in data collection and reporting, improving the reliability of cross-country comparisons (International Labour Organization, 2023; United Nations, 2023).
- **Scalability:** Automated data pipelines facilitate the integration of additional tools and datasets for broader regional analyses. For example, the structural business statistics from Eurostat can be seamlessly combined with national-level data from Romania's Institute of Statistics, providing a scalable framework for multi-regional studies (Eurostat, 2023b; Romanian National Institute of Statistics, 2023a).

4. Results and discussion

4.1 Study case using the Jobs Group Demography Tool

Our analysis begins with a first comparative analysis of population structures in 2020 and 2025: Romania as a receiving country and main source countries (Nepal, Sri Lanka, India, Bangladesh, and Turkey) providing workforce.

Both figures 3 and 4 showcase the population distribution by five-year age groups and gender for six countries: Romania, Turkey, Nepal, Sri Lanka, India, and Bangladesh. The data in Figure 3 represents the population structure in 2020, while Figure 4 projects the structure for 2025 under a medium fertility scenario. These visualizations provide insight into demographic changes over the five years, highlighting trends in population growth, ageing, and gender distribution. These demographic differences partly explain the migration flows from countries with younger, more abundant labour pools to Romania, which faces labour shortages due to an ageing population and emigration.

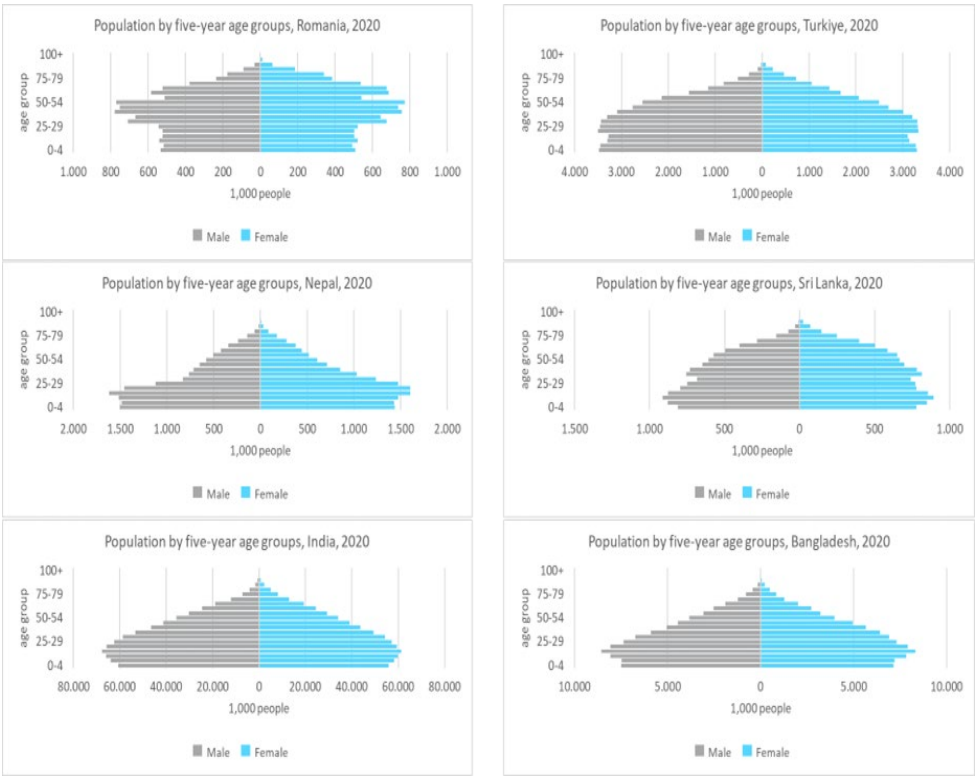


Figure 1. Population Distribution by Five-Year Age Groups and Gender for Romania, Turkey, Nepal, Sri Lanka, India and Bangladesh, 2020

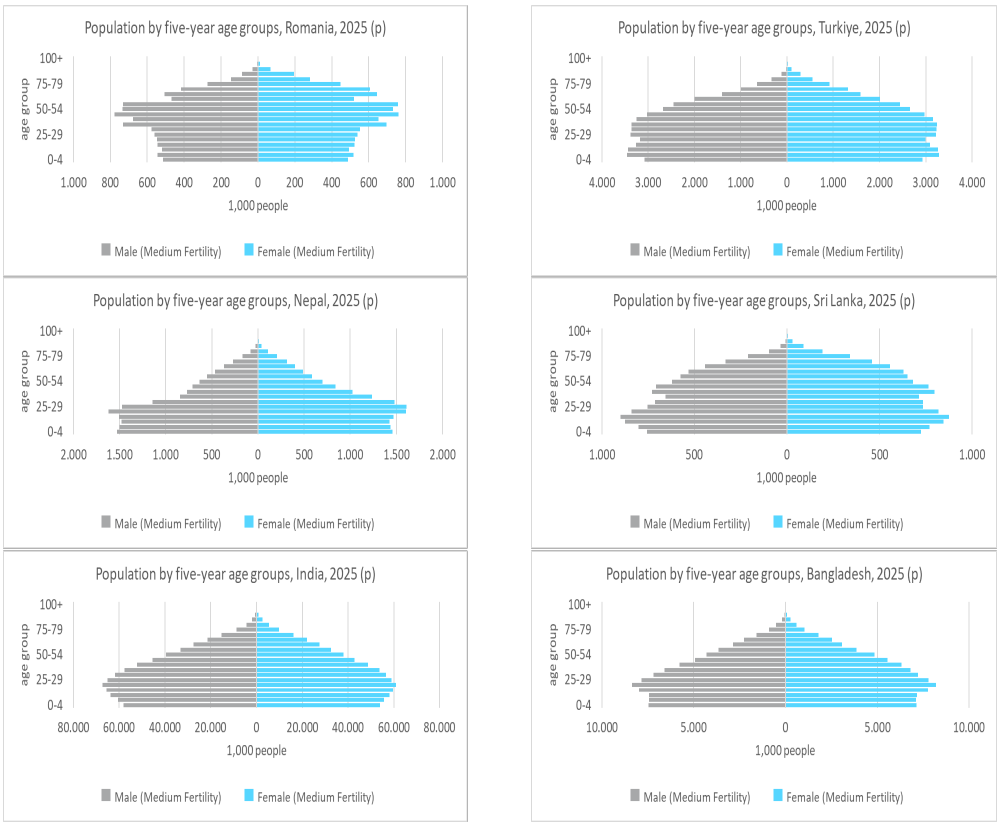


Figure 2. Population Distribution by Five-Year Age Groups and Gender for Romania, Turkey, Nepal, Sri Lanka, India, and Bangladesh, 2025

Comparative Insights (2020 vs. 2025):

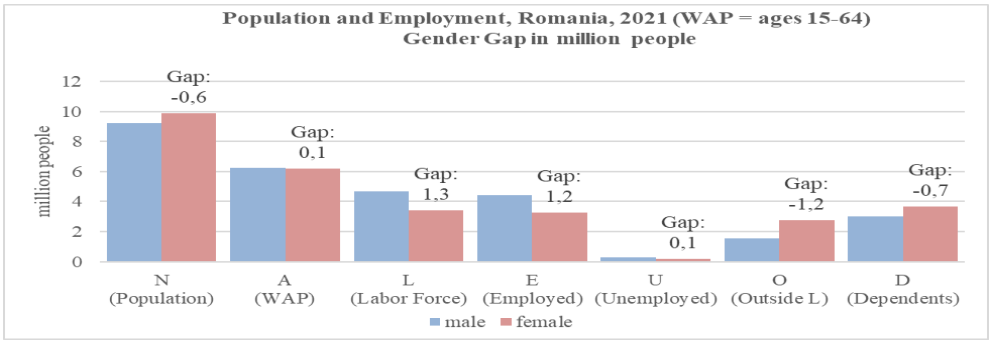
1. **Ageing Trends**: Romania and Sri Lanka continue to experience significant ageing, while Turkey, Nepal, India, and Bangladesh maintain younger populations, albeit with signs of demographic transition.
2. **Labour Force Potential**: the labour force in countries like Nepal, India, and Bangladesh remains strong, with a broad working-age population. These countries are likely to continue serving as major sources of migrant labour for ageing countries like Romania.
3. **Dependency Ratios**: the increasing proportion of older age groups in Romania and Sri Lanka will likely raise dependency ratios, whereas Turkey, India, Nepal, and Bangladesh maintain more favourable demographic profiles.
4. **Population Stability**: while Romania's population shrinks and ages, countries like India and Bangladesh demonstrate demographic resilience, suggesting sustained population growth and economic potential.

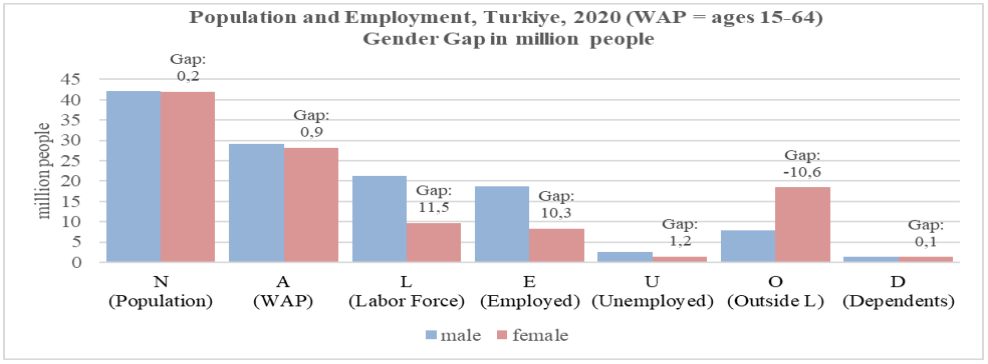
The comparison of Figures 3 and 4 highlights the stark differences in demographic trajectories. Romania faces an ongoing demographic decline, necessitating strategies to attract foreign workers and address ageing-related

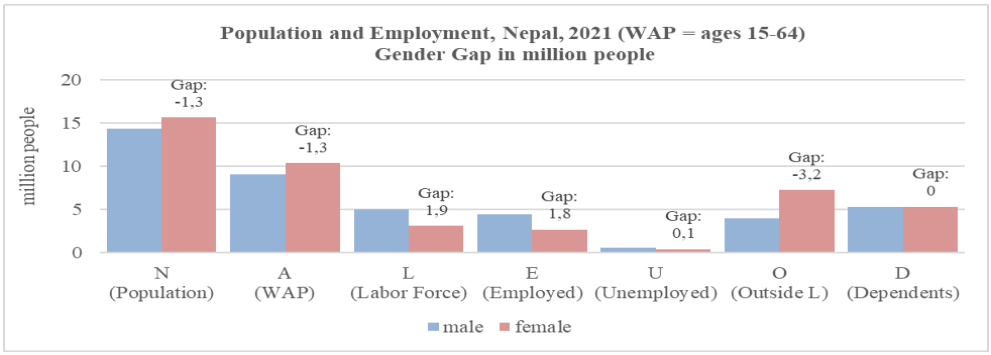
challenges. Meanwhile, countries like Nepal, India, and Bangladesh, with their youthful population, remain critical sources of labour migration.

4.2 Relative Gender Gaps in Population and Employment for Romania and Labour-Exporting Countries

This hierarchical analysis evaluates the **gender gaps** across Romania and labour-exporting countries (Figure 5), focusing on the relative disparities between males and females in labour force participation and other categories.







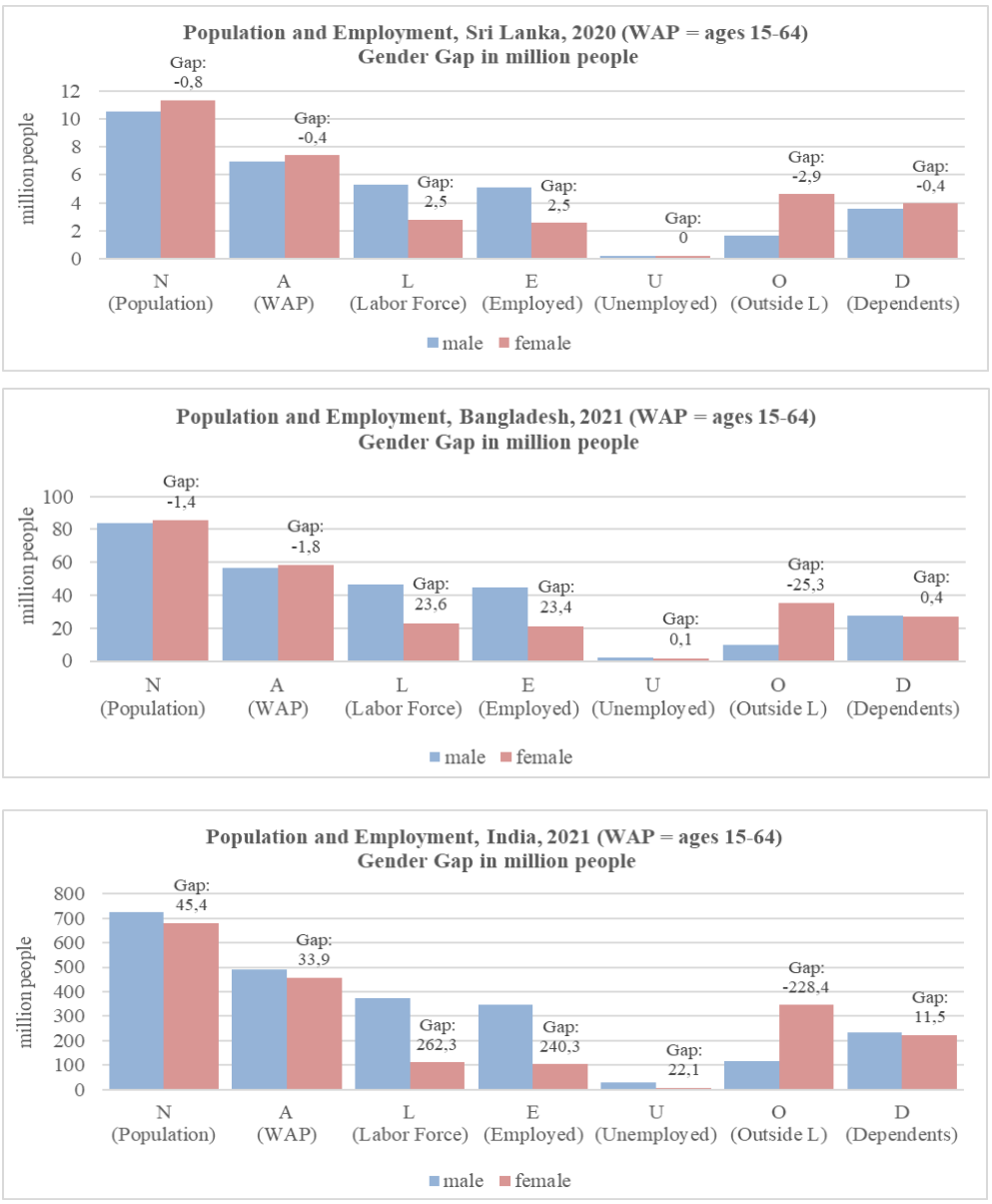


Figure 3. Relative Gender Gaps in Population and Employment for Romania and Labour-Exporting Countries, 2020, 2021 (million people)

The main key takeaways of the hierarchical analysis are:

- **Largest Relative Gaps:** India and Bangladesh exhibit the most significant disparities in female labour force participation relative to males.
- **Moderate Gaps:** Türkiye and Nepal reflect structural labour force imbalances, albeit less severe than in South Asia.

- **Smaller Gaps:** Romania and Sri Lanka show comparatively smaller gaps in labour force participation but still face notable disparities.

4.3 Comparative Analysis of Dependency Ratios Across Countries (1998 vs. 2021/2020)

This analysis compares the dependency ratios across **Romania, Türkiye, Nepal, Sri Lanka, India, and Bangladesh**, focusing on three indicators: Dependents per WAP (Working Age Population), Dependents per Labour Force (LF), and Dependents per Employed. The trends reflect demographic, labour market, and economic shifts over time.

Dependents per WAP (Working Age Population*)*

- *Key Insight:* A universal decline in Dependents/WAP suggests improving dependency ratios due to falling fertility rates and increased workforce participation.

Dependents per Labour Force (LF)

- *Key Insight:* Declining dependents/LF in most countries reflects better labour market utilization, except in Romania, where ageing may increase dependency.

Dependents per Employed

- *Key Insight:* The most significant improvements are seen in Nepal and Bangladesh, indicating a rapid shift toward reducing dependency burdens on employed individuals.

Overall Trends and Comparative Insights:

- **Demographic Shifts**: universal declines in **Dependents/WAP** reflect demographic transitions, especially reductions in youth dependency (e.g., Nepal and Bangladesh). Romania's stability in WAP ratios contrasts with slight increases in economic burdens on its labour force and employed population, driven by ageing demographics.
- **Labour Market Adjustments**: countries like Nepal and Bangladesh show significant reductions in **Dependents/LF** and **Dependents/Employed**, driven by structural changes in labour markets and increased economic participation. Türkiye reflects balanced demographic and labour market dynamics, with consistent improvements in all indicators.
- **Economic Implications**: Romania's rising burdens highlight challenges with an ageing population and declining labour force. South Asian countries (Nepal, India, Bangladesh) show steady progress in labour market utilization, suggesting growing productivity and reduced dependency

Country Rankings by Dependency Reductions (1998-2021/2020):

1. **Most Improved**: Nepal and Bangladesh (significant reductions in all dependency ratios).
2. **Moderately Improved**: Türkiye and India (consistent but less dramatic declines).
3. **Stable or Rising Burden**: Romania and Sri Lanka (slight increases in dependency burdens on workers).

4.4 Demographic Dependency Ratios Relative to Labour Market Aggregates: A Comparative Analysis Across Six Countries (1998-2021/2020)

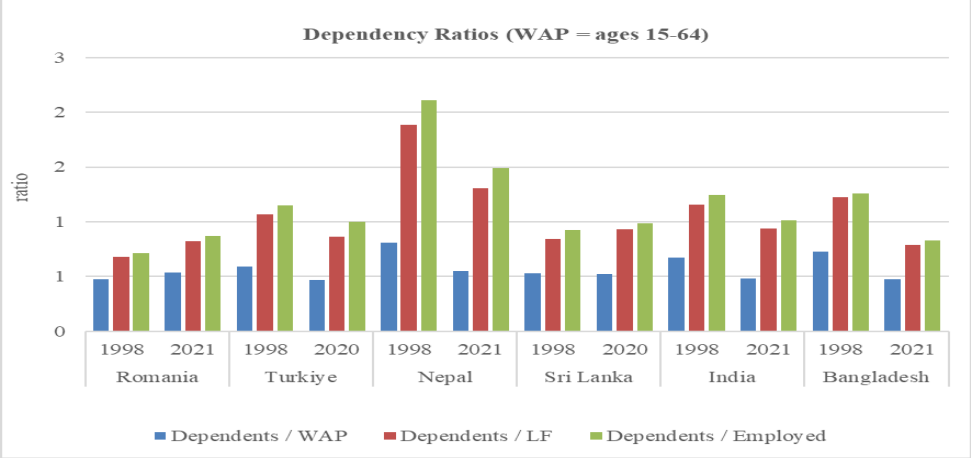
Figure 6 illustrates the dependency ratios across six countries (Romania, Türkiye, Nepal, Sri Lanka, India, and Bangladesh) for two-time points: 1998 and 2021/2020. The ratios are broken down into three metrics:

Dependents per Working Age Population (WAP) - Blue bars.
Dependents per Labour Force (LF) - Red bars.
Dependents per Employed - Green bars.

The analysis shows that concerning **Romania and Türkiye** the ratios remained stable for dependents per WAP (0.5), with moderate increases in dependents per LF and dependents per employed, reflecting ageing populations and labour market shifts. **Nepal** showed the highest dependency ratios in 1998, especially for dependents per LF (1.9) and dependents per employed (2.1). These decreased significantly by 2021, indicating demographic and labour market improvements. Dependency ratios in South Asia (India, Bangladesh) declined uniformly, with substantial improvements in dependents per employed. However, these countries still face higher burdens compared to Romania and Türkiye. **Sri Lanka** demonstrated stability, but a slight rise in dependents per employed highlights workforce challenges.

This chart underscores the demographic transitions and labour market dynamics influencing dependency burdens across diverse economic contexts.

Figure 4. Demographic Dependency Ratios Relative to Labour Market Aggregates: A



4.5 Age-Specific Dependency Ratios Relative to Working-Age Population (WAP = ages 15–64): A Cross-Country Comparison (1998–2021/2020)

Figure 7 illustrates **age-specific dependency ratios across six countries (**Romania, Türkiye**,** Nepal, Sri Lanka, India, and Bangladesh) for 1998 and 2021/2020, dividing dependents into two categories:

Youth Dependents (ages 0–14) per WAP: Represented by blue bars.

Old-age Dependents (ages 65+) per WAP: Represented by red bars.

Declining Youth Dependency Ratios: across all countries, the youth dependency ratio has decreased significantly between 1998 and 2021/2020.

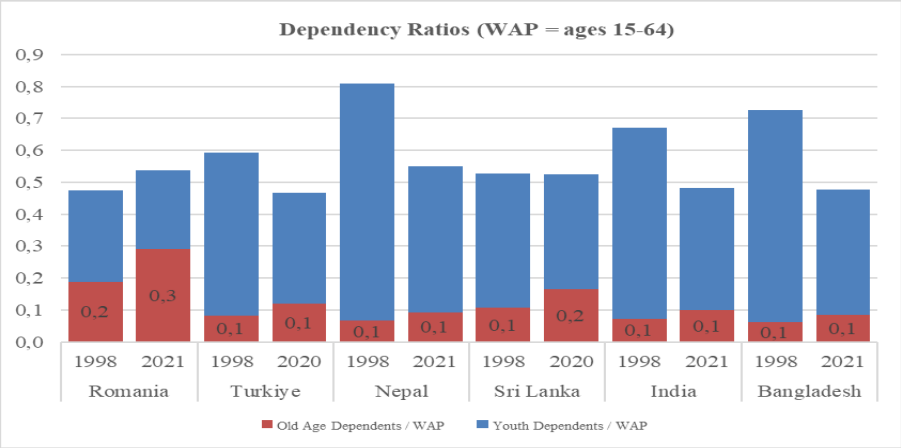


Figure 5. Age-Specific Dependency Ratios Relative to Working-Age Population (WAP = ages 15–64): A Cross-Country Comparison, 1998-2021/2020

The analysis shows two main features:

- **Increasing Old-Age Dependency Ratios***:* in **Romania**, the old-age dependency ratio increased significantly from 0.2 to 0.3, driven by an ageing population and emigration of younger workers; in **Türkiye**: While stable at 0.1, the trend suggests gradual demographic ageing; in **South Asia (India, Nepal, Bangladesh),** old-age dependency remains low (0.1) but is expected to rise as these countries experience demographic shifts.
- **Balanced Dependency Trends***:* in **Sri Lanka**, the youth dependency ratio has stabilized at 0.4, but the old-age dependency ratio has risen from 0.1 to 0.2, reflecting a shift toward an ageing population. **Türkiye** demonstrates the most balanced dependency ratios, reflecting improvements in demographic and labour market stability.

Implications:

- **Declining Youth Dependency**: Reduced youth dependency eases economic pressure on working-age populations, creating opportunities to invest in education and skill development for long-term productivity.
- **Rising Old-Age Dependency**: Aging populations, particularly in Romania, highlight the need for policies to address labour shortages, such as extending working ages, increasing female labour participation, or attracting immigrants.
- **Regional Variations**: While South Asia benefits from a relatively youthful population, these countries must prepare for future challenges associated with ageing populations.

This last chart underscores the importance of understanding age-specific dependency ratios in shaping labour market policies and addressing labour shortages over time.

The paper's discussions regarding labour shortages, their rigorous measurements and the best design of appropriate policies to manage them, underscore some insights related to the data, addressing gender disparities, demographic dependency, the impact of dependency ratios on labour supply and the strategies of labour shortages, and the overall implications of results and the limitations of the research.

Accessing the different databases, mentioned before, the authors found some observations related to *data challenges*: data availability, data quality, lack of integrated datasets combining macroeconomic, sectoral, and demographic information, infrequent updates, differences in definitions and classifications (e.g., types of employment, labour shortages) across international, regional, and national datasets that complicate comparative analyses, challenges to ensure compatibility between tools like those from the World Bank and regional databases like Eurostat, some restricted access to some data, limited availability of granular data, such as sub-regional labour market dynamics or sector-specific trends reduces the ability to implement targeted policies.

The relationship between labour shortages and the gender gap in the *labour participation* often result in *underutilization* of the available workforce. Blau and Kahn (2017) highlight that reducing gender disparities can lead to significant *economic gains by increasing the effective labour supply*. They note that "policies aimed at reducing gender gaps in labour force participation could have substantial economic benefits" (p. 845).

Implementing *policies that promote gender equality* in the labour market can *alleviate labour shortages*. The World Economic Forum (2020) suggests that closing gender gaps could mitigate the effects of ageing populations and declining birth rates on the labour supply. They argue, that "increasing female labour force participation is a key strategy to counteract the economic impacts of demographic shifts" (p. 15).

The interplay between labour shortages and demographic dependency is a critical area of study in labour economics. Demographic dependency ratios, defined

as the proportion of dependents (individuals aged below 15 and above 64) to the working-age population (WAP, ages 15–64), significantly influence labour market dynamics. *A high dependency ratio indicates a smaller proportion of the population available for employment*, potentially leading to labour shortages. This scenario places greater financial and social responsibilities on the working population, which can discourage labour force participation, exacerbating labour shortages. For instance, an ageing population with a high old-age dependency ratio can lead to a shrinking labour force, as observed in countries like Japan (Matsukura, Ogawa, & Clark, 2007).

Demographic transitions, such as *declining youth dependency ratios, can signal an increasing number of individuals reaching working age*, potentially expanding the labour force. However, without appropriate policies enhancing workforce participation, this demographic advantage may not be translated into economic benefits. Conversely, rising old-age dependency ratios, as seen in many European countries, can reduce the labour force size, creating labour shortages unless mitigate by strategies like extending retirement ages or promoting immigration (European Commission, 2018).

Addressing labour shortages requires managing demographic dependency through various specific strategies (encouraging female labour force participation., investing in youth education and training, addressing ageing populations etc).

In summary, demographic dependency ratios are a crucial determinant of labour market outcomes. Effective management of these ratios through targeted policies can help alleviate labour shortages and promote economic sustainability.

The findings of this study underscore the multifaceted relationship between demographic dependency ratios, labour shortages, and employment structures in Romania and selected labour-exporting countries. The analysis highlights critical economic and policy implications while acknowledging the methodological and data limitations.

The implications of the results are related to:

- **Policy Interventions for Labour Shortages.** The increasing dependency ratios, particularly in Romania, require targeted policies to offset labour shortages. Addressing gender gaps in labour market participation and incentivizing immigration from labour-abundant countries such as Nepal, Sri Lanka, and Bangladesh are strategic options.
- **Long-Term Sustainability.** The demographic transitions in youth and old-age dependency ratios suggest potential benefits for countries with declining youth dependency (e.g., India, and Bangladesh). These demographic dividends, however, require strategic investments to harness the expanding working-age populations for sustained economic growth (World Bank, 2019).

This research has some **limitations** related to **data gaps and inconsistencies** related to variability in data sources and collection methodologies. **Temporal and granular constraints** impede real-time policy analysis and reduce the specificity of policy recommendations (OECD, 2021). **The exclusion of Informal Sectors** which constitutes a significant share of the workforce in South

Asia impacts labour market dynamics (Kinoshita & Guo, 2015). Addressing these limitations through enhanced data standardization, integration of informal sector metrics, and real-time labour market monitoring is essential to refine future analyses. These steps will better inform policies for mitigating labour shortages and optimizing demographic dividends.

5. Conclusions

The study focused on applying a standardized methodology provided by the World Bank, specifically the **Jobs Group Demography Tool**, analyzing demographic dependencies and labour market dynamics in six countries. By narrowing the analysis to key components of the tool, we aimed to highlighting critical trends such as declining youth dependency and rising old-age dependency, particularly in Romania, underscore the importance of tailored workforce policies to address ageing populations and labour shortages. The standardized approach allowed for cross-country comparisons, revealing disparities in labour force participation, and dependency ratios between Central and Eastern Europe (e.g., Romania, Türkiye) and South Asia (e.g., Nepal, India, Bangladesh). **Strategic Understanding of Labour Shortages** provided by demographics tools and labour market metrics, allows us to identify key drivers of labour shortages, such as gender gaps, informal employment, and underutilized labour force segments and to design a critical role of demographic management and labour market integration in mitigating shortages and sustaining economic growth. The **Value of Standardized Tools** demonstrated the importance of structured, data-driven approaches in strategic workforce planning.

While this study highlights the utility of the **Jobs Group Demography Tool**, it also reveals opportunities for further exploration and application of the broader set of tools offered by the World Bank. Future research will explore complementary tools for developing a holistic understanding of the labour market dynamics. It will be essential to study sector-specific analysis, particularly in ageing economies, and gender-inclusive studies to unlock the whole labour potential. Depending on the development of dynamic, real-time data collection tools, we will promote specific research about dynamics and real data integration to enhance the responsiveness of evolving labour market conditions.

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