

# Nexus between demographic dividend and economic growth: A systematic review with bibliometric exploration



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**Abstract** Since every country is going through distinct stages of demographic change over different periods, the demographic dividend has become a prevalent issue in the domain of economic review. The influence of the demographic dividend on economic growth remains a subject of debate; therefore, it is opportune to reexamine this topic. This systematic review with bibliometric assessment aims to add augmented insights to the current body of knowledge on the nexus between demographic dividend and economic growth. Hence, a total of 427 published papers from both the Scopus and Web of Science databases were assessed using the updated PRISMA flow diagram to classify 24 relevant research publications. The bibliometric data from the 24 related articles were analysed using VOSviewer to construct co-occurrence network maps. After critically examining the identified papers, five thematic clusters were established. Accounting, behavioural, and human capital effects were recognised as broad themes based on the five thematic clusters. Governments, policymakers, and stakeholders can use the findings of this study to make long-term decisions in the domain of demographic dividend and economic growth.

**Keywords:** demographic transition, human capital, age structure, VOSviewer

## 1. Introduction

Approximately 200 years ago, the world's population was one billion; today, it is more than 7.7 billion (Pinsker, 2019). However, the demographic age trend is not unique to the United States (Pasichnyi & Nepyaliuk, 2021). Different countries are undergoing various stages of demographic transformation. The initial demographic shift is characterised by a long lifespan, as well as high fertility and death rates. The second stage of this transitional era is characterised by low death rates and high birth rates, while the third stage is characterised by a decrease in both death and birth rates. In the final stage of the demographic shift, both death and birth rates stabilise at a reduced level, resulting in little or no population growth (Jafrin & Masud, 2020).

Due to their characteristics, different stages of demographic transition have played a prominent role in economics over the last few decades. For example, in the third phase of demographic transition, a larger proportion of the working-age population has significant economic implications for a society's overall economic growth as well as development, which is considered a generic contribution, such as per capita income, savings, and investments.

The terms 'demographic bonus,' 'demographic dividend,' or 'window of opportunity' refer to the larger portion of the working-age cohort, typically aged between 15 and 64 years. The first demographic dividend begins during this period and phase (Lee & Mason, 2006; Ja'afar, 2020). However, since labour supply and savings rates vary throughout the life cycle, changes in the population age structure can significantly impact economic performance. Longevity may also increase the labour supply and savings rates. Furthermore, when fertility declines, so does the quantity of female labour and the resources available to spend on children's health and education (Bloom et al., 2007). The response to an upcoming demographic dividend and the transition process varies across nations due to historical, social, and cultural factors. Countries, notably the wealthy ones, prepare in advance for reaping the benefits of a demographic dividend, while developing economies are often not that prepared (Jafrin & Masud, 2020).

The first demographic dividend is characterised by a decrease in fertility, resulting in a significant but temporary increase in the ratio of workers to consumers. The second demographic dividend shows signs of fertility decline and an



increase in the productivity of individual workers. A second demographic dividend is possible if the demographic transition causes behavioural changes that could lead to a longer-lasting second demographic dividend. This could manifest as increased productivity as a result of capital deepening, whether physical or otherwise (Lee & Mason, 2006). In summary, the first dividend provides a one-time benefit, while the second dividend converts that bonus into increased assets and long-term growth. The dividends are paid in order: the first pay-out is paid first and terminates after a certain period, and the second dividend is paid later and continues indefinitely. However, whether the demographic dividend is a blessing or a burden remains disputed. While the demographic dividend presents numerous opportunities, nations must effectively harness these potentials to attain sustained economic growth in the long run (Bohini, Yaganti, & Thomas, 2021). As a result, the dividend era is more of a window of opportunity than a promise of higher living standards (Lee & Mason, 2006).

Since then, governments, policymakers, and stakeholders around the world have been dealing with various stages of demographic change, which presents both difficulties and possibilities for governments, policymakers, and stakeholders. Several studies have been undertaken on this topic due to the significant economic ramifications of the demographic dividend. Although a large amount of research has been conducted on demographic dividend and economic growth or development, there is still a great deal of interest in comprehensive literature reviews on this topic using bibliometric and meta-analysis approaches. Even though the demographic dividend comes from a variety of sources, the current analysis will concentrate solely on age features and their impact on economic growth rather than savings, the labour force, or other factors.

Thus, the current study aims to conduct a systematic review to identify, assess, and analyse representative academic literature, particularly in the form of journal articles, on the topic of demographic dividend and economic growth to provide a critical overview of current research efforts, to present empirical evidence on the predictive validity of demographic dividend, and to provide a critical overview of the current state of research efforts. Overall, this paper aims to contribute to advancing knowledge about the relationship between demographic dividend and economic growth through a systematic literature review and bibliometric exploration.

## 2. Methods and techniques

The authors followed four fundamental steps for including relevant pieces of literature for further synthesis (Mengist, Soromessa, & Legese, 2020; Thomé, Scavarda, & Scavarda, 2016; Kovacs et al., 2015), as the main requirements of an SLR are clarity and vigour in assembling previous publications (Kraus, Breier, & Das-Rodriguez, 2020; Linnenluecke, Marrone, & Singh, 2020). The steps include identifying literature, filtering, mining, and reporting (Hart, 2018; Sonis et al., 2018; Bernard, Wutich, & Ryan, 2016). A multilevel search approach was employed by preset criteria specifying the year, research strings, database, and number of publications to discover acceptable pieces of literature (Gusenbauer & Haddaway, 2020; Xiao & Watson, 2019; Booth, 2016).

### 2.1. Literature identification

This study reveals findings from a systematic review of published journal articles that endorse research on the relationship between demographic dividend and economic growth. The concept-centric literature search used in the systematic review focused on the relationship between demographic dividend and economic growth. The papers were extracted from the Web of Science and Scopus databases, which are the most comprehensive interdisciplinary databases for social sciences, business, and economics (Mahmoud et al., 2024; Saif et al., 2022; Martn-Martn, Orduna-Malea, & López-Cózar, 2018; Montoya et al., 2018; Sánchez et al., 2017). For this study, articles published between 2003 and 2021 were identified. The authors chose 2003 as the starting year since both databases displayed search results from 2003.

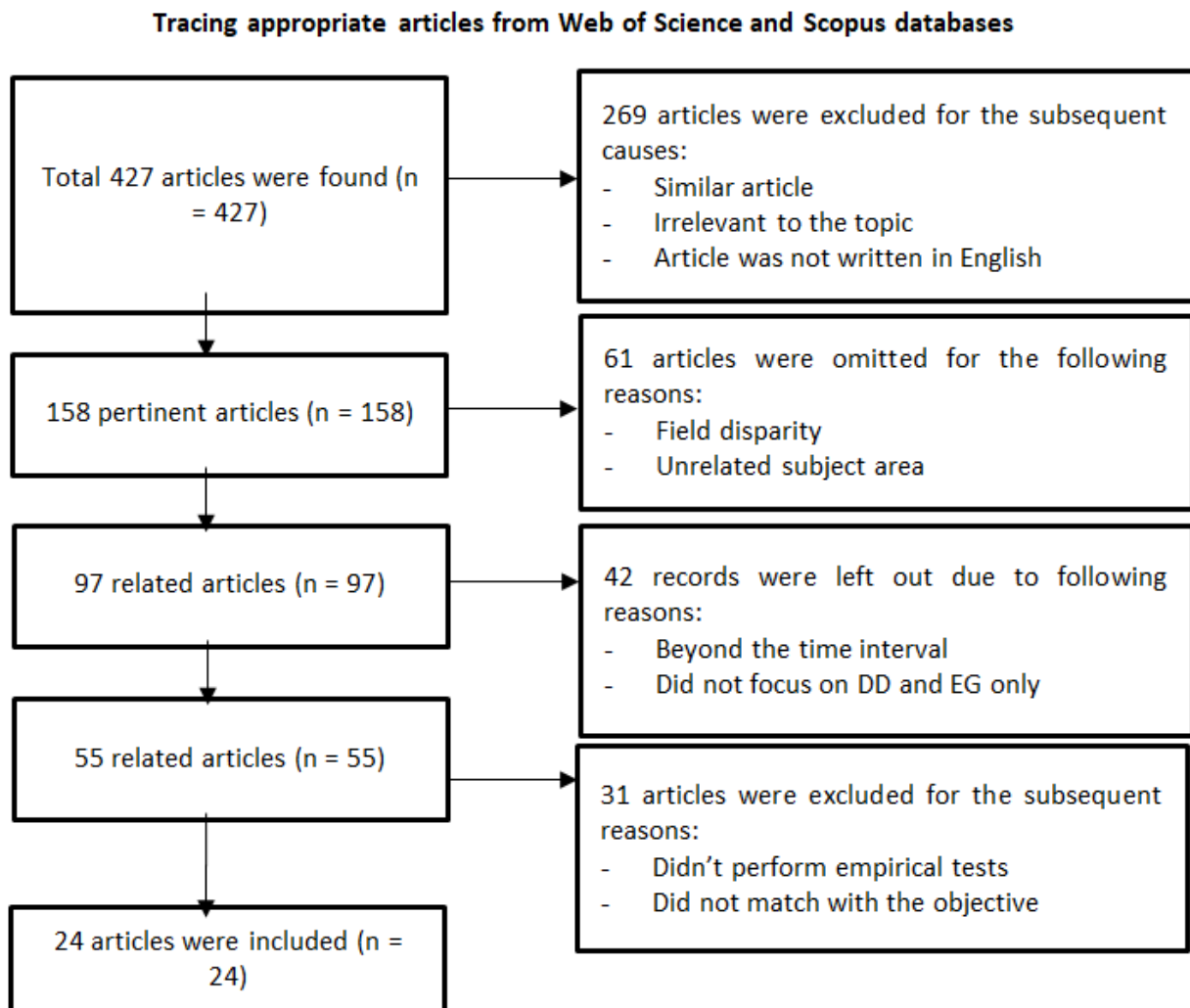
**Table 1** Initial searching for strictures.

Search items	Search within	Databases	Document type	Source type	Basic search explanation	Number of articles
Demographic dividend	Article title, abstract, keywords	Web of Science, Scopus	Article	Journal	TITLE-ABS-KEY ( demographic AND dividend ) AND ( LIMIT-TO ( DOCTYPE , "ar" ) ) AND ( LIMIT-TO ( SRCTYPE , "j" ) )	308
Demographic dividend and economic growth	Article title, abstract, keywords	Web of Science, Scopus	Article	Journal	TITLE-ABS-KEY ( demographic AND dividend AND economic AND growth ) AND ( LIMIT-TO ( DOCTYPE , "ar" ) ) AND ( LIMIT-TO ( SRCTYPE , "j" ) )	119

The initial number of articles retrieved through the searches is shown in Table 1. Initially, 427 articles were identified from both databases.

### 2.2. Literature screening

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) flow diagram was used to screen the literature (Moher et al., 2010; Liberati et al., 2009). The PRISMA flow diagram is often used in the literature screening process to identify publications that should be studied further (Saif, Abd Rahman, & Mostafa, 2021; Asar et al., 2016; Peters et al., 2015).



**Figure 1** The outcome of the PRISMA flow diagram.

Figure 1 illustrates the step-by-step procedures followed to retrieve the final number of articles. Finally, 24 articles were retrieved through the PRISMA flow diagram.

### 2.3. Literature mining

After the retrieval procedure was completed, bibliometric data, including abstracts and keywords, were extracted for each of the 24 publications. Bibliometric data are required to determine research preferences and construct theme groups (Baker, Kumar, & Pandey, 2021; Pizzi et al., 2020; Fergnani, 2019; Liao et al., 2019; Jiang, Ritchie, & Benckendorff, 2019; Cuc, 2019; Feng, Zhu, & Lai, 2017; Sinkovics, 2016). As a result, the bibliometric data for each paper were converted to the Research Information Systems (RIS) format for analysis.

### 2.4. Results reporting

The authors used a bar chart to depict the frequency of 24 published articles from 2007 to 2021 to present their findings. VOSviewer software was used to create a map based on the acquired bibliographic data. A term co-occurrence map was also created using the text data extracted from each article's abstract field. From the items, the authors constructed clusters, and from the clusters, the authors developed themes.

## 3. Results and findings

Table 2 shows the frequency of publishing outlets and article sources.

**Table 2** Publication outlets and article sources.

Journal Title	Number of publishing outlet	Sources
Review of Development Economics	02	Ye, Chen, & Peng (2021); Ahmed et al. (2016)
The Journal of the Economics of Ageing	02	Baerlocher, Parente, & Rios-Neto, (2019); Abrigo et al. (2016)
International Journal of Forecasting	02	Bloom et al. (2007); Prskawetz et al., (2007)
Proceedings of the National Academy of Sciences	02	Lutz et al. (2019); Kotschy, Urtaza, & Sunde (2020)
Population Research and Policy Review	01	Narayana (2015)
Journal of Comparative Economics	01	Wei, & Hao (2010)
International Journal of Social Economics	01	Jafrin et al. (2021)
Economic Systems	01	Choudhry, & Elhorst (2010)
European Economic Review	01	Liao (2011)
World Development	01	Cruz, & Ahmed (2018)
Journal of Macroeconomics	01	De la Croix, Lindh, & Malmberg (2009)
Asian Population Studies	01	Joe, Kumar, & Rajpal(2018)
Journal of the Asia Pacific Economy	01	Minh (2009)
Problemy Ekorożwoju – Problems of Sustainable Development	01	Pasichnyi, & Nepytaliuk(2021)
The Journal of North African Studies	01	Rizk (2018)
SERIEs - Journal of the Spanish Economic Association	01	Sánchez-Romero et al. (2018)
Asian Development Review	01	Ogawa et al. (2021)
Epidemiology, Biostatistics, and Public Health	01	Youssef, Elden, & Abou Ali (2018)
The Pakistan Development Review	01	Jehan & Khan (2020)
Pakistan Journal of Commerce and Social Sciences	01	Ahmad & Khan (2018)
Total	24	

### 3.1. Publishing outlets

The publishing house is included in Table 2. According to these findings, several journals have published studies on demographic dividend and economic development. Review of Development Economics, The Journal of the Economics of Aging, International Journal of Forecasting, and Proceedings of the National Academy of Sciences each have eight publications among the 24.

### 3.2. Frequency of publication

Figure 2 shows the frequency with which 24 research publications examining the relationship between demographic dividend and economic growth were published between 2007 and 2021. Figure 2 shows that the majority of the publications (6 out of 24) were published in 2018, followed by 2021 (4 out of 24).

### 3.3. Studies performed in countries

The empirical study of the relationship between age features and economic growth was carried out in a multi-country setting rather than a single-country setting. However, the much of the literature was based on China and India under the single country setting.

### 3.4. Research methods used in the studies

Only quantitative approach-based studies that evaluated or demonstrated the association between age group and economic growth were chosen to fit our study's objective requirements. However, the methodologies or instruments used in the 24 selected publications were not the same. Most of the studies used panel data analysis, and only a selected few employed time series analysis. Furthermore, a few papers have used the National Transfer Account model for estimation, and only a few have used the overlapping generations model for analysis. Projection or prediction is another popular technique that a few authors have used.

### 3.5. Text analyses of the studies

Figure 3 depicts a map created using bibliographic data. The map shows that economic growth is heavily influenced by the demographic dividend, which occurs as a result of changing age patterns at various stages of demographic transition. The final selection of 24 articles yielded this result. As a result, the selection approach is well aligned with our research goals.

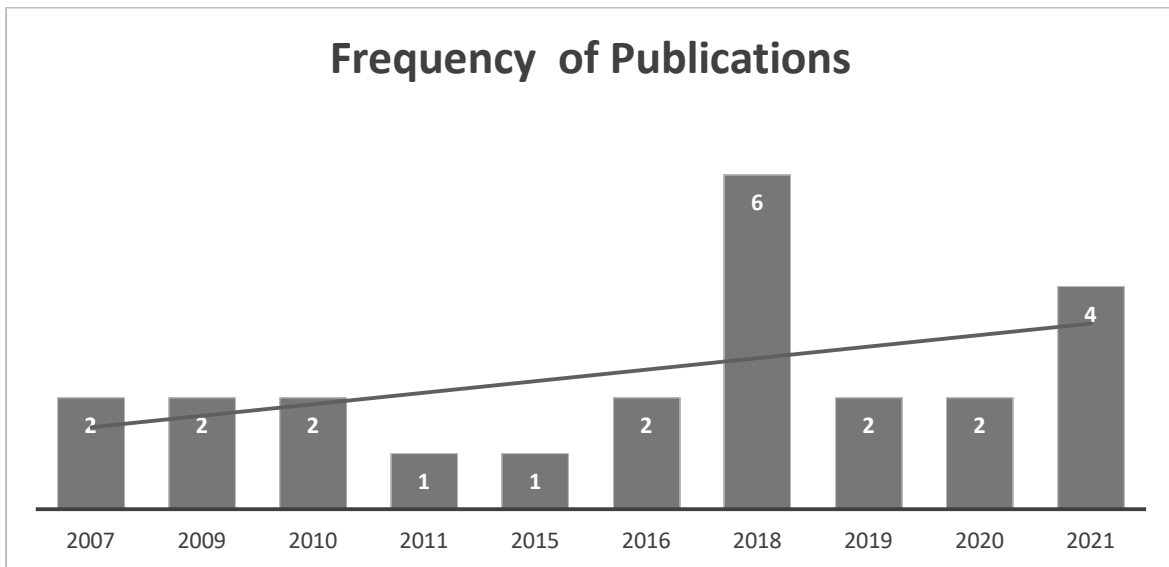


Figure 2 Frequency of Publications.

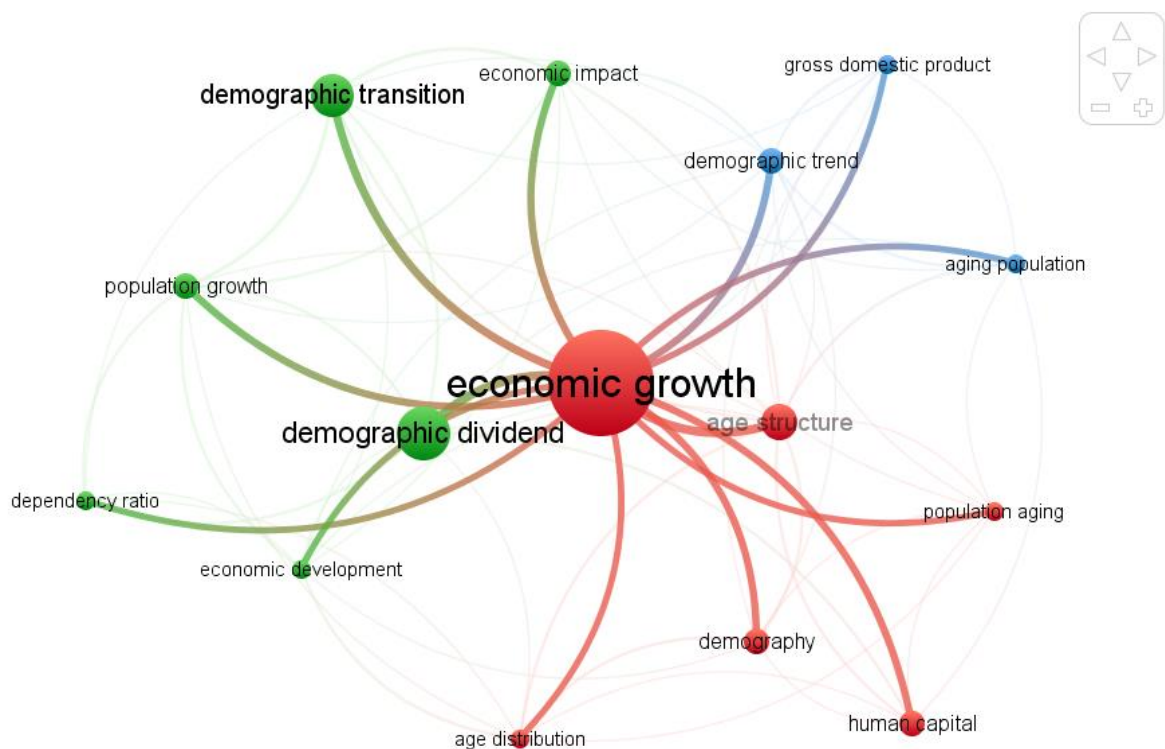


Figure 3 Network plotting of bibliographic information (full counting mode).

Figure 4 depicts the term co-occurrence map of the text information extracted from the abstracts of each of those 24 articles. The abstract shows the summary of an article, and the following figure shows the relationships between economic growth, demographic dividend, education, and human capital. However, in most of the 24 articles, economic growth is measured by the proxy variable gross domestic product (GDP), which is also shown in this figure.

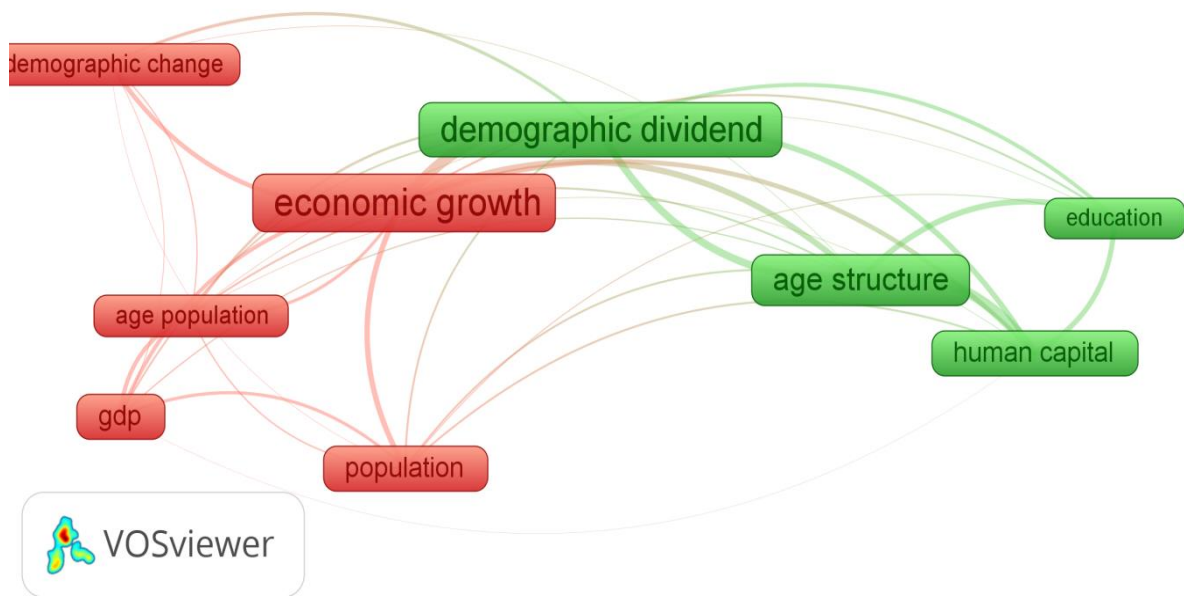


Figure 4 Term co-occurrence plot of text information (full counting mode).

Table 3 shows the related clusters, and themes were developed from those clusters.

Table 3 Development of clusters and themes.

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Age Distribution	Demographic Dividend	Age Population	Age Structure	Ageing Population
Age Structure	Demographic Transition	Demographic Change	Demographic Dividend	Demographic Trend
Demography	Dependency Ratio	Economic Growth	Education	Gross Domestic Product
Economic Growth	Economic Development	GDP	Human Capital	
Human Capital	Economic Impact	Population		
Population Ageing	Economic Growth			

Based on the above five clusters, we developed the following three themes (Figure 5):

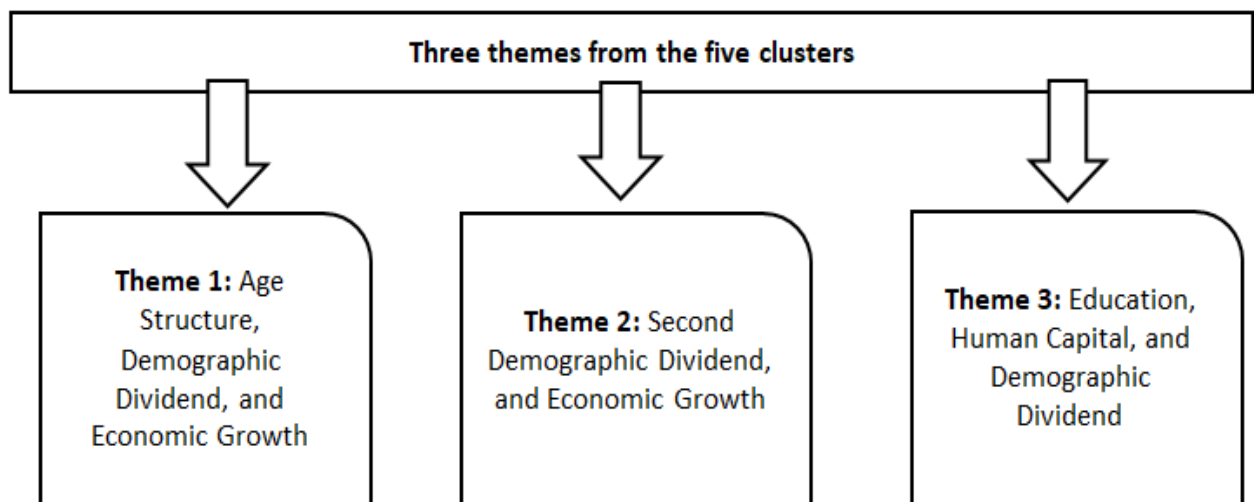


Figure 5 Different themes.

## 4. Discussion

### 4.1. Theme 1: Age Structure, Demographic Dividend, and Economic Growth (Accounting Effects)

The findings of studies on the relationship between the ratio of the working-age population and economic growth have always been positive. However, the literature investigating this association has used different parts of this linkage. This subject delves into the findings as well as the numerous dimensions explored to obtain a better understanding of the relationship. Youssef et al. (2018) look into this link in an Arabic context, focusing on Egypt and Morocco in particular. They also compared these Arab countries to Korea, which had similar economic conditions in the 1960s but differed significantly from Egypt and Morocco. Between 1965 and 2016, the authors calculated long-term and short-term relationships between the dependency ratio, working-age population, and GDP per capita and found that a decrease in the country's reliance ratio or an increase in the working-age segment resulted in positive economic growth. More specifically, a decrease in the dependency ratio was found to lead to yearly economic growth rates of 9% and 2% for Egypt and Morocco, respectively. The value of the coefficient varied for Korea and the Arabic countries, possibly due to the large variation in fertility and death rates between the two regions, according to the authors.

The relationship between economic growth and the dependency ratio can also be examined using the medium of change, which entails taking into account and comparing the indirect and direct effects of the dependency ratio on growth. For example, Jehan and Khan (2020) use data from Pakistan to study the significance of variations in saving rates and investments in promoting economic growth as society's age structure shifts. They estimated the impact of population change (represented by four alternate measures) and physical capital first and then utilised the results to evaluate the influence on economic growth. The authors find that the working-age population benefits from economic growth in both direct and indirect ways over a lengthy period of time, from 1960 to 2015. As a result, it is critical that countries with large working-age populations actively take steps to ensure a high percentage of youth employment, which subsequently translates to a high savings rate and, eventually, economic growth.

The association between economic growth and demographic dividend is influenced by both the period under examination and the population growth rate. Abrigo et al. (2016) use data from the Philippines to apply National Transfer accounting estimates to analyse disparities in population group-level performance, as not all groups undergo demographic transitions at the same time. The authors breakdown the gains and losses for different population groups during two separate economic periods. They classify people into three groups based on where they live and how much money they make. The authors find that during the low-growth era of 1991-1999, when the Philippines witnessed its first demographic dividend, demographic conditions improved in urban regions compared to those in rural areas and among the middle and upper classes compared to those in poor household groups. Using the same NTA technique, Narayana (2015) constructed estimates of the empirical links between India's demographic structure, labour productivity by sector, and economic growth. In this example, the author observes that the influence of the demographic dividend differs not only by area, as Abrigo et al. (2016) concluded but also by the formal-informal economic sector. Narayana (2015) used 2004-2005 base data to predict the effects of the demographic dividend from 2005 to 2050 and concluded that the beneficial shadow of a high ratio of the younger generation (the first demographic dividend) will last until 2045. Sectoral productivity and growth, on the other hand, are critical to enjoying rewards. In the informal sector, lower productivity sectors and lower age-level productivity drive down the overall positive economic growth effect.

Joe et al. (2018) utilize data from India spanning from 1980 to 2010 to examine whether the ongoing demographic dividend has an effect. They employ a state-level panel and thus adjust for regional dynamics. Their OLS and 2SLS model estimates show a favourable relationship, which is also supported by earlier research. According to Joe et al. (2018), the full potential of beneficial demographic dividend effects can only be realised if growth-restricting issues are addressed.

Bloom et al. (2007) experimented with using an age structure variable in the growth equation in an attempt to forecast economic growth. The authors use data from a wide range of countries from 1960 to 1980 to project growth from 1980 to 2000. They conclude that, as indicated by previous studies, age structure has a considerable impact on estimating economic growth throughout the defined period. The authors propose that much of the forecasting model error derives from the period's parameter instability, which can be mitigated by forecasting relative rather than absolute economic growth.

Prskawetz et al. (2007) first examined the behavioural effect by constructing a growth-age structure regression using data from 97 established and developing nations between 1965 and 1990 based on the accounting influence of age structure on economic growth and previous literature. Their findings show that the young dependency ratio is inversely related to the output per working-age population. The authors go on to estimate a probabilistic forecast of shifting demographic factors on India's economic growth as part of their research. The authors employ India's behavioural impact regression estimates to forecast economic development and better understand the influence of youth reliance, life expectancy, and the account effect. They conclude that the annual growth rate of output per capita between 2000 and 2035 would range between 3.8 to 4.6 percent, compared to the 4.1 percent witnessed between 1995 and 2000.

Using data from a SAARC nation panel between 1990 and 2017 for Bangladesh, India, Pakistan, Nepal, and Sri Lanka, Jafrin et al. (2021) evaluate the link between demographic dividend and economic growth. Their findings also support prior

research in the South Asian setting, which found that demographic dividend boosts economic growth. A country-level study of the dataset confirmed the same conclusions. While this paper revisits the empirically established relationship between the demographic dividend and economic growth, a significant contribution lies in its regionalism aspect. Culture plays a prominent role in shaping working, saving, and investment behaviours, as demonstrated by Jehan and Khan (2020), who assessed the indirect route effect of the demographic dividend on economic growth using exclusively Pakistani data.

Similar to Abrigo et al. (2016), Ogawa et al. (2021) investigated this relationship using data from 12 Asian countries. They use National Transfer Accounts data to first analyse age structure trends in methodology to examine the trends in structural shifts in age in the selected Asian economies on their economic growth. They also use NTA data to link the effects of changing age structure on the trajectory of intergenerational transfers. Despite major differences in population structure among Asian nations, the first and second demographic dividends have a significant impact on economic growth between 1950 and 2050.

Sánchez-Romero et al. (2018) use an overlapping generations model (OLG) to analyse the impact of declining fertility rates and increased life expectancy on Spanish data, going beyond typical models of demographic transition and economic growth. The authors also incorporate subtle elements such as education level variation within a household and the choice between market/home-based product consumption/production, which are often missed in the previous literature. According to the study, the demographic transition was responsible for approximately 17% of the increase in GDP per capita growth between 1850 and 2000. This contribution can be further defined as 50 percent by the increase in productivity per worker and 50 percent by the relative growth rate of workers in the country.

Ahmad and Khan (2018) use a difference generalised method of moments (Diff-GMM) to analyse the impact of age structure and human capital on economic growth using a panel of 67 emerging economies across regions and income levels from 1960 to 2014. They breakdown the data by income levels, ensuring that endogeneity and reverse causation concerns are avoided. The authors argue that in developed and high-income regions, the link between age structure and economic growth is greater than that in less-developed economies. However, the authors claim that in less developed economies, the pace of convergence of economic growth is high.

Rizk (2019) used an extended exogenous Solow-Swan growth model to examine the relationships among the expansion of the working-age population, education enrolment rates, the country's trade involvement, and Egypt's savings rate between 1971 and 2015. The findings show that, in the context of these macro determinants, a larger working-age population functions as a stimulant for GDP per capita growth in the short and also in the long run. Minh (2009) used microlevel data from the Vietnamese Household Living Standard Survey for the years 2002, 2004, and 2006 to inspect the impact of age structure on economic growth. Using the OLS regression approach and the neoclassical growth model theory of steady-state income, the author believes that Vietnam has successfully utilised demographic dividend opportunities. More specifically, the regression results revealed that population changes in Vietnam contributed almost 15% of the country's economic growth in the years preceding the research period. Pasichnyi and Nepytyaliuk (2021) looked at a larger sample of 45 advanced and emerging economies from 1990 to 2018. The author also divides the sample into distinct time periods to perform the analysis. This study examined three time periods: 1990-2004, 2005-2018, and 1990-2018. Their regressions contain not only demographic data such as life expectancy and the working-age population but also macroeconomic indicators such as investment, public spending, and research and development spending. In the presence of macroeconomic variables, the study concludes that life expectancy had a negative significant effect on economic growth during all three eras. The same negative coefficients were found for the working-age population variable; however, the results were significant only from 1990 to 2004. Ahmed et al. (2016) examined the impending large demographic changes in Sub-Saharan Africa as a result of the region's rapidly rising working-age population. According to the authors' research, the forthcoming demographic dividend might contribute up to 11-15 percent of GDP growth by 2030 if sub-Saharan African nations continue to expand along with current development patterns. De la Croix et al. (2009) explored the accuracy of modern data in forecasting historical growth trends. They want to determine whether historical population and economic growth can be leveraged to generate data that can be used to forecast growth during demographic transition stages. Based on data from Sweden, the authors argue that historical demographic and economic trends dating back to 1750 are major predictors of economic growth, notably per capita income. Wei and Hao (2010) investigated the economic impacts of demographic transition in China in an Asian environment. Instead of using national-level data, as in earlier studies, they used data from China's provinces from 1989 to 2004. Their findings on demographic variables show that, starting in 1989, a decrease in the fertility rate and a reduction in the youth dependency rate catalysed China's economic growth. They noted that the favourable effect was due to stable income levels and a province's ability to respond to market forces. In another Asian country-based study, Choudhry and Elhorst (2010) used data multi-country data from China, India, and Pakistan to calculate the link between economic growth and demographic change. The estimates indicate that approximately 46%, 39% and 25% of the economic growth in GDP per capita was observed to be a result of population dynamics in China, India, and Pakistan, respectively. The authors also forecast that following population dynamic trends, age structure will positively affect the economies of India and Pakistan. However, the effect in China will be negative between 2005 and 2050. Using data from Taiwan, Liao (2011) employs an overlapping-generations general equilibrium model and accounts for the endogenous fertility variable. The model results

suggest that in the past four decades, one-third of the rapid economic output growth witnessed in Taiwan can be attributed to the demographic transition that the country experienced. Cruz and Ahmed (2018) reported that there is a significant association between the working-age population, GDP per capita growth, and the country's poverty rate. They use data from 180 countries from 1950-2010 and obtain similar results for the association between the working-age population and economic growth. They further add to the literature by showing that an increase in the working-age population and a decrease in the dependency ratio significantly contribute to reducing poverty in countries.

#### 4.2. Theme 2: Second Demographic Dividend and Economic Growth (Behavioural Effects) and the Ageing Population

The trend of a second demographic dividend appeared as the second theme. The second demographic dividend of a country is the higher rate of productivity or output per effective worker, which leads to increased wealth accumulation and the deepening of physical and human capital. This stage of the demographic dividend occurs when people choose to accumulate more wealth to ensure that they will be able to consume when they are older. Economic security during sunset is mainly reliant on the public sector's pension scheme and other welfare programmes. In addition, elderly people rely on the financial support of their family members. An increase in wealth accumulation leads to increased productivity and efficiency. Unlike the first demographic transition, which resulted in an increase in the working-age population, the second demographic dividend is not transient; it can result in a rise in wealth if the transition is efficiently utilised and channelled (Cruz & Ahmed, 2018; Ogawa et al., 2021; Abrigo et al., 2016). The occurrence of the second demographic dividend is not automatic, and it is dependent on the level of consumer behaviour changes, as well as policymakers' ability to adapt policies to account for changes in working adults' decision-making processes. Therefore, promoting an old-age support system is essential. Demographic considerations can lead to growth in life cycle wealth accumulation and ultimately contribute to the second demographic dividend in two ways. The first is compositional, i.e., when the number of people towards the end of their productive years increases, and the second is when life expectancy increases, triggering a behavioural change of accumulating wealth to maintain present lifestyles in later life (Cruz & Ahmed, 2018; Ogawa et al., 2021).

Using and observing data from Brazil between 1970 and 2000, Baerlocher, Parente, and Rios-Neto (2019) conclude that there is a clear accounting effect between the second demographic dividend and growth when the equation is controlled for human capital using a system-Generalised Method of Moments (GMM) approach. The authors also find that, in the case of Brazil, the second demographic dividend is much more crucial for economic prospects than the first demographic dividend.

As the rate of childbearing decreases and life expectancy increases, industrialised and emerging countries are moving toward a significant population of people aged 60 years and older. Accounting for this silver wave is necessary to maintain economic growth owing to the first demographic growth; nevertheless, evidence on how the aging population affects income growth is generally lacking, even though it is critical for developing and implementing economic policy (De la Croix, Lindh, & Malmberg, 2009).

Concerns about the aging population have also been raised by authors such as Jehan and Khan (2020), who believe that the aging population has a detrimental impact on Pakistan's economic growth. Compared to the effect of young age on the working-age population, the effect was greater. Ye, Chen, and Peng (2021) agree with research that finds that an aging population has a negative influence on economic growth and propose a careful evaluation for a plan to mitigate the natural effect of society's unavoidable aging. The authors identify that there are three critical avenues through which old age has an impact on economic growth. First, population aging combined with a decreased fertility rate results in a decrease in the entire working-age population, lowering economic outflows. Second, as the population ages, cognitive abilities, health, and other elements that affect labour productivity deteriorate, resulting in a decrease in production over time. Third, investment, consumption, and macroeconomic factors, such as governmental expenditure, fluctuate over time, requiring rigorous examination of their impact on economic growth.

The authors estimate that a 10% increase in the population aged 65 and above resulted in a 2% decline in GDP per capita growth between 1990 and 2015. They used Chinese data and an interaction fixed effects model at the provincial level between 1990 and 2015. A slower increase in the labour force ratio accounted for half of this decrease, while a decrease in labour productivity accounted for the other half. The magnitude of the outcomes, on the other hand, varied depending on the time period under consideration (Ye et al., 2021).

#### 4.3. Theme 3: Education, Human Capital, and Demographic Dividend (Human Capital Effects)

Finally, the link between education, human capital, and demographic dividend emerged as the third theme. Malthus, who lived in the late 1700s, established a link between population variations and economic growth. The focus of altering demographic trends has shifted over time from actual age structure changes to relative shares of the working-age population. This shift in the demographic dividend argument is also the foundation for advocating for family planning and fertility decisions. However, the benefits of a larger relative working-age population can only be realised if effective human capital development occurs over time. According to unified growth theory, human capital is a crucial trigger for demographic

change and economic growth (Lutz et al., 2019). Given the necessity of human capital development for an effective positive effect on the demographic dividend, research by Kotschy Urtaza and Sunde (2020) concludes that enhancing educational outcomes and quality is critical. The research of Lutz et al. (2019), who analyse the relevance of building human capital vs just correcting for age structure for effective economic growth, provides an example to support this thesis. Using a panel of 165 nations from 1980 to 2015, the authors conclude that improving education is a clear winner in terms of supporting effective economic growth compared to merely correcting for the working-age population. They also look at the relationship between a dropping young dependence ratio and low educational attainment, concluding that the two have a detrimental impact on economic growth. Higher educational attainment also leads to better health outcomes and other indicators, according to the authors, which is a multifaceted setup that boosts labour productivity and, eventually, economic growth.

Baerlocher, Parente, and Rios-Neto (2019) reach similar conclusions for human capital accumulation, stating that excluding education as a form of human capital development from regressions estimating the effect of age structure on economic growth results in biased estimates due to omitted variable bias. Using data from African countries, Ahmed et al. (2016) conclude that the demographic dividend has a favourable influence on growth regardless of education level, but the effect is even more positive when higher educational attainment is factored in. They discovered that if Africa's skilled workforce doubles between 2011 and 2030, the age structure improvements can add up to 22% to economic development by 2030. Additionally, an extra 51 million people will be lifted out of poverty.

Kotschy et al. (2020) used an age-structured human capital endowment model to study 159 countries from 1950 to 2015. According to their findings, there is a considerable relationship between age structure and human capital endowment. Their findings show that the link between human capital development and age structure only helps economic growth when applied to a specific age group. When accounting for economic growth, a general result occurs independent of education level, implying that productive age is more essential than just educational advancement. The results also indicate a significant policy implication of taking into consideration the heterogeneity that enters the equation and can be accounted for by considering human capital and age structure linkages.

According to Sánchez-Romero et al. (2018), 9.8% of the entire growth in Spain's per capita income from 1850 to 2000 can be attributed to the country's educational expansion, which was somewhat late in comparison to that of other European countries. According to a critical theme and conclusion from the studies listed under the third theme, the demographic dividend cannot be explained solely by the economy's educational attainment. Careful examination of age structure is also needed. However, focusing solely on education and disregarding other factors, such as lowering the fertility rate, is insufficient (Kotschy, Urtaza, & Sunde, 2020). As a result, spending on young people is primarily for education, which helps to enhance the amount of human capital stock, thus enhancing a country's development process (Jehan & Khan, 2020).

## 5. Future Directions

It cannot be denied that some insightful and important work has been done in the arena of demographic dividend and economic growth over the last decade. However, some empirical gaps can still be filled in the near future to thoroughly understand the effects of demographic dividend on economic growth. There is a need to decompose the effects of age structure on economic growth according to the place of residence, sex distribution, formal and informal sector, and social stratification. Although few studies on these issues have been conducted, these studies have not analysed them together; instead, they have analysed them separately thus a comprehensive study is yet to be conducted.

Education, human capital, and demographic dividend are integral parts of each other. Some studies have empirically tested the relationships among these variables. However, there is also a need to focus on education attainment on a gender basis. Male and female education can have different impacts on accounting and the behavioural effects of economic growth.

More attention should be given to various projection models to examine the relationship between age structure and economic growth. As a result, all countries can take the required safeguards based on age composition. Finally, the future availability of new data or upgrades to existing data might help overcome these constraints by extending this study.

## 6. Final considerations

This paper aimed to comprehensively analyse the relevant literature addressing the relationship between demographic dividend and economic growth using 24 studies identified from leading academic databases. The short-listed studies were analysed based on their characteristics, such as publication outlets, frequency of publication by year, and country context. Moreover, these studies were also analysed in terms of their research methods and techniques. By analysing the 24 articles using VOSviewer, this paper identified five clusters, and the authors developed three themes, namely, age structure, demographic dividend, and economic growth: second demographic dividend and economic growth and education, human capital, and demographic dividend. This article contributes by providing concrete directions for future research in the field of population economics. In addition, this study provides useful information for decision-making by governments, policymakers, and stakeholders in the areas of demographic dividend and economic growth for the sustainable development of society.

## Ethical considerations

Not applicable since human or animal participation was absent in this research; therefore, such consent does not apply.

## Conflict of Interest

Authors declare no conflicts of interest.

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