



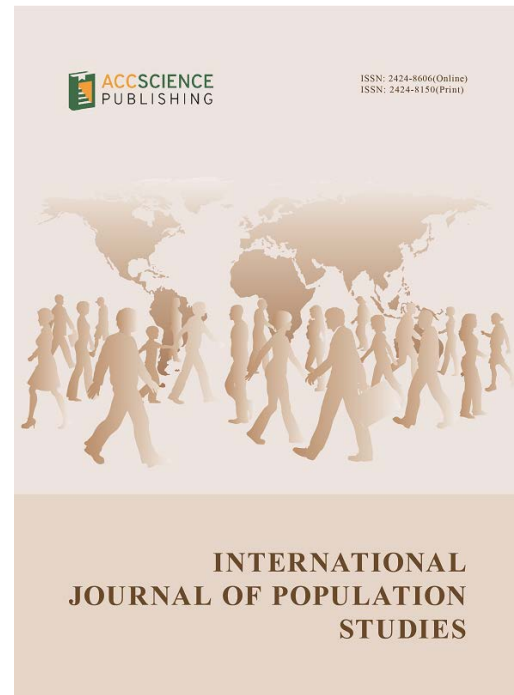
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## CONTENTS

<b>1</b>	<b>Uncovering connections between ageism and child-centric care</b> <i>Lynn Yu Ling Ng</i>	<i>PERSPECTIVE ARTICLE</i>
<b>7</b>	<b>Climate change, migration, and displacement: Advancing a risk-informed approach for sustainable solutions</b> <i>Shingirai Mugambiwa, Patience Sibanda</i>	<i>PERSPECTIVE ARTICLE</i>
<b>15</b>	<b>Preventing and responding to violence against women: A case study from Vietnam</b> <i>Phan Thi Lan Huong</i>	<i>PERSPECTIVE ARTICLE</i>
<b>25</b>	<b>Impact of stress during adolescence on general and work-related stress in early adulthood: A prospective cohort study</b> <i>Trine Nøhr Winding, Mette Lykke Nielsen, Regine Grytnes</i>	<i>RESEARCH ARTICLE</i>
<b>41</b>	<b>Education fever in South Korea: Rite of passage versus children's rights</b> <i>Hwayoung Kim, Vladimir Hlasny</i>	<i>RESEARCH ARTICLE</i>
<b>53</b>	<b>Associations between early marriage, women's empowerment, and infant mortality in Sub-Saharan Africa</b> <i>Sunday A. Adedini, Sunday Matthew Abatan, Kazeem Adebayo Sunmola, Adesoji Dunsin Ogunsakin, Sarafa Babatunde Shittu</i>	<i>RESEARCH ARTICLE</i>
<b>68</b>	<b>Does drought increase intimate partner violence? Evidence from India</b> <i>Durgesh C. Pathak, Dipti Chhugani</i>	<i>RESEARCH ARTICLE</i>
<b>84</b>	<b>Unveiling health disparities and assessing well-being of older adults in China's aging society: The socioeconomic nexus</b> <i>Kevin Yu-Ching Hsieh, Rikiya Matsukura</i>	<i>RESEARCH ARTICLE</i>
<b>100</b>	<b>Examining intergenerational transfers in Malaysia</b> <i>Halimah Awang, Muhammad Amirul Ashraf Abd Ghani, Norma Mansor</i>	<i>RESEARCH ARTICLE</i>
<b>119</b>	<b>Problems and perspectives on environmental component of quality of life: A case study from the Carpathian region of Ukraine</b> <i>Olha Ryndzak, Lilia Ukrainets, Iryna Gerlach</i>	<i>REPORT</i>

## PERSPECTIVE ARTICLE

## Uncovering connections between ageism and child-centric care

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## Abstract

Drawing on personal reflections of my research experience on eldercare in East Asia, I suggest some directions for future research on demographic patterns and social welfare that complicate the concepts of care work and filial piety in understanding the population. Since the global pandemic has made its mark, existential anxieties grounded in the coupling of declining fertility rates and rising elderly dependence (lengthening lifespans amidst advances in medical technology) are running high. In this broader social problematic, I advocate for colleagues especially in East Asia to unpack the social dynamics of age relations and the specific predicaments of eldercare amidst an increasing overreliance on foreign domestic workers for live-in eldercare. The literature on changing trends of eldercare policy and practice is highly contextual and dynamic, and thus does not have a one-size-fits-all model. Nonetheless, broader commonalities in the commodification of family care, including its rising privatization and outsourcing to paid market options, leaves much to be uncovered across diverse cultural contexts and geographical locations. Crucially, ageism in market society is openly recognized in Western cultural contexts but less so, if at all, among East Asian populations where Confucian virtues of filial piety in (stay-at-home/live-in) care take precedence. In this paper, I weave together fieldwork observations and secondary literature to suggest that there is much analytical merit in pushing the boundaries of social reproduction concepts that make room for later-life issues.

**Keywords:** Age relations; Childcare; Eldercare; East Asia; Filial piety; Foreign domestic workers

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**1. Background**

This perspective article speaks to population studies scholars interested in the intersections of eldercare planning (in social welfare) and immigration policy in East Asia and internationally. Researchers increasingly approach issues of eldercare, such as its poorly managed service quality and general lack of adequate physical care and emotional attention, from interdisciplinary perspectives that consider both large-scale survey data and personal stories to showcase some finer details or nuances in larger trends (Chiu & Yen, 2024; Munkejord *et al.*, 2021; Ng, 2023). In addition, with regard to rapidly aging population woes, critical social gerontology frameworks that debate the subjective constructions of aging, old age, and dependency are gaining traction (e.g., Chew, 2022; Tadaï *et al.*, 2023; Xue *et al.*, 2022). With the global pandemic's onset, issues

of care shortage alongside an overdependence on migrant care workers at a global scale emerged with renewed vigor (Ng, 2022; 2023). In this fashion, population studies scholars have advocated for the wider society to challenge the dominant negative connotations associated with elderly citizens and migrant workers who are marginalized through derogatory population categories; “foreign others” and “unproductive” seniors who are part of an imminent “silver tsunami” are cases in point (Teo, 2023; Yeh, 2022). The underlying concern is the poor plight of social institutions for family care and people’s growing struggles to secure adequate care in old age. In this perspective article, I do not offer detailed overviews of eldercare predicaments in specific locations but draw on observations from Singapore and the Taiwan Province of China (hereafter Taiwan) in East Asia to point to broader global trends in market convergence of eldercare management.

In both cases, the government’s decision to expand care labor migration for family care is primarily economic; a labor market strategy that draws on the availability of low-cost migrant labor for care service occupations shunned by the local workforce (Chiu & Yen, 2024; Ortiga *et al.*, 2021). This pivotal move enabled numerous post-war East Asian economies to maximize national income by increasing the workforce participation of female citizens, enabled by the social and cultural positioning of eldercare as a “3Ds” (dirty, dangerous, and difficult and/or demeaning) occupation (Munkejord *et al.*, 2021; Rozario & Hong, 2019; Teo, 2023). Rather and more than religious justifications for live-in care, especially for “Asian Tiger” economies, people’s cultural belief in the importance of aging-in-place (i.e., stay-at-home care) for elderly persons remains a strong social norm; the intense public stigma of elderly institutionalization (nursing homes) is unique to this part of the world (Hung *et al.*, 2021; Yeh, 2022). Even in some southern European societies where tight-knit family cooperation is more commonly observed in eldercare arrangements compared to North American counterparts, for instance, the general aversion toward long-term care (LTC) homes does not equate to the particular connotation of an adult child’s unforgivable sin of unfilial conduct (Wang *et al.*, 2023). These variations aside, I zone in on the imperative to unpack the complicated ethical and moral dilemmas arising out of dominant market imperatives that encroach on all corners and cultures of eldercare (Chew, 2022; Ng, 2023). Interrogating its customary lowly social status is a first step beyond studies of different policy trajectories toward enriched understandings of the social constructs of care’s valuation.

Deeper shifts in mentality about the “dirty” nature of care work, especially for elderly persons more so than

for infants and during early childhood, as well as about the foreign domestic workers (FDWs) paired with the elderly are needed. I suggest that prospective research can stay abreast of present trends by paying more attention to: (1) the ongoing dynamics of changing age relations, including the cultural role of Confucian values of filial piety, and (2) connections between ageism against the elderly and education as care labor for children in social welfare attitudes and policy practice. While the former is more pertinent to East Asian societies, the latter analytical angle has global resonances elsewhere that can inform more expansive definitions of social reproduction in care work studies that are of use for sustainable population planning.

## 2. Ageism and filial piety: An unwelcome but necessary duo for analysis

Compared to Western societies in Europe and North America where ageism is openly talked about in LTC policy – such as the tightening austerity measures of governments, which offload the costs of caring for the population’s health onto households – and recognized at an everyday level (e.g., Herron *et al.*, 2021 in Canada), East Asian societies face different challenges in coming to terms with creeping ageism in intergenerational household units. In my fieldwork experience across Singapore and Taiwan, Confucian cultural values of filial piety manifest rather specifically in the form of a dominant social preference for stay-at-home (live-in) care by adult daughters and/or daughters-in-law who are often assisted by FDWs in middle-class households (Ng, 2023). Although elderly institutionalization is gaining normative acceptance in China, Japan, and South Korea among other cases where live-out care options are more established, this has not been the case in Singapore and Taiwan where nursing homes are still strongly stigmatized (Peng, 2018; Rozario & Hong, 2019; Yeh, 2022). In my interviews with Singaporean and Taiwanese adult children and family caregivers, I often heard negative comments such as “a place to die” and “not an option” with regard to nursing homes; some made references to the onset of elderly depression triggered by bleak environments and feelings of abandonment or loneliness (e.g., Ng, 2023). Generally, at an emotional level, adult children who pledge allegiance to honor their parents’ wishes of aging at home – grounded in seniors’ familiar community and social networks – find it difficult to accept or even comprehend the idea that ageist processes are occurring (e.g., Chiu & Yen, 2024). In other words, both adult children and their elderly parents subscribe to a straightforward criterion of filial piety in which the 24/7 availability of a foreign “maid’s” service at one’s beck and call is key if not indispensable.

In light of the above, I argue that it is important to unsettle the harmonious façade of a migrant-in-the-family model of family care because the reliance on FDWs must be understood as part of a capitalist state strategy to minimize healthcare costs, which often hides behind cultural justifications (of adhering to the social virtues of filial piety) of informal care arrangements that may endanger elderly citizens (Chiu & Yen, 2024; Rozario & Hong, 2019). In contrast to many domestic employers who believe, simplistically, that a “maid” in the home symbolizes filial intentions, the FDWs I spoke to warned about the great risks posed to elderly patients of the existing market model. As one anonymous interviewee said, “people don’t realize that by treating us badly, like cheaply, people are also harming their own old people.” For context, governments approach FDWs as a market option for households needing family care rather than a workforce requiring adequate training in caregiving skills (Ortiga *et al.*, 2021). During the migration to the placement process, it is widely known that FDWs often receive little to no training by private recruitment agencies (labor brokers) that are not regulated by state agencies. This hands-off approach, as the women explain, creates abusive and exploitative working conditions that in fact compromise their capacity to care safely and properly for others (Ng, 2023). Taking FDWs’ perspectives necessarily elicit difficult but important conversations about the status quo of filial piety practice in the region and globally. For instance, what are the assumed connections between an adult child’s expression of filial piety, immigration policies for FDWs, and the quality of eldercare? How do FDWs’ lived experiences and stories unsettle these popular or mainstream views? In this vein, it is imperative for researchers to implicate diverse and dynamic approaches of filial piety ideology that do not overly prioritize host society constructs of care needs and wants. Comparative conversations about flexible and shifting perceptions of filial piety ethics nationally and beyond among different age groups can be a start. It is worth noting that complicating the cultural factors of filial piety in East Asia, especially in changing family dynamics in diverse Chinese populations (e.g., Li *et al.*, 2021; Yeh *et al.*, 2013), is a relatively less well-researched yet timely domain for population analysts to delve into.

### **3. What happens to eldercare when everyone is pre-occupied with child futures?**

Related to the above, I propose that researchers of demographic patterns direct increased analytical energies toward the implications of child-centric norms in market society for eldercare outcomes. Sociological frameworks of education as care labor are of utmost salience in this

day and age of competitive childhood industries rooted in education and tuition practices for modern (middle-class) parenthood (Göransson *et al.*, 2022; Katz, 2018; Teo, 2023). In intergenerational circumstances of family care, which are the most widespread in urban East Asia, one can hardly ignore the possibility that collective pre-occupations over the future fate of younger generations may have ageist consequences (Ng, 2023). That is, although the nurturing of children involves immense affection and parental love, it is also the case that younger generations nowadays, whether they like it or not, end up exploiting senior cohorts in some way or another in these increasingly uncertain times (e.g., Tadaï *et al.*, 2023; Thang *et al.*, 2011 on grandparenting labor). I observed such dynamics first-hand in one Singapore household where I worked as a home tutor for a teenage boy; his maternal grandmother, as I understood from his mother during our interview, was put in charge of childcare during the day – cooking, cleaning, and washing up after him – while supervising an FDW who provides an extra pair of hands around the house.

I am not alone in pointing out that older women in particular bear the brunt of gendered expectations in the social pressure of ideal grandparenting where seniors prioritize their grandchildren’s development over their retirement comfort (e.g., Hung *et al.*, 2021; Thang *et al.*, 2011). We have a scenario where child-rearing means devoting unprecedented investments, economically and emotionally, on the part of all family members (Göransson *et al.*, 2022; Teo, 2023). Population studies tend to analyze family care in generic terms without disaggregating its various components or unpacking its nuances (Chung *et al.*, 2021; Peng, 2018). The drastically different nature of childcare and eldercare may be part of why people tend to see these as “unrelated to each other” or as “two completely separate things,” as my interviewees conveyed (Ng, 2023). Nonetheless, from a theoretical perspective for our understanding of care work, it seems important to contrast eldercare and childcare, among other possible comparisons, to expand mainstream definitions of social reproduction of a population – what it means to socially reproduce human beings. Indeed, following the pandemic, gerontological concerns are gaining popular traction in academic and policy debates as the world faces rapidly aging population woes (Chiu & Yen, 2024). But it is still the case that eldercare’s extremely devalued status vis-a-vis other types of care work and general chores is not often scrutinized (Ng, 2023). Mostly in urban East Asia, care for the elderly and children falls simultaneously on the sandwiched generation (working adult children and parents) and sometimes occurs under the same roof, yet it is typically approached in silos instead of dialectically (Ng, 2023). There is room for population studies to incorporate

feminist political economy perspectives of care in social reproduction concepts (e.g., Katz, 2018; Ng, 2023; Raghuram, 2012) that complicate the standard metrics of “value.”

## 4. Parting thoughts

I do not elaborate in detail on the social and cultural policy context of family planning and care labor migration in Singapore and Taiwan in East Asia, which I do elsewhere (Ng, 2022; 2023). Still, it is important to note that both populations, although increasingly expressing and showing pluralistic beliefs and values, by and large adhere to a preference for live-in (at-home) care. Recent Pew Research Center’s findings suggest that Taiwan is “one of the most religiously diverse places in the world, second only to Singapore” (Miner, 2024). Slightly above one-quarter of Singaporeans (26%) and Taiwanese (28%), adults identify as Buddhist, reflecting a Chinese majority and Chinese dominant population, respectively (Miner, 2023; 2024). Crucially, this practice of filial piety has less to do with religious composition or any reported affiliation with Confucian beliefs but rather the historically marketized trajectory of eldercare management (Chung *et al.*, 2021; Peng, 2018). Namely, the policy decision to integrate family planning with labor migration to boost national income triggered an irreversible transition for the social role of FDWs: from economic strategy to welfare pillar (Chiu & Yen, 2024; Peng, 2018; Rozario & Hong, 2019; Teo, 2023). As population and social welfare analysts note, this move was most intense in Singapore, Hong Kong, and Taiwan compared to Japan and South Korea where publicly managed LTC facilities have stronger foundations (Yeh, 2022).

The unfolding trends of child-centric care organizations (e.g., competitive parenting culture in Göransson *et al.*, 2022; Katz, 2018; Teo, 2023) coexisting with emerging ageism in social life locally (e.g., Maulod & Lu, 2019; Ng, 2023) and internationally (e.g., Herron *et al.*, 2021) must be observed in each localized context. People’s gravitation to child-centric futures in allocating care arrangements is not intrinsic to Confucian cultural teachings or any given social framework, but rather a broader phenomenon arising from modernity as a global social problem. In closing, I reiterate the urgency for population researchers as well as interested social welfare policy analysts more broadly – especially those who study eldercare and migrant care work – to complicate the cultural factors (often treated as “variables”) of filial piety in East Asia as well as consider wider trends of child-centric bias in care organization. Although my contributions are grounded in a qualitative training background, I do not wish to imply any hierarchy or ranking of methodological approaches and

methods used. Age relations, intergenerational dynamics, and eldercare issues encompass a wide swathe of social actors and institutions that must be understood from macro to micro scales. For instance, social processes that reproduce ageist attitudes and care relations are observed in numerous settings ranging from formal skills training courses (e.g., Maulod & Lu, 2020) to informal, privatized domains of family interactions or grounded storytelling (Mehta & Leng, 2017; Munkejord *et al.*, 2021). This perspective article is of the view that while the widespread prevalence of FDWs in family planning and care labor migration policy may be particularly acute in East Asia, beyond institutional debates of welfare policy across East and West, social phenomena of ageism tied to child-centric productivity is a common problem in modernity that analysts could devote more research attention to (Katz, 2018; Teo, 2023). Ultimately, I see this brief contribution as participating in ongoing efforts to advocate for equitable and just care outcomes for people of all ages.

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## Conflict of interest

The author declares no conflicts of interest.

## Author contributions

This is a single-authored article.

## Ethics approval and consent to participate

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## Consent for publication

Participant consented on the publication of their data.

## Availability of data

The data used in the study can be found in the author’s doctoral dissertation, which was defended on June 10,

2024, and available to the public through the University of Victoria Faculty of Graduate Studies records: <https://dspace.library.uvic.ca/items/03d569ac-0cea-4020-b7db-d7e3462f6bc7>.

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## PERSPECTIVE ARTICLE

Climate change, migration, and displacement:  
Advancing a risk-informed approach for  
sustainable solutionsShingirai Mugambiwa<sup>1,2\*</sup>  and Patience Sibanda<sup>1</sup> <sup>1</sup>Department of Community Studies, Faculty of Social Sciences, Midlands State University, Gweru, Midlands Province, Zimbabwe<sup>2</sup>Department of Social Work, Faculty of Humanities, School of Social Sciences, University of Limpopo, Mankweng, Limpopo Province, South Africa**Abstract**

Climate change has become a crucial factor driving migration and human displacement. High temperatures lead to higher incidences of phenomena such as extreme weather, rising sea levels, and altered environmental conditions that threaten governance, human security, and sustainable development. This paper seeks to establish the intersections of climate change and migration vis-à-vis displacements and sociopolitical challenges to address them. The research methodology included a secondary research approach that began with a detailed search of relevant literature from databases such as Web of Science, JSTOR, Google Scholar, ScienceDirect, and SpringerLink. The paper establishes the importance of risk management in advancing climate justice, resilience, and migration policies with respect to sustainable development. The paper concludes with some policy recommendations aimed at promoting favorable strategies to address climate-driven migration and displacement.

**Keywords:** Climate change; Migration; Displacement; Risk-informed approach; Governance; Sustainable development

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**1. Introduction**

Climate change is significantly influencing the trends and patterns of human mobility (Ahsan, 2019). As the natural environment deteriorates and catastrophes become more common, society is likely to see more environmentally induced migration and displacement (Mugambiwa & Makubele, 2023). Based on an estimation done by the United Nations High Commissioner for Refugees (UNHCR), climate change contributes to the large-scale movement of people from their homes, particularly in regions of high risk or vulnerability such as Sub-Saharan Africa, South Asia and small islands (Black, 2001; UNHCR, 2022). The interconnections between climate change, the movement of people, and displacement pose a big challenge to policymakers, international agencies, and local communities (Alverio *et al.*, 2024).

There is a great likelihood that many people will be forced to abandon their homes due to climate changes, especially in regions that are already vulnerable, such as the

low-lying coastal, dry regions, and small island countries. For instance, in 2023, catastrophic floods resulted in 1,700 deaths, the destruction of 2 million homes, and the forced displacement of about 8 million people (UN News, 2023). Migration is becoming a more relatable consequence of climate change and ecological problems, rather than the economic, political, and social issues, which were its main drivers before (Neef *et al.*, 2023). A risk-informed approach would seek to tackle not just the factors forcing people out of their homes but also the vulnerability aspect, building the capacity of disadvantaged societies to withstand climate change impacts (Clement *et al.*, 2021). Such an approach would put the emphasis on proactive responses, such as promoting sustainable development, eliminating risks, utilizing disaster risk reduction strategies, and developing adaptive capacities so that there is no requirement for high levels of involuntary resettlement. By creating such linkages between climate change and migration policies, governments and agencies would be in a position to take full control of the emerging challenges of climate change without depending on migration as a maladaptive option.

The Climate Risk Index 2021 indicates that the effects of climate change are prevalent globally but disproportionately impact developing nations. These repercussions jeopardize lives, livelihoods, and human security, thereby hindering progress toward the realization of the 2030 development Agenda (Eckstein *et al.*, 2021). The susceptibility of physical environments, particularly from rising sea levels, strong storms, wildfires, and other extreme weather phenomena intensified by climate change, jeopardizes interpersonal and locational interactions and may instigate significant displacement (Mach & Siders 2021). Numerous urban regions in developing countries are significantly ill-equipped to handle swift surges of migrants, as many cities already suffer from insufficient social services, expensive housing, less accessible transportation, and threatened public safety for current inhabitants (Brueckner & Lall, 2015). UN-Habitat (2022) indicates that approximately 70% of the urban populace in developing nations is now inadequately provided by municipal services, encompassing piped water and fundamental sanitation services. To comprehend how urban settings will adjust to the increasing population of city residents, it is essential to analyze urban vulnerabilities and their impact on migrants. Although migration may strain essential infrastructures, communities can leverage the infusion of human capital to foster economic development (Alverio *et al.*, 2024).

Among the diverse potential responses to the impacts of climate change, migration has garnered increasing attention from researchers and policymakers (Aid, 2007; Warner *et al.*, 2009). Many of these reports operate under

the premise that climate-related migration fundamentally signifies a failure to mitigate climate change and/or a failure to adapt, collectively yielding concerning estimates of the potential volume of migration stemming from these shortcomings. This matter is also imbued with political and ethical implications. Climate-related calamities disproportionately render individuals homeless in impoverished nations of the Global South, despite the Global North being chiefly accountable for anthropogenic climate change (Roberts and Parks, 2007; Mugambiwa & Makhubele, 2021). The resultant global injustice raises both ethical and practical policy issues, as climate change negotiators in the Global South increasingly recognize the challenges that migration poses for states in the Global North and newly industrializing nations, potentially influencing international environmental negotiations significantly (Alverio *et al.*, 2024). Migration has become a fundamental component of the climate change debate. Nonetheless, its significance within the climate change discourse is perpetually evolving and subject to ongoing reconfiguration.

## 2. Methods

The research methodology employed a secondary research method. The study commenced with a focused literature search which sought to improve its accuracy as well as its comprehensiveness through the use of Boolean search techniques. A wide array of Boolean operators was employed across different academic databases, which include Web of Science, JSTOR, Google Scholar, ScienceDirect, and SpringerLink. The search strings used entailed keyword combinations such as “climate change,” “migration,” “displacement,” “risk-informed approach,” and “sustainable solutions.” This method resulted in the collection of a plethora of articles regarding the conflict of climate change, migration, and displacement. For the first 60 articles, keywords were employed to further filter the articles based on their relevance, time of publication, and whether they were published in peer-reviewed journals and were in line with the rest of the study objectives. The newly compiled articles were then sieved further down to 30 that were highly relevant using this method. Data were analyzed using discourse analysis and thematic analysis. Using both discourse and thematic analysis together enabled a comprehensive analysis of language and framing employed in academic discussions while recognizing major patterns and important claims. The method provided insights and constructed the principal narratives, and relationships pertaining to climate migration. The analysis underscored the many ways in which the stakeholders view the issues of climate risks and migration scenarios along with the solutions they suggest in the attempt to

address the climate change problem. In addition, discourse analysis enabled the assessment of the dispersal of climate risks and migration tendencies, together with the possible directions of sustainable measures proposed in the academic discourses regarding the issues under discussion. As a result of combining Boolean search strategies and discourse analysis, this method provided a nuanced yet thorough understanding of the relationship between climate change, migration, and sustainable solutions.

### 3. Relationship of climate change with migration and displacement

#### 3.1. Climate change as a key factor for migration and displacement

It has been found that the climate change-induced migration of women is more common in the developing world than in developed countries (WHO, 2008; Mugambiwa, 2021). The impacts of climate change in the developing world are largely manifested as slow-onset events, such as gradually worsening desertification, drought, and rising sea levels, as well as sudden-onset disasters such as flooding and hurricanes (Mugambiwa, 2024). Due to the high reliance on productive land for a variety of economic activities, along with the natural season changes, most communities will be left with no alternative but to move and search for better conditions for habitation if these events occur. Migration is commonly triggered by a few causes, but climate change also serves as an important driver for other factors that contribute to migration such as poverty, conflicts, and resource depletion (Alverio *et al.*, 2024). In the context of climate change, most families would opt for migration because their activities become no longer sustainable by the environmentally inferior conditions they were put into.

Migration is consistently becoming synonymous with climate change, especially in a world where the environment is changing for the worse and people cannot cope with the changes (Berlemann & Steinhardt, 2017). As the world gets warmer, organic systems are being altered frequently and radically, causing alterations in the effect of precipitation, increased extreme weather events, and increasing water levels (IPPC, 2013; Dell *et al.*, 2014). These environmental changes affect agricultural yields, water resource availability, and the habitability of whole climatic regions, pushing people and communities to seek better living conditions. For instance, in Sub-Saharan Africa, desertification resulted in land loss, forcing people to look for job opportunities in cities and towns (Mpandeli *et al.*, 2020; Mugambiwa & Makhubele, 2023). While people consider climate change a contributor to aggravating existing vulnerabilities, such as poverty, improper governance, and resource scarcity, the impacts of climate

change on migration tend to be indirect (Suckalla *et al.*, 2016). Moreover, rapid-onset climatic disasters, specifically floods and storms, and their severe consequences such as cyclones, are among the frequent causes of displacement from the home for affected individuals. With a regular cycle, Mother Nature welcomes warmer, cooler, wetter, or more dry seasons in a sequential fashion every year. However, human activities have significantly altered these patterns, toward the more extreme end of the spectrum, leading to large-scale displacement of people, with Hurricane Katrina in 2005 devastating the Gulf Coast of the United States (Sastry & Gregory, 2014) and the Pakistan floods in 2022 forcing millions to desert their homes due to submerged vast lands (Nanditha *et al.*, 2023) as notable examples. Desertification, sea-water encroachment, and glacial melting are considered slow-onset climate events causing slow migration, whereas quick-onset disasters lead to a speedy forced relocation (Mugambiwa & Makhubele, 2023). For instance, people may be displaced for several days to drought-affected areas within regions that are not directly experiencing drought. However, once these people return home, their attempts to sustain their livelihoods would have failed due to the devastating effects of other gradual environmental changes.

#### 3.2. Vulnerabilities and displacement patterns

Vulnerable populations, particularly the underprivileged in many developing countries, face climate-induced displacement in much larger proportions (Brzoska & Frohlich, 2016). For instance, most rural farmers and aboriginals who depend on rainfall for their crops may not possess the appropriate means and capacity to adapt to the shift in the environment, making them more susceptible to involuntary relocation (Mpandeli *et al.*, 2020). Displacement patterns are neither linear nor one-dimensional. Some individuals may decide to internally migrate with the intention of settling in urban centers while others may attempt to move abroad to seek safety.

Migration due to the consequences of climate change or eviction as a result of certain elements of the environment constitute the major environmentally induced migration trends (Suckalla *et al.*, 2016). The majority of these migration trends are found in areas vulnerable to climatic hazards such as droughts, flooding, and rising sea levels. Vulnerability tends to exist within the confines of certain socioeconomic features including poverty, as well as the absence of infrastructure, good governance, health care, and education, which leave individuals and communities incapable of adapting to climate change (Giovanni *et al.*, 2015). For example, in Africa and Asia, rural farmers dependent on agriculture that relies heavily on rainfall, tend to migrate when droughts due to climate change are

expected to last long or become disturbing, as their means of comfortable living through farming is jeopardized due to destruction of the environment (Laube *et al.*, 2012; Lewin *et al.*, 2012).

Forced migration usually subjects marginalized populations to new threats such as poverty, marginalization, and conflict (Alverio, *et al.*, 2024). Urban areas that encounter a high influx of displaced individuals often find it hard to support them, resulting in the establishment of oversubscribed slums (Ahsan, 2019). These shelters, which are often situated along riverbanks, flimsy hills, or flood plains, are also vulnerable to the impacts of climate change, once again placing the displaced populations due to conflicts and wars at increased risk of displacement if their new shelters are affected by climate change. People displaced by the effects of climate change such as shifting weather patterns may also add to the increasing competition over land and water resources and sometimes lead to erosion of social peace and stability among the already displaced populations (Islam *et al.*, 2006). The patterns of involuntary resettlement differ in complexity depending on the type of climate event, sociopolitical context, and resources available. With natural catastrophes that occur within short time frames such as in the case of floods or hurricanes, in most cases, displacements would only last for a brief period and occur within certain geographic limits (Gray & Mueller, 2012). People who are more financially stable may be able to choose when to relocate and find safer places away from areas affected by climate change, while those poor or marginalized are left behind in increasingly hostile conditions (Mpandeli *et al.*, 2020). In some cases, these underprivileged groups might lack the resources to emigrate altogether and therefore may face confinement in miserable zones as the effects of climate change become more severe. Bettini & Gioli (2015) argue that these persistent inequalities in displacement highlight the need for all stakeholders to put a preventive policy in place to address the disproportionate factors that make people vulnerable to climate change, to democratize migration or adaptation in the face of climate change regardless of their social class.

## 4. The need for a risk-informed approach

Addressing climate migration through risk assessment involves reconceptualizing migration as a phenomenon that results from the prevailing vulnerability. It acknowledges that climate change amplifies the already existing risk factors of poor health, insecurity, lack of food and water, and loss of livelihood, all of which are causes of migration. These risk factors should be considered in the broader national and international discussions on migration to

formulate a unified response that is preventive rather than merely reactionary to the impacts of climate change.

### 4.1. Strategies for disaster risk reduction

Strategies for disaster risk reduction are associated with increasing the resilience of populations whose regions have potential risks for sudden disasters such as floods, cyclones, and landslides (Warner, 2012). Some of the key strategies include early warning systems, emergency preparedness plans, and community-based disaster management programs where communities have the means and know-how to tackle disasters when they happen. However, in some regions, early warning systems for floods and cyclones worked by alerting people to move away from the areas of forecasts so that they would not be displaced further away from their origin of residence (Peters *et al.*, 2022). Building both social and institutional resilience is fundamental because it enables vulnerable populations to cope with the effects of climate change. This calls for the need to improve the existing governance systems, enhance the educational and health services available to the people, and enable people at the community level to take part in the decision-making regarding climate change adaptation. Social resilience emphasizes developing networks among communities to enable them to help each other during critical periods. This can be exemplified by local cooperatives or social organizations playing an important role in providing support to the people affected by climate change.

### 4.2. Strengthening migration governance

Policies that deal with migration need to be adaptive to the impacts of climate change. Most migration policies of states give little to no consideration to environmental factors such as migration drivers (Ahsan, 2019). This leaves those who are marginalized by climate events vulnerable. For governance, this would mean developing strategies that incorporate protective measures for climate change refugees and other vulnerable groups. Frameworks such as the Global Compact for Safe Orderly and Regular Migration (GCM) and the Paris Agreement are useful for addressing the displacement of people by climate conditions (Bufalini, 2019). Further, Mugambiwa & Makhubele (2023) assert that enhancing migration governance is necessary for efficiently responding to the effects of climate change. A number of migration governance frameworks seem to focus only on sanctioned economic migrants and refugees of conflict or war, addressing issues facing climate-induced forcibly displaced people in a limited manner (Gemenne, 2021). The lack of features such as proper legal definitions or instruments of protection within the climate migrant legal framework creates a void in which many persons

are stuck somewhere in between. To fill these voids, it is essential for migration governance to transform and include climate-related migration within its paradigm and assist in providing legal protection for climate migrants under the existing international legal instruments. This will entail the addition of provisions in the refugee law, such as the 1951 Refugee Convention, to address the issue of environmental refugees, which is currently lacking.

On a national scale, migration policies should become more flexible and responsive toward climate displacement migration (White, 2011). For example, addressing migration due to climate-induced adverse conditions should involve establishing consistent migration governance regimes. It could mean upholding measures that encourage the movement of people within the country during periods of environmental shocks such as droughts or floods temporarily with an option for permanent displacement if there are no substantial improvements subsequently. For example, New Zealand has already set up a climate migration visa for Barbadian people who are facing an increasing risk of climate change (Dempster & Ober, 2020). Creating legal channels for climate migrants and stability in the region can thus be achieved through the imposition of such policies more widely with specific legal provisions in place. International partnerships must therefore be reinforced. It is recognized that migration resulting from climate change is a problem of global dimensions (Warner *et al.*, 2009). For this reason, it is essential for nations to come up with burden-sharing mechanisms and other measures that will help provide capacity building and resources to countries facing overwhelming changes in climate. Specifically in the area of climate migration, fostering frameworks such as the GCM and the Paris Agreement is necessary but must be backed with more tangible pledges and resources. Besides, increasing the scope of the mandate of international bodies such as UNHCR concerned with the issue of forced migration to also include climate refugees will ensure that relief is available to such groups.

In the same vein, migration governance must safeguard the fundamental rights of climate migrants above all, making sure that these persons are treated properly during the entire process of being displaced (Mianabadi *et al.*, 2022; McLeman, 2018; Burrows and Kinney, 2016). That includes meeting their basic needs such as health care, education, and housing provision along with the preservation of their legal protections in the host country's government. Governments and international organizations should seek the removal of migratory discrimination among the existing groups and help to resettle the displaced people to target regions without creating social disintegration

(Foresight, 2011). A rights-based approach to migration governance enables the climate migration actors to not only cater to the urgent humanitarian aspects of climate migrants but also to address the long-term and more structural changes needed to address the concerns about climate change.

## 5. Toward a coherent policy framework

### 5.1. Integrating climate and migration policies

A multilevel policy approach and a host of policy integration measures help to succeed in a complex policy environment. Policies on migration and climate change should be mainstreamed in the relevant national development, national disaster management, and state housing policies (Sarkar & Danda, 2023). This holistic approach would ensure that climate migrants are not seen as a physical force, whose needs are separate and therefore needs to be addressed individually. Policymakers ought to take migration as an adaptation approach and help in facilitating it by strengthening livelihood management (Eckstein *et al.* 2021). For instance, such trends as temporary migration or seasonal labor migration can provide households with an opportunity to enhance the range of possible sources of income further and diminish the households' dependencies on environmentally induced stress.

This increasing overlap between climate change and migration gives rise to the requirement of combining climate and migration policy to promote a wider, risk-aware policymaking approach (Mugambiwa & Makhubele, 2023). Climate change has epistemically expanded beyond simply being an environmental issue because its impacts are now sociologically, economically, and politically engendered, influencing migration patterns among people (Martin, 2010). However, most existing economies do not integrate climate change and migration policies as two sides of the same coin, causing inadequate intervention to address challenges that drive displacement. To engender better responses, policymakers need to shift to a unitary framework that appropriately combines climate adaptation and migration governance in a manner that ensures optimum protection of at-risk populations. In the process of incorporating migration policy into climate strategies, mainstreaming is a fundamental step of climate risk assessment in ascertaining when and where such planning occurs, whether at the national, regional, or even international level (McAdams, 2011). Governments and the international community should, in particular regions of climate variability and change, make an effort to ascertain populations that are expected to be displaced, and who, therefore, need security against the effects of climate

change. This means that there is a need to establish national and/or regional early warning systems and mechanisms for collecting information on migration trends and climate impacts to mitigate loss in real-time instead of waiting for adverse events to occur.

## 5.2. Policy recommendations

As the climate crisis worsens, so will the mass exodus of at-risk groups of people. It is necessary to take an integrated risk management approach to climate-related migration and displacement so that vulnerable populations are protected. Since migration as a new way of coping with changing environmental conditions is inevitable, it is crucial to factor climate change into migration policies for strengthening vulnerable populations' communities and international collaboration. Policies that are anticipatory and focused more on human security and sustainable development rather than reactionary policies are what policymakers must implement bearing in mind that the effects of climate change on migration will be large and complicated. National, regional, and international migration policies encompassing climate risk and responsive mechanisms that respond to climate-induced displacement should be developed. The need to develop legal frameworks that assist with climate change displacement should be undertaken with respect to their settlement and resettlement. Laws and regulations about climate migration and those who are displaced by climate effects must be the top priority for policymakers. For communities displaced as a result of climate change, resilience-building initiatives such as sustainable farming and infrastructural development are essential.

The government and international bodies should target their support and resources to programs that boost the delicate coping ability of poor populations especially through promoting climate-smart agriculture mode that reduces the effects of climate change, enhances soils, and safeguards food security. Furthermore, higher-income countries and international funding agencies should provide a greater amount of financial assistance toward promoting adaptation programs in the poorer countries that are more vulnerable to the impacts of climate change. This enables these countries to enhance their adaptive capability and minimize the likelihood of displacements. The nexus between climate change, migration, and displacement is one of the more challenging areas among the global issues that need the most attention and coordination of efforts. By developing effective and harmonized responses, the global society will be able to address the issue of displaced persons due to climate change and use it to enhance the state of the society and prevent its fragmentation.

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## PERSPECTIVE ARTICLE

## Preventing and responding to violence against women: A case study from Vietnam

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**Abstract**

Violence against women (VAW) has significant detrimental effects on the daily lives of women and the overall development of society. Addressing VAW poses a considerable challenge for nations striving to achieve sustainable development goals (SDGs). Vietnamese society, deeply influenced by Confucianism and Buddhism, continues to perpetuate male preferences. The persistence of gender stereotypes and discrimination shaped by societal norms serves as an underlying cause of VAW in Vietnam. Despite the Vietnamese government's efforts since 2010 to implement prevention and response programs for gender-based violence, the alarming reality is that nearly 63% of women report experiencing at least one form of violence in their lives. However, various obstacles prevent many of these women from seeking legal protection. These obstacles include inadequate support services, burdensome proof requirements, and fear of re-victimization. Thus, the crucial question of how to effectively eliminate VAW in Vietnam remains a major concern, influencing the nation's progress toward achieving the SDGs and upholding its commitment as a member country of the Convention on the Elimination of All Forms of Discrimination against Women. This paper analyzes the obstacles Vietnam faces in its efforts to prevent and respond to VAW, aiming to safeguard women's rights and advance gender equality.

**Keywords:** Gender-based violence; Violence against women; Prevention; Response; Legal protection; Essential support services; Vietnam

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**1. Introduction****1.1. Vietnam's social context**

Gender inequality is prevalent in most countries around the world, and addressing it is recognized as a key sustainable development goal. Vietnam shares common features with other Asian countries, such as China, Japan, and Korea, which have been influenced by Confucianism. Therefore, Vietnam faces similar challenges in promoting gender equality, especially in eliminating discrimination against women. Gender inequality refers to the different treatment of individuals based on their sex, including in societal participation, roles, asset control, and decision-making. In Vietnam, societal norms stemming from traditional beliefs often dictate that women prioritize family over personal well-being and aspirations. The prevailing expectation for women is to defer to male authority, potentially leading to a lack of awareness of or failure to actively assert their legal and policy-granted rights (Asian Development Bank [ADB], 2005). Such inequality has also

resulted in adverse effects on human resources, particularly given the significant role of women in the workforce—a pivotal factor for driving economic advancement.

Different gendered roles contribute to the formation of societal gender norms. The most common caregiving and leadership norms in Vietnam are that “women should be primarily responsible for child and family caretaking” and that “women should not be in leadership positions within the workplace” (Nguyen, 2020, p. 13). Gender norms from the past continue to strongly influence the roles of women in the workplace and at home. Persisting gender inequality in the labor market results in disparities in recruitment, compensation, and promotion. Data on employment status reveal a notable disparity favoring men, with a lower percentage of women having access to and obtaining employment.

Based on the employment status, Vietnam’s economic structure shows that only 43% of employed women are wage workers, whereas the corresponding figure for employed men is higher (51.4%). Notably, women’s labor force participation rate is very high in Vietnam (62.3% for women; 75.4% for men), but 67.2% of female workers are employed in the informal sector (UN Women *et al.*, 2021). Moreover, the proportion of unpaid family labor for women is more than twice that of men, at 19.4% compared to 9.2% in 2019 (GSO, 2021). In a family, women are required to do the housework and perform unpaid care tasks. A survey by the Institute for Social Development Studies (ISDS) revealed that 20% of women were unemployed because they were busy with household chores, compared to only 2% of men. Therefore, women are more likely to be responsible for the unpaid work of running a household, which can be both time- and energy-consuming (ISDS, 2015). The 2018 Labor Force Survey revealed that 47.5% of economically inactive women chose this employment status due to “personal or family-related reasons,” compared to only 18.9% of inactive men. Despite the generally high participation of women in the labor market in Vietnam, women continue to encounter unequal opportunities for economic engagement compared to men (General Statistics Office, 2018), thereby indicating an imbalance of power in the labor market.

The norm of favoring males has caused significant gender inequality, such as gender selection and limited access to education for females. As a result, women are more likely to have lower levels of education. According to the ISDS (2015) survey, 70.78% of women had completed a lower secondary school education or less, compared to 60.28% of men. Further, only 29.22% of women had upper-secondary school or higher education compared to 40.33% of men. Further gender norms, such as the notion that a

good wife should follow her husband’s decisions, lead to discrimination against the role of women in their families (MOLISA *et al.*, 2020). Although both men and women reported being involved in decision-making on most family matters, the majority agreed that men have the final say in more important matters, such as land, housing, and the purchase of valuable assets (ISDS, 2015).

Gender norms and stereotypes remain the primary causes of discrimination against women and gender-based violence (GBV). Women and girls are also victims of violence, such as sexual harassment, fueled by notions like “women are flowers for men to pick up.” However, laws preventing women and girls from fully exercising their rights have not still clearly determined sexual harassment in public spaces. The notion of educating one’s wife from the 1<sup>st</sup> day of marriage also encourages men to dominate the decision-making in the family, even using violence as a means to carry out such “education.”

To eliminate GBV and promote gender equality, the Vietnamese government has enacted several laws and policies, including the Law on Gender Equality, the Law on Marriage and Family, the Law on Domestic Violence Prevention and Control, and the Labor Code. In addition, the government has implemented several national programs to promote gender equality, such as the National Strategy on Gender Equality 2021 – 2030 and the Action Plan on Gender Equality 2021 – 2025. These laws, policies, and programs aim to ensure that women have equal rights and opportunities in all aspects of life, including education, employment, politics, and health.

Vietnam has also exerted considerable efforts to meet the commitments outlined in international conventions, such as the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and the Convention on the Rights of the Child. Notably, the country is currently considering ratifying the Violence and Harassment Convention 2019 (No. 190). Moreover, the Labor Code (2019) defines sexual harassment in the workplace as a prohibited act, and the employer is responsible for developing internal rules to prevent and respond to any such acts (Decree No.145/2020). These conventions further reflect the Vietnamese government’s commitment to eliminating GBV and promoting gender equality. However, GBV remains a challenging issue, and Vietnam must focus on developing stronger intervention measures to achieve the goals of the 2030 Agenda.

## 1.2. Violence against women (VAW) in Vietnam

VAW remains a significant issue in Vietnam. The 2019 *National Study on VAW in Vietnam* revealed that nearly 63% of women have experienced at least one form of GBV

(MOLISA *et al.*, 2020). Women are exposed to various forms of violence. Regarding physical or sexual violence by a husband or partner, 26.1% of women who have been married or are in a relationship have experienced physical violence, whereas 13.3% have experienced sexual violence. Emotional violence by a husband or partner is the most frequently reported form, with almost half of women (47.0%) encountering it at least once and nearly one-fifth (19.3%) in the past year (MOLISA *et al.*, 2020).

Despite Vietnam's first National Program on Preventing and Responding to GBV in 2010, the issue remains prevalent. The 2019 study on VAW compared data from 2010 to 2019, revealing an increase in violence committed by husbands or partners from 10% to 13%. Incidents of physical violence by individuals other than partners increased from 9.9% to 11.4%, whereas sexual violence by others increased from 2.3% to 9.0%. Notably, sexual violence against girls under 15 years increased from 2.8% to 4.4% (MOLISA *et al.*, 2020).

Although Vietnam has implemented a 10-year program dedicated to preventing and responding to GBV, the situation is still a challenge. The following question arises: Why is the number of cases of violence increasing? Gender discrimination and stereotypes are the root causes of VAW. More than one-third of women in Vietnam express traditional beliefs that favor men as household decision-makers. Over half of the female respondents of the 2019 study on VAW (51.8%) believed that a man is justified in physically harming his wife for reasons such as infidelity (45.2%) or neglecting childcare duties (27.0%). Such beliefs are more prevalent in rural areas and among less educated women. Women who have experienced violence are also likely to excuse their husbands or partners for violent behavior. Among those who have experienced physical violence, the most common triggers were "family problems" (50.8%) and "alcohol use" (40.9%), followed by "financial issues" (18.8%) (MOLISA *et al.*, 2020). The belief that women should fulfill their marital duties without the right to refuse their husband's sexual advances persists, with 27% of women still adhering to the notion that a good wife should comply with her husband's wishes even if she disagrees with him (MOLISA *et al.*, 2020). Consequently, Vietnam still does not have reports on rape cases committed by husbands, and 90% of women who experienced sexual violence did not report it or seek help from the system. Many reasons prevent women from seeking protection because violence is considered a private issue and women want to protect the reputation of their families, or the burden of proof or infeasible sanctions (Phan, 2022).

Women who have experienced violence encounter substantial obstacles when attempting to pursue equitable

and rightful resolutions through both formal and informal legal systems. The same is true of individuals seeking essential services, such as healthcare, law enforcement, legal support, and social services. These challenges persist due to deeply ingrained gender stereotypes that permeate traditional, historical, cultural, legislative, and service-oriented responses. For instance, women are frequently urged to compromise on their ambitions for the benefit of their children, and domestic violence is often regarded as a private family matter, with the wife being expected to protect her husband's reputation. The notion of "xấu chàng hổ ai" (both are being shamed) or the traditional belief that a wife should bring pride to her husband, as reflected in Vietnamese folklore, "A man gets rich by his friend and gets pride from his wife," discourages women from reporting such cases, perpetuating the acceptance of violence as commonplace (MOLISA *et al.*, 2020). The primary reason cited by women for not seeking assistance was their belief that the violence they experienced was either normal or not serious—a sentiment expressed by 48.4% of women who did not seek help. Conversely, most women who sought help did so only when they could no longer tolerate the violence (69.7%). In addition, nearly one in five women (19.3%) left home at least once due to a violent husband or partner. These women stayed away for an average of 20 days and mostly sought refuge with their relatives. Reasons for returning included not wanting to leave children behind (50.4%), being asked to return by their partner (26.0%), and forgiving their partner (25.5%) (MOLISA *et al.*, 2020).

During the COVID-19 pandemic, domestic violence worsened due to social distancing policies. Working from home also imposes a greater burden of housework on women. The COVID-19 pandemic introduced various challenges into people's daily lives, but its impact has been particularly severe on women, both in their professional and domestic roles. As highlighted in a UN Women (2020) report during the early months of the pandemic, women were significantly affected due to their higher representation in insecure jobs, including in the informal sector, where they receive inadequate benefits and protection. Throughout the pandemic, women, girls, and vulnerable populations have faced an elevated risk of GBV due to their limited influence and involvement in household decision-making. This vulnerability was exacerbated by changes in social safety nets, mobility restrictions, and reduced access to information and services. The COVID-19 pandemic in Vietnam disrupted the supply of contraceptives and essential medical resources to women, mirroring disruptions in the supply of various goods and services globally (World Bank, 2023). As a result, the challenge of VAW persists in

Vietnam, hindering women from fully exercising their rights.

## 2. Preventing and responding to VAW in Vietnam

### 2.1. Laws and policies

The Vietnamese government has reaffirmed its commitment to recognizing and safeguarding human rights through its membership in several UN conventions, including the UN Convention on Political and Civil Rights and CEDAW. Consequently, Vietnam has developed a legal framework for protecting women's rights and preventing VAW. The country's dedication to fulfilling its international obligations by taking proactive steps to prevent, investigate, and prosecute cases of VAW is evident in its recent legislative and policy initiatives. These efforts extend beyond gender equality and encompass broader concerns such as domestic violence and workplace sexual harassment. This commitment is demonstrated through recent revisions to the Penal Code, Criminal Procedure Code, and Legal Aid Act (UN Women, 2017).

Developing comprehensive legislation on the prevention of VAW is one of Vietnam's most important tasks. The legal framework for preventing and responding to VAW can be described as follows.

First, the form of VAW is often categorized into four forms: physical, emotional, economic, and sexual. These distinct forms of violence are governed by various legal instruments in Vietnam. They are addressed within different legal frameworks, including the Law on the Prevention and Control of Domestic Violence, the Penal Code, the Law on Human Trafficking, the Law on Children, and several decrees related to handling cases of violence. For instance, Decree No. 144/202/ND-CP, dated December 31, 2021, addresses administrative penalties for violations related to social safety, security, order, social issues, fire prevention, firefighting, rescue, and domestic violence prevention and control.

However, significant flaws exist in the consistent application of gender-sensitive procedures for addressing all forms of VAW. For example, cases of VAW can be handled under different legal procedures, including the Criminal Procedure Code, Civil Procedure Code, and Law on Handling Administrative Violations. This lack of uniformity in the principles governing the handling of VAW leads to inconsistencies and increased risk of victimization. In addition, emerging forms of violence, such as cyber and dating violence, are not currently addressed by existing laws. Consequently, Vietnam urgently requires the development of a comprehensive

legal framework aimed at eradicating all forms of VAW, as mandated by CEDAW.

Second, regarding the place of VAW, various forms of VAW are stipulated by different laws and regulations as follows:

(i) Domestic VAW: The Law on the Prevention and Control of Domestic Violence, enacted in 2007 and amended in 2022, introduces new forms of domestic violence, notably domestic sexual violence (Article 2[1]). This Law categorizes sexual violence as any sexual act or behavior occurring without consent. However, cultural perceptions often regard sexual relations between spouses as private matters, with the expectation that a woman is responsible for satisfying her husband's sexual needs. Consequently, marital rape is not acknowledged, as there is a prevailing belief that consent to marriage implies consent to sexual intercourse, and this presumed sexual "right" is typically considered irrevocable unless the couple divorces (Skinnider *et al.*, 2017, p. 45). The new amendment also introduces more protective measures and support services for women and children. Article 22 outlines measures to prevent domestic violence and protect and support its victims, including the following:

- Forcing an end to acts of domestic violence.
- Requesting the person committing domestic violence to report to the police office of the commune where the violence occurred.
- Imposing protective orders.
- Arranging shelters and providing support for essential needs.
- Providing care and treatment for victims of domestic violence.
- Offering legal aid, psychological counseling, and training in responding to domestic violence.
- Providing domestic violence education and control.
- Offering suggestions and criticism to perpetrators in their communities.
- Performing community service.
- Implementing measures to prevent and handle administrative violations according to the law; measures to prevent and protect victims under criminal procedures laws regarding perpetrators.

(ii) VAW in the workplace: The Labor Code 2019 and Decree No.12/2022 on penalties for administrative violations against regulations on labor, social insurance, and Vietnamese guest workers prohibits sexual harassment. Article 11(3) specifies that a fine of approximately 700 – 1200 USD shall be imposed for acts of sexual harassment in the workplace, if not

subject to criminal prosecution. To promote female workers' rights regarding gender equality, Article 28 of this Decree on regulatory violations against female employees and gender equality stipulates:

(1) A fine of approximately 250 – 500 USD shall be imposed on an employer for:

- a) Failing to ensure gender equality and the implementation of measures to promote gender equality in recruitment, job assignment, placement, training, working hours, rest periods, salaries, and other policies.
- b) Failing to consult with female employees or their representatives when making decisions affecting their rights and interests.

Decree No.145/2020, dated December 14, 2020, which elaborates on some articles of the Labor Code regarding working conditions and labor relations, also stipulates the obligations of employers in developing internal regulations to prevent sexual harassment. According to Article 84(1), sexual harassment is defined as including requests, demands, suggestions, threats, or the use of force to coerce sex in exchange for any work-related benefits. In addition, it includes any sexual act that creates an insecure and uncomfortable work environment, adversely affecting the mental and physical health, performance, and overall life of the victim. This marks the first legal definition of sexual harassment in Vietnam, reflecting the government's increased focus on protecting women's rights and combating sexual violence in the workplace.

(iii) VAW in public spaces: Public spaces are defined to differentiate them from domestic and workplace settings. This clarification helps determine the jurisdiction for addressing cases of violence and provides a legal foundation for their resolution. For example, if a case of sexual harassment occurs in a public space, penalties as stipulated in Decree No. 144/2021/ND-CP will apply, whereas sexual harassment in the workplace will be governed by Decree No. 12/2022.

Third, regarding penalties imposed on perpetrators, acts of VAW are divided into categories including administrative violations and criminal offenses, which can be described as follows:

(i) Administrative violence these are illegal acts committed by individuals or organizations that are not classified as crimes and for which administrative sanctions are imposed according to law. Various regulations govern acts of domestic violence, as well as violence perpetrated by individuals other than family members. Cases of administrative violations fall under the jurisdiction of either the local police

or the Chairperson of the People's Committee at the respective administrative levels. The authority to handle such cases is based on the gravity of the violation and the associated penalties. For example, the Chairperson of the People's Committee at the commune level has the authority to impose fines of up to 250 USD (5 million VND), whereas, at the district level, the Chairperson's competence extends to penalties of up to 2,500 USD (50 million VND) (Article 38, Law on Handling Administrative Violation 2012, amended 2020). For instance, Decree No. 144/2021 includes two distinct articles related to cases of violence, specifying different penalties and jurisdictions. Article 7.3 states,

"A fine ranging from around 100 – 150 USD shall be imposed for any of the following violations: (a) Taunting, teasing, insulting, or humiliating another person, except in cases specified in Point b Clause 2 Article 21 and Article 54 of this Decree; (b) Organizing, hiring, enticing, or tempting another person to cause injuries or bodily harm, or to insult or humiliate another person, without being subject to criminal prosecution."

In cases falling under this article, the Chairperson at the commune level has jurisdiction to handle the matter according to the administrative procedures outlined in the Law on Handling Administrative Violations. However, Article 54 of the same Decree applies in cases involving domestic violence, with more severe penalties. Article 54 addresses acts of defamation within family relationships as follows:

"1. A fine ranging from around 250 – 500 USD shall be imposed for insulting, nagging, or damaging the honor and dignity of a family member; 2. A fine ranging from around 500 – 1,000 USD shall be imposed for any of the following violations: (a) Disclosing or distributing materials or documentation concerning the privacy of a family member to harm their honor and dignity; (b) Using media to tarnish the honor and dignity of a family member; (c) Disseminating and distributing leaflets, articles, photos, or audio materials aimed at harming the honor and dignity of a family member."

The Chairperson of the People's Committee has jurisdiction to deal with cases falling under Article 54. However, if a perpetrator is involved in an administrative violence incident, their actions do not result in a criminal record. This distinction is noteworthy because a wife may be hesitant to report instances of domestic violence, fearing that she would be liable to pay the fines from the family's shared assets. This highlights practical challenges in enforcing the law effectively and contributes to the low number of reported cases.

- (ii) Criminal offenses: VAW is also addressed under the Penal Code 2015 (amended in 2017), which includes various articles such as
- Physical acts of violence: Article 133 on the threat of murder and Article 134 on the deliberate infliction of bodily harm upon another person: “A person who deliberately inflicts bodily harm upon another person and causes 11 – 33% WPI or under 11% WPI in any of the following circumstances shall face a penalty of up to a 3-year community sentence or 6 – 36 months of imprisonment.”
  - Acts of sexual violence: Article 141 on the crime of rape; Article 142 on the rape of a person under 16 years old; and Article 146 on the molestation of a person under 16.
  - Emotional violence: Article 155 on insults to another person.
  - Economic violence: Article 178 on the deliberate destruction of property.

It is worth noting that there is no distinction between crimes committed by husbands/partners or strangers. For example, rape applies to all cases, with a relationship potentially serving as a mitigating or aggregating factor. However, there are no reported cases of marital rape (Huong & Ly, 2022). Other provisions also apply to domestic violence, such as Article 184 on incest and Article 185 on the maltreatment or abuse of one’s grandparent, parent, spouse, child, grandchild, or caregiver.

## 2.2. Ineffective implementation of law in handling VAW

In addition to limitations in the legal framework for preventing and responding to GBV, the ineffective implementation of the law impedes victims of GBV from seeking legal protection and remedies. Notably, a joint United Nations Population Fund (UNFPA) and Government of Vietnam survey (2020) revealed that 49.6% of women who had experienced physical and/or sexual violence by a husband or partner had never disclosed it to anyone, and 90.4% had not sought help from official support services or authorities. The primary reasons for this include victim-blaming and a lack of gender-sensitive skills among law enforcement officers, particularly when handling cases of sexual violence. For instance, many victims of sexual violence find little support from the criminal justice system, where the attitudes of police, prosecutors, and judges can significantly influence the application of the law and the treatment of victims (Skinnider *et al.*, 2017).

Procedures for handling cases also pose challenges to victims. Victims of violence are often hesitant to report

their cases due to the burden of proof. For example, in a rape case, it is crucial to report the crime to the police before undergoing a medical forensic examination. The examination, which is not mandatory, is conducted by female officers at the investigator’s request to collect evidence. However, a significant challenge arises because these medical examinations often occur more than 24 h after the crime is committed, and DNA evidence must be collected within 72 h. Missing this timeframe may undermine the credibility of the evidence supporting a rape allegation. Therefore, it is essential to collect potential bodily fluids from areas where DNA might not persist beyond 24 h.

Regarding sexual harassment, the Labor Code 2019 and Decree No. 145/2020 address sexual harassment in the workplace, whereas Decree No. 144/2021 covers sexual harassment in public spaces. However, handling sexual harassment cases depends on a company’s internal rules. Under Vietnamese legal regulations, sexual harassment cases fall under different jurisdictions based on the location of the incident—whether it occurs in the workplace or a public space. According to Decree No. 145/2020, a workplace is defined as “any location where the employee works, as agreed or assigned by the employer, including work-related venues such as social activities, conferences, training sessions, business trips, meals, phone conversations, communications through electronic media, employer-provided shuttles, and other locations specified by the employer.” This definition creates challenges in cases that can address sexual harassment that occurs between co-workers, as it may not always be clear whether the employer can handle such a situation. For example, if an employee invites colleagues to their home for a farewell party and commits an act of sexual harassment in a private setting, it is uncertain whether the company can handle such a case because it did not occur in the workplace. Similar challenges arise when a group of employees goes to a karaoke bar, and one employee harasses another. In such cases, determining the appropriate legal framework is challenging, as it may involve Decree No. 144/2021 (addressing sexual harassment in public spaces) or Decree 12/2022 (addressing sexual harassment in the workplace). Consequently, law enforcement officers face difficulties in determining the legal grounds for handling sexual harassment cases.

Another issue is that judgments often lack adequate consideration of the impacts on victims of sexual abuse. Sexual violence is one of the most severe forms of GBV, and victims often encounter significant challenges in seeking legal protection and remedies. The impacts of sexual violence differ from those of other types of GBV,

such as physical or mental violence. Discriminatory social and cultural values, patterns, and practices contribute to the vulnerability of women and girls to sexual violence (Tan, 2017).

### 2.3. Implementation of the national program on preventing and responding to VAW

The Vietnamese government has been actively working to advance gender equality through a multifaceted approach, which includes establishing a comprehensive legal framework and developing national strategies and programs. One of the key objectives outlined in the National Strategy on Gender Equality from 2021 to 2030, as specified in Resolution No. 28/NQ-CP dated March 3, 2021, focuses on improving family dynamics and addressing gender-based abuse. This objective includes the following targets:

- (1) Reduce the average working hours of women in unpaid housewife and caregiving roles to 1.7 times that of men by 2025 and further reduce it to 1.4 times by 2030.
- (2) Increase the percentage of gender-based domestic violence victims who are identified and have access to basic support services to 80% by 2025 and 90% by 2030.
- (3) Enhance efforts to provide guidance and support to individuals responsible for gender-based domestic violence, aiming to achieve a 50% increase in those criminally prosecuted by 2025 and 70% by 2030.

Vietnam is also implementing the National Program on Preventing and Responding to GBV (2021 – 2025), as stipulated in Decision No. 2232/QĐ-TTg dated December 28, 2021. This program sets a specific objective: to ensure that at least 50% of victims of GBV seek help from support service providers, with the goal of providing support to 100% of those in need.

The Ministry of Labor, Invalid, and Social Affairs has introduced the Peace House Model, and the Law on the Prevention and Control of Domestic Violence (amended in 2022). This statute includes preventive measures that ensure victims have the right to request accommodation in a “Peace House.” However, despite these measures, a survey indicated that 90% of victims did not report the case and seek remedies (MOLISA *et al.*, 2020).

### 3. Discussion

Despite implementing the 2010 National Program on Preventing and Responding to GBV, significant concerns persist among various stakeholders in Vietnam regarding the enduring challenges in addressing VAW and achieving gender equality. This prompts questions about the

effectiveness of the collective efforts stemming from the Program. Many obstacles threaten the success of these efforts to prevent and respond to VAW.

#### 3.1. Difficulty in changing attitudes and behaviors

VAW is a product of gender-based discrimination and is deeply ingrained in the historical disparities between men and women. According to a 2014 UN report, GBV is shaped by prevailing gender norms and attitudes, including expectations related to masculinity and femininity, as well as societal preferences for sons, all of which create a structural environment conducive to such violence (UN, 2014). Gender norms continue to serve as an underlying reason for persistent VAW, particularly in rural and remote regions. The conventional family structure in Vietnam, which has been shaped by Confucianism, continues to marginalize the role of women in both the community and society. For example, in elections for the National Assembly and People’s Council, both male and female voters tend to show a preference for male candidates. Female candidates also face greater bias, particularly when competing for executive roles, which, compared to legislative roles, are the most influential decision-making positions. This bias against female candidates is most pronounced in village elections, where women are less likely to garner voter support if they have a family. However, having a family is viewed as an advantage for male candidates, resulting in a significantly higher proportion of male votes in local elections going to men (UN Women *et al.*, 2021).

Despite Vietnam’s efforts to implement various awareness campaigns and capacity-building programs aimed at addressing VAW and better legally empowering women, the high occurrence of unreported cases of violence underscores the ongoing challenge of effectively addressing and resolving the issue. The Vietnamese government has implemented many programs to raise awareness of GBV by introducing optional courses in the education system from middle schools and promoting gender mainstreaming in educational programs and textbooks. However, Vietnam faces a severe gender imbalance in newborns, primarily driven by a strong preference for sons and the practice of sex-selective abortions. According to the 2019 Census, for every 100 girls born, 111.5 boys were born, placing Vietnam among the world’s five countries with the most significant gender imbalances. In 2020, the UNFPA estimated that approximately 45,900 female births go missing each year in Vietnam due to the country’s high rates of sex-selective abortion (UN Women *et al.*, 2021). This indicates that sons are still being preferred, and women are under pressure to have a son to protect their marriage. Clearly, efforts to shift attitudes and behaviors must continue, and employing mass media and the education system remains vital in eradicating VAW.

### 3.2. Low percentage of men's engagement in preventing and responding to violence

Promoting women's participation is a criterion for promoting gender equality in Vietnam. In 2015, Vietnam introduced a legal requirement that at least 35% of candidates in elections must be women. Although there was a slight 2% increase in the 2016 – 2020 term, this still fell short of meeting the mandated quota. However, there was a significant improvement in the 2021 – 2026 term. During the 2021 elections, female candidates comprised 45.38% of the total number of candidates, and the proportion of female National Assembly Deputies rose to 30.26%. This was the 1<sup>st</sup> time that women's representation exceeded 30%, reaching its highest level since 1976 (UN Women *et al.*, 2021). However, men's participation in efforts to prevent and respond to GBV remains low.

Vietnam's efforts to prevent and respond to GBV have been organized from the national level to the local level through the establishment of the Women's Advancement Committee at the provincial and district levels (Decision No. 1585/QĐ-TTg, dated November 11, 2009). The Committee includes members of different state organs and the Women's Union at the same level. However, there is a significant gender imbalance within this committee, with a limited number of male members. Most GBV programs have been led and executed by women. This is largely due to the perception that these initiatives are designed for women and should be managed by women. There is a prevailing notion that men should primarily focus on labor-intensive tasks and decision-making roles, thereby hindering their involvement in GBV prevention and gender equality promotion programs.

Recently, some provinces have collaborated with UN Women to establish a model of men's engagement in the prevention of VAW, such as the Men's Club of Da Nang Province and Ho Chi Minh City. As Elisa Fernandez, Head of the UN Women's Head of Office in Vietnam, pointed out, attaining gender equality necessitates a fundamental shift in the imbalanced power dynamics between men and women. This transformation involves challenging the established ideas of masculinity and traditional concepts of manhood. It calls upon men to critically examine power structures, not only in their personal lives but also in their interactions with others and within society. Men must acknowledge their role in instigating and assuming responsibility for change (UNDP, 2018). Hence, Vietnam should engage more men in prevention programs to better raise awareness of the need to address VAW.

### 3.3. Obstacles to obtaining protection and access to crucial support services

Providing support services for victims is crucial for ensuring that GBV victims can seek protection and

remedy. Vietnam has developed support models such as Peace House. Some provinces, with technical and financial support from UNFPA, KOIKA, and UN Women, have introduced the "one-shop-stop" model (Huong & Ly, 2022). Victims of domestic violence and children under 16 are also eligible for free legal aid, as prescribed by the Law on Legal Aid 2017.

However, multiple barriers often make victims of violence reluctant to seek support. For example, victims of sexual violence face obstacles when reporting an incident, including harmful gender stereotypes that perpetuate misconceptions about what qualifies as "legitimate" rape and a "genuine victim." These stereotypes influence beliefs and assumptions about how an "ideal victim" should act, which, in turn, impacts the assessment of a survivor's credibility and affects how the criminal justice system handles cases related to VAW (UN Women, 2017.25). Victim blaming poses a considerable obstacle to women seeking justice, particularly for GBV victims. Handling cases of violence is challenging for these victims (Huong & Ly, 2022). Domestic violence persists as a private matter within families, often pressuring women to make sacrifices for the sake of their families and to uphold their husbands' reputations. Women in rural areas lacking a stable income may find it challenging to request divorce due to financial dependency.

Gender discrimination and stereotypes also remain challenging issues in women's empowerment because of power imbalances, which impact women's complete and equal involvement in both politics and employment. This situation is further exacerbated by women's dual responsibilities of work and caregiving, particularly with their disproportionate share of domestic and care-related roles. Although awareness campaigns are important, they also have limitations. To create meaningful change, it is essential to address structural factors such as unequal power dynamics (UN Women *et al.*, 2021). To address this, the National Program on Preventing and Responding to GBV (2021 – 2025) set a goal of ensuring that 50% of victims can access support services. If Vietnam is to meet this target, it must establish a comprehensive package of essential support services alongside other measures aimed at eradicating VAW.

## 4. Conclusion

Despite introducing the Law on Gender Equality and the National Program on Preventing and Responding to GBV over the past two decades, Vietnam continues to grapple with the persistent issue of VAW. VAW remains a significant barrier, preventing women from fully exercising their rights and participating in society, which in turn

impedes national development. In the Vietnamese societal context, entrenched gender norms and stereotypes are the primary causes of VAW. To effectively address this issue and move toward gender equality, Vietnam must prioritize the eradication of VAW as a key solution. To achieve this goal, the country should continue promoting awareness of gender equality, increase men's participation in preventing and responding to VAW, establish "one-stop-shop" models, and strengthen the monitoring and evaluation of intervention measures to ensure that victims of VAW can readily seek help and receive effective protection.

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This is a single-authored paper.

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Not applicable.

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## RESEARCH ARTICLE

Impact of stress during adolescence on general  
and work-related stress in early adulthood:  
A prospective cohort studyTrine Nøhr Winding<sup>1\*</sup> , Mette Lykke Nielsen<sup>2</sup>, and Regine Grytnes<sup>1</sup><sup>1</sup>Department of Occupational Medicine, University Research Clinic, Danish Ramazzini Center, Goedstrup Hospital, Herning, Denmark<sup>2</sup>Department of Culture and Learning, Center for Youth Research, Aalborg University, Copenhagen, Denmark**Abstract**

High-stress levels during youth can negatively impact an individual's long-term physical and psychological health and overall well-being, potentially extending into adulthood and affecting their work life. Further investigation is required to deepen our understanding of how the stress experienced during adolescence correlates with stress in early adult work life. Furthermore, exploring how factors within the psychosocial work environment and temporary employment contribute to stressful experiences is crucial. This study followed a cohort of 1275 Danish working adults born in 1989, tracking them from age 15 – 28. Participants reported perceived stress levels at ages 15, 18, and 21, and the outcomes included perceived stress and work-related stress at age 28. Additional information on the psychosocial work environment and temporary employment was collected at age 28. The study consistently identified associations between perceived stress during adolescence and perceived stress or work-related stress in adulthood. The psychosocial work environment variables significantly contributed to work-related stress and partially explained general perceived stress, particularly among those with more work experience. Occupational health professionals should be aware that stress during adolescence can result in stress in future work life. It is important to understand that perceived stress and work-related stress are distinct facets, requiring different prevention approaches.

**Keywords:** Adolescents; Perceived stress; Work stress**\*Corresponding author:**Trine Nøhr Winding  
(trwind@rm.dk)**Citation:** Winding, T.N., Nielsen, M.L., & Grytnes, R. (2025). Impact of stress during adolescence on general and work-related stress in early adulthood: A prospective cohort study. *International Journal of Population Studies*, 11(4): 25-40. <https://doi.org/10.36922/ijps.0864>**Received:** April 26, 2023**Revised:** October 11, 2023**Accepted:** April 12, 2024**Published online:** August 6, 2024**Copyright:** © 2024 Author(s). This is an Open-Access article distributed under the terms of the Creative Commons Attribution License, permitting distribution, and reproduction in any medium, provided the original work is properly cited.**Publisher's Note:** AccScience Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.**1. Introduction****1.1. Stress in youth**

The prevalence of mental health challenges, such as stress, anxiety, and depression, among young individuals is on the rise both in Denmark (Jeppesen *et al.*, 2020) and internationally (Johnson *et al.*, 2018; Kaasbøll *et al.*, 2021; the World Health Organization [WHO], 2020). The mental health issues often begin during their school years and can persist into their work lives. The explanations behind the increase in psychological problems, including stress, in young individuals are multifaceted. A clear social gradient

in the reporting of stress among young individuals has been documented (National Institute of Public Health, 2020), and many young individuals experience mounting pressures and expectations in their academic or vocational pursuits, leading to elevated levels of stress (Due *et al.*, 2014). International comparative surveys show an increase in educational stress during school years (Klinger *et al.*, 2015; Löfstedt *et al.*, 2019), with girls reporting the highest stress levels (Trolle *et al.*, 2017). Sociologists have argued that the negative trends in the development of mental health and stress reflect a wider social trend in the “Performance Society,” where young individuals are described as “Generation Performance,” whose experience of worth and identity is increasingly about performing optimally and being positioned as a winner (Madsen, 2018; Petersen, 2016), making success in life the predominant idea in life (Sørensen *et al.*, 2017). The young generation commonly demonstrates high levels of discipline and displays a thoughtful approach when weighing the outcomes of their decisions in relation to future prospects (Farrugia, 2020), which often leads to feelings of worry and stress (Nielsen *et al.*, 2010).

## 1.2. The negative health consequences of stress

Basically, perceived stress develops when demands in the environment exceed a person's resources and thus endanger the person's well-being (Lazarus & Folkman, 1984). Stress in youth can have major repercussions on young individuals' lives. In the short term, this can lead to an extension of the time required to complete their education or to the risk of dropping out of school or university. However, high-stress levels in youth can also have potential negative long-term consequences for the individual's physical and psychological health and well-being (WHO, 2009). A high degree of perceived stress among young adults has been found to relate to poorer self-rated health, poorer health behavior, and a higher risk of depression (Due *et al.*, 2014; Nielsen *et al.*, 2010). Furthermore, a study by Hanson *et al.* (2016) discovered that accumulated stress that occurs in childhood affects reward-related activity in the brain, causing decreased motivation and increased negative mood at age 26.

## 1.3. Stress and work-life

Stress during adolescence can have an enduring negative effect that extends into adult work life, contributing to stressful working conditions (work stress). In fact, a recent study on the same cohort revealed that stress during adolescence doubled the risk of low labor market participation between ages 25 and 29 compared to those who had not been stressed (Winding *et al.*, 2023). The labor market is in great need for young workers, and they should

ideally be able to work for many years. However, there is a lack of studies investigating how the well-being of young individuals influences their subsequent work lives. It is essential to understand the initiatives that should be taken to ensure that the next generation of workers establishes a good and stable connection to the labor market. However, the role of the psychosocial work environment in the stress and psychological well-being of young adults remains debated. In Denmark, workers below the age of 35 report higher stress levels compared to the general working population (NFA, 2017). Studies investigating the association between work environment and the development of stress or other mental health problems have identified associations between poor psychosocial work environment factors like a low degree of procedural and interactional organizational justice and the experience of stress (Oshio *et al.*, 2014) and between job resources such as variety, autonomy, or good relations with superiors or coworkers and mental well-being (Taris, 1999). These results are supported by the conclusion of a review from 2011, which revealed that high psychological demands and a low level of social support are associated with mental health problems, including stress among young workers (Laberge & Ledoux, 2011). At the same time, a reverse association between stress and work environment was demonstrated, where mental health problems can affect the experienced work environment of young workers (Taris, 1999), and a previous Danish study documented that mentally vulnerable young individuals experience more demanding work environments early in their careers compared to their peers (Winding *et al.*, 2015). However, it remains unclear if this negative association is due to the vulnerable position of new employees and whether it diminishes with more experience. This knowledge is important for implementing preventive measures in the workplace.

## 1.4. Temporary employment

In recent years, the negative consequences of part-time work, short-term employment, and insecurity in employment have gained focus, especially since different forms of temporary employment have become increasingly common among young individuals transitioning from education to work life (Nielsen *et al.*, 2017; Nielsen *et al.*, 2018). Temporary employment has been identified as a potential social determinant that can affect the health and well-being of employees and their families (Benach *et al.*, 2016). However, research in this area is still sparse, particularly regarding the impact of temporary work on stress development, especially early in one's career.

Thus, there is a need for more knowledge about the potential negative impact of high-stress levels during

adolescence on the experience of stress, both general perceived stress and work stress, during young adulthood. It is also essential to understand how psychosocial work environment factors and temporary employment affect the experience of stress in the early career stages. Furthermore, there is a need to investigate whether the perceived stress diminishes as young individuals gain more experience in the labor market.

In this study, stress is measured as perceived or experienced stress, which is different from clinical stress and is viewed from a psychological perspective. Lazarus' cognitive stress model (Cohen *et al.*, 1997) is the basis for the definition of the concept. Lazarus' theory suggests that the experience of stress is not fixed or unchanging but rather emerges as an ongoing interaction between the individual and their surroundings (Lazarus & Folkman, 1984).

## 1.5. Aim

This theoretical understanding and interest have led to the following three study aims:

- (i) To investigate the strength of the association between perceived stress during adolescence and stress experienced in young adult work life.
- (ii) To investigate the extent to which the association between perceived stress in adolescence and stress in young adult work life is explained by a poor psychosocial work environment and temporary employment.
- (iii) To investigate whether the association between perceived stress in adolescence and stress in young adult work life is dependent on work experience.

## 2. Methods

### 2.1. Participants

The individuals included in this study were drawn from the West Jutland Cohort, which consisted of all individuals ( $n = 3681$ ) born in 1989 and residing in Ringkjøbing County, Denmark, in early April 2004. The primary objective of the West Jutland Cohort study was to examine and explore various dimensions of inequalities and social disparities affecting physical and mental health as well as overall well-being across the lifespan (Glasscock *et al.*, 2013; Winding & Andersen, 2015). At the age of 15, in 2004, a baseline questionnaire was administered during school hours, with participants who were absent from school on the collection day receiving the questionnaire by mail. Out of the 3681 potential participants invited, 3054 (83%) chose to participate. Subsequent follow-up surveys were conducted in 2007 (age 18), 2010 (age 21), and

2017 (age 28), with response rates of 65%, 58%, and 57%, respectively. For the present study, the study population comprises individuals who indicated having a job at age 28 in the 2017 questionnaire and provided information about stress (perceived stress from ages 15 – 28 or work stress at age 28) on at least one questionnaire ( $n = 1275$ ).

### 2.2. Measures

To measure stress in young adults at the age of 28, two measures were employed:

- (i) The PSS-10, known as the Perceived Stress Scale 10-item version, is a widely used psychological tool developed to gauge the level of global stress individuals perceive in their lives. It was designed to measure the degree to which individuals find their lives unpredictable, uncontrollable, and overloaded (Cohen *et al.*, 1983). In clinical research, the Danish version of the PSS-10 has been proven to be feasible and possesses strong psychometric properties such as agreement, reliability, validity, responsiveness, and interpretability, particularly among patients who experience work-related stress complaints (Eskildsen *et al.*, 2015). To calculate stress scores at the age of 28, the 2017 questionnaire included 10 items with response categories ranging from “never” to “very often” on a scale of 0 to 4. These responses were then summed to create a score ranging from 0 to 40. To distinguish between high and low-stress levels, the scores were dichotomized at the 75<sup>th</sup> percentile ( $\geq 18$ ).
- (ii) Work stress at age 28 was assessed using a single-item question: “is your normal daily work stressful in an unpleasant way?” This measure has been used in previous studies to measure work-related stress in a Danish work context (Haahr, 2006). It contains six response categories, from 1 (always) to 6 (rarely/never), that were dichotomized into low work stress (rarely/never; sometimes) and high work stress (always; almost always; usually; frequently).

The abbreviated version of the Perceived Stress Scale, known as PSS-4, was used to assess stress levels in adolescents (Cohen *et al.*, 1983). Information was collected using questionnaires at ages 15, 18, and 21. The PSS-4 was a subset of the PSS-10 used at age 28, and the response categories were identical to those of the PSS-10 scale. The items were likewise summarized on a scale ranging from 0 to 16 points and dichotomized at the 75<sup>th</sup> percentile into a high vs. low-stress score at ages 15 and 18 ( $\geq 7$ ) and 21 ( $\geq 8$ ).

An assessment of accumulated stress throughout adolescence was created, consisting of three categories: (i) individuals who reported low-stress scores in all three rounds of questionnaires; (ii) individuals who

reported a high-stress score in one of the three rounds of questionnaires; and (iii) individuals who reported high-stress levels in two or all three rounds of questionnaires. Missing data were handled using multiple imputations. The accumulated stress scale was based on the imputation of stress scale scores at ages 15, 18, and 21.

The parental socioeconomic background was measured using the following two perspectives: equivalized household income and the highest attained level of education of the parents, according to Statistics Denmark, using information from the Central Office of Civil Registration (Pedersen, 2011). The equivalized household income was determined by calculating the average income over a 4-year period when the children were between 7 and 10 years old. This period was chosen as it reflects a time when the children were still living at home and financially dependent on their parents. Equivalized income takes into account the number of household members and is calculated as a weighted average. The weight assigned is 1.0 for the first adult, 0.5 for the second adult and individuals above age 14, and 0.3 for children below age 14 (Baadsgaard & Quitzau, 2011). Household income was split into tertiles: low (<11,072 €), medium (11,072 – 13,489 €), and high (>13,489 €) yearly equivalized average income.

The highest level of education achieved by the parents, based on information provided by both parents, was collected in 2004. In addition, the participants' own highest educational attainment was obtained at age 28 in 2017. In both cases, the education levels were categorized into primary level (<10 years), secondary level (10 – 13 years), and tertiary level (>13 years) of education (Jensen & Rasmussen, 2011). Information about gender also came from registers (Pedersen, 2011). Information about the time since the last educational completion was likewise derived from the educational registers (Jensen & Rasmussen, 2011).

Temporary employment at age 28 was assessed by an item asking, "In your main occupation, you are," with the two response options "permanently employed" or "temporarily employed" from the national work environment cohort (NFA, 2020). Questionnaire information about the following four psychosocial working conditions at age 28 was used:

Psychosocial work climate was collected by the item: "how is the atmosphere and the mental work climate usually in your workplace?" from the national work environment cohort (NFA, 2020). The six response categories were dichotomized into good (very good, good, reasonably good) and bad (not so good, bad, very bad).

Work-life balance was collected by four items from the Danish Psychosocial Questionnaire (DPQ) asking about

conflicts between work and private life, for example, if work takes too much energy and time from private life (NFA, 2021). Based on the five response categories (scores of 0, 25, 50, 75, or 100), a mean sum score between 0 and 100 was calculated and dichotomized at the 75<sup>th</sup> percentile of the scale, with scores >50 indicating a high degree of work-life conflict.

Work justice was measured by four items from the DPQ (NFA, 2021) asking about justice in relation to, for example, how conflicts are solved, decisions are made, or how you are treated at the workplace. Based on the five response categories (scores of 0, 25, 50, 75, or 100), a mean sum score between 0 and 100 was calculated and dichotomized at the 25<sup>th</sup> percentile of the scale, with scores <56 indicating low work justice.

Worries about losing one's job were measured by three items from the DPQ (NFA, 2021), asking about worries about getting fired, troubles in finding a new job, or worries about being moved to a new job against your will. Based on the five response categories (scores of 0, 25, 50, 75, or 100), a mean sum score between 0 and 100 was calculated and dichotomized at the 75<sup>th</sup> percentile of the scale, with scores >33 indicating many worries about losing one's job.

## 2.3. Analysis

The final set of data had a small number of missing values in both outcome variables (perceived stress at age 28,  $n = 17$  [ $<0.01\%$ ]; work stress at age 28,  $n = 9$  [ $<0.01\%$ ]). Among exposures and covariates, the number of missing values ranged from 8 ( $<0.01\%$ ) for psychosocial work climate to 365 (29%) for perceived stress at age 21.

Initially, a multiple imputation chained model was performed. This model utilized 100 imputations to impute missing values for various variables. These variables included five stress scale measures spanning from age 15 – 28, two socioeconomic position measures, one measure of temporary employment, and four psychosocial work environment measures. Chains were constructed, utilizing either regress logit or ologit, depending on the nature of the data.

Certain variables had complete information, including gender, highest completed education, and time since educational completion. In addition to the aforementioned variables, other variables were included in the imputation process: (i) self-reported information about depressive symptoms at ages 15, 18, 21, and 28 was included when imputing the stress measures and (ii) additional measures of work satisfaction, influence, and workload were included when imputing measures of the psychosocial work environment at age 28. The final estimates were derived by averaging the sets of estimates obtained from

the imputations, while standard errors were computed using Rubin's rule, a formula that accounts for multiple imputations (results not shown) (Ruben, 1987). The dichotomization of scales was performed after multiple imputations of missing values.

A correlation analysis between the two measures of young adult stress (work stress and perceived stress) at age 28 revealed a correlation of  $r = 0.32$ . In addition, a correlation analysis between all exposure variables showed the strongest correlation between the stress measures at ages 15, 18, and 21, with correlations of  $r = 0.33$  and  $r = 0.38$ . All the other correlations were below 0.3. All correlations were performed before dichotomization. Descriptive statistics in relation to the two outcome measures were presented for all exposures and covariates as the number and percentile distribution of the scales. Multiple logistic regression analyses were computed to study the associations between perceived stress at ages 15, 18, and 21 and perceived stress or work stress at age 28. The selection of covariates included in the analyses was based on a priori considerations and informed by a literature review. The associations between adolescent stress and young adult stress were analyzed by two different models. First, the crude associations between adolescent stress or covariates and young adult stress were performed. Second (model 1), the associations between adolescent stress and young adult stress measures were adjusted for gender, own educational level, parental education, and level of income. Third, (model 2), the fully adjusted analyses were performed, additionally adjusting for temporary employment and the four psychosocial work environment factors.

Finally, a stratified analysis was performed to investigate the association between accumulated adolescent stress and young adult stress among individuals who had completed their education less or more than 2 years ago.

All odds ratios (OR) were presented with 95% confidence intervals (95% CIs) with a significance level of  $p < 0.05$ . Data analysis was performed using Stata version 16.0 (Stata Corporation, College Station, Texas, USA).

## 2.4. Ethics

This study adheres to the principles outlined in the 1975 Declaration of Helsinki (WMA, 2021). Approval for the study was obtained from the Danish Data Protection Agency. Participants were provided with information regarding the project's purpose, and their completion and return of the questionnaire were regarded as informed consent and willingness to participate in the study. These procedures were consistent with the regulations in place during the data collection period in Denmark. According

to Danish legislation, written informed consent or approval from ethics or scientific committees is not required for questionnaire- and register-based studies (NVK, 2021).

## 3. Results

Table 1 displays the distribution of exposure variables in relation to perceived stress and work stress at age 28. Among those who reported feeling stressed between the ages of 15 and 21, the percentage reporting high perceived stress at age 28 increased from 34% to 44% with increasing age, compared to percentages between 18% and 22% among those who had not previously felt stressed. A similar tendency was observed for work stress, where 23% to 26% of those who experienced stress during adolescence reported high work stress compared to between 15% and 16% of those who did not experience stress during adolescence. Considering the accumulative stress measure, individuals who reported stress at  $\geq 2$  time points during adolescence experienced higher proportions of high perceived stress and work stress at age 28, compared to those who had not reported feeling stressed during adolescence (46% vs. 13% and 27% vs. 13%). A lower proportion of the temporary employed experienced work stress compared to the permanently employed (16% vs. 19%). Regarding the work environment, the proportion of individuals who experienced high perceived stress and work stress at age 28 was higher among those with a poor psychosocial work environment compared to those with a good psychosocial work environment. The proportions of females who reported high perceived stress or work stress at age 28 were higher than in males.

Table 2 presents the associations between stress at ages 15, 18, and 21 and perceived stress or work stress at age 28. Statistically significant crude associations were seen between high stress at ages 15, 18, or 21 and perceived stress or work stress at age 28, with increasing associations in relation to increasing age and the strongest associations in relation to perceived stress being seen at age 21 (crude association between perceived stress at ages 21 and 28: OR = 4.0). Adjustments for gender and socioeconomic variables in Model 1 changed the estimates by a maximum of 0.1 in relation to both outcome measures.

When additional adjustments for temporary employment and the four measures of psychosocial work environment were performed (model 2), the associations between adolescent stress and young adult work stress decreased to non-significant ORs in the range of 1.1 – 1.4. After adjusting for temporary employment and psychosocial work environment measures, the ORs between adolescent stress and perceived stress at age 28 decreased; however, statistically significant associations

**Table 1. Distribution of exposure variables in relation to perceived stress and work stress at age 28 (*n* = 1275)**

Variables	Perceived stress		Work stress	
	High, <i>n</i> (%)	Low, <i>n</i> (%)	High, <i>n</i> (%)	Low, <i>n</i> (%)
Stress age: 15				
High	108 (33.5)	214 (66.5)	74 (23.0)	248 (77.0)
Low	205 (21.5)	748 (78.5)	157 (16.5)	796 (83.5)
Stress age: 18				
High	140 (42.9)	186 (57.1)	78 (24.0)	248 (76.1)
Low	173 (18.2)	776 (81.8)	153 (16.1)	796 (83.9)
Stress age: 21				
High	149 (44.1)	189 (55.9)	87 (25.7)	251 (74.3)
Low	164 (17.5)	773 (82.5)	144 (15.4)	793 (84.6)
Accumulated stress (number of time points)				
≥2	117 (45.5)	140 (54.5)	69 (26.8)	188 (73.2)
1	113 (29.8)	266 (70.2)	79 (20.8)	300 (79.2)
0	83 (13.0)	556 (87.0)	83 (13.0)	556 (87.0)
Sex				
Female	191 (26.2)	538 (73.8)	147 (20.2)	582 (79.8)
Male	122 (22.3)	424 (77.7)	84 (15.4)	462 (84.6)
Equivalized parental income (ages 7 – 10)				
Low	108 (27.3)	287 (72.7)	73 (18.4)	322 (81.5)
Medium	100 (23.3)	329 (76.7)	82 (19.1)	347 (80.9)
High	105 (23.3)	346 (76.7)	76 (16.9)	375 (83.1)
Parental educational level (age 15)				
<10 years	51 (31.5)	111 (68.5)	33 (20.0)	132 (80.8)
10 – 13 years	143 (22.9)	481 (77.1)	104 (16.7)	520 (83.3)
>13 years	116 (23.9)	370 (76.1)	94 (19.3)	392 (80.7)
Own educational level				
<10 years	22 (39.3)	34 (60.7)	12 (21.4)	44 (78.6)
10 – 13 years	98 (24.5)	302 (75.5)	69 (17.3)	331 (82.8)
>13 years	793 (55.9)	626 (44.1)	150 (18.3)	669 (81.7)
Forms of employment				
Temporarily employed	67 (32.5)	139 (67.5)	32 (15.5)	174 (84.5)
Permanently employed	246 (23.0)	823 (77.0)	199 (18.6)	870 (81.4)
Psychosocial work climate				
Poor	45 (46.0)	53 (54.1)	49 (48.5)	52 (51.5)
Good	268 (22.8)	906 (77.2)	182 (15.5)	992 (84.5)
Work-life balance				
Poor	115 (47.1)	129 (52.9)	98 (40.2)	146 (59.8)
Good	198 (19.2)	833 (80.8)	133 (12.9)	898 (87.1)
Work justice				
Poor	146 (44.5)	182 (55.5)	107 (32.6)	221 (67.4)
Good	167 (17.6)	780 (82.4)	124 (13.1)	823 (86.9)
Worries about losing job				
Many	150 (40.0)	225 (60.0)	90 (24.0)	285 (76.0)
Few	163 (18.1)	737 (82.9)	141 (15.7)	759 (84.3)

**Table 2. The association between stress at ages 15, 18, and 21 and perceived stress or work stress at age 28, *n* = 1275**

Variables	Perceived stress			Work stress		
	Crude, OR (95% CI)	Model 1 <sup>†</sup> , OR (95% CI)	Model 2 <sup>‡</sup> , OR (95% CI)	Crude, OR (95% CI)	Model 1 <sup>†</sup> , OR (95% CI)	Model 2 <sup>‡</sup> , OR (95% CI)
Stress age 15						
High	1.7 (1.3 – 2.3)	1.7 (1.2 – 2.3)	1.3 (0.9 – 1.8)	1.5 (1.1 – 2.1)	1.5 (1.0 – 2.0)	1.1 (0.8 – 1.7)
Low	Reference	Reference	Reference	Reference	Reference	Reference
Stress age 18						
High	3.1 (2.3 – 4.2)	3.1 (2.3 – 4.2)	2.5 (1.7 – 3.5)	1.7 (1.2 – 2.4)	1.6 (1.1 – 2.3)	1.2 (0.8 – 1.7)
Low	Reference	Reference	Reference	Reference	Reference	Reference
Stress age 21						
High	4.0 (2.9 – 5.5)	3.9 (2.8 – 5.4)	3.1 (2.2 – 4.4)	1.9 (1.4 – 2.7)	1.9 (1.3 – 2.7)	1.4 (0.9 – 2.1)
Low	Reference	Reference	Reference	Reference	Reference	Reference
Accumulated stress (number of time points)						
≥2	5.4 (1.9 – 4.0)	5.5 (3.7 – 8.0)	3.7 (2.4 – 5.6)	2.5 (1.7 – 3.6)	2.4 (1.6 – 3.6)	1.5 (0.9 – 2.4)
1	2.7 (1.9 – 4.0)	2.8 (1.9 – 4.1)	2.3 (1.5 – 3.5)	1.5 (1.0 – 2.2)	1.4 (1.0 – 2.2)	1.0 (0.7 – 1.6)
0	Reference	Reference	Reference	Reference	Reference	Reference
Sex						
Female	1.2 (0.9 – 1.6)			1.4 (1.0 – 1.9)		
Male	Reference			Reference		
Equivalized parental income (ages 7 – 10)						
Low	1.3 (0.9 – 1.8)			1.1 (0.8 – 1.6)		
Medium	1.0 (0.7 – 1.4)			1.2 (0.8 – 1.6)		
High	Reference			Reference		
Parental educational level (age 15)						
<10 years	1.5 (1.0 – 2.3)			1.1 (0.7 – 1.7)		
10 – 13 years	0.9 (0.7 – 1.3)			0.9 (0.6 – 1.2)		
>13 years	Reference			Reference		
Own educational level						
<10 years	2.1 (1.2 – 3.7)			1.1 (0.6 – 2.2)		
10 – 13 years	1.1 (0.8 – 1.4)			0.9 (0.7 – 1.3)		
>13 years	Reference			Reference		
Forms of employment						
Temporarily employed	1.6 (1.1 – 2.2)			0.8 (0.5 – 1.2)		
Permanently employed	Reference			Reference		
Psychosocial work climate						
Poor	2.8 (1.8 – 4.2)			5.2 (3.4 – 7.9)		
Good	Reference			Reference		
Work-life balance						
Poor	3.7 (2.7 – 5.0)			4.6 (3.3 – 6.3)		
Good	Reference			Reference		
Work justice						
Poor	3.8 (2.9 – 5.0)			3.2 (2.4 – 4.4)		
Good	Reference			Reference		
Worries about losing job						
Many	3.1 (2.4 – 4.1)			1.7 (1.3 – 2.4)		
Few	Reference			Reference		

Notes: <sup>†</sup>Adjusted for gender, parental education and income, and own educational level. <sup>‡</sup>: Model 1 and adjusted for psychosocial work climate, precariousness, work-life balance, work justice, and worries about losing the job.

Abbreviations: CI: Confidence interval; OR: Odds ratio.

were present between stress at age 18 or 21 and perceived stress at age 28 (OR 2.5 and 3.1, respectively). Regarding the accumulated stress measure, those who reported high-stress levels at  $\geq 2$ -time points during adolescence had 2.4 (1.6 – 3.6) and 5.5 (3.7 – 8.0) increased odds of reporting high perceived stress or high work stress at age 28 after adjustment for gender and socioeconomic measures. When further adjusted for measures of temporary employment and psychosocial work environment, the association with perceived stress at age 28 decreased to 3.7 (2.4 – 5.6) and was still statistically significant, and the association with work stress decreased to 1.5 (0.9 – 2.4) but was no longer statistically significant. For both outcomes, ORs increased as the number of stress time points in the accumulated stress measure increased. When adjusting for one psychosocial work environment variable at a time, all variables resulted in attenuation of the estimates, with poor work-life balance explaining a big part of the association between stress during adolescence and young adult work stress, whereas adjustment for temporary employment did not change the estimate (results not shown). In addition, we made supplementary analyses, adjusting all analyses for the other outcome (adjusting perceived stress for work stress and vice versa). This resulted in attenuations of the estimates to a maximum of 0.2 (results not shown).

**Table 3** displays the associations between accumulated stress during adolescence and perceived stress or work stress at age 28 stratified by time since completion of education.

Overall, crude and adjusted measures of both perceived stress and work stress at age 28 are quite similar among those who have completed their education more than or less than two years ago. However, adjusting for gender, temporary employment, and psychosocial work environment variables attenuated the associations between accumulated adolescent stress and perceived stress at age 28 to non-statistically significant associations among those who had completed their education more than 2 years ago, whereas statistically significant associations were seen in the group with less than 2 years since completion of education, after adjustment for temporary employment and psychosocial work environment factors (if  $\geq 2$  stress time points [OR: 3.3]; 95% CI: 1.5 – 7.1).

## 4. Discussion

The major finding of this study was the consistent association between perceived stress in adolescence and perceived stress or work stress at age 28, especially if the stress was accumulated during adolescence. Moreover, we observed that when adjusting for the psychosocial work environment variables, the associations between

adolescent stress and work stress at age 28 attenuated, whereas only small attenuations were observed in relation to general perceived stress at age 28 among those who had completed education within less than 2 years. A poor work-life balance was found to be the psychosocial work environment aspect with the greatest impact on the association between adolescent stress and young adult work stress, whereas temporary employment did not have any important impact. We found an interesting difference between those with short or longer work experience (time since completion of education) regarding the influence of temporary employment and psychosocial work environment on stress. It seems that temporary employment and the psychosocial work environment aspects play an important role in explaining the association between adolescent stress and work stress or perceived stress at age 28 among the more experienced participants (those with more than 2 years since completed education). For the less experienced (those with less than 2 years since completion of education), temporary employment and the psychosocial work environment did not, to the same degree, affect the high general perceived stress level.

This finding indicates that experiencing stress during adolescence increases the likelihood of perceiving the transition into the labor market as stressful. This effect is particularly pronounced among individuals with less work experience, indicating that the stress burden is not solely due to poor employment or poor psychosocial working environment conditions. The result implies that psychosocial pressure on young individuals can arise from other areas of life than work. This resonates with research that argues that young individuals are expected to perform well in all areas of life, expectations which potentially lead to psychosocial stress (Madsen, 2018; Petersen, 2016; Sørensen *et al.*, 2017) as well as to other mental health problems such as depressive symptoms and anxiety (Johnson *et al.*, 2018; Kaasbøll *et al.*, 2021). In the performance society, young individuals increasingly measure and evaluate themselves through their performances, and it becomes absolutely crucial to appear successful both in youth and work life, which can have negative consequences for the transition to work life (Semmer *et al.*, 2007).

Previous studies documented that a range of childhood physical and mental health, socioeconomic, and school-related factors (Winding *et al.*, 2015; Wang *et al.*, 2018), as well as student burnout (Robins *et al.*, 2018), affect later perceived work environments and work stress. At the same time, it is well known that a demanding work environment among young workers, like experiencing high psychological demands and a low level of social support, is associated with several different mental health problems, including

**Table 3. The association between stress at ages 15, 18, and 21 and perceived stress or work stress at age 28 stratified by time since educational completion (n = 1275)**

Educational completion	Perceived stress		Work stress	
	Crude OR (95%CI)	Adjusted <sup>†</sup> OR (95%CI)	Crude OR (95%CI)	Adjusted <sup>†</sup> OR (95%CI)
Less than 2 years since completion				
Accumulated stress (number of time points)				
≥2	5.4 (2.8 – 10.5)	3.3 (1.5 – 7.2)	2.4 (1.2 – 4.8)	1.6 (0.7 – 3.7)
1	2.7 (1.4 – 5.3)	2.2 (1.0 – 4.8)	1.3 (0.6 – 2.7)	1.0 (0.5 – 2.3)
0	Reference	Reference	Reference	Reference
More than 2 years since completion				
Accumulated stress (number of time points)				
≥2	5.3 (3.5 – 8.2)	1.4 (0.8 – 2.4)	2.5 (1.6 – 4.0)	1.4 (0.8 – 2.4)
1	2.8 (1.8 – 4.3)	1.1 (0.6 – 1.9)	1.5 (0.9 – 2.5)	1.1 (0.6 – 1.9)
0	Reference	Reference	Reference	Reference

Notes: <sup>†</sup>Adjusted for gender, own educational level, psychosocial work climate, precariousness, work-life balance, work justice, and worries about losing the job.

stress (Laberge & Ledoux, 2011). However, to the best of our knowledge, this study is the first to investigate how stress is transferred from youth to adult life in a Danish population, taking into account temporary employment and psychosocial work environment factors.

Based on our findings, the two stress outcome measures (perceived stress and work stress at age 28) are affected differently by work environment aspects. A good work environment seems important to reduce work stress among individuals who are previously stressed, whereas work environment aspects only have a positive effect on the general stress level of individuals who have been in the labor market for some time. However, previous stress experiences and the psychosocial work environment seem to mutually influence each other, which was also observed by Taris in his study of the mutual effects between job resources and mental health (Taris, 1999).

The previous reports documented that temporary employment can affect the health and well-being of employees (Benach *et al.*, 2016; Rugulies *et al.*, 2008; Standing, 2011), but the results of our study did not substantiate this finding. The reason for the conflicting results could be that the population of our study was relatively young and, therefore, did not expect (or need) permanent employment to the same degree as older employees. Temporary employment has traditionally involved young individuals working in part-time jobs during their education (Nielsen *et al.*, 2018). Yet, based on the results of our study, it seems that young workers during the first 2 years after educational completion do not have expectations of permanent employment. If they have not yet settled down, for example, if they have a family

and a home mortgage, the immediate negative effects of temporary employment might not have surfaced.

This study has several notable strengths. First, it employs a prospective design with a high initial response rate of 83%. In addition, it spans a 13-year follow-up period, with stress measures collected every 3rd year from the ages of 15 to 21. This extended timeframe provides valuable insights into the evolving impact of these stress exposures. In line with Lazarus's stress theory, which highlights the dynamic nature of perceived stress, the study's design is well suited to examine the changes in stress levels over time. According to Lazarus and Folkman (1984), perceived stress is not a static condition but can be influenced by daily hassles and major life events. By capturing stress measures at multiple time points, this study can effectively explore these fluctuations.

Given that perceived stress is a subjective assessment, the utilization of a self-reported questionnaire, specifically the Perceived Stress Scale (PSS), is a sensible choice. The PSS is specifically designed to capture the extent to which individuals perceive their lives as unpredictable, uncontrollable, and overloaded, essential components of the stress experience. Moreover, this measure takes into account individual differences in the perception of stress, providing a comprehensive assessment of stress levels (Cohen *et al.*, 1983). However, it is important to emphasize that stress can result from various factors, such as negative life events and poor social relationships.

The present study has potential limitations related to the methods used to measure perceived stress at ages 15, 18, and 21. The utilization of derivative scales, specifically the 4-item perceived stress scale (Cohen *et al.*, 1983), poses certain disadvantages such as limited internal

reliability and a less adequate approximation of perceived stress levels compared to the 10-item scale (Eskildsen *et al.*, 2015). Consequently, there is a possibility of non-differentiated misclassification. In addition, the study may be susceptible to healthy worker bias, as individuals with psychosocial demanding work environments might be underrepresented. This bias could arise because younger workers facing high work demands or experiencing elevated stress levels may have already left the labor market, leading to potential underestimation of the associations examined in the study. Moreover, there is a risk that individuals with the most demanding work environments or highest stress levels did not choose to participate and, therefore, were not represented in the study population.

When using questionnaire data to measure stress and work environment, there is a risk of introducing negative affectivity (Watson & Clark, 1984), where high-stress could influence the way the individual perceives the working environment. This may result in more negative reports on all aspects of the work environment for those with high stress. However, as the correlation of these measures is low, we do not consider it to significantly affect the validity of the measures.

In this study, we attempt to capture work experience by measuring “time since educational completion.” However, there is a risk that short work experience (<2 years) could be due to long tertiary education, which is why the results must be interpreted with caution.

The socioeconomic characteristics of the West Jutland Cohort study, such as income and parental educational level, were comparable to those of families of young individuals of the same age in Denmark (Glasscock *et al.*, 2013). Comparison of the 2406 non-responders to the 1275 responders on socioeconomic measures shows that more non-responders (17%) than responders (13%) had low-educated parents and had grown up in low-income families (39% vs. 31%), and more non-responders had low educational level (17%) compared to the responders (4%). This selection may have underestimated the true association. It is important to note that the external validity and generalizability of the current study are confined to individuals residing in Denmark and other countries sharing similar welfare systems.

The response rate was 83% at the first collection of questionnaires, declining slightly to 57% at the collection in 2017. A previous study investigating non-participation across questionnaire collection rounds in the same cohort found that the selection of socioeconomic measures had no significant impact on the validity of the measured risk estimates (Winding *et al.*, 2014). The present study only included those who had indicated being employed at age 28 in the 2017 questionnaire, which corresponds to 71% of

those responding in 2017. This percentage is comparable to official data from Statistics Denmark, which shows that 76% of 25 – 34 years olds had a job in 2017 (DST, 2020).

In this study, we used multiple imputation analyses, which enabled us to analyze the complete sample, potentially enhancing statistical power and reducing bias (Sterne *et al.*, 2009). Information on the participants responding to the questionnaires (without imputed data) can be seen in appendix (Tables A1 and A2).

In addition, a complete case analysis containing 846 respondents was performed that substantiated the results of the study (results not shown).

When using self-reported information, there is a risk of participants’ over- or under-reporting, and a risk that a negative response to one question concerning well-being may negatively affect the answers to other questions related to well-being. This potential bias, called common method bias (Podsakoff *et al.*, 2003), has, to some extent, been minimized using both questionnaire and registered data and using prospectively collected data. However, there could be a potential problem related to the collection of information on the two stress outcome measures and the information about temporary employment and psychosocial work environment aspects because they were collected at the same time. However, as there was a low correlation between these measures, this does not seem to have caused any substantial information bias.

The limitations presented are not considered to result in serious bias concerning the observed associations. However, caution is advised when interpreting causality.

## 5. Conclusion

This study reveals a significant association between stress levels during adolescence and stress experienced in early adulthood. From a public health perspective, it is important for both occupational health-care professionals and educators at secondary and tertiary educational institutions to recognize that stress during adolescence can increase the risk of stress in early adult working life. The fact that those who experience stress during adolescence reported high levels of general perceived stress at the beginning of work life underscores the need for nuanced and tailored support for young individuals entering the workforce. Moreover, this study underlines the importance of employers prioritizing psychosocial aspects of the work environment, such as promoting work-life balance. These factors can significantly influence levels of work-related stress among young adults.

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## Conflict of interest

The authors declare that they have no conflicts of interest.

## Author contributions

*Conceptualization:* All authors

*Formal Analysis:* Trine Nøhr Winding

*Investigation:* Trine Nøhr Winding, Regine Grytnes

*Methodology:* Trine Nøhr Winding, Regine Grytnes, Mette Lykke Nielsen

*Writing – original draft:* Trine Nøhr Winding

*Writing – review & editing:* Mette Lykke Nielsen, Regine Grytnes

## Ethics approval and consent to participate

This study was conducted in accordance with the 1975 Declaration of Helsinki (<https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects>). The study was approved by the Danish Data Protection Agency, which is an independent authority that supervises compliance with the rules on the protection of personal data. The participants were informed about the purpose of the project, and their return of the questionnaire was interpreted as informed consent and willingness to participate. This was in accordance with Danish regulations at the time of the data collection. According to Danish law, questionnaire and register-based studies require neither approval by ethical or scientific committees nor written informed consent (<https://en.nvk.dk/rules-and-guidelines/act-on-research-ethics-review-of-health-research-projects>). It is not possible to apply for ethical approval of studies unless they involve clinical examinations or biological material. The Danish Research Ethics Committee specifically waived the need for consent before the collection of any data with the following statement, translated from Danish: “it can be hereby announced that in connection with a questionnaire survey of 15 year olds such as the one outlined, there is no requirement for informed consent (either oral or written) from parents/guardians.”

## Consent for publication

The participants were informed about the purpose of the project, and their returning of the questionnaire was interpreted as informed consent and willingness to participate. This was in accordance with Danish regulations at the time of data collection. According

to Danish law, questionnaire and register-based studies require neither approval by ethical or scientific committees nor written informed consent (<https://en.nvk.dk/rules-and-guidelines/act-on-research-ethics-review-of-health-research-projects>).

## Availability of data

Data are available from the authors on reasonable request and with permission of the corresponding author and Statistics Denmark.

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Appendix

Table A1. Distribution of exposure variables in relation to perceived stress and work stress at age 28

Variables	Perceived stress		Work stress	
	High, n (%)	Low, n (%)	High, n (%)	Low, n (%)
Stress age: 15				
High	90 (32)	195 (68)	65 (22)	225 (78)
Low	178 (22)	639 (78)	133 (16)	697 (84)
Stress age: 18				
High	105 (41)	149 (59)	59 (23)	201 (77)
Low	130 (18)	588 (82)	106 (15)	619 (85)
Stress age: 21				
High	109 (44)	139 (56)	61 (24)	189 (76)
Low	103 (16)	538 (84)	90 (14)	564 (86)
Accumulated stress (number of time points)				
≥2	60 (42)	82 (58)	37 (26)	106 (74)
1	68 (30)	159 (70)	40 (17)	192 (83)
0	179 (20)	699 (80)	151 (17)	740 (83)
Sex				
Female	188 (26)	528 (74)	146 (20)	579 (80)
Male	119 (22)	412 (78)	82 (15)	459 (85)
Equivalentized parental income (ages 7 – 10)				
Low	99 (23)	333 (77)	72 (19)	314 (81)
Medium	98 (23)	321 (77)	80 (19)	343 (81)
High	106 (28)	278 (72)	75 (17)	370 (83)
Parental educational level (age 15)				
<10 years	51 (33)	106 (67)	33 (20)	126 (79)
10 – 13 years	138 (23)	460 (77)	101 (17)	503 (83)
>13 years	112 (24)	351 (76)	91 (19)	383 (81)
Own educational level				
<10 years	22 (39)	34 (61)	11 (20)	44 (80)
10 – 13 years	96 (25)	290 (75)	68 (17)	329 (83)
>13 years	189 (23)	616 (77)	149 (18)	665 (82)
Forms of employment				
Temporarily employed	65 (32)	137 (68)	32 (16)	171 (84)
Permanently employed	240 (23)	792 (77)	195 (19)	857 (81)
Psychosocial work climate				
Poor	45 (45)	54 (55)	49 (49)	52 (51)
Good	259 (23)	880 (77)	179 (15)	983 (85)
Work-life balance				
Poor	110 (48)	120 (52)	94 (40)	140 (60)
Good	192 (19)	807 (81)	129 (13)	886 (87)
Work justice				
Poor	140 (45)	174 (55)	103 (33)	213 (67)
Good	154 (17)	733 (83)	114 (13)	795 (87)
Worries about losing job				
Many	144 (40)	215 (60)	88 (24)	280 (76)
Few	156 (18)	710 (82)	135 (15)	748 (85)

**Table A2. The association between stress at ages 15,18, and 21 and perceived stress or work stress at age 28 (n = 1266)**

Variables	Perceived stress			Work stress		
	Crude, OR (95% CI)	Model 1*, OR (95% CI)	Model 2**, OR (95% CI)	Crude, OR (95% CI)	Model 1*, OR (95% CI)	Model 2**, OR (95% CI)
Stress age 15						
High	1.7 (1.2 – 2.2)	1.6 (1.1 – 2.2)	1.1 (0.8 – 1.6)	1.5 (1.1 – 2.1)	1.5 (1.1 – 2.2)	1.1 (0.8 – 1.7)
Low	Reference	Reference	Reference	Reference	Reference	Reference
Stress age 18						
High	3.2 (2.3 – 4.4)	2.9 (2.1 – 4.1)	2.4 (1.6 – 3.5)	1.7 (1.2 – 2.4)	1.6 (1.1 – 2.2)	1.1 (0.7 – 1.7)
Low	Reference	Reference	Reference	Reference	Reference	Reference
Stress age 21						
High	4.1 (3.0 – 5.7)	4.1 (2.9 – 5.7)	3.0 (2.0 – 4.3)	2.0 (1.4 – 2.7)	2.0 (1.4 – 3.0)	1.4 (0.9 – 2.1)
Low	Reference	Reference	Reference	Reference	Reference	Reference
Accumulated stress (number of time points)						
≥2	2.9 (2.0 – 4.1)	3.0 (2.0 – 4.4)	2.4 (1.5 – 3.7)	1.7 (1.1 – 2.6)	1.6 (1.0 – 2.5)	1.3 (0.8 – 2.1)
1	1.7 (1.2 – 2.3)	1.7 (1.2 – 2.4)	1.7 (1.1 – 2.5)	1.0 (0.7 – 1.5)	1.0 (0.7 – 1.5)	0.9 (0.6 – 1.4)
0	Reference	Reference	Reference	Reference	Reference	Reference
Sex						
Female	1.2 (0.9 – 1.6)			1.4 (1.0 – 1.9)		
Male	Reference			Reference		
Equivalentized parental income (ages 7 – 10)						
Low	1.3 (0.9 – 1.8)			1.1 (0.8 – 1.6)		
Medium	1.0 (0.7 – 1.4)			1.2 (0.8 – 1.6)		
High	Reference			Reference		
Parental educational level (age 15)						
<10 years	1.5 (1.0 – 2.3)			1.1 (0.7 – 1.7)		
10 – 13 years	0.9 (0.7 – 1.3)			0.8 (0.6 – 1.2)		
>13 years	Reference			Reference		
Own educational level						
<10 years	2.1 (1.2 – 3.7)			1.1 (0.6 – 2.2)		
10 – 13 years	1.1 (0.8 – 1.4)			0.9 (0.7 – 1.3)		
>13 years	Reference			Reference		
Forms of employment						
Temporarily employed	1.6 (1.1 – 2.2)			0.8 (0.5 – 1.2)		
Permanently employed	Reference			Reference		
Psychosocial work climate						
Poor	2.8 (1.9 – 4.3)			5.2 (3.4 – 7.9)		
Good	Reference			Reference		
Work-life balance						
Poor	3.9 (2.8 – 5.2)			4.6 (3.3 – 6.4)		
Good	Reference			Reference		
Work justice						
Poor	3.8 (2.9 – 5.1)			3.4 (2.5 – 4.6)		
Good	Reference			Reference		
Worries about losing job						
Many	3.0 (2.3 – 4.0)			1.7 (1.3 – 2.4)		
Few	Reference			Reference		

Notes: \*Adjusted for gender, parental education and income, and own educational level. \*\*Model 1 and adjusted for psychosocial work climate, precariousness, work-life balance, work justice, and worries about losing the job.  
Abbreviations: CI: Confidence interval; OR: Odds ratio.

Educational completion	Perceived stress		Work stress	
	Crude OR (95%CI)	Adjusted <sup>†</sup> OR (95%CI)	Crude OR (95%CI)	Adjusted <sup>†</sup> OR (95%CI)
Less than 2 years since completion				
Accumulated stress (number of time points)				
≥2	5.4 (2.8 – 10.5)	2.4 (1.4 – 4.0)	1.3 (0.6 – 2.9)	1.0 (0.4 – 2.6)
1	2.7 (1.4 – 5.3)	1.8 (1.2 – 2.8)	1.0 (0.5 – 2.0)	0.8 (0.4 – 1.9)
0	Reference	Reference	Reference	Reference
More than 2 years since completion				
Accumulated stress (number of time points)				
≥2	2.7 (1.4 – 5.4)	2.0 (0.9 – 4.5)	1.9 (1.2 – 3.1)	1.4 (0.8 – 2.5)
1	1.7 (0.9 – 3.1)	1.4 (0.7 – 2.9)	1.0 (0.7 – 1.6)	1.0 (0.6 – 1.6)
0	Reference	Reference	Reference	Reference

## RESEARCH ARTICLE

Education fever in South Korea: Rite of passage  
versus children's rightsHwayoung Kim<sup>1</sup> and Vladimir Hlasny<sup>2\*</sup> <sup>1</sup>Department of Social and Cultural Anthropology, Faculty of Social Sciences, Katholieke Universiteit Leuven, Leuven, Belgium<sup>2</sup>Department of Economics, College of Social Sciences, Ewha Womans University, Seoul, South Korea

## Abstract

From enrolment in elementary school until acceptance at university, South Korean children pursue a uniform, arduous goal assigned to them by their mothers, community, and popular culture. Where this personal struggle will lead adolescents, and how, why, and at what cost? This study conceptualizes education as the rite of passage, not only for the children's social initiation but also in their mothers' pursuit of self-validation and self-worth. This social ritual aims to raise successful workers and righteous citizens but also inflicts various harms on the children, posing significant costs to them, their parents, and their teachers. We document evidence that youths endure various hardships and even long-term harms from being blindly and unidirectionally steered during their adolescence by their ostensibly emotionally cold "manager moms." We assert that giving children their own voice, shifting the prevailing social norms, and reforming the educational and career-access systems would help children attain better outcomes with lower collateral damage.

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## 1. Introduction

From enrolment in elementary school until acceptance at university, Korean students strive toward a uniform, arduous goal set by their mothers, society, and popular culture. The similarity lies not only in the intensity and endurance of their struggle to climb the social ladder but also in the immediate day-to-day urgency of the pursuit and the lack of guidance on where this personal struggle will lead adolescents, how, or why. Many students are rewarded only with disillusionment once they see the landscape from the plateau of the social scaffolding they have climbed – their social role and status may differ from their prior naïve expectations. Their choices then include acceptance of their fate, climbing another social pillar to yet another platform, or jumping down in a desperate call of protest.

The reality for Korean students can be described as a blind struggle of uncoordinated individuals for their interaction with their environment and culture, the organization of society, and the role of the state in shaping and controlling this nexus. This calls for critical introspection before setting off on a life path and a systemic reconceptualization – or a popular rebellion – against the established social conventions. These responses are

beyond the control of Korean students in their day-to-day up-or-out bubble, put up by their parents and amid the existing educational arrangement. Therefore, a new system-wide institutional arrangement should be pursued.

This study describes the social and cultural setting in which Korean mothers, with over-ambitious expectations toward their children, play a pivotal role in subjecting the children to excessive cramming, mental burnout, and risks of “experiential stunting” and other long-term harms. The study contributes by adopting the children’s perspective, drawing on existing theories from sociology and social anthropology, and providing new evidence in the Korean context. The study eschews detailed descriptions of the Korean educational and career management systems or the experiences of mothers in the patriarchal male-breadwinner culture and under prevailing value systems, instead focusing squarely on the developmental experiences of children.

Our study begins by observing that during their adolescence, Korean children are almost universally enrolled in private after-school academies (Hagwon, also known as cram schools or shadow education) and spend a substantial proportion of their free time there. Shadow education is so prevalent in South Korea that parents fear their children will fall behind if they do not engage in it. These privately run after-school institutions teach English, Korean language, and mathematics, which constitute a large portion of the major subjects in the university entrance examinations. Often, private classes prepare students for the following academic year, allowing them to stay ahead of their school schedule and peers. This system produces a vicious cycle in which many students have already learned course material before it is covered in public school, leading them to study harder at the private institution than at their regular school.

Our key thesis is that children’s mothers derive a sensation of entrepreneurship, existential security, self-worth, and prestige from managing their children’s advancement of capabilities, social initiation, and academic achievements (Lee, 2011; 2014). Children serve as avatars living the lives their mothers may not have been able to live themselves, through which mothers aspire to and experience their own (imagined) life dreams. The status quo is socially harmful; as children attain improper developmental outcomes, parents gain a false sense of social status with significant side effects, and the educational system becomes unduly strained.

The values espoused in many Korean families, and by extension in the Korean education system and society at large, internalize children’s academic involvement and achievement while externalizing children’s intrinsic values

and struggles. Korean social and cultural norms grant parents firm control over their children’s access to resources and capabilities, allowing them to shape their children’s constructed values, emotions, and functioning. As a result, children’s own views of their skills and prospects, their will, and their autonomy are disregarded. The emphasis on cognitive performance, coupled with parental control over children’s bodies and minds and the splintered nature of the educational experience, leads to uneven development in children, exposing them to undue burdens and long-term harms.

The rest of the article is organized as follows: Section 2 provides the context of education in Korean society and proposes a more nuanced re-conceptualization. Section 3 presents the implications of this approach in relation to social stakes, the meaning of successful matriculation, and the side effects of the current norms, drawing implications for students. Section 4 discusses public policy considerations.

## 2. Context and re-conceptualization of Korean Education

Existing literature contextualizes the significance of children’s education in South Korea vis-à-vis social institutions and individual norms. We build on the extant narratives to advance a more nuanced conceptualization, taking into account the role of education as the means of social initiation and self-validation.

In a society built up on Confucian traditions, individuals place high value on collective experiences and knowledge, particularly at the level of one’s kin and extended family. Yet, in spite of this collectivist value system, families have practiced the individualization of spheres of influence and the structuring of experiences attained by each family member.

South Korean family relations are patriarchal, based on clear age and gender roles and responsibilities. Under Confucianism, adolescents are prescribed a rite of passage to become righteous citizens (Seth, 2012), involving the discovery of both the external world and the self, through reading, writing, and demonstrating filial piety by working hard (Yang & Shin, 2008). Mothers have traditionally been responsible for raising children, and this role has been the sphere of their individual influence and an intrinsic part of their value system. In a society where women are often forced out of the labor market at the time of marriage (signifying their commitment to childbearing) and struggle to return upon their last child’s successful enrolment in university – resulting in a notorious M-shaped career life-cycle pattern – Korean mothers struggle to be recognized for their individual achievements (Kwon & Doellgast, 2018). Their

stake in their children’s upbringing thus extends beyond the material benefits to family circumstances and the benefits bestowed on the children themselves, reflecting the women’s individualized value from the community’s perspective as well as their self-worth.

With the advent of a compressed, East-Asian variety of modernity in South Korea, individuals’ gender and age roles underwent a transformation, making the intricate paradigm of collectivism and skewed individualization within families particularly pronounced (Chang, 2010). The sociocultural and economic reality became “intricately enmeshed with the simultaneously subservient and masterminding status of women in the highly family-centered systems of political economy, social care, educational competition, etc.” (Chang & Song, 2010, p. 559). Modernity has transformed the space in which Korean mothers function and receive value and the means by which that happens. Korean mothers have individualized the management of household affairs and children’s academic achievements, placing their children’s achievements on the front line to be publicly seen and appropriating value from them for their own gratification and self-validation.

Modernity, by upending the existing social fabric and norms of community relations and bringing along the opportunities and risks associated with worldwide exchange and the knowledge-based economy, has focused the spotlight on individuals’ cognition and education, particularly on families’ role in raising children. The traditional zeal for children’s education in Korean families has survived a bygone era, but its manifestations and social implications have undergone a realignment. As economic and social problems in Korean society have evolved, so have the circumstances, forms, and yardsticks of instruction.

**2.1. One path and one output metric**

An important element of the compressed modernity has been the validation through simple seemingly objective output metrics. The South Korean education system is notoriously effective according to these metrics. Korean adolescents have consistently scored at the top in the International Assessment of Educational Progress in math and science and in all components of the Program for International Student Assessment (Table 1). These achievements have given international recognition to the quality of the Korean schooling system and bestowed a sense of pride on the nation at large. However, what is missing from the rankings is the measure of effort and resource outlays that enable these excellent results. Moreover, while the international recognition accrues to the nation, the unmeasured burdens are borne by individual families, in particular the children. Finally, the standardized results do

**Table 1. Korea’s rankings on the Program for International Student Assessment 2000 – 2018**

	2000	2003	2006	2009	2012	2015	2018
Reading	6	2	1	2–4	3–5	4–9	2–7
Mathematics	2	3	1–4	3–6	3–5	6–9	1–4
Science	1	4	7–13	4–7	5–8	9–14	3–5

Notes: Estimates from the Organization for Economic Co-operation and Development (OECD, 2019). Ranges indicate that Korea’s score was statistically insignificant from those of select other countries.

not necessarily translate into actual skills, successful social integration, job prospects, or welfare, potentially leaving Korean children behind in these areas.

While the nation basks in pride, and parents derive their self-worth from identifying with their children’s academic achievements, the children bear the costs and remain unaware of the true value of their education. Children become unwilling pawns in their mothers’ and the state’s tactical struggle to climb respective hierarchies. To the extent that the mothers’ support for children’s education does not stem from an understanding of their children’s or their own true needs (Han, 2008), the arrangement does not enhance social welfare – or indeed the welfare of any single person.

**2.2. Reconceptualizing education**

In his exposition of the symbols and meanings of initiation rituals, Turner (1967) decomposed the elements in the society’s production of fully integrated social members. The typical route involves neophytes undergoing isolation and a set of predetermined exercises conducted by someone with absolute authority to transition from an initial prima material state to a state of maturity. During the period of liminality, on the margin (or limen) of accepted social structures, neophytes are not recognized as legitimate members of either the unspoiled innocent youth or the experienced mature class, and, as such, have limited rights and civic responsibilities. During initiation, they are thoroughly exposed to a hierarchical relationship with their initiators to learn the skills and values necessary to (re)join society as full members. Children engaged in formal education in a modern society can be viewed as going through a liminal phase of an initiation ritual.

The student–initiator relationships exist between the students and their educators. The education establishment is tasked with initiating children into successful participation in the modern, democratic Confucian society and the creativity and knowledge-based marketplace. The institution of a traditional initiator is represented by the educators and by the package of norms and truths they stand for. Students are expected to accept these norms and

truths without question. The primary outcome of initiation is instilling in the student the knowledge and values that society holds to be critical for the student's successful integration and participation in society.

The primary stakeholders in the students' initiation process are private tutoring academies and the students' mothers. The academies act as agents for the students, or rather for the students' paying mothers, ensuring the successful initiation of their clients following an intensive cramming ritual. They have been found to be proficient at raising the students' standardized scores in math, English, and other core subjects (Park *et al.*, 2011).

Besides its costliness in terms of tuition, supplies, and transportation, private tutoring also affects students' outcomes. The academies rig the social initiation contract, corrupting the traditional Confucian rite of passage, by offering an alternative, more dependable, and straightforward path to successful matriculation. Matriculation is degraded into a market commodity. Instead of facilitating a broad discovery of the external and the self for students' wholesome initiation, private academies focus on preparing students for the standardized tests of interest. The academies identify the subject areas for discovery, conduct the instruction, and practice testing – all without the student's input or creative effort. Opportunities for well-rounded discovery are thus lost.

### 2.3. Assigning responsibility for children's shadow education

Children's education in South Korea falls largely within the sphere of influence of their mothers. Mothers serve as the children's caretakers, financiers of their capacity to be initiated, architects and arbiters of the modalities in the initiation process, and residual claimants on the outcome of initiation. The involvement of mothers may not radically affect the demanding nature of the children's initiation regime – since this is dictated by social pressures – but it affects the type of knowledge children gain and the meaning of the exercise and its outcome.

Mothers hold the keys to their children's initiation by channeling physical resources, values, and sound-bite information to them (Göransson *et al.*, 2022). They are also stakeholders in the chosen course and outcome of their children's initiation, in terms of self-perceived social status and self-worth. The initiation process involving their avatars (children) has a transformational effect on them. A parallel, interconnected initiation process can thus be characterized for the mothers themselves, whereby they are initiated into the prevailing social and cultural fabric. They are on a transformational path from being unaccomplished stay-at-home moms to becoming the entrepreneurial brains,

or “manager moms,” behind a successful graduate (Chung, 2016; Jang, 2021). The process of steering and sponsoring their children's initiation, in a chaotic “busy mother” liminal phase, leads them to anticipate achieving social prestige, at least as assessed by self.

Korean mothers' enthusiasm for their children's education and early-career success is notoriously zealous, often referred to as *chimatbaram* (치맛바람), or the swishing of a skirt (of a young obsessive woman). This term reflects mothers' social engagement and overprotection, which is not dictated by outside pressures but is undertaken in any case as it is deemed helpful for establishing the mother's position in the family and community. This engagement ranges from volunteering to clean the children's classrooms, preparing lunch boxes for teachers on school field trips, to calling employers where their grown-up children are applying to request information about recruitment criteria and their children's prospects. The engagement aims to complement teachers' efforts, attract attention to specific children, or help secure priority consideration for their children in upcoming opportunities or competitions.

Mothers engage in an undeclared but fierce competition among themselves over who is more in their children's affairs, and who is more caring, active, or generous. This shows itself in ostentatious ways, such as through the brand names of clothes and bags that they or their children carry to school. To ensure that their children do not fall out of favor with their teachers (in the mothers' perception), mothers continue to participate in time-consuming and unproductive activities, sacrificing their opportunities to work formally or to develop their own capabilities. When mothers cannot participate actively in their children's affairs at school, perhaps due to financial difficulties, they experience a sense of guilt and self-blame over their perceived failure to adequately provide for their children (Lee, 2014).

These sentiments are widespread and are reflected even in aggregate national statistics. The full-time equivalent employment rate for women aged 15 – 64 is 53.4% as of 2021, near the bottom of the Organization for Economic Co-operation and Development (OECD) rankings, and Korea's lowest score in a near-monotonic decline since the beginning of the 1990s (OECD, 2023). This is not an unskilled labor phenomenon. South Korea is the single worst performer among the OECD countries in terms of the educated-female employment rate, and the third worst performer in terms of female employment in managerial positions (ILO, 2022). Career interruptions due to childcare are partly to blame.

Even if mothers experience domestic violence or abuse from their husbands, their children's welfare and lifetime

prospects often make the mothers endure difficulties and cling to their marriage. When asked whether divorce should be avoided until all children have grown up, 82% of women respond in the affirmative (Chang & Song, 2010). In short, Korean mothers' involvement in their children's upbringing calls for personal and economic sacrifice on their part, but they accept it as the social norm. They then seek other sources of fulfillment and self-validation. Mothers' participation in their children's learning process has been found to be related to the mothers' degree of self-esteem (Kim, 2008). Children's academic achievement feeds directly into their mothers' sense of self-worth and social status. Mothers who have given up their own intellectual or professional development invest in the development of their children to regain their lost "self" and thus attain their individualized gratification. However, children with poor academic performance are often reproached by their mothers for sabotaging their efforts. Children are thus subjugated to serve as instruments for their mothers' self-advancement under the guise of the children's upbringing and social initiation (Kim, 2008).

### 3. Stakes at hands and implications for students

In light of the reconceptualization in the previous section, we next present the stakes at hand and the consequences for students, their families, and wider society.

#### 3.1. Students' lifetime outcomes and social side effects

Adults' expectations toward children, and children's expectations of themselves, vary across cultures in terms of skills, understandings, and knowledge of proper behavior (Thomas, 2000). The World Economic Forum has identified 10 key skills necessary to thrive in the Fourth Industrial Revolution, topped by complex problem solving, critical thinking, and creativity (WEF, 2016). The Partnership for 21<sup>st</sup> Century Learning emphasized the "4C" skills: Critical thinking, communication, collaboration, and creativity. These skills are notably missing from Korean students' curricula, both in their formal instruction and after-school tutoring.

In South Korea, the aspirations regarding the accumulation of values, skills, and knowledge that children are exposed to during school years focus solely on improving the children's performance on examinations and contests. The emphasis in formal education leans heavily toward skills assessed on written examinations, particularly the university entrance examination and other standardized assessments (Park, 2002). This educational focus involves a limited set of skills – primarily memorization of specific types of knowledge and receptive skills.

During the years of primary and secondary education, children in South Korea are often turned into "studying machines" (Cho, 2000). Figuratively, they are blindfolded to disregard the surrounding reality and their internal values and developmental needs (e.g., leisure, pleasure, reflection, sleep), focusing instead on fulfilling the self-worth needs of their mothers. This focus primarily pertains to the ranking of the high school and university where the students enroll, which has an enormous influence on their lifetime access to social and cultural capital as well as their socioeconomic achievements (No, 2009). "It is a shared belief among most parents that the rank of one's university determines one's worth as a social being [...] Those who fail consider themselves to be second-class citizens [...] the values of mainstream culture presuppose that getting on the escalator to academic success should be the top priority in children's lives" (Cho, 1995, p. 148). This belief contributes to the "education fever" in South Korea and its regional neighbors, which is transmitted and perpetuated by mainstream culture, community relations, and the children's own parents (Seth, 2002; Chen *et al.*, 2021).

A standardized nationwide university entrance examination determines which universities students may be admitted to. This examination holds colossal importance not only for the students themselves but also for their entire families. Mothers often perform shamanist rituals or Christian prayers near the sites where their children are taking their examinations. The government mobilizes public transportation and police, asks private citizens to avoid causing traffic jams, and even reroutes flights to minimize noise around testing sites.

All the skills and knowledge that students have perfected during the preceding school years are assessed on a single morning, during the university entrance examination day. This singular assessment gives rise to substantial pressure and stress that start accumulating years before the examination date. From early childhood, even before elementary school – commonly considered the basic stepping stone on the path to the university entrance examination – children are enrolled in English-language kindergartens and after-school private tutoring in anticipation of getting ahead of other children (Cho, 1995; Bae & Park, 2020). The competitive pressure follows the students over the years. On weekdays, middle school students typically spend as much as 9 h on formal and informal study, while university students spend only 4.5 h (Statistics Korea, 2022). The skills and knowledge that children focus on are all closely related to the requirements of the university entrance examination.

The side effect of the students' preoccupation with a handful of standardized written tests is that they lack a

broader worldview, intuitive understanding of complex material, creativity, and emotional maturity. Due to the limited form of instruction – principally self-study from written materials and sample examinations – Korean adolescents lack the social, emotional, and problem-solving skills necessary to mature at the same age as their foreign peers. This is aggravated by a tight after-school tutoring program, which does not allow for close personal relationships with their peers, social awareness beyond what is being tested, or the development of soft skills such as socializing and creative problem solving. The academy-hopping – arranged by “manager moms” (related to the well-known role of soccer or hockey moms in North America) – has been referred to as transboundary post-schooling (Kim & Jung, 2019). Because the decisions regarding the number and choice of subjects, and the study schedule, are made for the students, they miss out on gaining self-control, perspective, and experience in making their own decisions.

The pursuit of a high score on the university entrance examination day deprives students of 12 school year’s worth of opportunities to develop an array of physical, emotional, psychological, and social functions – notably their sociability, creativity, critical analytical skills, and independence. At home, throughout their childhood and adolescence, students are directed by a carrot-and-stick approach to fulfill their parents’ expectations, with their autonomy and self-governance under suspension.

Korean mothers’ overzealous engagement in their children’s upbringing has a number of negative repercussions, including excessive need for physical and social contact, extended infantilization, hindrance of independent behavior and social maturity, and a distorted (low or high) degree of parental control over the children’s life choices (Levy, 1966).

Students merely learn to amass and compartmentalize theoretical facts without the capacity to judge the facts’ validity and relevance, or the legitimacy of their mentors and the learning process broadly. This lack of critical thinking is problematic as the transmitted knowledge may be incorrect, irrelevant to the students’ long-term needs, or mischaracterized by biased instruction. Indeed, students’ English proficiency is often limited to reading comprehension and providing standard written responses, and even that proficiency may wither after the conclusion of qualifying examinations (Cho & Brutt-Griffler, 2015). The academies also distort the learners’ discovery of knowledge (or the initiate–initiator relationship) through the fragmented perspectives offered by multiple part-time, overworked instructors.

Parents and teachers themselves are not immune to the impacts of the education fever, facing significant

financial, psychological, and mental burdens. Families’ gross expenditures on private after-school tutoring and instruction far exceed those on formal high-school tuition and school supplies. According to Statistics Korea (2022), 75.5% of elementary, middle, and high school students received private education in 2021, averaging 29 hours per month and costing 485,000 Korean won per month per student, or 367,000 Korean won when including non-participants (equivalent to approximately US\$373 or \$282, respectively). Nationwide, 23.4 trillion Korean won (equivalent to approximately US\$18 billion) was spent on private tutoring in the year 2021. Meanwhile, rich and poor families differ in their means of arranging shadow education. Parents who cannot afford it take out loans due to a sense of shame, peer pressure, and “prestige orientation” (Lee, 2006; Lee & Shouse, 2011). These financial burdens further constrain their disposable incomes and cause additional distress down the line.

Public teachers preparing students for the university entrance examination also experience stress (Kim, 2016), overwork, strained voice, and other adverse health outcomes – particularly homeroom teachers in the third year of high school (Kim & Lee, 2001; Shin *et al.*, 2013; Lee *et al.*, 2018a; 2018b). Aggression from students is also prevalent (Moon *et al.*, 2015). This evidence corroborates the presupposition that the status quo in Korean adolescents’ upbringing and initiation is deleterious to social welfare and should be reformed.

### 3.2. The psycho-emotional and physical harms of forced schooling

Relying on carrot-and-stick approaches to children’s initiation reduces their status within the home to that of objects to be groomed, and warps family bonds from intimate person-to-person mutual-learning and respect relations to person-to-object command-and-submission relations. In this setting, parents act as their children’s managers rather than companions, with negative consequences for children’s development outcomes (Jang & Suh, 2021). The disassociation between parent and child may lead to the child’s “experiential stunting” (Smith, 2013). Hence, paradoxically, the manager moms engaging in *chimatbaram* and following their children relentlessly could be reproached for emotional neglect toward their children.

Besides emotional and cognitive consequences, physical harms are also inflicted. Because students face high pressure to produce academic results, their stress levels are elevated for extended periods of time. High school students experience substantial stress during the two years leading up to the examination date, a phenomenon known as the “disease of the third grade of high school.” Clinical

depression is common (Lee & Larson, 2000; Kim, 2021). Low exposure to emotional stimuli makes them vulnerable to external factors and unable to cope with emotional challenges such as peer violence, sexual violence, or personal tragedies. These and other experiential shortfalls during adolescence may have lifelong and irreversible consequences.

It has been estimated that up to 90% of students in large East-Asian cities suffer from myopia, compared to 20 – 30% in the UK not due to genetic factors, but primarily environmental and thus preventable factors. Excessive desk study and lack of exposure to outdoor light have been blamed (McGrath, 2012). High school students enter school by 7:30 a.m., take classes until 6 p.m., and then remain at school until late at night to study quasi-voluntarily at their own pace. Even middle and elementary school students are not spared, under the constant pressure from looming examinations and the nudging from their parents and peers.

The pressure on children from their mothers and by society at large can lead to explicit harms. Naver, the most popular search engine in South Korea, has a virtual consulting service where people with various personal concerns can post anonymously. Posts by high school students reveal the seriousness of their desperation and exhaustion. As one female student wrote:

“I don’t know why, but I just get angry with myself. I can’t sleep until 4 a.m. as I’m extremely worried that I’d be late for school and be scolded by my teacher. Every day, I wonder why I have to live if my scores are not good in Korean language, English, and Math. There are so many students with better scores than mine. If I can’t go to the university my parents want, why should I live? I know my parents don’t have money to pay for private tutoring anymore. I feel so behind and lost. That’s why I keep hitting myself.” (Anonymous, 2014)

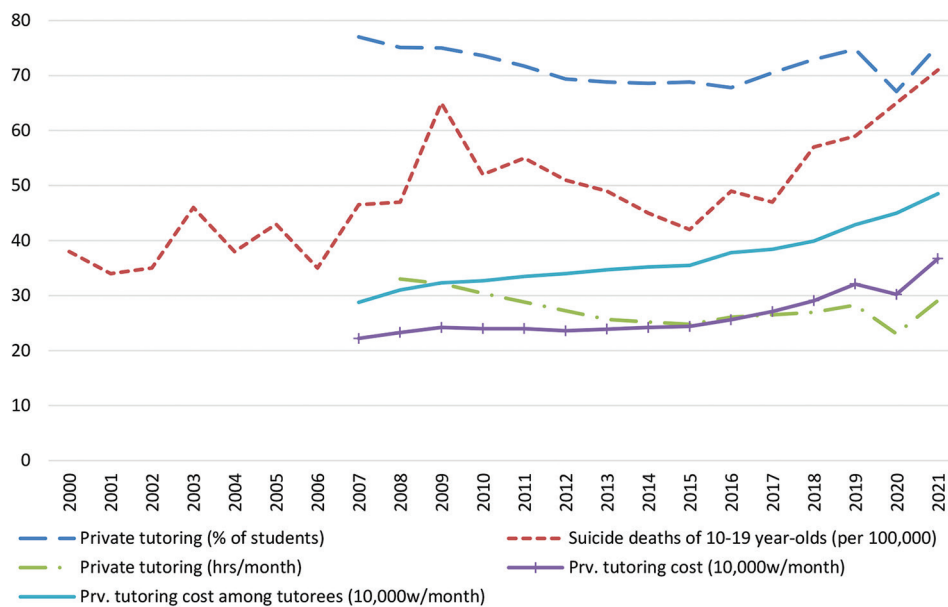
More than 90% of high school students posting on the anonymous consulting platform attribute their desperation to their poor academic results. Students internalize their scores and rankings compared to their classmates into their sense of self-worth and their perception of the meaning of life. Instead of viewing their circumstances as composed of various experiences in which education plays a limited part, their sense of the meaning of life rests solely on their academic results. Low quotas on university acceptance leave a mark on the students who fail, as they have not just failed an examination – they have disappointed their parents and permanently disgraced their families’ honor (Ellinger & Beckham, 1997). Only a small subset of them can re-enroll in private academies to repeat the examination 1 year later.

When students fail to meet the goals they have set for themselves or those set by their parents or teachers, they feel ashamed to the extent that they may become passive and lethargic, or aggressive and even self-abusive. The most prevalent cause of death among Korean teenagers, ahead of car accidents in most years, is suicide. Widespread stress over upcoming or recently failed university entrance examinations is one of the most commonly reported causes (Phosaly *et al.*, 2019; Liu, 2020). Other behavioral responses of students to stress include violence toward teachers and one another (Park *et al.*, 2014; Moon *et al.*, 2015; Bax & Hlasny, 2019). **Figure 1** shows that the prevalence of private tutoring, its intensity in terms of typical hours, and its cost were stagnating or declining in the early 2010s but have been on a continuous rise since 2015. Correspondingly, the youth suicide rate increased sharply during 2015 – 2021, reaching double the rates observed at the turn of the century.

## 4. Discussion

This study emphasizes the conceptualization of education in South Korea as a rite of social initiation for children, coercing them into attaining narrow, standardized education subject to high personal costs and unclear benefits. Throughout their educational journey, children have little opportunity to voice their views or reservations. The value system of Korean mothers, and by extension, that of the Korean education system and society at large, internalizes children’s academic involvement and achievement while largely externalizing children’s intrinsic values and suffering. Korean social and cultural norms equip parents with firm control over their children’s access to information and their basic functions, thus allowing parents to dictate their children’s constructed value structures, emotions, and choices. The pressure for academic performance, the control of students’ bodies and minds by parents, and the splintered nature of the educational system result in uneven development for children, imposing undue burdens and even long-term harms. Children are deprived of opportunities to develop into wholesome, autonomous human beings and citizens because of prevailing norms, reductionist instruction at private institutes, and the insecurity and prestige orientation of children’s mothers.

We conclude that Korean students do not receive the protection from the educational system that they are entitled to. Rather, they are robbed of their autonomy, childhood experiences, and the learning they should have received. This situation results mainly from the tacit social compact among families, the state, and the education industry, which views youths in their liminal stage as incomplete and believes they should be shaped in ways



**Figure 1.** Indicators of the burden of shadow education on students and parents, 2000 – 2021. Note: Data from Statistics Korea (various years). Monetary values are in nominal terms

that only adults deem valuable. The students’ opinions, individuality, and diversity are trampled on, and they are molded to fit standardized social norms and knowledge.

We assert that the pervasiveness and endurance of the practice amounts to a violation of Article 6.2 of the Convention on the Rights of the Child, which South Korea has ratified. This article states that “States Parties shall ensure to the maximum extent possible the survival and development of the child” (UNICEF, 1989). Just as with child labor, children’s sexual exploitation, trafficking, organ harvesting, child witchcraft, or the recruitment of child soldiers in other contexts (Bales, 2004), the mental violence inflicted on Korean children stems from a deeply rooted, complex social rite that deserves scrutiny by social scientists, including sociologists and anthropologists, and a response by policymakers. This is despite the fact that children’s shadow schooling occurs subtly, in broad daylight, in modern and safe classroom settings.

#### 4.1. Policy responses

For 10 years of their life, Korean students partake in a grueling regime, acting as blind studying machines, suspending their aspirations, demands, and dreams of a free future. During this period, their independence, capacity for critical and creative thought, and ability to protect themselves from external assaults become inhibited. This regime is also grueling for the students’ mothers and teachers, who participate in the process due to peer and career pressures, respectively. To break the vicious, self-reinforcing cycle,

comprehensive, multipronged reforms addressing the root causes and the positions of all actors are necessary.

Transitioning to a state in which Korean children are acknowledged as independent human beings and empowered to use and develop their creativity and critical thought will require serious societal and policy actions (Kitamura *et al.*, 2022). These actions include reforms of the public and private educational sectors, and public campaigns targeting social norms, family roles, and community and individual-level responses. Mapping out children’s own recourses is essential. Systemically and rigorously addressing children’s anxieties and other physical and mental side effects of accumulated stress is warranted. Facilitating a stress-free, smooth, and level school-to-work transition for youths and tackling the exclusion of mothers from the formal labor market would go far in mitigating some of the root causes.

In fact, the government embarked on educational reforms in the mid-2000s (Kim & Chang, 2010; Kim, 2016), cracking down on the special business rights of private academies, reducing their legal operating hours, updating the curriculum in public schools, and reforming the university, corporate, and public-service admission processes. Regulation of private tutoring has since wavered according to the focus and resolve of the administration in power, amid various political distractions. Families’ demand for tutoring has also proved to be inelastic, and families have responded to regulation by simply switching from one type of tutoring to another (Choi & Choi, 2016).

The government has also worked with the industry to strengthen equality of opportunities in hiring, offer workers second chances if they failed initial examinations, make it easier for workers to change their career tracks, and promote vocational training. These initiatives were partly possible thanks to the state-led nature of the country's industry and the system of incentives such as public tenders and fiscal support during downturns (Kalinowski & Hlasny, 2017), subject to eligibility criteria in terms of firms' inclusiveness.

Political debate has also considered the extent of children's participation in decision-making over their interests, and the applicability of related decrees in other cultures. In this regard, Article 12 of the Convention on the Rights of the Child calls for children's participation in matters affecting them:

1. States Parties shall assure to the child who is capable of forming his or her own views the right to express those views freely in all matters affecting the child, the views of the child being given due weight in accordance with the age and maturity of the child.
2. For this purpose, the child shall in particular be provided the opportunity to be heard in any judicial and administrative proceedings affecting the child, either directly, or through a representative or an appropriate body, in a manner consistent with the procedural rules of national law.

## 4.2. Future directions of policy discourse

Notwithstanding the calls in the Convention on the Rights of the Child, children's competence to form and voice sound opinions has often been underestimated in deliberations over policies affecting children's welfare, and children's participation has been overlooked. Thomas (2000) documented cases of discrepancies between adults' assumptions regarding children's ability and willingness to participate, and children's competence and desire to direct themselves.

In traditional societies, parenting has entailed preparing children for a fixed pattern of living; therefore, obedience to parents has been viewed as good preparation for future life. As custom and authority have given way to freedom of choice under modernity, individuals are increasingly held responsible for shaping their own lifestyles. Helping children to form and express their opinions and make sound choices is becoming a critical parental task (Thomas, 2000). Pedagogy and educational methodology affecting children should be aligned with their wishes and with the local and cultural contexts.

In South Korea, children have had limited ability to position themselves as agents in control of the narrative

of their plight. They largely internalize and accept their role as cogs in the machine-perpetuating social hierarchy. This is because their community and social media portray educational fever as playing out in safe and modern conditions, and children's abuse as subtle and performed under the guise of children's own upbringing and social initiation. Korean students' plight is thus easy to discount even by the students themselves as a cruel necessity.

Broadly speaking, children are entitled to all opportunities for wholesome development, but predicting which learning and skills students will need for their self-realization is difficult. Unbiased by past norms, students themselves should be trusted as best placed to judge which skills will be valued in their age cohort, in the information and social environment they are growing up in. Further consideration should thus be given to the modalities of children's participation. Children should be considered as agents expressing their version of the narrative fully and candidly, under the support of professional counselors.

Rather than imposing predetermined types of knowledge and lifestyles on their children, parents should encourage children to articulate their own desires, hopes, and concerns so that they can help shape their life destinies. By taking part in their own life design, children may find more meaning and motivation to realize their individual dreams. This could relieve some of the pressure on the mainstream educational system and the main career entry points, alleviate competitive pressure for students choosing the traditional trajectory, and bring positive effects to communities cherishing diversity.

To ensure that students choose the correct social pillar to climb in their adolescence and realize their full potential without lifelong scars, they must become more closely involved in their initiation process. The problem of imbalance in their school-to-work transition and in their mothers' value system must be addressed via systemic reforms. Upskilling opportunities will need to be expanded to provide for balanced youth development, particularly for children with alternative learning needs, styles, and academic interests.

## 5. Conclusion

From enrollment in elementary school until acceptance at university, South Korean children, as well as their mothers and teachers, are subjected to a grueling regimen of preparation for standardized examinations. This study re-conceptualizes the educational experience as the rite of passage, not only as part of the children's social initiation but also in their mothers' pursuit of self-worth. Given that the blind and unidirectional steering of children toward a common goal subjects them to hardships and long-term

harms, we assert that public awareness campaigns and educational-sector reforms can improve welfare for all those affected. The advocacy and search for a preferred regime should bring together various stakeholders – including education scholars, employer groups, and representatives of children and healthcare – with the common interest of ushering in a harmonious society preoccupied not with the test scores of 18 year olds, but with what the next generation broadly can do and become.

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## Author contributions

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*Investigation:* All authors

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## RESEARCH ARTICLE

## Associations between early marriage, women's empowerment, and infant mortality in Sub-Saharan Africa

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**Abstract**

Sub-Saharan Africa (SSA) is characterized by high gender inequality and a high rate of early marriages of girl children, which could have a negative influence on child health outcomes and child mortality in the region. This study examined the influence of child marriage on infant mortality in selected countries in SSA. We used Cox proportional hazard models to analyze pooled data ( $N = 33,549$  children) from the Demographic and Health Surveys of 28 SSA countries. Our study established that children of child brides faced heightened risks of infant mortality compared with children of women who married after the age of 18, although this relationship became insignificant after controlling for women's empowerment and other control variables. Therefore, the findings support the hypothesis that a certain extent of women's empowerment could moderate the relationship between early marriage and infant mortality in regions where early marriages occur due to the low socioeconomic status of women. We conclude that ensuring women empowerment and increasing their economic opportunities (such as involvement in the agriculture and formal employment sectors) will lead to decreases in child marriage, thereby reducing infant mortality in SSA.

**Keywords:** Child marriage; Child mortality; Infant mortality; Women's empowerment; Sub-Saharan Africa

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**1. Introduction**

Improving child health outcomes remains a key national and international priority. The world seeks to reduce the under-5 mortality rate to 25 deaths per 1000 live births by 2030, as enshrined in the international agenda, for instance, target 3.2 of the Sustainable Development Goals. To a large extent, considerable progress has been achieved in reducing global child mortality: 1 in 27 children died before the age of 5 in 2020 compared with 1 in 11 in 1990 (UNICEF *et al.*, 2020a). Notwithstanding this improvement, the global burden of child death remains high. Around 5 million children died before age 5

in 2020 alone, and more than half of these deaths occurred in sub-Saharan Africa (SSA; UNICEF *et al.*, 2020b).

Prior studies have established many factors influencing child mortality in SSA. These determinants include low maternal education (Adedini *et al.*, 2015b; Kravdal, 2004), sociocultural practices such as gender inequality and the desire for high fertility (Adedini *et al.*, 2015a; Mobolaji *et al.*, 2020), insufficient women's empowerment (Adedini *et al.*, 2019; Akinyemi *et al.*, 2017), low or non-use of contraception (Adedini *et al.*, 2015c; Bitew & Nyarko, 2019), poor or limited access to health care interventions such as antenatal care and skilled delivery (Adedini *et al.*, 2014; Vieira-Meyer *et al.*, 2019), and biomedical causes (Breiman *et al.*, 2021; Fottrell *et al.*, 2015; Salzberg *et al.*, 2019).

A significant gap exists in the literature; child marriage constitutes a conceivable risk factor for child mortality that remains inadequately explored. Several countries in SSA exhibit a high prevalence of child marriage (Adedini *et al.*, 2022; Fatusi *et al.*, 2021); however, the implications of child marriage for infant mortality have rarely been investigated. Child marriage is defined as matrimony involving at least one individual under the age of 18 years; this custom represents a key global public health concern because it adversely affects the sexual and reproductive health and rights of women and girls (Nour, 2006; Raj, 2010; Raj & Boehmer, 2013). Both boys and girls are involved in early marriage; however, girls are disproportionately affected (Nour, 2006; UNICEF, 2019; 2020). A recent overview of the available evidence indicated that an estimated 115 million boys and men were married as children compared with over 650 million girls and women. This statistic translates to around 765 million child grooms and brides globally (UNICEF, 2019). Approximately two-fifths of women aged 20 – 24 who were married before they were 18 years old live in SSA; therefore, a majority of global early marriages happen in SSA (Walker, 2012).

Women's empowerment is a critical factor in the promotion of child health, and the extant literature elucidates that child brides tend to belong to poorer socioeconomic strata compared with women who marry as adults (Ortigoza *et al.*, 2021). For instance, a recent study found that girls who married as child brides are more likely to be unemployed, uneducated, poor, multiparous, rural residents, and engage in non-professional occupations in comparison with women who married as adults (Adedini *et al.*, 2022). Furthermore, high education levels in women of reproductive age are linked with reduced infant mortality through decreases in adolescent birth rates and premature births and through improved caregiving skills (Gakidou *et al.*, 2010). Similarly, women with more

financial autonomy appear to allocate increased resources to the health of their children (Pratley, 2016). Births may occur in marital contexts or outside of marriage; however, literature clearly indicates that early marriage is strongly linked with younger ages of mothers at birth; meanwhile, while teenage pregnancy is viewed as a motivational factor for early marriage, as families evaluate the costs of their daughters raising children born out of wedlock (Schaffnit & Lawson, 2021).

The children of child brides may be predisposed to poor health outcomes such as childhood stunting, wasting, and being underweight due to the pressures of the mother raising children at a young age with little or no knowledge of childbearing and childrearing (Kidman, 2017). Moreover, giving birth before the body is fully mature is a major risk factor for poor maternal and child health and may result in stillbirths, miscarriages, or infant deaths. Furthermore, early marriage is associated with mistimed or unwanted pregnancies, susceptibility to domestic violence, poor participation in family decision-making, and poor agency (Godha *et al.*, 2013; Santhya *et al.*, 2010). Given that pregnancy among child brides places the mother as well as the fetus at a higher risk of adverse reproductive health outcomes, this study aimed to examine the influence of child marriage on infant mortality (and the impact of controlling for women's empowerment) in 28 selected countries in SSA.

## 1.1. Some theoretical perspectives on early marriage, women's agency, and child survival

The study was guided by the ecological model (EM) and the human behavioral ecology (HBE) theory to highlight the relationships among early marriage, women's empowerment, and child survival. EM emphasizes the multidimensionality of human behaviors and recognizes the role of structural and contextual factors (including socioeconomic issues and political environment) in determining individual behaviors. HBE uses the evolutionary approach to study human behaviors and posits that the patterns we observe in human behaviors are shaped by certain selective pressures present in the social and ecological environment in which individuals live. HBE has been widely applied in a range of domains including anthropology, archeology, and demographic transition (Winterhalder & Smith, 2000, 2017). A recent study conducted by Schaffnit & Lawson (2021) utilized HBE to offer perspectives on four alternative hypotheses sustaining the practice of child marriage in low- and middle-income countries.

The prevalence of child marriage persists in developing countries despite its many negative consequences

including poor physical and mental well-being, poor sexual and reproductive health, and reduced educational and employment prospects for child brides. Its continued prevalence, despite its apparent adverse consequences, has inspired multiple disciplines including evolutionary and sociocultural anthropology and global health frameworks to elucidate why child marriages remain common. Scholars have argued that child marriage should not only be viewed as a forced union or a determinant of low socioeconomic status (Schaffnit *et al.*, 2021) but also as a viable response to poverty or poor socioeconomic status: girls marry early because it is the best available option for them in their community. Researchers have argued that early marriages tend to generate reproductive success and that parents benefit from child marriages at the expense of their daughters' best interests. Moreover, early marriages are viewed as the likely product of a conflict of interest between parents and their daughters because parents desire bride wealth at a cost to their daughters. Early marriages can also result from conflicts between men and women as girls are lured into early marriages against their desires or long-term relationship goals. Further, it has been posited that girls marry early to liberate themselves from intergenerational conflicts and escape unfavorable conditions in their native homes. Moreover, early marriages could be the best option for poor parents and their daughters due to the limited choices available. These hypotheses highlight the roles enacted by the autonomy and agency of women and reveal the complex determinants of transitioning through individual life courses. Thus, these studies emphasize the need for appropriate, context-specific policies to address the sociocultural framing of gender norms and attend to the practice of child marriage, and its negative concomitants (Mobolaji *et al.*, 2020).

This study hypothesized that a link exists between early marriage and adverse child health outcomes, including infant mortality. Girls who marry early suffer severe negative health and social consequences that result in poor status, low empowerment, and limited agency. Child brides lack the opportunities to enjoy their childhood and develop fully, which limits their empowerment. They do not get the opportunity to develop friendships and bonds. Their status in their households remains low because they are not granted the option of acquiring the education and skills needed for future employment prospects. Moreover, child brides cannot negotiate safer and protected sexual acts due to their low status or poor agency, which often leads to high-risk births. Kramer & Lancaster (2010) reported that negative pregnancy outcomes are associated with teen motherhood due to relative developmental maturity, limited knowledge about childrearing, and the psychological unpreparedness of young mothers for

motherhood. Scholars have also shown that child bride pregnancies and births are often too early, too close (short inter-birth intervals), and even too late (Akinyemi *et al.*, 2015; Ibrahim *et al.*, 2019): such circumstances indicate higher mortality risks for the children of child brides than for the offspring of older women. Child marriage is also associated with low birth weights, preterm births, and risks of human immunodeficiency virus infection through mother-to-child transmissions. This jeopardizes the health of the next generation, making infant mortality/survival a relevant outcome for evolutionary models of human life history. The study also postulates that women's empowerment could reduce the risk of infant mortality for child brides who can subsequently acquire some measure of enfranchisement through education, employment, and participation in household decision-making.

## 2. Data and methods

### 2.1. Data source

The study used the most recent Demographics and Health Survey (DHS) data from 28 countries selected across the four regional blocs of SSA. The selected countries were located in four African subregions presenting sociocultural differences. The surveys were conducted in the selected countries between 2010 and 2020. Table 1 shows that the weighted samples of the children of the respondents range from 404 infants in Comoros to 3,817 babies in Nigeria. We employed a stratified two-stage cluster design sampling technique to select representative samples. Enumeration areas (EAs) served as the primary sampling units and a complete listing of households was compiled for selected EAs to derive representative samples for each country. The analysis for this study focused on young mothers aged 15 – 24 years, dividing them into three mutually exclusive strata: women who were first married at ages less than 15 years (<15 years), those who were first married between the ages of 15 and 17 (15 – 17), and those whose first marriage occurred at age 18 or older (18+ years). Categorizing early marriages in this manner according to the age the girls were first married allowed us to compare the risks of infant mortality between the three groups. We assumed that very early marriages of girls (before age 15) were probably associated with poorer child health outcomes compared to marriages at ages 15 – 17 (Kramer & Lancaster, 2010). We utilized the recode datasets pertaining to the children and restricted our analysis to children whose mothers were currently aged between 15 and 24 years and who were born within one calendar year before the survey. Our analysis focused on women aged 15 – 24 years to ensure that the sample was not biased due to the systematic exclusion of births to younger mothers. The existing literature indicates that maternal age at the birth of a child represents an

Table 1. Neonatal and infant mortality rates of countries included in the analysis

Countries	DHS year	N=33,549	Neonatal mortality rate (per 1000 live births)	Infant mortality rate (per 1000 live births)	% of infant deaths during the neonatal period
Angola	2015 – 2016	1,456	28.1	41	68.5
Benin	2017 – 2018	1,080	22.8	32	71.3
Burkina Faso	2010	1,876	21.8	48.7	44.8
Burundi	2016 – 2017	742	19	32.2	59.0
Cameroon	2018	1,404	25.5	38.9	65.6
Chad	2014 – 2015	1,544	38.5	60.2	64.0
Congo	2011 – 2012	789	22.2	34.8	63.8
Congo DR (CD)	2013 – 2014	1,494	45.3	64.4	70.3
Comoros	2012	404	35.3	53	66.6
Cote D'Ivoire	2011 – 2012	780	23.6	42.1	56.1
Gabon	2012	780	45.3	50.9	89.0
Ghana	2014	588	22.5	25.3	88.9
Guinea	2018	857	42.2	73.5	57.4
Kenya	2014	2,565	24.5	40.1	61.1
Lesotho	2014	646	30.2	41.2	73.3
Liberia	2019 – 2020	506	42.4	45.7	92.8
Malawi	2015 – 2016	1,582	33.8	40.7	83.0
Mali	2018	1,341	33.4	44.6	74.9
Mozambique	2015	878	29.4	48	61.3
Namibia	2013	680	18.9	34.5	54.8
Niger	2012	1,226	19.1	32.1	59.5
Nigeria	2018	3,817	41.3	59.5	69.4
Rwanda	2014 – 2015 (2019/20)	535	31.9	40.3	79.2
Sierra-Leone	2019	1,170	26.2	58.3	44.9
Tanzania	2015 – 2016	835	31.2	37.8	82.5
Uganda	2016	2,316	32.3	46	70.2
Zambia	2018	772	30.1	36.5	82.5
Zimbabwe	2015	886	25.2	37.8	66.7

important mediator between early marriage and infant mortality.

## 2.2. Variable measurements

### 2.2.1. Outcome variables

Infant mortality measured per 1000 live births among children of young mothers aged 20 – 24 years was set as the dependent variable for this study. Infant mortality was defined as death before age one (death before the first birthday). This variable was measured as the duration of survival since birth in months. This variable is an event history outcome; thus, infant mortality was modeled as the duration of survival from birth until the 11<sup>th</sup> month. The survival time for children who were alive was considered

at their current age (in months) at the time of the survey. The survival time for dead children was recorded as their age at death in months.

### 2.2.2. Independent variables

Child marriage denoted the key explanatory variable in this study, and women's empowerment was considered as an intervening variable. Child marriage was measured and categorized as (i) first marriage before age 15, (ii) first marriage between ages 15 and 17, and (iii) first marriage at age 18 or older. In addition, we considered the women's education levels, occupation strata, and participation in household decision-making as proxy variables for women's empowerment. We utilized principal component analysis

to derive women's participation in household decision-making from responses to questions about who made decisions on visits to relatives, major purchases, husband's earnings, and the respondent's health care and earnings. The resultant composite scores were divided into (i) less empowerment and (ii) more empowerment. Other selected covariates were considered based on the reviewed literature. These variables included birth order, place of delivery, religion, wealth index, parity, place of residence, and number of antenatal visits. Antenatal care visits and place of delivery were included in the model based on the assumption that child brides are likely to have limited access to these life-saving measures for their infants due to their relatively low status in their families and communities. We also controlled for the country of residence to compare the estimated effects of child marriage on infant mortality across countries.

### 2.3. Statistical analysis

We performed three levels of statistical analyses. At the univariate level, the study samples were distributed according to the selected countries and the key independent variables. The bivariate analysis assessed the distribution according to the sample characteristics. Cox proportional hazard models were fitted at the multivariable level to determine the influence of child marriage on infant mortality while adjusting for the selected control variables. We employed the Cox proportional hazards model because it is appropriate for analyzing survival data and handling censored observations. Censoring occurs when the value of an observation is not comprehensively identified. Some children in our study sample were not completely exposed to mortality risk at the time of the survey. The probability of infant death was regarded as the hazard in using the Cox proportional hazards model.

A total of seven Cox proportional hazard models were fitted for the outcome variable. Model 1 represented an unadjusted model examining the relationship between age at marriage (as a continuous variable) and infant mortality. Model 2 had a similar objective but also adjusted for a proxy measure of women's empowerment (i.e., involvement in household decision-making). Model 3 was unadjusted with age at marriage as a categorical variable, whereas Model 4 included women's empowerment. Model 5 incorporated maternal characteristics, and Model 6 considered additional variables (i.e., characteristics of children). Model 7 represented the full model incorporating all the independent variables, including the country of residence. Multiple models were fitted to confirm rigorous analyses and to ensure that highly correlated predictors were not included in

the same model. We applied weighting factors provided by the DHS program to account for the survey's complex nature ensuring the national representativeness of the data. We applied the sample size weight for the pooled data using the formula  $1/(C [n_c/n_p])$ , in which  $C$  denotes the number of countries involved in the analysis and  $n_c$  and  $n_p$  indicate the sample size for each studied country and the pooled data, respectively. Multivariable analyses of the pooled data were performed using the sample size weight. Measures of association were presented as hazard ratios (HRs) with a 95% confidence interval (CI) and at a significance level of  $p < 0.05$ . The normative and largest groups were chosen as the reference categories during the multivariable analysis. All statistical analyses were performed using Stata (version 16.0; StataCorp, USA).

### 2.4. Patient and public involvement

No patients were involved in the design or dissemination of this study.

## 3. Results

### 3.1. Infant mortality rate

Table 1 and Figure 1 present the infant mortality rates and the percentages of infant deaths occurring in the neonatal period in the selected countries. Table 1 clarifies that the neonatal mortality rate was found to be more than 30 per 1000 live births in 13 of the 28 selected countries. Moreover, the infant mortality rate was higher than 30 per 1000 live births in 27 of the 28 selected countries. At least, 45% of the total infant mortality occurred during the neonatal period in all 28 selected countries. The infant mortality rate was highest in Guinea (73.5 deaths/1000 live births) and lowest in Ghana (25.3 deaths/1000 live births).

### 3.2. Level of women's empowerment

Figure 2 illustrates the women's empowerment levels registered by the study participants in the selected countries. Women's empowerment levels were low across all selected countries except Burundi, the Democratic Republic of the Congo, Rwanda, Uganda, and Zimbabwe, where women were moderately (or intermediately) empowered.

### 3.3. Age at first marriage

Figure 3 presents the ages of the respondents in the selected countries at their first marriage. A high percentage of women married at age 18+ in Burundi, Gabon, the Democratic Republic of the Congo, Kenya, Lesotho, and Namibia. Meanwhile, the proportion of women who married before age 15 or at ages 15 – 17 was 50% or more in Burkina Faso, Guinea, Liberia, Mali, Mozambique, Niger, Tanzania, and Zambia.

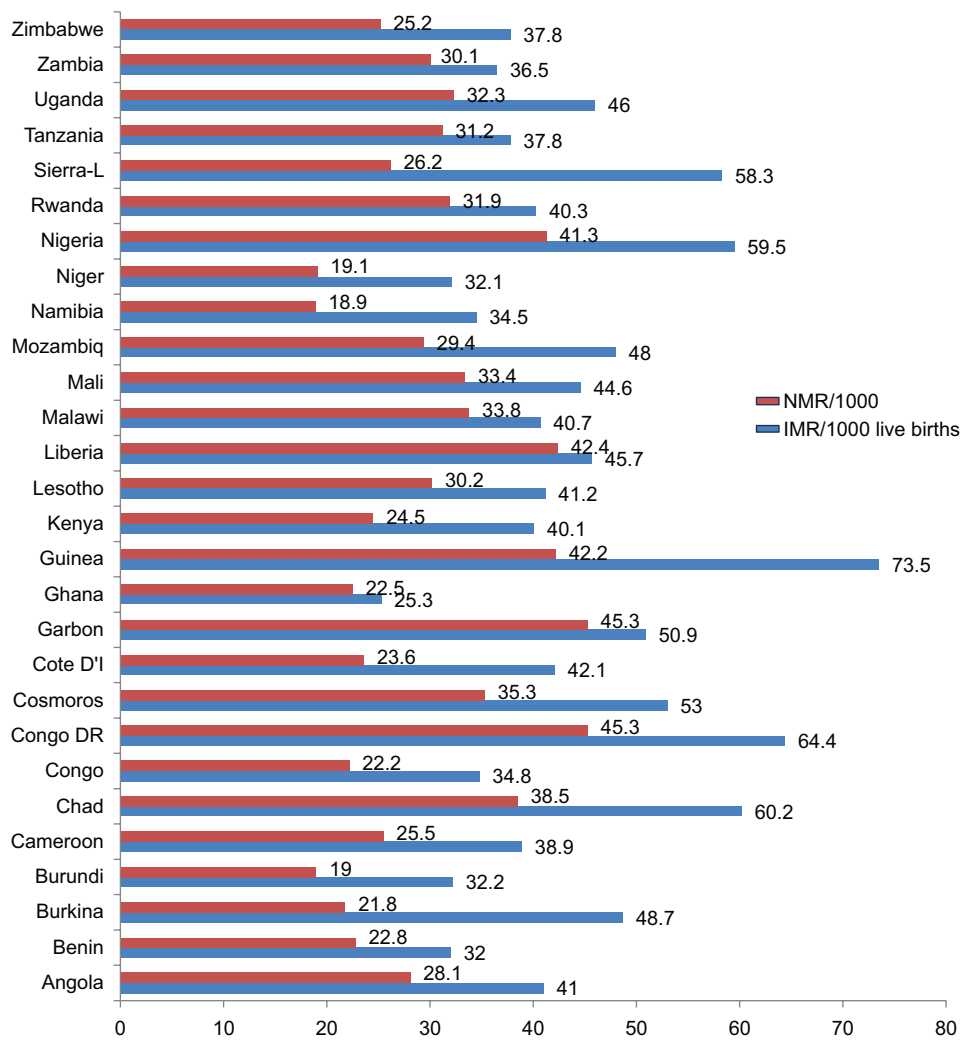


Figure 1. Infant and neonatal mortality rates (per 1000 live births). Cote D'I = Cote D'Ivoire; Sierra L = Sierra Leone  
Abbreviations: IMR: Infant mortality rate; NMR: Neonatal mortality rate.

### 3.4. Child marriage, women’s empowerment, and infant mortality

Table 2 displays the relationships between child marriage, women’s empowerment, selected maternal characteristics, and infant mortality. Compared with the other categories, infant mortality was higher among male children ( $\chi^2 = 10.26, p < 0.05$ ), children who are in first birth order ( $\chi^2 = 41.94, p < 0.001$ ), children of less empowered women ( $\chi^2 = 15.21, p < 0.01$ ), children of 15 – 19-old mothers ( $\chi^2 = 51.07, p < 0.001$ ), children of uneducated mothers ( $\chi^2 = 16.28, p < 0.01$ ), multiple-birth children ( $\chi^2 = 346.10, p < 0.001$ ), children of Muslim mothers ( $\chi^2 = 13.17, p < 0.05$ ), children of mothers who married at age 15 – 17 ( $\chi^2 = 3.68, p < 0.05$ ), children delivered at home ( $\chi^2 = 45.51, p < 0.001$ ), and children whose mothers had <4 antenatal care visits ( $\chi^2 = 89.65, p < 0.001$ ).

The results of the multivariable analysis are presented in Table 3. Model 1 shows the unadjusted HRs indicating the independent effects of age at first marriage (continuous variable) on infant mortality. The findings reveal significantly elevated hazards of infant death among children whose mothers married at ages 15 (HR: 1.65, CI: 1.18 – 2.31,  $p < 0.01$ ) and 16 (HR: 1.40 CI: 1.04 – 1.90,  $p < 0.05$ ) compared with those whose mothers married at ages 18+. The outcomes obtained after adjusting for the proxy measure for women’s empowerment in Model 2 divulged similar patterns.

The unadjusted Model 3 is shown in Table 4, revealing that children whose mothers married before age 15 (HR: 1.34, CI: 1.01 – 1.89,  $p < 0.05$ ) and at the age span of 15 – 17 (HR: 1.38, CI: 1.06 – 1.80,  $p < 0.05$ ) were at significantly higher risk of dying during infancy than children whose

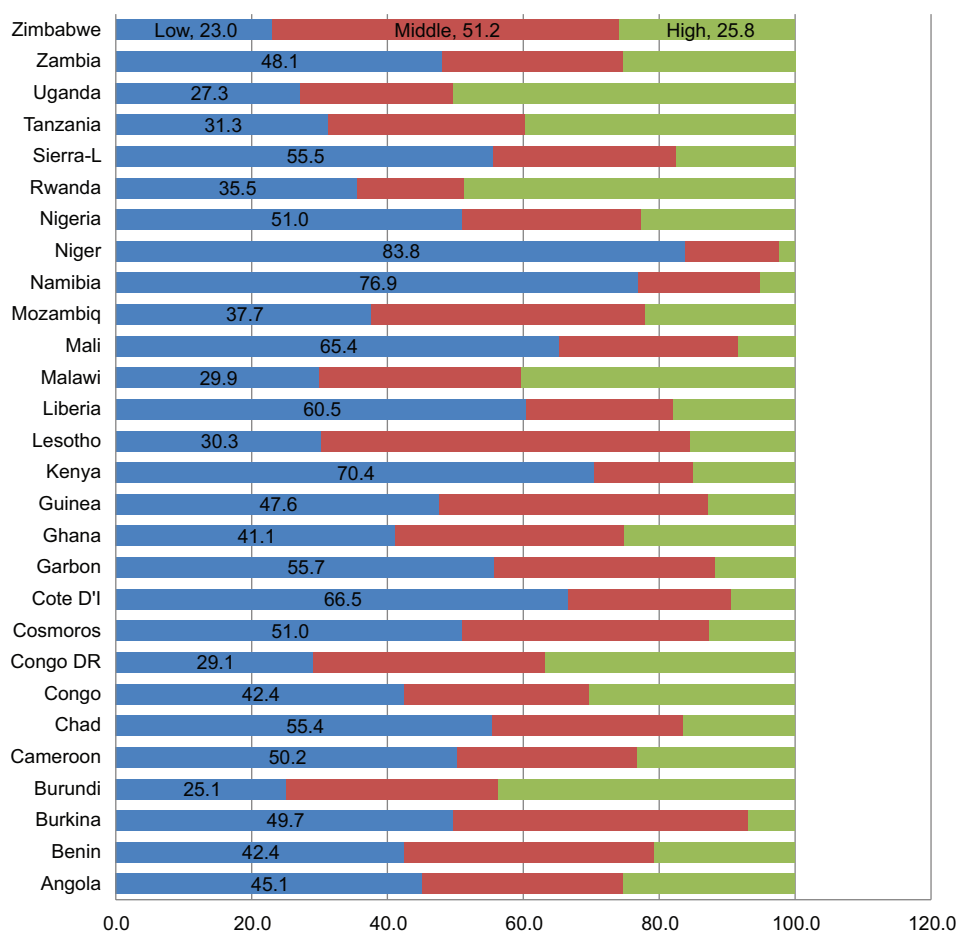


Figure 2. Level of women's empowerment in selected countries

mothers were first married at age 18 or older. These results were reaffirmed after adjusting for women's empowerment in Model 4 because children of respondents who were married at age 15 – 17 (HR: 1.33, CI: 1.02 – 1.74,  $p < 0.05$ ) were significantly at higher risk of infant mortality than babies whose mothers were age 18 or older when they were first married. The findings obtained from Model 4 further revealed that children whose mothers were less empowered (HR: 1.41, CI: 1.10 – 1.84,  $p < 0.01$ ) were significantly more at risk of infant mortality compared to children of women who were more empowered. The risks of infant death were significant for the offspring of child brides aged 15 – 17 in both Model 3 (HR: 1.38, CI: 1.06 – 1.80,  $p < 0.05$ ) and Model 4 (HR: 1.33, CI: 1.02 – 1.74,  $p < 0.05$ ). However, the risk of death during infancy was significant for children whose mothers were married before age 15 in Model 3 (HR: 1.34, CI: 1.01 – 1.89,  $p < 0.05$ ) but was insignificant for the same group in Model 4. The results obtained from Model 4 further evinced that children of less empowered women (HR: 1.41, CI: 1.10 – 1.84,  $p < 0.01$ ) were significantly more at risk of infant death than children whose mothers were

more empowered. The relationship between child marriage and infant mortality became insignificant after controlling for the selected variables noted in Model 5. Some control variables included in Model 5 were significantly associated with infant mortality. For instance, children of women with secondary or higher education (HR: 0.80, CI: 0.58 – 0.96,  $p < 0.05$ ) were significantly more at risk of infant mortality than children in the reference groups. Model 6 clarified that birth order, birth type, and antenatal care visits were significantly associated with infant mortality. For example, children with a 4+ birth order (HR: 0.76, CI: 0.46 – 0.95,  $p < 0.05$ ) and children with multiple births (HR: 3.93, CI: 2.43 – 6.35,  $p < 0.001$ ) had significantly higher risks of dying during infancy than children in the reference groups. Meanwhile, children whose mothers attended up to four or more antenatal visits (HR: 0.75, CI: 0.58 – 0.97,  $p < 0.05$ ) had significantly lower risks of dying during infancy than children whose mothers who attended less than four antenatal visits. Like Model 6, the last model (Model 7) established some predictors of infant mortality, including birth order, birth type, antenatal visits, and country of

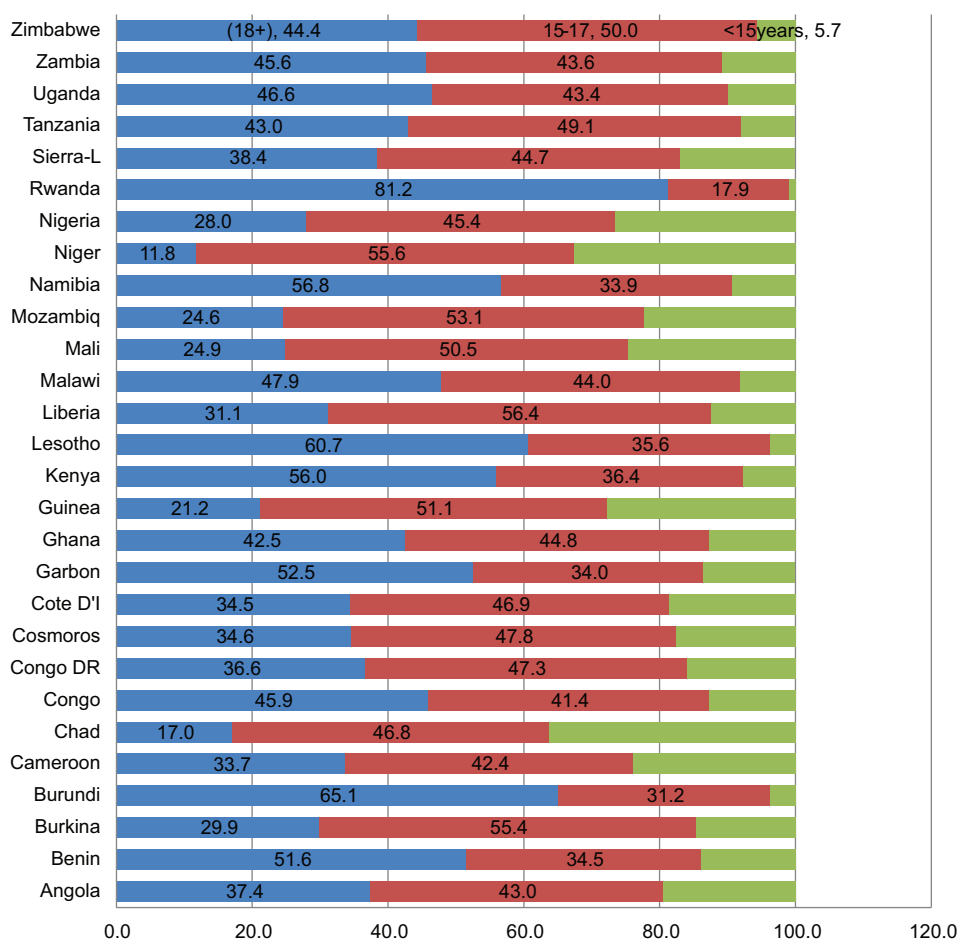


Figure 3. Age at first marriage by selected countries

residence. For instance, children born in Burkina Faso (HR: 1.79, CI: 1.00 – 3.22,  $p < 0.05$ ), Guinea (HR: 2.21, CI: 1.09 – 4.48,  $p < 0.05$ ), and Sierra-Leone (HR: 2.93, CI: 1.43 – 5.83,  $p < 0.01$ ) confronted significantly higher risks of dying during infancy than children born in Nigeria.

#### 4. Discussion

This study evidenced the influence of child marriage on infant mortality (while controlling for women’s empowerment) in countries in SSA where it is still commonplace for girls to be married before the age of 18. The study represents one of the few scholarly investigations conducted on this subject and is valuable given the prevalence of child marriage and the huge burden of child death observed in many parts of SSA (Adedini *et al.*, 2022; Adedini & Akinyemi, 2022; Simmons *et al.*, 2021; UNICEF *et al.*, 2019). The findings of this study could aid policy framing and guide future actions toward improving child health outcomes in SSA.

The previous studies have primarily established variances in child mortality between high- and low/middle-income countries (Adedini & Akinyemi, 2022; UNICEF *et al.*, 2020a). However, our analysis established substantial intra- and inter-regional variations in infant mortality across SSA. The intra-regional pattern divulged that among the selected countries, Ghana, a West African country, reported the lowest infant mortality rate (per 1,000 live births), whereas Guinea, another West African country, registered the highest infant mortality rate. The previous studies have advocated for (Adedini & Akinyemi, 2022; Macassa *et al.*, 2011) context-specific programs and interventions to address the high burden of childhood deaths in countries exhibiting high incidences of infant mortality. Such actions are essential given the immense intra- and inter-regional variations in infant mortality in SSA. Such efforts will accelerate the global progression toward achieving target 3.2 of the SDGs. Our study also found that approximately half the total infant mortality in all 28 countries occurred during the neonatal period. This

**Table 2. Percentage distribution of infant mortality by child marriage, women's empowerment, and selected characteristics**

Characteristics	Infant mortality (% who died before age 1)		$\chi^2$
	Dead	Alive	
	Age at first marriage		
18+	4.3	95.7	
15 – 17	4.8	95.2	
<15	4.3	95.7	
Maternal age		51.07***	
15 – 19	5.9	94.1	
20 – 24	4.1	95.9	
Women's empowerment		15.21**	
Less empowerment	4.9	95.1	
More empowerment	3.0	96.0	
Educational attainment		16.28**	
No formal education	5.2	94.8	
Primary	4.8	95.2	
Secondary or higher	4.0	96.0	
Occupation		9.84	
Not working	4.3	95.7	
Professional/technical/managerial work	5.8	94.2	
Clerical/sales/agriculture/service	5.0	95.0	
Manual labor	4.4	95.6	
Child's sex		10.26*	
Male	5.0	95.0	
Female	4.3	95.7	
Birth order		41.94***	
First	5.4	94.6	
2 – 3	3.9	96.1	
4+	4.9	95.6	
Number of births		346.10***	
Singleton	4.3	95.7	
Multiple births	18.5	81.5	
Religion		13.17*	
Christianity	4.6	95.4	
Islam	5.5	94.5	
Others	4.3	95.7	
Wealth quartile		18.05*	
Poorest	4.6	95.4	
Poorer	5.1	94.9	
Middle	4.5	95.5	

(Cont'd...)

**Table 2. (Continued)**

Characteristics	Infant mortality (% who died before age 1)		$\chi^2$
	Dead	Alive	
	Richer	4.6	
Richest	4.1	95.9	
Place of residence		2.86	
Rural	4.3	95.7	
Urban	4.8	95.2	
Family structure		2.04	
Monogamous	4.6	95.4	
Polygamous	5.1	94.9	
Place of delivery		45.51***	
Home	5.6	94.4	
Facility-based	4.1	95.9	
Other	5.9	94.1	
Antenatal care visits		89.65***	
<4	5.7	94.3	
4+	3.6	96.4	

Note: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

**Table 3. Cox proportional hazard model examining the effects of child marriage and women's empowerment on infant mortality**

Variables	Model 1	Model 2
Age at first marriage		
10	0.56 (0.13 – 2.29)	0.55 (0.13 – 2.28)
11	0.75 (0.23 – 2.14)	0.76 (0.24 – 2.41)
12	1.19 (0.60 – 2.32)	1.18 (0.60 – 2.31)
13	1.74 (0.93 – 3.26)	1.72 (1.00 – 3.23)*
14	1.39 (0.95 – 2.32)	1.38 (0.94 – 2.03)
15	1.65 (1.18 – 2.31)**	1.66 (1.19 – 2.32)**
16	1.40 (1.04 – 1.90)*	1.42 (1.05 – 1.93)*
17	1.30 (0.93 – 1.83)	1.34 (0.95 – 1.88)
18+ (RC)	1.00	1.00
Women's decision-making		
Less empowerment		1.34 (1.05 – 1.71)*
More empowerment		1.00

Note: \* $p < 0.05$ , \*\* $p < 0.01$ .

Abbreviation: RC: Reference category.

outcome calls for more concerted efforts and interventions to bolster child survival rates during the 1<sup>st</sup> month after birth.

**Table 4. Cox proportional hazard model examining the effects of child marriage, women’s empowerment, and selected control variables on infant mortality**

Variables	Model 3	Model 4	Model 5	Model 6	Model 7
<b>Age at first marriage</b>					
18+years (RC)	1.00	1.00		1.00	1.00
15 – 17	1.38 (1.06 – 1.80)*	1.33 (1.02 – 1.74)*	1.07 (.81 – 1.39)	1.09 (.81 – 1.44)	1.05 (0.78 – 1.39)
<15 years	1.34 (1.01 – 1.89)*	1.26 (0.89 – 1.79)	0.91 (.63 – 1.32)	0.94 (.62 – 1.40)	0.90 (0.60 – 1.36)
<b>Women’s decision-making</b>					
Less empowerment		1.41 (1.10 – 1.84)**	1.31 (1.01 – 1.69)*	1.28 (.98 – 1.65)	1.23 (0.94 – 1.61)
More empowerment		1.00	1.00	1.00	1.00
<b>Maternal educational attainment</b>					
No formal education			1.00	1.00	1.00
Primary			1.06 (0.79 – 1.42)	1.14 (0.85 – 1.52)	1.30 (0.94 – 1.79)
Secondary or higher			0.8 (0.58 – 0.96)*	0.89 (0.64 – 1.23)	1.00 (0.70 – 1.44)
<b>Maternal occupation</b>					
Not working			1.00	1.00	1.00
Professional/technical/managerial work			0.92 (0.23 – 3.79)	0.99 (.24 – 3.97)	1.01 (0.23 – 4.21)
Clerical/sales/agriculture/service			1.08 (0.83 – 1.39)	1.14 (0.88 – 1.47)	1.04 (0.77 – 1.41)
Manual labor			0.81 (0.52 – 1.25)	0.86 (0.55 – 1.33)	0.89 (0.55 – 1.43)
<b>Religion</b>					
Christianity			1.00	1.00	1.00
Islam			1.14 (0.84 – 1.55)	1.08 (0.79 – 1.45)	1.37 (0.87 – 2.14)
Others			0.88 (0.66 – 1.17)	0.89 (0.66 – 1.18)	1.18 (0.81 – 1.71)
<b>Wealth quartile</b>					
Poorest (RC)			1.00	1.00	1.00
Poorer			0.86 (0.63 – 1.18)	0.89 (0.65 – 1.22)	0.88 (0.64 – 1.21)
Middle			0.72 (0.51 – 1.02)	0.75 (0.53 – 1.06)	0.73 (0.51 – 1.04)
Richer			0.87 (0.61 – 1.25)	0.95 (0.66 – 1.36)	0.91 (0.61 – 1.34)
Richest			0.79 (0.48 – 1.31)	0.85 (0.50 – 1.42)	0.79 (0.44 – 1.42)
<b>Family structure</b>					
Monogamous			1.00	1.00	1.00
Polygamous			1.27 (0.95 – 1.70)	1.26 (0.94 – 1.67)	1.20 (0.89 – 1.61)
<b>Place of residence</b>					
Rural			1.18 (0.85 – 1.64)	1.10 (0.79 – 1.52)	1.11 (0.79 – 1.56)
Urban			1.00	1.00	1.00
<b>Child’s sex</b>					
Male				1.00	1.00
Female				1.08 (0.85 – 1.36)	1.05 (0.85 – 1.35)
<b>Birth order</b>					
First				1.00	1.00
2 – 3				0.82 (0.61 – 1.08)	0.81 (0.61 – 1.08)
4+				0.76 (0.46 – 0.95)*	0.76 (0.45 – 0.97)*
<b>Birth type</b>					
Single				1.00	1.00

(Cont’d...)

Table 4. (Continued)

Variables	Model 3	Model 4	Model 5	Model 6	Model 7
Multiple				3.93 (2.43 – 6.35)***	3.97 (2.44 – 6.47)***
Antenatal care visits					
<4				1.00	1.00
4+				0.75 (.58 – 0.97)*	0.75 (0.58 – 0.98)*
Place of delivery					
Facility-based				1.00	1.00
Home				1.31 (1.01 – 1.69)	1.35 (.096 – 1.89)
Other				0.78 (0.33 – 1.81)	0.90 (0.37 – 2.17)
Country					
Nigeria (RC)					1.00
Angola					1.06 (0.42 – 2.69)
Benin					0.80 (0.37 – 1.73)
Burkina Faso					1.79 (1.00 – 3.22)*
Burundi					1.33 (0.54 – 3.29)
Cameroon					0.71 (0.34 – 1.49)
Chad					1.47 (0.78 – 2.43)
Congo					1.59 (0.61 – 4.14)
Congo DR					1.77 (0.77 – 4.07)
Comoros					1.30 (0.44 – 3.78)
Cote D'Ivoire					1.68 (0.67 – 4.15)
Gabon					0.36 (0.09 – 1.38)
Ghana					0.06 (0.01 – 0.51)**
Guinea					2.21 (1.09 – 4.48)*
Kenya					1.20 (0.57 – 2.52)
Lesotho					0.58 (0.21 – 1.59)
Liberia					0.52 (0.12 – 2.18)
Malawi					0.60 (0.24 – 1.47)
Mali					0.83 (0.40 – 1.74)
Mozambique					1.31 (0.49 – 3.48)
Namibia					1.31 (0.28 – 6.00)
Niger					0.82 (0.35 – 1.94)
Rwanda					0.93 (0.30 – 2.89)
South Africa					1.20 (0.24 – 5.92)
Sierra-Leone					2.93 (1.43 – 5.83)**
Tanzania					0.48 (0.15 – 1.52)
Uganda					0.95 (0.52 – 1.72)
Zambia					1.09 (0.32 – 3.68)
Zimbabwe					1.09 (0.41 – 2.85)

Note: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

Abbreviation: RC: Reference category.

Our multivariable analysis explored the independent effects of child marriage on infant mortality and its results established an association between the two variables:

children of women who were first married before age 15 and at the age range of 15 – 17 were found to confront elevated danger of dying in the 1<sup>st</sup> year of their life. The

association between early marriage and infant mortality was similar in magnitude in the unadjusted models for women who married before age 15 and those who married at the age span of 15 – 17 years. It was hypothesized that girls who are married before age 15 would bear children with worse health outcomes than those who married in later adolescence (Kramer & Lancaster, 2010); however, our results indicated a somewhat similar pattern in the risks of infant mortality of both groups. Nevertheless, our findings were congruent with Kramer's (2008) report that children whose mothers got married before age 18 (at <15 or 15-17) exhibited a higher risk of death compared with those whose mothers were married as adults (aged 18+). The model that considered age at marriage as a continuous variable also indicates slight variations in the estimated effects of child marriage on infant mortality by the mother's age at marriage.

Numerous plausible reasons could be posited for the high risk of death of children of child brides. Child brides have a limited capacity for healthy childbearing and childrearing (Parsons *et al.*, 2015; Raj, 2010). Scholars have argued that the risks of malnutrition, underweight, stunting, and wasting are generally high among children of child brides (Kidman, 2017; Nour, 2006; Raj *et al.*, 2010). Furthermore, children of child brides tend to have poor access to adequate health care due to limited resources (Atuoye *et al.*, 2015; Rutherford *et al.*, 2010). The previous studies have also asserted that child marriage should not always be viewed as a forced marital dyad; it is sometimes a viable option for poor parents and their daughters due to the limited choices limited (Mobolaji *et al.*, 2020; Schaffnit *et al.*, 2019; Schaffnit *et al.*, 2021). Therefore, we controlled for proxy measures of women's empowerment in this study. An analysis was conducted to compare the estimated effects of child marriage on infant mortality with and without the inclusion of controls for women's empowerment. We assumed that controlling for women's empowerment would result in an insignificant association between the outcome and exposure variables if early marriage is explained as the best available option due to women's low social status. A significant relationship was established between child marriage and infant mortality in Models 1 – 4; however, the relevant values became insignificant in Models 5 – 7 after adjusting for proxy measures of women's empowerment, education, occupation, and other control variables. These outcomes lend credence to the findings of previous studies that emphasize the crucial function of the agency and autonomy of women in decision-making related to their reproductive health (Budu *et al.*, 2020; Sougou *et al.*, 2020; Wado, 2018). The outcomes of our study suggest that age at marriage is of little relevance to infant mortality once women's empowerment and other selected covariates are considered in the analysis. The

results also indicate that efforts to improve infant mortality must include strategies to improve the socioeconomic status of women by encouraging the education of girls, enhancing their employment prospects, and encouraging their participation in decision-making processes.

Furthermore, we found that some of the selected demographic and socioeconomic characteristics influencing child marriage are also predictors of infant mortality. Poor socioeconomic status (SES) makes early marriage an attractive option to parents, and their daughters could also predispose the children of child brides to unfavorable socioeconomic and health conditions. For instance, if the hypothesis that girls could opt for early marriages in the attempt to liberate themselves from the unfavorable conditions in their natal households is correct, it is expected that children of child brides would also be somewhat disadvantaged by the poverty and poor socioeconomic status that pushed their psychologically unprepared and young mothers into early marriage.

This study has some drawbacks. First, this study used cross-sectional datasets, precluding a cause-effect analysis. A longitudinal study design could offer the opportunity to explore causality; however, such datasets are rarely available across SSA. Second, the studied datasets were not compiled in the same year in all the selected countries. However, our findings cannot be invalidated by this limitation because the changes in key reproductive health variables across SSA were non-significant during the study period. Our study presents several strengths notwithstanding its limitations. First, our study utilized nationally representative data. Second, the DHS program utilized a similar data collection methodology across countries, allowing us to effect cross-country comparisons.

## 5. Conclusions

This study established a higher risk of infant deaths in children of child brides than in those of adult brides. However, this relationship became insignificant after controlling for indicators of women's empowerment and other control variables. The study thus indicates that high socioeconomic status (improved education, employment, and enhanced wealth status for girl children) helps ameliorate poor health outcomes and mitigate vulnerabilities in children of child brides. Therefore, policies directed toward raising the educational status of girl children are a crucial strategy for improving child survival rates in SSA. We conclude that enhancing women's empowerment and increasing economic opportunities for women (such as their participation in the agriculture and formal employment sectors) will contribute to the reduction of infant mortality in SSA.

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## Conflict of interest

Authors declare no conflicts of interest.

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## Ethics approval and consent to participate

This study utilized secondary data from DHS with all identifier information removed. The MEASURE Demographic and Health Surveys project was reviewed and approved by the Institutional Review Board (IRB) of Inner City Fund (ICF), United States. All study participants gave written informed consent and the projects were implemented following relevant guidelines and regulations.

## Consent for publication

Not applicable.

## Availability of data

Datasets for this study were obtained from the Demographic and Health Survey (DHS) program. These are publicly available data that can be accessed on request at <https://dhsprogram.com/Data/>.

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## RESEARCH ARTICLE

# Does drought increase intimate partner violence? Evidence from India

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## Abstract

India has a high prevalence of intimate partner violence (IPV) against women. IPV has been observed to increase during natural disasters. Many studies have attempted to unravel the effect of drought on IPV; however, the evidence remains mixed. There is a gap in such studies in the Indian context, and this study seeks to fill this gap. We used data from the National Family Health Survey-4 (NFHS-4) (2015 – 2016) and NFHS-5 (2019 – 2021) to examine the effect of drought caused by the failure of the northeastern monsoon (NEM) in 2016 – 2018. Our analysis included data from 19 states and Union Territories of India (N = 34,590) in a difference-in-differences setup to evaluate the effect of the NEM drought on IPV. Exposure to the NEM drought was positively associated with physical violence (PV) and emotional violence, with results significant at the 95% and 99% confidence levels, respectively. A subsample analysis of rural and urban populations revealed that drought is significantly associated with an increase in sexual violence in urban areas, whereas it correlates with PV in rural areas. Additionally, exposure to drought is linked to a considerable rise in the controlling behavior of partners, for example, “He (is/was) jealous or angry if you (talk/talked) to other men,” “he (does/did) not permit you to meet your female friends.” These findings call for a two-fold policy action: providing support in the form of wage employment programs, subsidies, and other financial assistance during drought periods to help households cope with financial stress and implementing awareness programs aimed at changing partners’ mindsets, thereby reducing controlling behaviors in marriages.

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## 1. Introduction

Natural disasters and extreme events have impacted human lives in several ways throughout history. As the effects of climate change become more pronounced, the intersection of environmental stressors and social issues has become an increasingly important area of study. One critical aspect of this intersection is the relation between drought and intimate partner violence (IPV). Droughts, characterized by prolonged periods of insufficient rainfall, have far-reaching consequences beyond immediate agricultural and economic impacts. Imagine living through a drought: crops fail, income drops, water becomes scarce, and stress builds as families worry about their next meal and how to make ends meet. This heightened stress does not stay confined to the fields; it seeps into homes, affecting relationships and mental health and potentially leading

to increased IPV, where the strain and pressure of tough times can escalate household conflicts.

Declining agricultural output due to drought may lead to economic distress and food insecurity, which can intensify IPV toward women. One channel for this increased violence is reduced family income from crop failure. Although research on the association between drought and IPV is scarce globally and specifically within India, studies like those by Cools *et al.* (2020), Epstein *et al.* (2020), and Cooper *et al.* (2021) have explored the relation in various African countries. However, the evidence remains mixed. To the best of our knowledge, only Rai *et al.* (2021) have examined the effects of drought on IPV among Indian women. However, they acknowledge limitations in their data collection, as it coincided with the drought, potentially biasing their results. Our study seeks to address this gap using a dataset free from such timing issues.

Drought may affect IPV differently across population groups. Rural households, which rely heavily on agriculture than urban households, are likely to experience income reductions both directly, due to crop failure, and indirectly, from fewer farm-employment opportunities. This economic stress, a known contributor to IPV, can disproportionately affect rural households. However, no research to date has investigated the heterogeneous effect of drought on IPV in rural and urban populations. Our study aims to fill this gap.

Although IPV is a global issue, affecting approximately 30% of women worldwide, the IPV rate in Southeast Asia prevails at 37.7% (WHO, 2013). In India, the National Family Health Survey-5 (NFHS-5) shows that around 32% of women aged 18 – 49 have experienced either physical violence (PV) or sexual violence (SV) by their intimate partner (International Institute for Population Sciences & ICF, 2021). Several Indian states experienced severe drought between 2016 and 2018. The data collection period for the NFHS-5 aligns with the recall period for IPV questions in the Demographic and Health Survey (DHS) questionnaire, providing a unique opportunity to study the effects of drought on IPV in a natural experiment setting. Using difference-in-difference (DID) estimates, we analyze the impact of drought on IPV in Indian women. Our study adds to the literature on IPV with robust results and indicates a causal relation between drought and IPV.

## 1.1. Literature review

Human history has been interspersed with natural disasters. One such disaster is drought, which is caused by rainfall shortages. India receives its annual rainfall during two primary monsoon seasons: the Indian summer

monsoon (southwestern monsoon [SWM]), which occurs from July to September, and the Indian winter monsoon (northeastern monsoon [NEM]), which spans from October to December (Mishra *et al.*, 2021). Although India receives the majority of its annual rainfall from the SWM, the NEM, which is crucial for the southern peninsular states, contributes to 11% of India's annual rainfall, with several districts in the southern peninsula receiving about 30 – 60% of their yearly rainfall during this period (Rajeevan *et al.*, 2012). On average, the NEM accounts for more than 40% of the region's total annual rainfall (Mishra *et al.*, 2021).

### 1.1.1. Monsoon and the Indian economy

Gadgil and Gadgil (2006) examined the impact of monsoon variability on India's gross domestic product (GDP) and agriculture, finding that a deficit in rainfall affects GDP more significantly than surplus rainfall. The NEM shows higher variability than the SWM, and a substantial decrease in agricultural output is observed in the southern peninsula during the NEM-deficit year (Rajeevan *et al.*, 2012). For instance, data from the Directorate of Economics and Statistics of the Government of India (GOI, 2020) reveal that rabi food grains yield in Andhra Pradesh dropped to 2623 kg/ha in 2018 – 2019, compared to 3086 kg/ha in 2017 – 2018 and 3284 kg/ha in 2019 – 2020. Similarly, in Karnataka, the yield dropped to 931 kg/ha in 2018 – 2019, down from 1114 kg/ha in 2017 – 2018 and 1344 kg/ha in 2019 – 2020. However, the all-India average food grain production for rabi increased in 2018 – 2019, indicating that states affected by an NEM precipitation deficit experienced a decline in rabi food grain production.

### 1.1.2. Natural disasters and women

O'Keefe *et al.* (1976) argue that "disaster occurs at the interface between extreme physical phenomena and vulnerable human populations," emphasizing the importance of recognizing both elements. Disaster vulnerability theory explains why certain individuals, groups, or communities experience greater losses during disasters (Zakour & Gillespie, 2012). Both physical and social factors contribute to disaster vulnerability. It is crucial to understand how natural events (physical factors) and economic, political, and cultural factors (social factors) influence vulnerability to disasters (Zakour & Gillespie, 2012).

Women often experienced increased vulnerability during disasters. Thurston *et al.* (2021) discussed the increased risk that women and girls face amidst natural hazards and disasters. For example, Weitzman and Behrman (2016) analyzed IPV before and after the 2010 Haiti earthquake using data from the DHS and found that

exposure to the earthquake's devastation increased the likelihood of both physical and sexual IPV. In India, Sekhri and Storeygard (2014) found that deviations in annual rainfall by one standard deviation from the local average led to a 7.8% increase in dowry deaths, whereas wet shocks had no noticeable effect. Sahni and Sinha (2018) reported that communities experiencing higher-than-average annual precipitation were less likely to report IPV. Rao (2020) examined IPV in Andhra Pradesh, Tamil Nadu, Karnataka, and Kerala before and after the 2004 Indian Ocean tsunami and found a correlation between being affected by the tsunami and IPV.

### 1.1.3. Drought and IPV

Research on the relationship between drought and IPV has offered mixed results. Epstein *et al.* (2020) analyzed cross-sectional surveys of 83,990 women from 19 sub-Saharan African countries between 2011 and 2018, finding that several droughts were associated with a higher risk of reporting PV, SV, or emotional violence (EV). However, they did not find a connection between drought and partners' controlling behavior. Cools *et al.* (2020) used DHSs from 17 sub-Saharan countries between 2003 and 2013 to study the effects of rainfall shocks on IPV, concluding that there was no significant association. Unlike Epstein *et al.* (2020), Cools *et al.* (2020) controlled for spatial correlations. Cooper *et al.* (2021) attempted to reconcile these contradictory findings by combining the methodologies of both studies. Although their sample size was larger, including DHSs from sub-Saharan Africa, Latin America, and Asia, they found insignificant relation between drought and IPV on any of the three continents. However, Rai *et al.* (2021) examined the effect of cyclones and drought on IPV among Indian women and found no statistically significant association between drought and IPV, although a positive correlation was noted between drought and PV.

### 1.2. Research purpose

After reviewing the existing literature on IPV, we realized that the debate surrounding the association between droughts and IPV remains open, with mixed evidence at best. Several attempts have been made to establish a statistically significant association between rainfall shocks and IPV using large sample sizes (Cools *et al.*, 2020; Cooper *et al.*, 2021; Epstein *et al.*, 2020) while controlling for known individual- and household-level covariates of IPV (Cooper *et al.*, 2021; Epstein *et al.*, 2020), as well as spatial correlations (Cools *et al.*, 2020; Cooper *et al.*, 2021). We employed a slightly different approach. First, we focused on data only from Indian states to avoid cultural and contextual differences that might affect the results.

Second, only a few studies have analyzed the effect of drought on IPV within the Indian context. Rai *et al.* (2021) examined the effects of drought and cyclones on IPV among Indian women and found a positive association between exposure to cyclones and all forms of IPV, but no such relationship was observed between drought exposure and IPV. However, the data collection period in their study coincided with the drought period; thus, the result may not fully reflect the effects of drought. Our study overcomes this limitation. Third, we used subsample analysis to understand the heterogeneous effects of drought on rural and urban sectors. Fourth, we benefited from conducting a DHS just before the NEM drought and a second DHS after the drought. The question about IPV refers to incidences within the last 12 months, aligning with the data collection time of the second survey and the NEM drought. Unlike nationwide droughts, exposure to the NEM drought was localized; thus, we did not account for spatial correlation. In addition, we used drought as a binary variable rather than employing actual rainfall deficiency data across districts. Districts are smaller units compared to states or countries, and rainfall deficiency is more uniform in smaller geographical areas. We also used district-level fixed effects to control for unobserved heterogeneities and clustered the standard errors at the district level.

Moreover, this study improves on previous studies by incorporating an extensive set of control variables, which allows for more precise estimates of the drought's effect. Thus, the objective of this study is to isolate the impact of drought on different forms of IPV.

South India experienced an extreme NEM drought from 2016 to 2018 (Mishra *et al.*, 2021). This drought was the worst in the past 150 years, with a precipitation deficit of 45%. As a result, four of Chennai's reservoirs dried up, leading to the declaration of a "Day Zero" in the summer of 2019 (Jain, 2021). As the drought occurred and affected lives before the NFHS-5 data collection and the recall period for IPV questions coincides with the drought period, this situation creates a natural experiment. Therefore, the data should capture the effect of drought on IPV. Although the data are not longitudinal, which makes it technically difficult to establish a causal relationship between drought and IPV, one thing is certain: the relation is not bidirectional; incidences of IPV cannot cause drought.

## 2. Data and methods

DHSs are nationally representative household surveys that collect population, health, and nutrition data across regions, including sub-Saharan Africa, North Africa/West Asia/Europe, Central Asia, South and Southeast Asia,

Oceania, Latin America, and the Caribbean. There are two types of DHSs: the Standard DHS, conducted every 5 years with a large sample size to allow for time-based comparison, and the Interim DHS, conducted between the standard DHSs, using a smaller questionnaire and sample size. The DHSs for India are also referred to as the NFHS. For consistency, the term NFHS was used in this study. We used pooled data from NFHS-4 (DHS-2015 – 2016) and NFHS-5 (DHS-2019 – 2021). Data collection for NFHS-4 occurred in two phases (January 20, 2015 – December 04, 2016), and for NFHS-5, it was conducted in two phases: Phase 1 from June 17, 2019 to January 30, 2020, and Phase 2 from January 02, 2020, to April 30, 2021. In total, NFHS-4 interviewed 699,686 women and 112,122 men from 601,509 households, and NFHS-5 interviewed 724,115 women and 101,839 men from 636,699 households.

The Couples' recode file, which contains 63,696 observations from NFHS-4 and 57,535 observations from NFHS-5, is used in this analysis. Of these, 47,514 women in NFHS-4 and 46,353 women in NFHS-5 were interviewed for the domestic violence module. Table S1 summarizes this information.

The domestic violence module of NFHS-5 was administered to women aged 18 – 49 years in a subsample of households selected for the state module, following a similar structure as that of NFHS-4. According to the World Health Organization guidelines on the ethical collection of domestic violence data, only one eligible woman per household was randomly selected. The module was not administered if privacy could not be obtained after at least three attempts to ensure respondent confidentiality.

For comparability, Dadra and Nagar Haveli and Daman and Diu were combined in the NFHS-4 sample, as NFHS-5 represents these Union Territories. As NFHS-4 did not collect data for Ladakh, we excluded this region from NFHS-5.

The onset of the COVID-19 pandemic interrupted the data collection process. Data for 16 states were collected in 2019 (Table S2) and completed by February 2020 in the Andaman and Nicobar Islands and Lakshadweep. For the remaining states and Union Territories, the data were collected between 2020 and 2021. We used data from 19 states and Union Territories, for which the data collection was completed in February 2020. The states and Union Territories included in the analysis are marked with an asterisk in Table S2.

Due to the legal obligations of the Protection of Children from Sexual Offenses Act, we included only respondents aged 18 years or older. We also excluded

observations with missing values for covariates and cases in which the value of the variable "d121" (whether the respondent had seen her father beat her mother) was 8, as well as observations with missing values for "s116" (the respondent's social group). The final sample size comprises 34,590 observations, with 16,123 from NFHS-4 and 18,467 from NFHS-5.

## 2.1. Dependent variable

IPV can take various forms. The NFHS measures three forms of IPV PV, SV, and EV. A woman is considered to have experienced PV if, in the past 12 months, her intimate partner has pushed, shook, slapped, punched, kicked, dragged, strangled, or burned her, twisted her arm, or threatened her with a knife. SV occurs when a woman is forced into unwanted sexual activities or acts by her partner. EV includes humiliation, insults, threats of harm, or other forms of emotional abuse. Each form of IPV is measured as a dichotomous variable and takes the value of 1 if the woman has experienced it at any time or in the past 12 months, and 0 otherwise.

## 2.2. Independent variables

The independent variable in this study explains the effect of drought on IPV. The Indian states of Andhra Pradesh, Karnataka, and Tamil Nadu experienced severe droughts in 2018 due to a precipitation deficit from NEM. However, because data collection in Tamil Nadu was interrupted by COVID-19, we excluded Tamil Nadu and similar states and Union Territories. This left Andhra Pradesh and Karnataka as the two states exposed to NEM drought. We created a binary variable, "Drought," by coding districts in drought-affected states as 1 and districts in unaffected states as 0. Thus, all districts in Andhra Pradesh and Karnataka are coded as 1 to proxy for drought exposure from the NEM. In impact evaluation terms, Andhra Pradesh and Karnataka represent the treatment group, and the remaining 16 states and Union Territories represent the comparison group.

## 2.3. Control variables

The primary source of our control variables was covariates commonly recognized in the IPV literature (Dhanaraj & Mahambare, 2021; Pathak, 2022; Pathak & Kumar, 2023). We controlled the respondent-level characteristics, including current age (a categorical variable with seven categories), education level of both the respondent and her partner (a categorical variable with six categories), age at first cohabitation, age at first childbirth, total number of children born, and respondent's employment status. In addition, we controlled for whether the respondent had witnessed her father beating her mother.

We also incorporated the degree of autonomy enjoyed by respondents, measured by the women's autonomy index. DHSs ask whether women have a say in various decision-making processes. A response of "yes" is coded as 1, and "no" is coded as 0. The autonomy index is the sum of these responses, ranging from 0 to 6. The higher the score, the greater the respondent's autonomy in household decisions. Another control variable used is the number of control issues faced by the respondent, as reported by the DHS. This variable also ranges from 0 to 6, with a higher score indicating a more controlling partner.

We controlled for the partner's current age (a categorical variable with eight categories), education level, and alcohol consumption. In addition, we controlled for household-level characteristics, including the respondent's religion (Hindu, Muslim, or Others), social group, household size, urban residence, urban area, and household wealth index. The household wealth index is a composite measure of a household's cumulative living standard, reflecting ownership of various consumer items, such as television, housing type, toilet facilities, and drinking water sources. The wealth index categorizes households into five groups: poorest, poorer, middle, richer, and richest.

DHSs are cross-sectional in nature. Although we do not know whether the same households or clusters were repeated across the two survey rounds, we know that the sample is drawn from each district, meaning that the districts are repeated. We used this information to include district-level fixed effects and cluster standard errors at the district level in all models.

## 2.4. Study design

The occurrence of NEM droughts in only some Indian states makes this study a natural experiment. Our study follows a "pre-post, with-without" design. The states that were exposed to NEM drought were compared with those that were not. This creates the "with" and "without" groups. The data are drawn from 2 time points: 2015 – 2016 and 2019 – 2021. As there was no NEM drought in 2015 – 2016, this period is labeled "Pre" (pre-exposure to drought), whereas data for 2019 – 2021 represents "Post" (post-exposure to drought).

We adopted natural experiment terminology to describe our groups, referring to the 2015 – 2016 data (from NFHS-4) as "pre" and the 2019 – 2021 data (from NFHS-5) as "post." States not exposed to the NEM drought served as the "comparison group," whereas those exposed (Andhra Pradesh and Karnataka) were the "treatment group."

## 2.5. Statistical analysis

We analyzed the associations between the variables using the proportions test, Chi-square tests, Goodman and Kruskal's gamma, Kendall's tau-b test, Cramer's V test, and kernel density plots. Furthermore, the DID technique, along with logistic regressions, was employed to estimate the effect of drought on IPV. All statistical analyses were conducted using Stata 18.

## 2.6. Estimated model

We estimated the following model:

$$O_{it} = \beta_0 + \beta_1 Year_t + \beta_2 drought_{it} + \beta_3 (Year_t * drought_{it}) + \beta_4 C_{it} + \epsilon_{it}$$

Where  $O_{it}$  represents the log odds of a woman facing IPV in time  $t$ ,  $year_{it}$  is a binary variable, taking the value 0 of observation from NFHS-4 (2015 – 2016) and 1 for NFHS-5 (2019 – 2021),  $drought_{it}$  is a binary variable coded as 1 for states experiencing the 2018 drought and 0 for the rest of the states, and  $C_{it}$  represents a vector of control variables.

The main coefficient of interest is  $\beta_3$ , which captures the interaction between the year and drought. This coefficient reflects the drought's impact on IPV, estimated using the DID approach.  $\epsilon$  represents the error term.

## 3. Results

We first present the descriptive statistics of the study sample in Table 1. We then proceed to examine the similarities and differences in the incidence of IPV between the treatment and comparison groups. In addition, we analyze how these two groups have fared over time in terms of IPV incidence (Table 2).

Next, we explored the change in the controlling behavior of partners over time and analyzed the association between control issues faced by the respondents and the incidence of IPV. Figure 1A-C illustrate these findings. Finally, we estimate the effect of the NEM drought on IPV (Table 3 and Figure 2).

We also conducted a subsample analysis by examining urban and rural samples (Table 4). The results align with our main findings. To verify the robustness of the estimates, we perform falsification tests by modifying the drought timeline (Table S7). These results confirm that drought significantly affects IPV, and our main findings are not mechanical.

### 3.1. Descriptive statistics

Table 1 presents the descriptive statistics of the study sample. The total number of observations for 2015 – 2016 is 13,908 in the comparison group and 2215 in the treatment

Table 1. Sociodemographic profile of the sample<sup>a</sup>

	Pre (2015 – 2016)		Post (2019 – 2021)	
	Comparison	Treatment	Comparison	Treatment
Individual level variables				
Age of the respondent				
15 – 19 <sup>b</sup>	309 (2.22)	55 (2.48)	269 (1.71)	47 (1.73)
20 – 24	1,838 (13.22)	297 (13.41)	1,761 (11.19)	278 (10.21)
25 – 29	3,067 (22.05)	502 (22.66)	3,215 (20.42)	560 (20.57)
30 – 34	2,969 (21.35)	508 (22.93)	3,364 (21.37)	595 (21.85)
35 – 39	2,684 (19.30)	407 (18.37)	3,294 (20.92)	589 (21.63)
40 – 44	1,876 (13.49)	282 (12.73)	2,254 (14.32)	388 (14.25)
45 – 49	1,165 (8.38)	164 (7.4)	1,587 (10.08)	266 (9.77)
Age of the partner				
15 – 19 <sup>b</sup>	27 (0.19)	1 (0.05)	23 (0.15)	1 (0.04)
20 – 24	607 (4.36)	56 (2.53)	556 (3.53)	21 (0.77)
25 – 29	1,837 (13.21)	242 (10.93)	1,815 (11.53)	211 (7.75)
30 – 34	2,717 (19.54)	421 (19.01)	2,813 (17.87)	448 (16.45)
35 – 39	2,969 (21.35)	468 (21.13)	3,396 (21.57)	618 (22.7)
40 – 44	2,378 (17.10)	419 (18.92)	2,831 (17.98)	519 (19.06)
45 – 49	2,096 (15.07)	337 (15.21)	2,647 (16.81)	533 (19.57)
50 – 54	1,277 (9.18)	271 (12.23)	1,663 (10.56)	372 (13.66)
Education of the respondent				
No education	3,528 (25.37)	655 (29.57)	3,787 (24.05)	736 (27.03)
Incomplete primary	1,293 (9.30)	177 (7.99)	2,256 (14.33)	337 (12.38)
Complete primary	727 (5.23)	162 (7.31)	NA	NA
Incomplete secondary	5,964 (42.88)	890 (40.18)	7,901 (50.18)	1,338 (49.14)
Complete secondary	1,110 (7.98)	156 (7.04)	321 (2.04)	55 (2.02)
Higher	1,286 (9.25)	175 (7.9)	1,479 (9.39)	257 (9.44)
Education of the partner				
No education	2,085 (14.99)	508 (22.93)	2,562 (16.27)	580 (21.3)
Incomplete primary	1,489 (10.71)	226 (10.2)	2,426 (15.41)	456 (16.75)
Complete primary <sup>c</sup>	755 (5.43)	159 (7.18)	NA	NA
Incomplete secondary	6,486 (46.64)	857 (38.69)	8,360 (53.10)	1,287 (47.26)
Complete secondary	1,340 (9.63)	191 (8.62)	403 (2.56)	56 (2.06)
Higher	1,753 (12.6)	274 (12.37)	1,993 (12.66)	344 (12.63)
Age at first cohabitation				
Mean	19.27	18.16	19.12	18.53
Median	19	18	18	18
Age at first childbirth				
Mean	21.0561	20.0342	20.8840	20.3534
Median	20	20	20	20
Number of children ever born				
Mean	2.44	2.10	2.38	2.10
Median	2	2	2	2

(Contd...)

Table 1. (Continued)

	Pre (2015 – 2016)		Post (2019 – 2021)	
	Comparison	Treatment	Comparison	Treatment
Respondent currently working				
No	10,072 (72.42)	1,543 (69.66)	10,495 (66.66)	1,547 (56.81)
Yes	3,836 (27.58)	672 (30.34)	5,249 (33.34)	1,176 (43.19)
Partner drinks alcohol				
No	9,534 (68.55)	1,594 (71.96)	11,264 (71.54)	2,021 (74.22)
Yes	4,374 (31.45)	621 (28.04)	4,480 (28.46)	702 (25.78)
History (has the respondent seen her father ever beat her mother?)				
No	11,395 (81.93)	1,577 (71.2)	12,927 (82.11)	1,785 (65.55)
Yes	2,513 (18.07)	638 (28.8)	2,817 (17.89)	938 (34.45)
Number of control issues reported				
0	8,004 (57.55)	1,348 (60.86)	9,226 (58.60)	1,505 (55.27)
1	2,292 (16.48)	471 (21.26)	2,687 (17.07)	391 (14.36)
2	1,512 (10.87)	146 (6.59)	1,627 (10.33)	249 (9.14)
3	896 (6.44)	118 (5.33)	1,017 (6.46)	213 (7.82)
4	693 (4.98)	64 (2.89)	574 (3.65)	127 (4.66)
5	330 (2.37)	26 (1.17)	314 (1.99)	80 (2.94)
6	181 (1.3)	42 (1.9)	299 (1.9)	158 (5.8)
Mean	0.97	0.79	0.93	1.24
Median	0	0	0	0
Woman autonomy index				
0	1,589 (11.43)	390 (17.61)	1277 (8.11)	429 (15.75)
1	753 (5.41)	156 (7.04)	719 (4.57)	161 (5.91)
2	1,123 (8.07)	244 (11.02)	1221 (7.76)	257 (9.44)
3	1,825 (13.12)	300 (13.54)	1,956 (12.42)	375 (13.77)
4	8,618 (61.96)	1,125 (50.79)	10,571 (67.14)	1,501 (55.12)
Household variables				
Social group				
Scheduled caste	1,703 (12.75)	439 (21.15)	2,232 (15.42)	570 (21.39)
Scheduled tribe	3,650 (27.33)	199 (9.59)	4,151 (28.67)	224 (8.41)
Other backward castes	4,886 (36.59)	1,134 (54.62)	5,672 (39.18)	1,593 (59.77)
None of them	3,034 (22.72)	298 (14.35)	2,343 (16.18)	274 (10.28)
Don't know	80 (0.60)	6 (0.29)	79 (0.55)	4 (0.15)
Religion				
Hindu	9,424 (67.76)	1,866 (84.24)	10,899 (69.23)	2,351 (86.34)
Muslim	1,573 (11.31)	268 (12.10)	1,992 (12.65)	279 (10.25)
Others	2,911 (20.93)	81 (3.66)	2,853 (18.12)	93 (3.42)
Number of household members				
Mean	5.0724	4.8321	4.8443	4.7268
Median	5	4	5	4
Wealth index				
Poorest	2,329 (16.75)	125 (5.64)	3,475 (22.07)	167 (6.13)
Poorer	3,143 (22.60)	475 (21.44)	3,870 (24.58)	513 (18.84)

(Contd...)

Table 1. (Continued)

	Pre (2015 – 2016)		Post (2019 – 2021)	
	Comparison	Treatment	Comparison	Treatment
Middle	3,126 (22.48)	663 (29.93)	3,454 (21.94)	907 (33.31)
Richer	3,031 (21.79)	626 (28.26)	3,014 (19.14)	734 (26.96)
Richest	2,279 (16.39)	326 (14.72)	1,931 (12.26)	402 (14.76)
Residence place				
Urban	4,228 (30.40)	749 (33.81)	3,766 (23.92)	766 (28.13)
Rural	9,680 (69.60)	1,466 (66.19)	11,978 (76.08)	1,957 (71.87)
Total	13,908 (100)	2,215 (100)	15,744 (100)	2,723 (100)

Notes: <sup>a</sup>Column-wise percentages are given in parentheses. <sup>b</sup>NFHS has not reported data for individuals below 17 years old due to the provisions of the POCSO Act. Though we used the predefined age groups, the 15 – 19 age groups contains no observation below 18. <sup>c</sup>Data for 2019 – 2020 does not include information for this category.

Source: Authors' computations using unit-level data from NFHS-4 and NFHS-5.

Table 2. Incidence of IPV in the treatment and comparison groups and its change

Group	Physical violence (proportion)			Sexual violence (proportion)			Emotional violence (proportion)		
	Pre ( $t_0$ )	Post ( $t_1$ )	Change over time ( $t_1 - t_0$ )	Pre ( $t_0$ )	Post ( $t_1$ )	Change over time ( $t_1 - t_0$ )	Pre ( $t_0$ )	Post ( $t_1$ )	Change over time ( $t_1 - t_0$ )
Comparison (C)	0.2542	0.2592	0.0050	0.0624	0.0483	-0.0141***	0.1193	0.1199	0.0006
Treatment (T)	0.2709	0.3970	0.1261***	0.0537	0.0834	0.0296***	0.1278	0.2174	0.0896***
Difference between groups (T – C)	0.0166*	0.1378***		-0.0087	0.0350***		0.0085	0.0975***	

Note: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

Source: Authors' computation using unit-level data from NFHS-4 and NFHS-5.

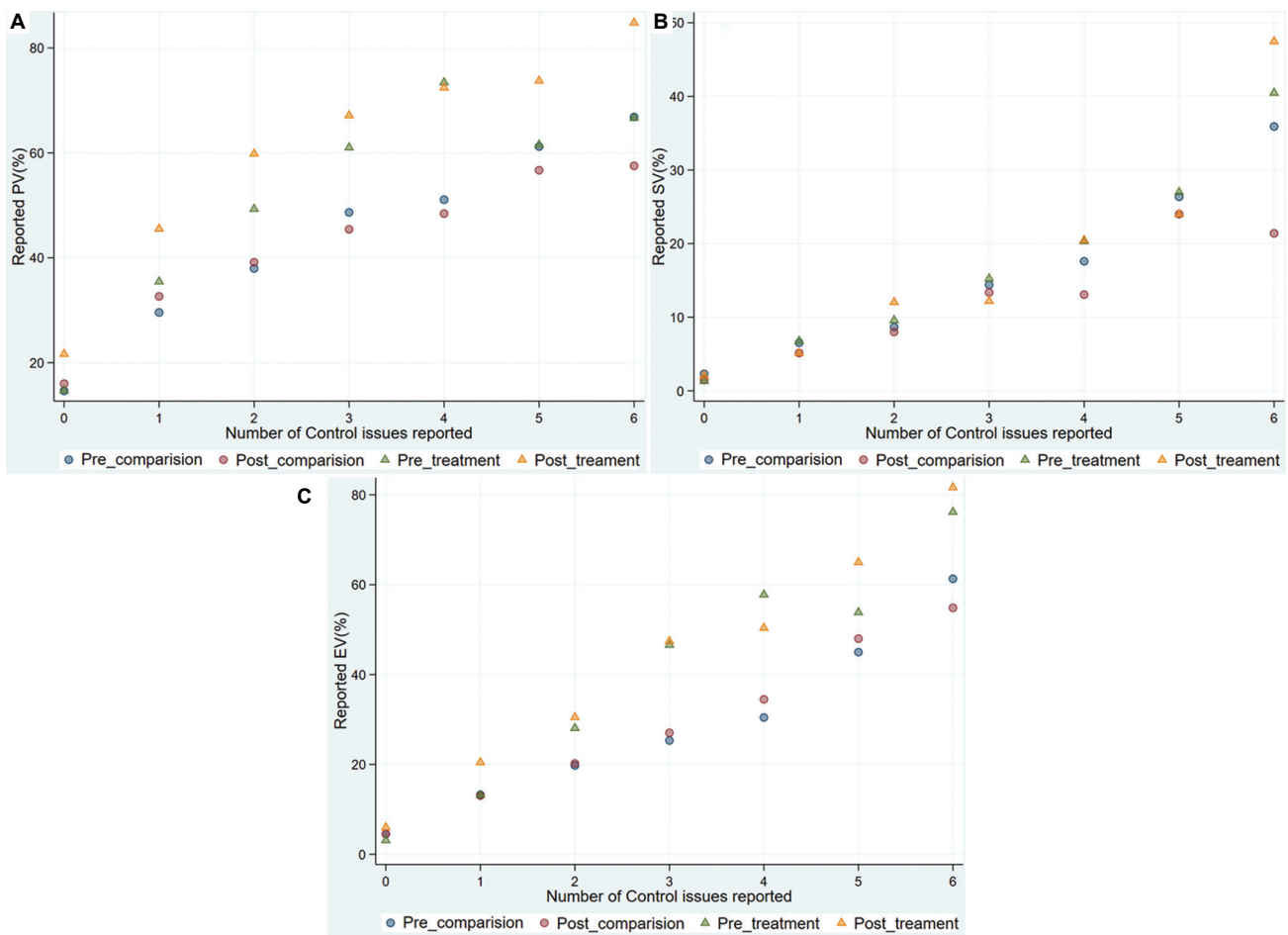
Table 3. DID estimation results

Variables	Model with no controls			Model with complete controls		
	(1)	(2)	(3)	(4)	(5)	(6)
	PV	SV	EV	PV	SV	EV
Year	0.985 (0.0644)	0.747*** (0.0758)	0.934 (0.0758)	1.103 (0.0755)	0.850 (0.0949)	1.019 (0.0849)
Drought: yes (Base: no)	0.915 (0.0826)	0.281*** (0.0284)	0.419*** (0.0362)	1.872*** (0.197)	0.550*** (0.0769)	1.028 (0.113)
Year*Drought	1.828*** (0.335)	2.140*** (0.409)	2.029*** (0.315)	1.475** (0.283)	1.247 (0.247)	1.442*** (0.203)
Respondent-level controls	N	N	N	Y	Y	Y
Partner level controls	N	N	N	Y	Y	Y
Household-level controls	N	N	N	Y	Y	Y
District fixed effects	Y	Y	Y	Y	Y	Y
Constant	0.456*** (0.0149)	0.0936*** (0.00416)	0.184*** (0.00728)	0.184** (0.130)	0.0204*** (0.00828)	0.188*** (0.110)
Pseudo R <sup>2</sup>	0.0944	0.0736	0.0569	0.2402	0.2274	0.2324
Observations	34,590	33,233	34,153	30,100	28,635	29,597

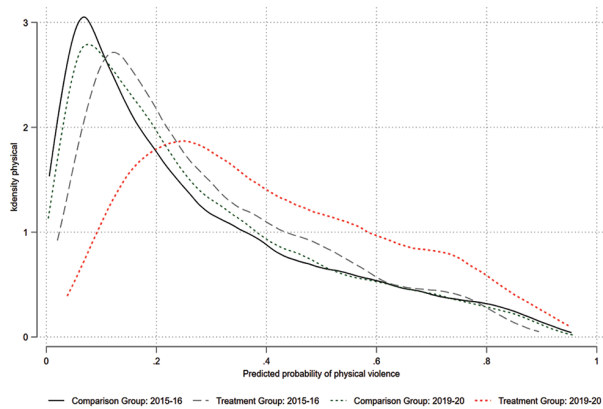
Notes: Robust standard errors in parentheses; \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

Source: Authors' computation using unit-level data from NFHS-4 and NFHS-5.

Abbreviations: PV: Physical violence; SV: Sexual violence; EV: Emotional violence.



**Figure 1.** Number of control issues reported and incidence of IPV (%). (A) Physical violence. (B) Sexual violence. (C) Emotional violence  
Abbreviations: PV: Physical violence; SV: Sexual violence; EV: Emotional violence.



**Figure 2.** Predicted probabilities of PV for the treatment and comparison groups before and after exposure to the NEM drought  
Abbreviations: PV: Physical violence; NEM: Northeastern monsoon.

group. The corresponding numbers are 15,744 and 2723 for the comparison and treatment groups, respectively, in 2019 – 2021.

### 3.2. Exploratory analysis

#### 3.2.1. Incidence of IPV in treatment and comparison groups

The row labeled (T – C) in Table 2 shows the relative proportions of respondents reporting IPV before and after the exposure to the drought in treatment and comparison groups. The treatment group had a marginally higher proportion of respondents reporting PV than the comparison group before the exposure, significantly at the  $p = 0.1$  level. However, the difference grew considerably post-exposure and became significant at the  $p = 0.01$  level. Similar results were observed for SV and EV, indicating that the treatment and comparison groups diverged further for all forms of IPV after drought exposure.

#### 3.2.2. All forms of IPV aggravated in the treatment group after drought exposure

The column labeled ( $t_1 - t_0$ ) in Table 2 presents the change in the proportions of respondents reporting IPV in both

Table 4. Subsample analysis

	Model with the urban sample and full controls			Model with the rural sample and full controls		
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	PV	SV	EV	PV	SV	EV
Year	1.150	0.729	0.824	1.085	0.889	1.069
Base: 2015 – 2016	(0.143)	(0.184)	(0.133)	(0.0811)	(0.105)	(0.102)
Drought: yes	1.531**	1.016	1.032	1.571***	0.387***	1.016
(Base: no)	(0.272)	(0.375)	(0.232)	(0.179)	(0.0616)	(0.126)
Year*Drought	1.447	1.980*	1.542	1.496**	1.067	1.460**
	(0.407)	(0.779)	(0.417)	(0.285)	(0.233)	(0.235)
Respondent-level controls	Y	Y	Y	Y	Y	Y
Partner level controls	Y	Y	Y	Y	Y	Y
Household-level controls	Y	Y	Y	Y	Y	Y
District fixed effects	Y	Y	Y	Y	Y	Y
Constant	1.042	0.00496***	0.0946*	0.126***	0.0210***	0.173***
	(1.448)	(0.00628)	(0.116)	(0.0973)	(0.00930)	(0.105)
Pseudo R <sup>2</sup>	0.2984	0.3135	0.3179	0.2286	0.2153	0.2239
Observations	7,861	5,561	7,345	21,781	19,908	21,523

Note: Robust standard errors in parentheses; \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

Source: Authors' computation using unit-level data from NFHS-4 and NFHS-5.

Abbreviations: PV: Physical violence; SV: Sexual violence; EV: Emotional violence.

the treatment and comparison groups, comparing the “before” and “after” periods. Although the proportion of respondents reporting PV increased only marginally and insignificantly for the comparison group states, it increased by approximately 13% points for the treatment group (Andhra Pradesh and Karnataka). This increase was statistically significant at the  $p = 0.01$  level. The proportion of respondents reporting SV decreased over time in the comparison group but increased in the treatment group. This change in SV over time was statistically significant at the  $p = 0.01$  level for both groups. EV increased by about 9 percentage points for the treatment group, a change that was statistically significant at the  $p = 0.01$  level, whereas it increased insignificantly in the comparison group. Thus, all forms of IPV registered a statistically significant increase in the treatment group, unlike in the comparison group.

### 3.2.3. Controlling behavior of partners in the treatment and comparison groups

Several studies have linked controlling behavior by intimate partners with IPV in women (Antai, 2011; Dhanaraj & Mahambare, 2021). We test our first hypothesis that there is no difference in the controlling behavior of intimate partners between states exposed to rainfall shocks (treatment group) and those not exposed (comparison group). The NFHS asks respondents about the number of “control issues” they face.

We begin by exploring how the number of reported control issues changed between 2015 – 2016 and 2019 – 2021. We calculated the point-biserial correlation between the variables “year” and “number of control issues reported” for the states exposed and not exposed to drought. As stated, “year” is a binary variable (0 for NFHS-4 (2015 – 2016) and 1 for NFHS-5 (2019 – 2021)). The variable representing the number of control issues faced ranges from 0 to 6. The point-biserial correlation between “year” and “number of control issues reported” for the comparison group (states not exposed to drought) is  $-0.0142$ ; ( $n = 29652$ ;  $p < 0.05$ ). The negative correlation coefficient indicates that the number of control issues faced by respondents from non-drought-exposed states decreased over time. Although the correlation is statistically significant, it is not substantively significant.

For the states exposed to drought, the point-biserial correlation coefficient is  $0.1382$  ( $n = 4938$ ;  $p < 0.01$ ). The positive, substantively and statistically significant correlation coefficient indicates the respondents in drought-exposed states reported a significantly higher number of control issues from their intimate partners.

We further explored whether respondents with controlling partners reported a higher incidence of PV by calculating the point-biserial correlation between the number of control issues and the incidence of PV for the

treatment and comparison groups, both before and after exposure to the NEM drought. The results are shown in Table S3. The following observations were made:

- a. The correlation coefficients between the number of control issues and the incidence of PV were significant at  $p = 0.01$  level across all groups, indicating a strong association between having a controlling partner and experiencing PV.
- b. The coefficient for the comparison group decreased from 0.3253 in 2015 – 2016 to 0.2797 in 2019 – 2021, suggesting that although the relationship remained strong and positive, its magnitude decreased over time.
- c. Conversely, the coefficient for the treatment group increased over the same period, from 0.3727 to 0.429, implying that for respondents in states exposed to drought, the relation between having a controlling partner and experiencing PV strengthened over time.

### 3.2.4. Controlling behavior of partners and IPV

We estimated the association between the number of control issues a woman faces and the incidence of PV. As the direction of the relationship is uncertain, we followed Acock (2018), using the number of control issues reported as the row variable and the incidence of PV as the column variable. We conducted separate analyses for states exposed to rainfall shock, using Kruskal's gamma and Kendall's tau-b as measures of association to demonstrate concordance. We hypothesized that a woman facing numerous control issues would also report IPV, and conversely, a woman reporting IPV would likely report control issues as well. The results of these analyses are presented in Tables S4-S6.

Figure 1A-C show the percentage of women reporting each form of IPV based on the number of control issues faced. These figures are derived from the data, as shown in Tables S4-S6. Figure 1A shows a clear positive association between the number of control issues reported and the incidence of PV. Notably, respondents in non-drought-exposed states reported lower incidences of PV in 2019 – 2021 when faced with more than two control issues. In contrast, for states exposed to drought, the incidence of PV was higher across nearly every control issue category. Similarly, Figure 1C shows a strong positive association between controlling behavior and EV, although no clear pattern emerges for SV in Figure 1B.

### 3.3. Effect of drought on IPV: The DID estimation

Table 3 presents the results of the DID for both models: one without controls and one with a full set of controls. Both models incorporated district-level fixed effects, and standard errors are clustered at the district level.

The DID estimator reveals an increase in the odds of PV, SV, and EV in the states affected by the NEM drought across both models. These results are significant at  $p = 0.01$  level for all forms of IPV, except for SV in the model with full controls.

In the model without controls, exposure to the NEM drought is associated with an approximate 83% increase in the odds of PV, whereas the effect is slightly reduced to a 48% increase when a full set of controls is applied. The corresponding increase in odds for SV is 114% in the model without controls and approximately 25% in the model with controls, although the estimates for SV are not statistically significant. For EV, the DID estimator indicates a 103% increase in odds in the model without controls and a 44% increase in the model with a full set of controls. These estimates demonstrate that exposure to the NEM drought is significantly associated with increased odds of PV and EV at the 1% significance level.

In an auxiliary regression, we calculated the predicted probabilities of PV using our DID framework. We then generated kernel density plots for four groups: the comparison group in 2015 – 2016, the treatment group in 2015 – 2016, the comparison group in 2019 – 2021, and the treatment group in 2019 – 2021. These plots are presented in Figure 2, and two key observations emerge:

- a. The respondents in the treatment group, which includes the states of Andhra Pradesh and Karnataka, had marginally higher predicted probabilities of PV in the baseline (2015 – 2016). This finding aligns with the results shown in Table 2, where the difference in the proportions of respondents facing PV between the treatment and comparison groups in 2015 – 2016 was statistically significant at  $p = 0.10$  level.
- b. The predicted probabilities of PV increased significantly for respondents in the treatment group pre-exposure to the NEM drought. This finding further supports the results presented in Table 2, which shows that the difference in the incidence of PV between the comparison and treatment groups has grown nearly eight-fold. In addition, the statistical significance of this difference was improved to the  $p = 0.01$  level.

#### 3.3.1. Subsample analysis

To further explore the effect of the NEM drought on IPV, we conducted a subsample analysis to examine whether the impact differs between rural and urban areas. The logic behind this approach is that if the NEM drought affects IPV through reduced agricultural output and income, its effect would likely be more pronounced in rural areas. The results of this subsample analysis are shown in Table 4. In the rural areas of states affected by the NEM drought, the odds of

PV increased by 50%, with statistical significance at the 5% level. EV also saw an increase of 46% ( $p < 0.05$ ). However, the estimates for SV in rural areas were not statistically significant. In contrast, the urban sample exhibits a 98% increase in the odds of SV, which is significant at the 10% level.

### 3.4. Robustness, model diagnostics, and goodness of fit

#### 3.4.1. Robustness check

*Falsification test:* To ensure the internal validity of our results, we conducted two falsification tests:

- Reversing the timeline: We reversed the “pre” and “post” periods. The estimation results were the exact opposite of the actual results and statistically significant (Table S7).
- Switching the timeline: We also tested by limiting the “pre” period to 2015 and grouping data from 2016, 2019, and 2020 as the “post” period. Table S7 presents these results, which show that exposure to drought is no longer associated with increased odds of IPV. This further supports the internal validity of our original results, as the effect of drought exposure is no longer observed.

Both falsification tests, which involved changing the drought exposure timeline, confirm that our findings are not a result of mechanical errors and that there is a strong association between drought exposure and increased odds of IPV.

#### 3.4.2. Model diagnostics and goodness of fit

To assess the goodness of fit of our estimated model, we applied the classification test and the receiver operating characteristic (ROC) curve. The classification test compares the model’s predicted response (positive for IPV or negative) with the actual observations. A well-fitted model should correctly identify both positive and negative outcomes. Here, we discuss the results of the PV model.

Table S8 shows that the model predicted positive responses for 5607 observations, of which 3807 were correctly classified as positive ( $y = 1$ ), whereas 1800 were incorrectly classified because the actual response was negative ( $y = 0$ ). Of the 24,493 observations for which the model predicted a negative response, 19,909 were correctly classified, whereas 4584 were incorrectly classified. The overall classification accuracy of the PV model is 78.79%. For the SV and EV models, the correct classification rates were 94.02% and 87.97%, respectively (Tables S9 and S10).

We further calculated the area under the ROC curve, as shown in Figures S1-S3. The area under the ROC curve

ranges from 0.5 to 1.0 and is used to measure the model’s ability to distinguish between subjects who experience the outcome of interest and those who do not (Hosmer *et al.*, 2013). The area under the ROC curve for our PV model is 0.8207, for the SV model, it is 0.8461, and for the EV model, it is 0.8281. According to Hosmer *et al.* (2013), these values indicate that the models demonstrate excellent discrimination and fit well.

For the PV model with full controls, the *pseudo*  $R^2$  value is 0.2402, indicating that the model explains approximately 24% of the variation in the data. Similarly, for the SV and EV models, the *pseudo*  $R^2$  values are 0.2274 and 0.2324, respectively, demonstrating good model fit.

## 4. Discussion

Recent studies have explored the complex relationship between droughts and IPV, producing varying results (Cools *et al.*, 2020; Cooper *et al.*, 2021; Epstein *et al.*, 2020). Rai *et al.* (2021) examined this relation within the Indian context but found no statistically significant link, likely due to the overlap in the data collection period with the drought, which may have limited the ability to capture the full impact of the drought. In contrast, our study aimed to resolve this ambiguity using a dataset in which the recall period for domestic violence modules aligns with the timeframe of the NEM drought, allowing us to assess the drought’s effect more comprehensively.

We began by examining whether the treatment and control groups had similar IPV incidences during 2015 – 2016. Using proportions tests (Table 2), we found that the treatment group had a marginally higher proportion of respondents experiencing IPV, except for those with SV, in 2015 – 2016. The differences increased further in 2019 – 2021, where all three forms of IPV registered a statistically significant increase for states exposed to the NEM drought. These results are consistent with Epstein *et al.* (2020) findings and contradict those of Cools *et al.* (2020) and Cooper *et al.* (2021). In the Indian context, Rai *et al.* (2021) also reported increased PV post-exposure to drought; however, their result was not statistically significant. Our dataset captured the full effects of the drought, enabling us to find statistically significant results.

The NFHS asks a question regarding the number of “control issues” the respondent faces. We explored how the number of reported control issues changed in 2015 – 2016 and 2019 – 2021 (Table S3). The negative sign of the point-biserial correlation coefficient ( $-0.0142$ ;  $n = 29652$ ;  $p < 0.05$ ) indicates that the number of control issues reported by respondents from states with no exposure to rainfall shock has a negative relationship with the number of control issues. This suggests that the number

of control issues faced by the respondents decreased over time. However, the magnitude of this correlation is not substantively significant. Conversely, a positive and substantive, as well as statistically significant point-biserial correlation coefficient (0.1382;  $n = 4938$ ;  $p < 0.01$ ) for states exposed to drought indicates that respondents in these states faced a statistically higher number of control issues from their intimate partners. Our results are similar to those of Cooper *et al.* (2021), who found a positive relationship between exposure to drought and controlling behavior by partners among women from Asian and Latin American countries, even though they could not find such an association between drought and other forms of IPV. Our results also align with Epstein *et al.* (2020), who found strong associations between exposure to severe drought and the likelihood of having a controlling partner.

It is important to note that the question regarding the controlling partner does not have a recall period that is limited to the past 12 months. Thus, a woman who has ever faced any control issues with a partner will report to a controlling partner. However, exposure to drought has been shown to increase controlling behavior.

Controlling behavior by intimate partners is often linked to IPV in women (Antai, 2011; Dhanaraj & Mahambare, 2021). We further explored whether respondents with controlling partners also report a higher incidence of PV by calculating the point-biserial correlation between the number of control issues and the incidence of PV in the treatment and comparison groups separately for the period before and after exposure to the NEM drought. The results are presented in Table S3. We observed a strong association between having a controlling partner and experiencing PV. Although the size of the point-biserial correlation coefficient decreased from 2015 – 2016 and 2019 – 2021 for the comparison group, it increased for the treatment group, further strengthening the finding that drought exposure intensifies partners' controlling behavior.

Having a controlling partner is a risk factor for IPV. Figure 1A-C were generated by plotting the percentage of women reporting a particular form of IPV for each number of control issues faced. A clear positive association between the number of control issues reported and the PV reporting is evident in Figure 1A. We also observed that respondents in states not exposed to drought reported a lower incidence of PV in 2019 – 2021 for more than two control issues. In contrast, for the states exposed to drought, the incidence of PV was higher for almost every control issue category. It is possible that decreasing income due to drought led to strife between partners, and the more controlling the partner, the more likely this strife resulted in PV. We did not find any clear relationship between the number of

control issues and the incidence of SV in states exposed to drought. Conversely, a distinct decline is observed in such cases for the comparison group (Figure 1B). As shown in Figure 1C, the incidence of EV for the number of control issues provides a clearer picture: the incidence was higher for the treatment group post-exposure and lower for the comparison group. One common thread among all three types of IPV is that the more controlling the partner, the higher the incidence of IPV. The incidence of IPV has consistently increased with the number of control issues. Dhanaraj and Mahambare (2021) found that working women who faced controlling behavior from their partners also experienced a higher incidence of IPV through the *male backlash* channel. We found a strong, positive association between the working status of women and IPV, even after accounting for the controlling behavior of their partners. The pathway through which the controlling behavior of partners increases IPV requires further research.

We found that the difference in the incidence of IPV between the states exposed to the NEM drought and those not exposed widened over time. The DID estimates in models with a complete set of control variables show that the odds of PV increase by approximately 48% among respondents exposed to the NEM drought. Similarly, the odds of EV increase by 44%. These results are significant at the 1% level of significance. Although Rai *et al.* (2021) found a positive relationship between drought and PV, their results were not statistically significant. The main reason for this may be that the data recall period during data collection did not coincide with the drought period, which may have led to an insignificant result. Our study improves upon Rai *et al.* (2021) by accurately capturing the effect of drought on IPV, which is one of the reasons for obtaining highly significant results in our study. Our findings are consistent with Epstein *et al.* (2020), who reported an increased risk of PV in women exposed to both mild and severe droughts.

We suspect that the causal link between drought and IPV is driven by increased stress following reduced income. As discussed earlier, the NEM drought adversely affected agricultural output. Decreased agricultural output translates into economic stress, which may intensify IPV. However, we cannot test this statistically, as the NFHS dataset does not contain information about income or agricultural production. This could serve as a future research agenda.

Following the logic that drought affects agricultural output, we suspected a heterogeneous effect of exposure to NEM drought between rural and urban areas. We estimated the models separately for rural and urban samples. The results are interesting: the rural areas of

states affected by the NEM drought saw a 50% increase in the odds of PV, and this result is significant at the 5% significance level. The odds of EV increased by 46% ( $p < 0.05$ ). The urban sample showed no statistically significant increase in the odds of PV and EV post-exposure to the rainfall shock. The estimates for SV are statistically insignificant for rural areas but show a 98% increase in the odds for the urban sample, which is significant at the 10% level. One plausible explanation for the difference in the change in odds of PV and SV between rural and urban areas is that PV is more visible than SV. It is easier for SV to go unnoticed by neighbors in urban areas. Social tolerance toward wife-beating is more prevalent in rural areas; thus, PV may be the preferred method for expressing aggression. Furthermore, respondents in rural areas might be more open to sharing incidences of SV than their urban counterparts.

The heterogeneous effect of drought on rural and urban samples also supports our suspicion that the pathway between drought and IPV runs through low income. Rural areas are predominantly responsible for agricultural output; thus, a decline in this sector is likely to affect income more significantly. However, any conclusive comment can be made using a dataset that includes information about household income in addition to the domestic violence module of the NFHS. Our results also highlight the implications for policymakers. Providing better government support during droughts could help mitigate the incidence of IPV, especially in rural areas directly affected by a reduction in agricultural income. Wage employment programs, properly targeted subsidies, and similar initiatives could relieve financial stress in rural areas during periods of low rainfall, thereby keeping the IPV under control.

As mentioned earlier, exposure to stressors like drought intensifies controlling behavior in partners. Even if no visible incidence of PV, SV, or EV develops from such a stressful situation, a considerable increase in controlling behavior alone can make life difficult for women. Further studies are needed to explore whether controlling behavior and IPV are mediation. One possible policy intervention could focus on changing the mindsets of male partners since control issues are likely a manifestation of deeper societal or psychological factors.

#### 4.1. Limitations

Our study faces the typical limitations of secondary data-based research. The responses are self-reported by victims of IPV and may suffer from recall bias and underreporting. In addition, we recognize the potential of mixed-methods research in which qualitative interviews with women could

complement a scientifically drawn sample. The lack of longitudinal databases also severely limits causal inference regarding the covariates of IPV.

## 5. Conclusion

This study aimed to understand the impact of drought on IPV in India, thereby improving previous studies by incorporating a more comprehensive set of covariates and using data that effectively captures the effects of drought. To maintain the integrity of the results, one major drought-affected state was excluded from the analysis to avoid contamination due to the onset of COVID-19. Our findings revealed a strong association between exposure to NEM drought and an increased incidence of PV and EV. Although SV was also positively associated with drought, the relationship was not statistically significant. In addition, our analysis highlights the heterogeneous effects of drought across rural and urban areas. In rural areas, we found a statistically significant relationship between exposure to the NEM drought and both PV and EV. In urban areas, although no significant relationship emerged between PV and EV, a statistically significant association for SV.

We suspect that the link between drought and increased IPV may be mediated by a decline in agricultural incomes. However, since the NFHS does not collect income data, this hypothesis could not be directly tested. Although household assets are recorded, they tend to change slowly and are not suitable proxies for income in causal analyses. This study established a clear, strong, and positive association between drought exposure and IPV. As drought itself cannot be influenced by IPV, we contribute to the existing literature by presenting strong evidence of drought's effects on IPV in the Indian context.

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## Conflict of interest

The authors declare that they have no competing interests.

## Author contributions

*Conceptualization:* Durgesh C. Pathak

*Formal analysis:* Durgesh C. Pathak

*Methodology:* Durgesh C. Pathak

*Writing-original draft:* All authors

*Writing-review & editing:* Durgesh C. Pathak

## Ethics approval and consent to participate

The DHS and the NFHS obtained informed and voluntary consent from all survey participants. Permission to use DHS/NFHS data for this study was granted through the DHS program when downloading the datasets. As this study involves the analysis of de-identified secondary data, specific ethics approval for this analysis was not required.

## Consent for publication

Not applicable.

## Availability of data

The study utilized secondary data from the DHS. The dataset is publicly accessible and can be obtained by registering on the DHS platform.

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## RESEARCH ARTICLE

## Unveiling health disparities and assessing well-being of older adults in China's aging society: The socioeconomic nexus

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### Abstract

With China's population aging rapidly, the challenge of preserving and enhancing the health of its older citizens has gained paramount importance. Leveraging data from the fourth wave of the China Health and Retirement Longitudinal Study, this study examines the relationship between socioeconomic status and well-being of older adults in the context of China's evolving demographic landscape. Empirical analysis reveals compelling statistical evidence that underscores the significant influence of socioeconomic status on the health outcomes of older adults. Notably, socioeconomic factors such as education level, place of residence, household registration (*hukou* [户口]) type, and Communist Party of China membership significantly affect the mental and cognitive well-being of older adults, with a more pronounced impact on mental health. These findings emphasize the need for targeted policies to address disparities and promote holistic well-being as China grapples with an aging population.

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**Keywords:** Older adults; Socioeconomic status; Health disparity; Health inequity; CHARLS; China

### 1. Introduction

China's accession to the World Trade Organization in 2001 marked a watershed moment in its economic history, propelling the nation into the global limelight as a manufacturing giant. The influx of foreign direct investment played an instrumental role in expediting China's journey toward globalization. By 2009, China's total economic output had outstripped that of Japan, solidifying its position as the world's second-largest economy. However, this impressive economic growth, averaging 8% annually over three decades, encountered an abrupt interruption with the advent of the 2019 pandemic.

Concurrently, as of 2021, the proportion of China's population aged 65 and above reached 14.2% of its total populace. The year 2022 witnessed a historic turning point, as China experienced its first population decline in 61 years, with a reduction of 850 thousand individuals. The demographic challenges have garnered worldwide attention, prompting the Chinese government to acknowledge the pressing issue of population aging.

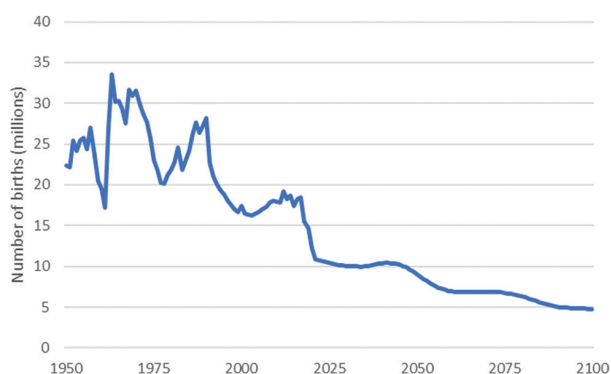
The repeal of the 36-year-old one-child policy in 2014 resulted in a significant upswing in births. In 2016, China recorded a record high of 17.86 million births, the

highest since 2000. Nevertheless, by 2022, the number of births had sharply declined to 9.56 million, nearly halving in less than a decade since the policy change (Figure 1). This precipitous drop in newborns within such a brief timeframe poses a substantial threat to the stability of the long-term demographic structure, with far-reaching implications for future government policies and even industrial restructuring.

Population aging is not solely a concern for developed nations; it is gradually becoming a global reality. This trend is rooted in advancements in medical standards following economic development, a decline in infant mortality rates, and a substantial increase in life expectancy, resulting in a growing older people population. The primary driver of population aging is the rapid decline in the total fertility rate, leading to an exacerbation of the proportion of old-age individuals relative to the total population. The pace of this demographic transition varies from one country to another (Bloom & Williamson, 1998; Lee & Mason, 2010).

In contrast to other nations, China faces particularly acute challenges of population aging due to previous policies of government. The implementation of strict family planning during the early stages of economic development led to an abrupt drop in birth rates (Cai, 2010; Jiang *et al.*, 2023). Furthermore, China experienced a significantly shorter timeframe for fertility rate decline relative to economic development compared to developed nations, and even shorter than East Asian countries such as Japan and South Korea, which embarked on their economic development post-World War II. Wu *et al.* (1991) argued that China's population aging is primarily due to the rapid decline in the birth population, resulting in the shortening of the population pyramid's base.

According to development economics, a country's population usually matches its level of social and economic



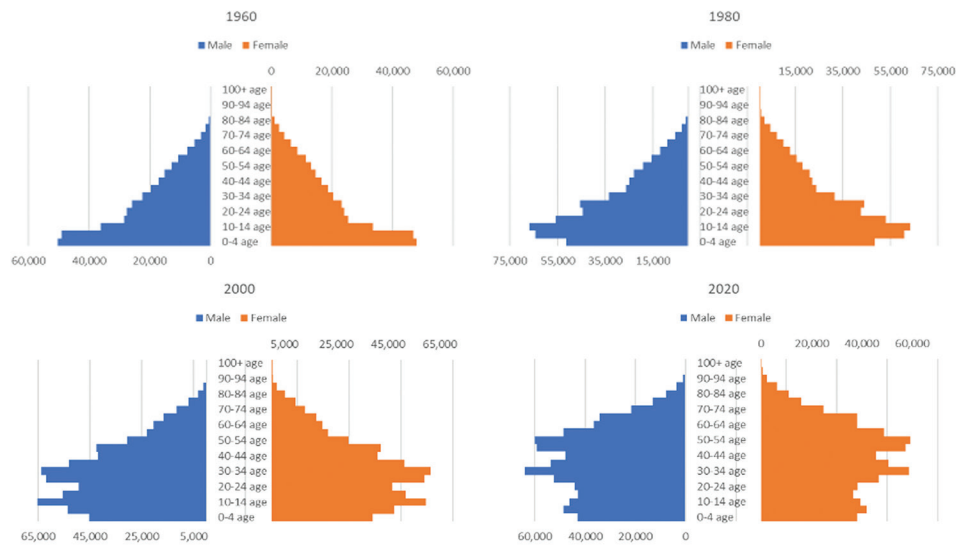
**Figure 1.** Annual number of births in China  
Source: United Nation (2022), World Population Prospects.

development. However, in the pursuit of economic growth, the Chinese government implemented the one-child policy to intervene in fertility for a prolonged period (1979 – 2015), causing the birth rate to decline earlier and more rapidly than in any other country. At the same time, advancements in China's public health system and the adoption of medical treatments from abroad have reduced the infant mortality rate, hastening the demographic transition process. This acceleration has greatly exceeded the corresponding level of economic development in contemporary society, and insufficient wealth accumulation has led to the problem of "getting old before getting rich." Consequently, households in China lack sufficient time to accumulate enough wealth to support retired older ages members, and the social security system is inadequate to meet the medical and care needs of the large older-aged population.

A clear observation from Figure 2 is the continuous reduction in the base of China's population pyramid since 1980, signifying a substantial decrease in the proportion of children in a short span, while the corresponding proportion of the older adults population has witnessed rapid growth. This intricate interplay between economic development and demographic shifts in China underscores the need for a comprehensive analysis of their complex relationship and their implications for China's future trajectory.

Over the past three decades, China's economy has witnessed significant growth, resulting in soaring housing prices and a rapid increase in the cost of raising children. At present, it has become challenging for ordinary middle-class families to afford the expenses associated with raising a second child. The high cost of marriage and parenting, coupled with the high unemployment rate among the young population (16 – 24) (Figure 3), has created a situation where individuals of working age struggle to marry and are hesitant to start families. Despite the Chinese government's announcement in 2021 of a new population policy allowing three children per couple, there is little interest among the younger generation. Birth rates in 2022 fell below 10 million, and based on marriage registration figures from that year, it is predicted that births in 2023 may drop below 8 million.

Since the outbreak of the pandemic, economic downturns, coupled with a 3-year zero-COVID policy, have heightened pessimism among most people regarding the future of the Chinese economy. Therefore, in the short term, reversing the declining birth rate trend proves difficult. Moreover, data from the National Bureau of Statistics of China indicate that in the next 15 years, from 2023, approximately 25 million baby boomers (born 1962 – 1976) will retire annually, exiting the labor market. If the current retirement policy (60 years old for men and 55 years old for women) remains unchanged, a substantial labor force shortage will loom in the future.



**Figure 2.** Population pyramids of China (1960, 1980, 2000, 2020)  
Source: United Nation (2022), World Population Prospects.



**Figure 3.** The urban unemployment rate of the population aged from 16 to 24 (%)  
Source: National Bureau of Statistics of China (2023).

The rapidly rising dependency ratio among the old-age population and declining public support ratio (Figure 4) will not only profoundly impact China’s economic growth but also put great pressure on the fragile social welfare system and scarce public health-care resources (Lee & Mason, 2011; United Nations, 2013). Government forecasts for medical and health-care financial burdens usually depend on the health indicators of older persons. Therefore, amid rapid population aging, prioritizing the health status of the old-age becomes paramount. In addition to health conditions naturally deteriorating with age, many studies have indicated that socioeconomic status significantly affects the health outcomes of the older adults. Therefore, this study aims to explore the influence of socioeconomic status on the health of the older adults in China. The contributions of this study are summarized as follows.

First, we address the health status of the older-aged from three different perspectives: physical health, mental health, and cognitive health. Previous studies primarily focused on the physical and mental health of the older people. However, given advancements in medical care and increased life expectancy, dementia has emerged as a significant concern among the older ages. Therefore, we introduce cognitive health as an additional indicator of health and examine the relationship between these three aspects of old-age health. Our findings reveal that the physical health of the old-age affects their mental health, and both physical and mental health have implications for cognitive health.

Second, to capture the unique characteristics of Chinese society, we incorporate household registration (*hukou* [户口]) and political party membership as two explanatory variables in our regression model to reflect individuals’ socioeconomic status. We find that, compared to traditional measures such as education level and place of residence, household registration type and party membership not only significantly represent the socioeconomic status of the Chinese populace but also exert a longer cumulative effect on the health status of the older people. These features specific to Chinese society may exacerbate health disparities among the older ages.

The remainder of this paper is structured as follows: Section 2 reviews the literature on the relationship between health and socioeconomic status; Section 3 introduces the data used in this study and provides a statistical description of the variables; Section 4 presents the empirical results and summarizes the findings of this study; finally, in Section 5, we draw conclusions regarding China’s future as a super-aged society.

## 1.1. Health of older adults and their socioeconomic status in China

Over the past 30 years, China has boasted an abundant and relatively inexpensive labor force, attracting foreign capital and achieving remarkable economic prosperity with an average annual growth rate of 8%. However, a notable “side effect” of this economic development, combined with strict population policies, is the shrinking of family sizes and the transformation of family structures into what is known as the 4-2-1 family model that consisting of four older persons, two middle-aged persons, and only one child. In recent years, a substantial portion of the labor force has started to retire, placing a heavy burden on one-child families to support the older people. The traditional intergenerational support model of the family is no longer suitable for China’s modern society due to industrialization and urbanization. Furthermore, the slow construction of the social security system in the rapidly aging society, coupled with low and unequal social welfare coverage, struggles to meet the demands of the large old-age population for medical resources and long-term care. Jiang & Sanchez-Barricarte (2011) figure out that as the proportion of the older-aged is projected to rapidly increase to 25% by 2050, according to UN projections, the 4-2-1 family structure could strain the social security system. Concerns regarding the difficult post-retirement live of older persons weigh not only on the older-aged individuals themselves and their families but also on society as a whole, fostering feelings of stress and helplessness about the uncertain future.

Because physical abilities for daily activities decline with age that is easier for the older adults to fall into an unhealthy state (Harman, 1981; McAuley *et al.*, 2000; Milanović *et al.*, 2013). The ability of the older ages to care for themselves in daily life is an important criterion for determining their quality of life. Only a healthy and prolonged life can guarantee a high quality of life. If older adults lose the ability to care for themselves, they not only experience personal discomfort but also impose financial burdens on their families. Moreover, a rapid increase in disabled or demented older ages could potentially collapse the social security system. Therefore, maintaining the health of the older people not only preserves their quality of life but also minimizes their dependence on family and social care systems, thereby reducing the demand for medical and health-care resources. Moreover, healthy older adults can activity participate in family and societal activities, helping to address the labor gap in an aging society. Consequently, the health status of the old-age is the key to mitigate the risk associated with an aging society. Addressing these risks can eliminate the potential financial threats posed by the unexpected future of a super-aging society. Therefore, the health of the older people emerges as one of the important issues in Chinese society.

Health, as a relatively abstract concept, proves challenging to measure using a single indicator. Instead, a comprehensive assessment requires consideration of multiple dimensions. Within the declared Constitution of the World Health Organization (WHO), health is defined as a state of complete physical, mental, and social well-being, rather than merely the absence of disease or infirmity – a definition staunchly upheld by the international health agency to this day (United Nations, 1956). In this study, based on the WHO’s definition of health, we aim to evaluate the health status of the older people from three different perspectives: physical health, mental health, and cognitive health. Through a literature survey of micro-level data, we identify measurement indicators corresponding to each aspect of older ages health. Furthermore, these three health indicators are not independent of each other; rather, they are correlated. For example, the older adults who are not healthy or experience difficulty in daily life are prone to psychological distress and even depression. Similarly, those who face difficulties in physical movement or often feel depressed are at greater risk of suffering from dementia and struggling to adapt well to daily life in society.

While reviewing the literature on the health of older-aged in China, it becomes apparent that the focus has predominantly been on physical and mental health, with insufficient attention given to cognitive health. According to the census data, China is expected to have approximately 300 million older people over the age of 60 by 2025, most of whom were born before 1965 and have experienced the Cultural Revolution (1966 – 1976) without receiving adequate education. The number of people with dementia increases with age, and China has a very big population. In the context of declining birth rates and a long-term economic recession, the care of the older ages with dementia poses a heavy burden on government finances and family expenditures. Therefore, in discussing the health of old-age, we believe that adding cognitive health to physical and mental health is necessary. In view of this point, the current study aims to fill this gap and provide reference points for policymakers.

As individuals age, not only does the absolute trend in the health of the older adults change but also the health indicators vary among individuals within the same age groups due to differing socioeconomic statuses. Black *et al.* (1980) mentioned the presence of health disparities and stratification among groups of different socioeconomic status, with those of higher socioeconomic status typically exhibiting better health status. Subsequent abundant empirical studies have consistently demonstrated the positive impact of socioeconomic status on health (Williams, 1990; Link & Phelan, 1995; Chen & Miller, 2013). Moreover, Lynch *et al.* (1994) argue that

socioeconomic status across different life stages ultimately impacts the health status of the older people. Disparities in health among different socioeconomic statuses tend to widen with age (Lowry & Xie, 2009). The cumulative effect of poor socioeconomic status over the life span culminates in the development of certain diseases (Galobardes *et al.*, 2004; Cohen *et al.*, 2010; Van den Berg *et al.*, 2010). Certain studies have even pointed out that individuals with disadvantaged socioeconomic status during childhood face a heightened risk of mortality, as children from lower socioeconomic statuses are more likely to adopt unhealthy behaviors such as smoking and drinking (Lynch *et al.*, 1994; Van de Mheen *et al.*, 1998; Chen *et al.*, 2002; Chen & Miller, 2013). The environment experienced during childhood, along with healthy habits and physical functions in midlife, is closely related and can significantly influence the aging process and susceptibility to chronic diseases throughout the life cycle (Guralnik *et al.*, 2006). In addition, Greenfield & Moorman (2019) used Wisconsin longitudinal data to verify that socioeconomic differences during childhood may have consequences for cognitive health status in later life. Therefore, socioeconomic status not only affects current health status but also exerts a cumulative and persistent impact on the health status of the older people.

Socioeconomic status usually refers to education level, household location, and specific identity factors. Zhu & Xie (2007) used education level as an indicator of socioeconomic status and verified its positive correlation with cognitive ability in China. The older people with higher education levels also demonstrate better cognitive abilities (Livingston *et al.*, 2017). To address regional inequalities within Chinese society, household location serves as a crucial distinction, particularly regarding household registration versus individual residence. Household registration is broadly divided into urban and rural types, with changing household registration being a challenging process. Individuals with urban household registration usually possess greater access to education resources and employment opportunities, initiating socioeconomic stratification from birth in China. Hayward & Gorman (2004) argued that childhood socioeconomic status affects adulthood socioeconomic status, subsequently impacting health. Children with rural household registration growing up under poor conditions may experience health consequences in adulthood. Zeng *et al.* (2007) observed that urban older adults exhibit superior cognitive abilities compared to their rural counterparts, whereas older adults tend to score higher in activities of daily living (ADLs). Regional inequality significantly contributes to social stratification in China. Furthermore, the significant outflow of young people exacerbates the

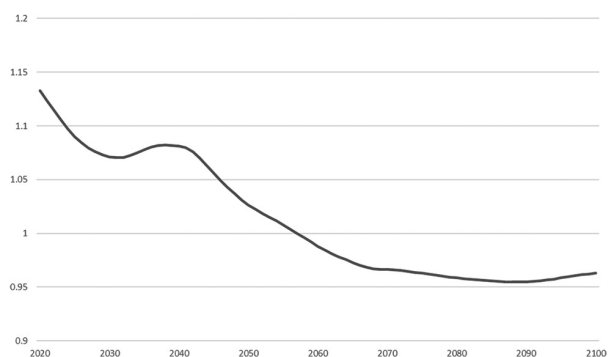
aging population in rural areas. The aging phenomenon in rural China surpasses that of urban areas, with the old-age population in rural areas being 1.8 times larger than in cities. Due to limited labor force and medical care, most older-aged living in rural areas usually experience relatively poorer health statuses.

Finally, a particular identity can be regarded as a symbol of privilege, signaling high socioeconomic status to the public. In comparison to ordinary citizens in China, only a select few have accumulated over 15 years of service in government, state-owned enterprises, universities/colleges, hospitals, and military institutions, benefitting from the “bureaucratic” welfare system. Their pensions and medical benefits far surpass those of individuals employed in the private sector, self-employed individuals, and those working in the agricultural sector. However, it is often difficult to specifically identify whether respondents have ever been employed in these government-related places using micro-level data. As a workaround, we use membership in the Communist Party of China as a proxy to reflect socioeconomic status, as most public institutions prioritize admission for party members. In addition, similar to the pension system, party membership also exhibits a cumulative effect: the longer one remains a member of the Communist Party of China, the greater the benefits they accrue. In Section 3, we use data analysis to verify the relationship between socioeconomic status and the health of the older persons.

## 2. Data and methods

### 2.1. Overview of China Health and Retirement Longitudinal Study (CHARLS)

This study used the fourth wave of the CHARLS to explore the intricate interplay between health and the socioeconomic status of old-age individuals in China. CHARLS, meticulously executed and maintained since 2008, is overseen by the China Center for Economic Research (CCER) at Peking University and the China Social Survey Center. It stands as a monumental, nationally representative longitudinal survey aimed at gathering a comprehensive dataset comprising micro-level information pertaining to families and individuals aged 45 and above in China. The overarching objective of CHARLS is to facilitate analysis of critical issues such as population aging. Its inaugural data collection took place in 2011, employing a multifaceted approach involving multistage stratified sampling across 150 county-level units and 450 village-level units, encompassing 17,000 individuals within approximately 10,000 households. These meticulously drawn samples are tracked at biennial intervals, with the dataset for 2018 constituting the fourth wave of the



**Figure 4.** Public support ratio of China  
Source: National Transfer Accounts using 2009 as the base year.

longitudinal survey.

CHARLS, as a rich longitudinal resource, primarily focuses on middle-aged and older-aged cohorts. It aligns itself with international best practices and serves as a valuable benchmark for cross-country comparisons. Its global counterparts include the Health and Retirement Study in the United States; the English Longitudinal Survey of Ageing in the United Kingdom; the Survey on Health, Aging, and Retirement in Europe covering continental Europe; and the Japanese Study on Aging and Retirement and the Korean Longitudinal Study of Aging in Asia. The extensive CHARLS questionnaire covers a gamut of domains, including personal demographics, familial structure and financial support, health status, employment, retirement and pension details, income and consumption patterns, as well as assets and savings. Notably, within the domain of health status assessment, CHARLS delves into fundamental health and disease records, disability assessments, cognitive function and mental health evaluations, as well as self-reported health assessments. For more detail insights into CHARLS's design and sample methodology, please refer to Zhao *et al.* (2014).

## 2.2. Variables and health assessment

In this study, we employed a range of variables to comprehensively assess the health of the old-age participants. We began by employing ADLs and instrumental ADLs (IADLs) as indicators of physical health. ADLs encompass fundamental daily activities such as eating, getting in and out of bed or a chair, dressing, toileting, bathing, and mobility within the home. On the other hand, IADLs assess the executive functioning involved in more complex daily tasks, including independent travel, shopping for daily necessities, managing personal finances, making telephone calls, performing heavy household chores, and engaging in general housework. In this study, both ADLs and IADLs were treated as binary variables, with individuals assigned

a value of 0 if they faced difficulty in any of these activities and a value of 1 if they could perform all these actions without impediment. This classification aligns with prior research (Gu & Dupre, 2008).

For the assessment of mental health, we rely on the Center for Epidemiological Studies Depression Scale (CESD). CESD comprises various dimensions, including assessments of depressed mood, feelings of guilt and worthlessness, hopelessness, psychomotor retardation, changes in appetite, and sleep disturbances. A higher total CESD score is indicative of more severe depressive symptoms, with a CESD total score of 16 or above signifying depression. A few surveys use the short version of CESD, called CESD-10, due to the regular version being too lengthy for certain respondents. CHARLS uses the short version CESD-10, with a total score of 10 or above signifying depression (Fu *et al.*, 2022). We acknowledge that CESD scores may vary among individuals, influenced by factors such as age, gender, and education level. Typically, studies have found a positive association between CESD scores and age, with old-age individuals reporting higher scores. Moreover, old-age women often exhibit higher CESD scores than their male counterparts. Educational attainment also plays a role, as higher education levels are often associated with lower CESD scores (Wallace & Ohara, 1992; Kimberlin & Pendergast, 1998; Everson-Rose *et al.*, 2005). To facilitate interpretation and reporting, we reversed the original CESD scores, such that higher scores indicate lower levels of depression and better mental health among the older people. Furthermore, Schuch *et al.* (2018) argue that poorer physical health in older adults tends to be associated with higher CESD scores. To explore the impact of physical health on the mental health of the older-aged, we incorporated IADLs as an explanatory variable in an alternative model (Model 4).

Finally, we employed the Mini-Mental State Examination (MMSE) score to assess cognitive ability and represent cognitive health in our regression model. Developed in 1975, the MMSE offers a comprehensive assessment of cognitive function, with a total score of 30 points. A score of 23 or lower is indicative of dementia. The prevalence of dementia is on the rise among the older adults due to increasing life expectancy. Nevertheless, Western countries such as the United States, the United Kingdom, and France have observed lower dementia incidence among more recent generations, attributed to advancements in education, socioeconomic factors, health care, and lifestyle changes (Livingston *et al.*, 2020). Conversely, East Asian countries or regions, including Japan, South Korea, Hong Kong, and Taiwan, have witnessed apparent increases in age-specific

dementia prevalence. One key driver behind these variations is differences in educational attainment. Well-educated older generations in high-income countries tend to exhibit better cognitive functioning. Furthermore, most empirical studies indicate that MMSE scores tend to decline with age; women typically score lower than men, and individuals with compromised physical or mental health are more susceptible to dementia (Van Gelder *et al.*, 2004; Marin *et al.*, 2011; Brown *et al.*, 2012; Groot *et al.*, 2016). Therefore, we introduced IADLs and CESD scores as explanatory variables in an alternative model (Model 6) to investigate the influence of physical and mental health on cognitive health among the older adults.

In summary, given the abstract nature of health, our study employed a comprehensive and objective assessment. To accommodate different dependent variable types (binary, discrete), we integrated ADLs, IADLs, CESD scores, and MMSE scores to holistically reflect the health status of older adults participants. The distribution of these indexes is presented in Figure 5-8.

**2.3. Methodology and study strategy**

There are many evaluation criteria for health of older people, and some studies use the older people’s self-rated health (SRH) as a variable of physical health. However, we believe that SRH of the older people is a subjective perception and instead use ADLs and IADLs as variables of physical health. In models 1 and 2, we used the results of ADLs and IADLs as the dependent variables and applied logit regression analysis, controlling for personal characteristics. For mental health analysis, we used the CESD score as the dependent variable in both models 3 and 4. Although model 3 does not consider the impact of physical health on mental health, we included IADLs as an explanatory variable in model 4 to address this shortcoming. In models 3 and 4, we used multiple regression to analyze the effect

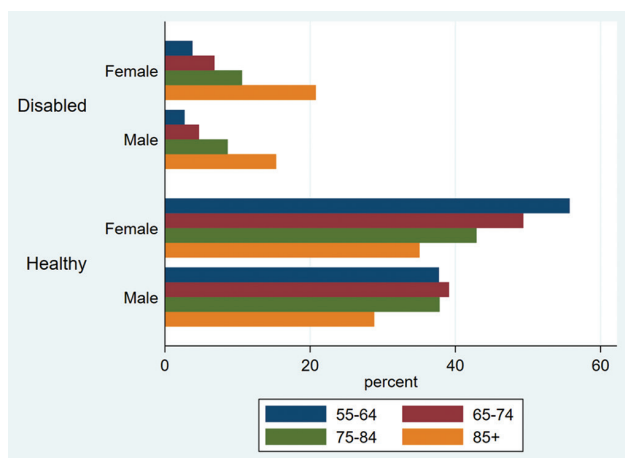


Figure 5. Age gradient of the activities of daily living index by sex

of socioeconomic variables on the mental health of older adults.

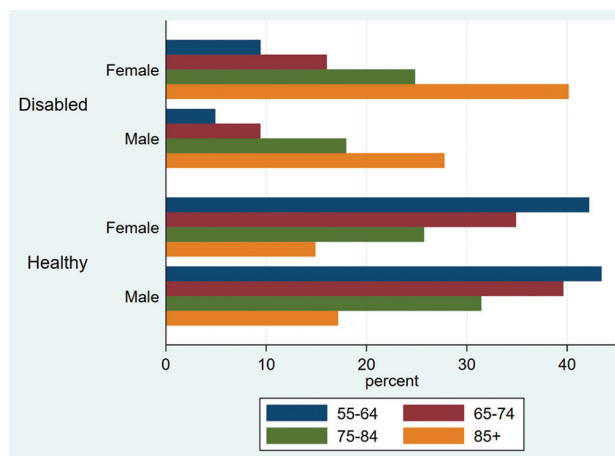


Figure 6. Age gradient of the instrumental activities of daily living index by sex

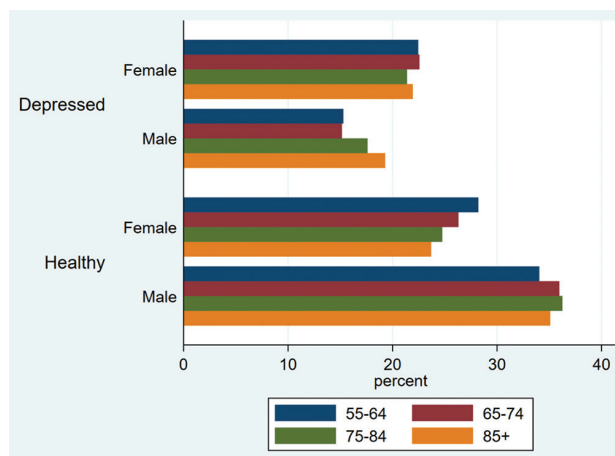


Figure 7. Age gradient of those suffering from depression (Center for Epidemiological Studies Depression Scale-10 score ≥10) by sex

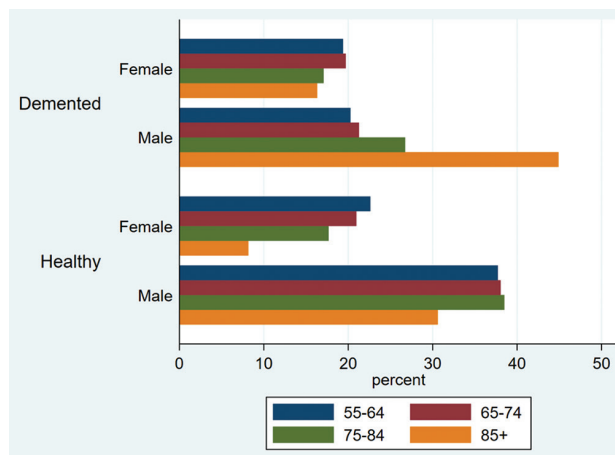


Figure 8. Age gradient of those suffering from dementia (Mini-Mental State Examination score ≤23) by sex

For cognitive health, we used the MMSE score as the dependent variable in both models 5 and 6. Since model 5 does not consider the impact of physical and mental health on cognitive health, we incorporated IADLs and CESD scores as explanatory variables in model 6. The difference between models 5 and 6 is the inclusion of these two variables to represent the physical and mental health of the older ages in model 6. Finally, in model 7, we constructed a dummy variable for the older ages who are physically, mentally, and cognitively healthy. Using logit regression, we verify if the socioeconomic variables have statistically significant positive effects on the older people's physical, mental, and cognitive health.

In addition, Table 1 presents variables that serve as proxies for socioeconomic status among the older adults, including education level, residential location, household registration type, and Communist Party of China membership. We created five dummy variables to represent various education levels. For residential location, we constructed an interaction of two dummy variables: one indicating urban residence (assigned a value of 1) and the other representing a rural household registration (assigned a value of 1). This creation of dummies resulted in four combinations reflecting different household locations: urban residence with an urban household registration (1,0), urban residence with a rural household registration (1,1), rural residence with an urban household registration (0,0), and rural residence with a rural household registration (0,1). In addition, we employed Communist Party of China membership as a proxy for the socioeconomic status of individuals who were employed in government-related institutions before retirement.

To control for potential confounding variables, we introduced control variables such as age, gender, marital status, and household status into our models to mitigate estimation bias. Furthermore, we incorporated two dummy variables into our models to account for the impact of location on interviewed households (those in well-developed eastern districts) and whether the households have savings. Both of these factors are known to influence the health of the older adults. Given China's vast territory, uneven economic development, and diverse population structures, we introduced dummy variables for specific regions, including Shanghai City, Jiangsu Province, Zhejiang Province, and Guangdong Province, primarily concentrated in the Yangtze River Delta and the Pearl River Delta. These regions exhibit higher economic output and greater demographic potential compared to others. Furthermore, in the context of China's imperfect social insurance system, we posit that the presence or absence of household savings can exert a positive influence on the health of the older adults.

**Table 1. Summary statistics**

Variables	Mean	SD
ADLs $\geq$ 1	0.883	0.321
IADLs $\geq$ 1	0.759	0.428
CESD $\geq$ 10	0.367	0.482
MMSE $\leq$ 23	0.411	0.492
Age	67.863	8.104
Male	0.487	0.499
Education		
Did not finish elementary school	0.216	0.412
Elementary school graduates	0.204	0.403
Junior high school graduates	0.188	0.391
Senior high school graduates	0.107	0.309
University graduates and above	0.015	0.123
Currently married	0.816	0.388
One-person household	0.201	0.401
Household location		
Urban residence with rural household registration	0.099	0.299
Urban residence with urban household registration	0.172	0.378
Rural residence with rural household registration	0.676	0.468
Communist Party of China member	0.108	0.310
Having savings	0.332	0.471
Living in the Yangtze River Delta/Pearl River Delta districts	0.095	0.293

Abbreviations: ADLs: Activities of daily living; CESD: Center for Epidemiological Studies Depression Scale; IADLs: Instrumental activities of daily living; MMSE: Mini-mental state examination; SD: Standard deviation.

In summary, our study employs a robust array of variables to comprehensively explore the multifaceted relationship between health and socioeconomic status among the older adults in China. This approach enables us to gain valuable insights into the intricate dynamics at play in this critical demographic segment.

### 3. Key findings

We employed the fourth wave of CHARLS data to conduct a regression analysis of the health of the older adults from three different perspectives: physical health (Models 1 and 2), mental health (models 3 and 4), and cognitive health (models 5 and 6). After analyzing these three different health perspectives of the older-aged, we attempted to combine the older people who are physically, mentally, and cognitively healthy into one index as an explanatory variable in model 7. The main results are summarized as follows:

First, in the evaluation of physical health (Table 2), we used ADLs and IADLs as explanatory variables in

models 1 and 2. In both models, we controlled for personal variables such as age, gender, marital status, and household type while examining if socioeconomic status affects the physical health of the older ages. The empirical results demonstrate that the one-person household variable has a statistically significant positive effect on the physical health of the older adults. In addition, the coefficients for “gender” and “married” are both positive in models 1 and 2. Model 1 indicates that the probability of physical health in the married group is higher than that in the unmarried group, with the difference being significant at the 5% level. Model 2 demonstrates that the probability of physical health for males is higher than for females, with the difference being significant at the 1% level.

However, we did not find any statistically significant relationship between socioeconomic status and the ADLs indicator in model 1, even though socioeconomic status variables such as education level and household location have statistically significant positive effects on IADLs in

model 2. While ADLs and IADLs are both indicators of physical health, ADLs encompass only fundamental daily activities, whereas IADLs assess the executive functioning involved in more complex daily tasks. Therefore, compared to the results of ADLs in model 1, IADLs (model 2) are more closely related to socioeconomic status. The coefficients for all education level categories are positive and have statistically significant effects on the physical health of the older people compared to those who are illiterate. In addition, the interaction variable of household location demonstrates that the older people who have urban household registration and reside in cities have a higher probability of physical health than the reference group, who have urban household registration but reside in rural areas.

Second, when analyzing mental health (Table 3), unlike previous studies, we found that there is no statistically significant correlation between the CESD score and age. This observation suggests that age may not be an important

**Table 2. Estimated results concerning physical health (activities of daily living [ADLs] and instrumental activities of daily living [IADLs])**

Variables	Model 1		Model 2	
	Coefficient	SE	Coefficient	SE
Age	0.018	0.048	0.048	0.038
Age square	-0.000	0.000*	-0.001	0.000***
Gender	0.002	0.072	0.259	0.050***
Married	0.681	0.324**	0.301	0.194
One-person household	0.659	0.320**	0.345	0.190*
Education level				
Illiterate (reference)				
Did not finish primary school	-0.079	0.087	0.493	0.059***
Elementary school	0.089	0.097	0.801	0.066***
Middle school	0.102	0.118	1.035	0.080***
High school	0.162	0.163	1.128	0.111***
College degree and above	0.417	0.355	1.547	0.288***
Household location				
Rural residence with urban household registration (reference)				
Urban residence with rural household registration (1,1)	-0.028	0.185	0.178	0.128
Urban residence with urban household registration (1,0)	0.093	0.172	0.281	0.121**
Rural residence with rural household registration (0,1)	0.005	0.155	-0.062	0.106
Communist Party of China member	-0.185	0.113	0.119	0.087
Having savings	0.667	0.085***	0.719	0.055***
Living in the Yangtze River Delta or Pearl River Delta districts	0.552	0.140***	0.655	0.089***
Constant	2.748	1.781	0.708	1.366
Number of observations	10,050		13,295	
Pseudo R squared	0.071		0.147	

Notes: \*\*\*Statistical significance at the 1% level. \*\*Statistical significance at the 5% level. \*Statistical significance at the 10% level.

factor in depression within Chinese society, despite some literature indicating otherwise. Given the significant disparity between urban and rural areas in China (Jiang *et al.*, 2021), our empirical results indicate that compared to the older people living in cities, those living in rural areas are more prone to depression. Both the explanatory variables “gender” and “married” have a statistically significant positive effect on CESD, implying that males tend to have better mental health than females, and that married older adults enjoy better mental health than unmarried ones. Except for the older adults who did not complete primary education, higher educational levels are associated with lower CESD scores and lower levels of depression. In terms of household location, our empirical results indicate two distinct trends among older-aged groups. One trend is that having a rural household registration and currently living in a rural area has a statistically significant negative effect on the mental health of the older people. Conversely, having an urban household registration and living in a city

has a statistically significant positive effect on the mental health of the older persons.

In addition, we observed that compared to the reference group (“rural residence with urban household registration”), the coefficient for the mental health of the older ages who fall in the category “rural household registration but live in urban area” indicates that their mental health condition is better, although there is no statistically significant evidence for this observation. This group, consisting of older people temporarily living in cities, benefits from superior services such as convenient infrastructure and high-quality medical resources. However, despite facing fewer obstacles in accessing medical care, they still harbor concerns about the cost of medical care since they are not covered by the urban medical insurance system. This discrepancy could explain why the coefficient of the variable for them is positive but lacks statistical significance. Furthermore, we identified a statistically significant positive effect on mental health

**Table 3. Estimated results concerning mental health (Center for Epidemiological Studies Depression Scale-10)**

Variables	Model 3		Model 4	
	Coefficient	SE	Coefficient	SE
Age	0.059	0.124	0.014	0.120
Age square	-0.000	0.001	0.000	0.001
Gender	1.527	0.136***	1.369	0.132***
Married	0.969	0.480**	0.770	0.468*
One-person household	-0.361	0.457	-0.557	0.446
Education level				
Illiterate (reference)				
Did not finish primary school	0.110	0.191	-0.298	0.187
Elementary school	0.894	0.195***	0.355	0.192*
Middle school	1.592	0.210***	0.973	0.206***
High school	2.262	0.256***	1.636	0.251***
College degree and above	2.948	0.541***	2.192	0.528***
Household location				
Rural residence with urban household registration (reference)				
Urban residence with rural household registration (1,1)	0.465	0.338	0.422	0.329
Urban residence with urban household registration (1,0)	0.871	0.309***	0.791	0.301***
Rural residence with rural household registration (0,1)	-0.756	0.285***	-0.646	0.278**
Communist Party of China member	0.390	0.207*	0.343	0.202*
Having savings	1.110	0.133***	0.823	0.130***
Living in the Yangtze River Delta or Pearl River Delta districts	1.909	0.213***	1.592	0.208***
Instrumental activities of daily living			3.784	0.162***
Constant	16.423	4.214***	14.577	4.109***
Number of observations	10,504		10,502	
Adjusted R squared	0.095		0.139	

Notes: \*\*\*Statistical significance at the 1% level. \*\*Statistical significance at the 5% level. \*Statistical significance at the 10% level.

associated with membership in the Communist Party of China. Many party members receive generous pension benefits after retirement, tend to join medical insurance schemes, and have access to long-term care resources. Therefore, older-aged Communist Party of China members need not worry about their livelihoods after retirement.

To verify whether the physical health condition of older-aged affects their mental health, we incorporated an additional explanatory variable, “IADLs,” in model 4. Our results suggest that IADLs have a statistically significant positive effect on the mental health of the older adults. This finding suggests that physically healthy older adults are usually mentally healthy as well. Furthermore, upon incorporating IADLs into model 4, the adjusted *R* squared increased by 0.044 compared to model 3. This result confirms that physical health is indeed one of the important factors influencing the mental health of the older people.

Third, concerning the results of cognitive health (Table 4), we observed that the cognitive ability of older-aged tends to improve with age in the model. However, we also found that the quadratic term of age has a statistically significant negative effect on their cognitive ability. This finding suggests that after reaching a certain age, the cognitive ability of surviving older-aged declines. In addition, on average, men exhibit significantly higher cognitive ability than women. In addition, socioeconomic status-related explanatory variables demonstrate statistically significant and positive effects on the cognitive ability of the older adults.

Compared to those who are illiterate, the older adults with higher education levels demonstrate higher MMSE scores, indicating better cognitive ability. Regarding household location, irrespective of whether the older adults have urban or rural household registration, living in cities is associated with better cognitive abilities

**Table 4. Estimated results concerning cognitive health (Mini-Mental State Examination)**

Variables	Model 5		Model 6	
	Coefficient	SE	Coefficient	SE
Age	0.873	0.142***	0.863	0.148***
Age square	-0.006	0.001***	-0.006	0.001***
Gender	0.388	0.100***	0.226	0.103**
Married	0.589	0.374	0.575	0.380
One-person household	0.118	0.360	0.107	0.366
Education level				
Illiterate (reference)				
Did not finish primary school	2.003	0.172***	1.907	0.180***
Elementary school	3.188	0.170***	2.973	0.177***
Middle school	3.920	0.179***	3.702	0.186***
High school	4.497	0.205***	4.230	0.212***
College degree and above	4.796	0.360***	4.476	0.365***
Household location				
Rural residence with urban household registration (reference)				
Urban residence with rural household registration (1,1)	0.567	0.234**	0.543	0.239**
Urban residence with urban household registration (1,0)	1.271	0.200***	1.107	0.204***
Rural residence with rural household registration (0,1)	-0.220	0.188	-0.256	0.193
Communist Party of China member	0.539	0.132***	0.451	0.133***
Having savings	0.579	0.094***	0.494	0.096***
Living in the Yangtze River Delta or Pearl River Delta districts	0.133	0.146	0.035	0.150
Instrumental activities of daily living			0.703	0.139***
Center for Epidemiological Studies Depression Scale			0.056	0.008***
Constant	-9.610	5.004*	-10.919	5.197**
Number of observations	5,037		4,669	
Adjusted <i>R</i> squared	0.252		0.261	

Notes: \*\*\*Statistical significance at the 1% level. \*\*Statistical significance at the 5% level. \*Statistical significance at the 10% level.

compared to living in rural areas. Moreover, the estimated coefficients of explanatory variables reveal differences in cognitive abilities even among the older adults residing in cities, depending on their household registration status. In essence, household registration reflects the cumulative effects of socioeconomic status throughout the life cycle, contributing to health disparities.

Regarding Communist Party of China membership, older-aged party members demonstrate superior cognitive abilities compared to non-party members. In China, both the health-care system and social welfare system prioritize the members of the Communist Party of China, signifying an aristocratic status among party members in Chinese society, particularly the old-age. In addition, most of those who manage to become party members originate from the elite class in society. To investigate the impact of physical and mental health on cognitive health, we extended model 5 by incorporating two new explanatory variables to form model 6: IADLs and CESD. These variables represent physical health and mental health, respectively. The results obtained from model 6 indicate that both health variables have statistically significant and positive effects on the cognitive ability of the older adults. Notably, physical health has a particularly significant effect on cognitive ability.

Finally, our analysis of physical, mental, and cognitive health (Table 5) revealed that the explanatory variable “age” and its quadratic term both have statistically significant effects. In addition, most of the socioeconomic variables, including education level, household location, and Communist Party of China membership, also exert a statistically significant effect on physical, mental, and cognitive health. Next, we made a prediction of the dependent variable while keeping other conditions constant in Model 7. As people age, the predicted health ratio initially increases (predicted dependent variable). However, this trend reverses around 72 years old. Figure 9 visually illustrates this trend, showing a sharp drop in the health ratio, especially after the age of 85, when the older adults enter the “oldest old” age category.

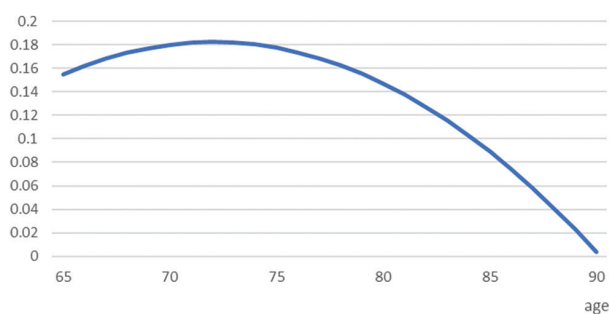


Figure 9. Predicted healthy ratio of older adults in China

In this study, we aimed to analyze the health status of older adults from three different perspectives. Irrespective of the specific health status being evaluated, we incorporated two dummy variables into each regression model: (i) whether the household has savings and (ii) whether the household is located in the Yangtze River Delta or the Pearl River Delta region. Our empirical results indicate that having savings has a statistically significant positive effect on the health condition of the Chinese older adults, regardless of their health status. In addition, the dummy variable for developed regions demonstrates

Table 5. Estimated results concerning physical, mental, and cognitive health (ADLs≥1, IADLs≥1, CESD≥10, MMSE≤23)

Variables	Model 7	
	Coefficient	SE
Age	0.080	0.006***
Age square	-0.001	0.000***
Gender	0.011	0.008
Married	0.033	0.028
One-person household	-0.003	0.028
Education level		
Illiterate (reference)		
Did not finish primary school	0.038	0.010***
Elementary school	0.109	0.011***
Middle school	0.161	0.012***
High school	0.214	0.015***
College degree and above	0.299	0.035***
Household location		
Rural residence with urban household registration (reference)		
Urban residence with rural household registration (1,1)	0.019	0.019
Urban residence with urban household registration (1,0)	0.112	0.018***
Rural residence with rural household registration (0,1)	-0.027	0.016*
Communist Party of China member	0.056	0.012***
Having savings	0.078	0.008***
Living in the Yangtze River Delta or Pearl River Delta districts	0.040	0.013***
Constant	-2.839	0.200***
Number of observations	8,396	
Adjusted R squared	0.161	

Note: \*\*\*Statistical significance at the 1% level. \*\*Statistical significance at the 5% level. \*Statistical significance at the 10% level.

Abbreviations: ADLs: Activities of daily living; CESD: Center for Epidemiological Studies Depression Scale; IADLs: Instrumental activities of daily living; MMSE: Mini-mental state examination; SE: Standard error.

statistically significant positive effects on physical health and mental health, but not on cognitive health. Based on these empirical results, we can argue that there are no apparent regional differences in dementia prevalence among the older ages in China.

## 4. Concluding remarks

In this study, we used the micro-level data obtained from the fourth wave of the CHARLS to investigate the impact of socioeconomic status on the health of older adults in China. Our results reveal that several variables representing socioeconomic status, such as education level, place of residence, household registration type, and party membership, have statistically significant positive effects on their health status, especially mental and cognitive health. However, when it comes to physical health, we did not find a statistically significant effect of socioeconomic status on the older people's ADLs indicator. Considering that different age groups have different experiences leading to their present socioeconomic status, and socioeconomic status has cumulative and continuous effects throughout their life cycle, it is reasonable to assume that older-aged health is influenced by socioeconomic status. While the resource advantages associated with higher socioeconomic status can accumulate, we also observed that the disadvantages faced by those with low socioeconomic status accumulate over time. Health inequalities among the older adults are not solely related to current social stratification; early-life experiences also play a crucial role. This article explores the cumulative effects of early-life socioeconomic states and verifies their existence in Chinese society. Over time, socioeconomic status inequalities among the older adults exacerbate health status inequalities.

After 3 years of the pandemic in China, the post-COVID economy is in recession, the population is aging, and the population is starting to decline. Within the constraints of limited resources, the challenge lies in fairly distributing output and improving the welfare of the majority. Drawing from our empirical results on health inequality among the Chinese older people, we offer a few thoughts and suggestions.

First, in terms of education level, the middle-aged and older-aged population (over 55 years old) in this study were all born before 1963 and lived through the Cultural Revolution in China. During that tumultuous period, most young people missed out on educational opportunities or were unable to pursue higher education due to the 10-year upheaval of the Cultural Revolution. Therefore, the prevalence of dementia in old age is relatively high within this generation. However, given the popularity of education in China today and the increased rate of admission to

higher education, the chances of receiving education have greatly improved compared to 50 years ago. As a result, we anticipate a reduction in the number of older-aged people with dementia due to low education levels in the future.

Second, when considering household location, the urban-rural divide remains one of the most significant challenges in Chinese society. Even within the same provinces, substantial disparities persist between urban and rural areas across various dimensions, including education, income, medical care, and old-age care. Urban residents with urban household registrations tend to benefit from better education since childhood, increased job opportunities, higher income, and access to abundant, high-quality medical and nursing care. Therefore, the health status of Chinese living in cities tends to be better than that of their rural counterparts. Given the ongoing population aging and labor shortage, rural economic development has become increasingly important. Prioritizing local infrastructure construction and easing household registration restrictions to facilitate residents' motility are essential steps for the Chinese government. Narrowing the gap between urban and rural areas not only improves the health of rural residents but also improves the health status of the older adults.

Third, considering the distinctive identity associated with Chinese society, our empirical results suggest that middle-aged and older-aged people who are members of the Communist Party of China usually exhibit excellent mental and cognitive health, along with positive IADLs indicators. Compared to the general population, party members enjoy a higher socioeconomic status and tend to benefit from quality social welfare even after retirement. Therefore, we recommend that the Chinese government expand the scope of services within the social welfare system to include disabled individuals and those living in poverty. In addition, strengthening government transfers and wealth distribution mechanisms will contribute to overall improvements in the social welfare system.

Finally, China has recently entered the phase of an aged society last year, with the average age in the data, we used being 67.9 years old. Population aging is not yet severe, and the health condition of the older adults is relatively good, as indicated by the healthy ratio of 0.174 (Figure 9). Policymakers should proactively establish several institutions to provide long-term care services for the older persons living in rural areas, where medical resources are insufficient. We emphasize that the Chinese government needs to accelerate efforts to narrow the gap between urban and rural areas, increase the transfer of social resources, and drastically reform the social security system. By focusing on a long-term, sustainable, yet

often invisible social welfare system and social transfer, China will be better prepared to face the challenges of a society burdened with population aging and a declining population in the future.

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## Conflict of interest

The authors declare no conflict of interest.

## Author contributions

*Conceptualization:* All authors

*Format analysis:* All authors

*Methodology:* All authors

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## Ethics approval and consent to participate

Not applicable.

## Consent for publication

Not applicable.

## Availability of data

Data used in this work are available from the fourth wave of the CHARLS (<https://charls.pku.edu.cn/en/>).

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## RESEARCH ARTICLE

Examining intergenerational transfers in  
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## Abstract

With the demographic changes toward the aging population, the role of intergenerational support and transfers has become increasingly prominent in the family support network. Using the Malaysia Ageing and Retirement Survey Wave 1 conducted in 2018/2019, this study analyzed the flow and factors associated with the amount of intergenerational financial transfers across three generations via multiple regression analysis. The results showed an upstream flow of financial support from younger to older generations. Variables with significant capability in determining the amount of intergenerational financial transfers include age, gender, ethnicity, education level, marital status, employment, health status, number of living children or parents, income, and financial assistance received from the government. Findings from this study are useful for policymakers to understand the issues of old-age financial security in Malaysia and thus implement relevant policies such as improving the coverage and adequacy of existing social protection programs, strengthening family support networks, as well as educating the public on the importance of having sound financial knowledge.

**Keywords:** Intergenerational relationships; Intergenerational transfers; Financial transfers; Malaysia

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## 1. Introduction

The world is grappling with the inevitable trend of population aging. An indication of the aging trend is the higher world average life expectancy, which had increased from 51 years in 1960 to 73 years in 2019 (World Bank & World Development Indicators, 2019).

Despite the remarkable progress made in extending life expectancy, population growth is observed to be decelerating, which is around 1% as of 2023 (World Bank & World Development Indicators, 2024). As a result, in 2018 for the first time ever, the population of persons aged 65 and older exceeded that of children under the age of five (UN, 2019). The combination of an aging population and a declining birth rate raises serious concerns about the sustainability of economic development in the future, particularly for low- and middle-income countries. The absence of appropriate policy planning will undoubtedly hurt the overall well-being of older persons.

Malaysia's population distribution in the 1970s was predominantly dominated by younger age groups. The population's composition has changed toward older-age cohorts as a result of the demographic transition that took place over the last several decades.

Since 2020, Malaysia has become a country with an aging population. As of 2022, there are about 2.4 million persons in Malaysia who are 65 years of age or older (DOSM, 2022). Malaysia is projected to become a country with an aged population by 2040.

The aging population in Malaysia presents significant challenges since it puts more strain on those of working age, particularly the “sandwiched generation,” who must financially provide for their parents and children at the same time. For every 100 persons of working age, the old-age dependency ratio is predicted to rise from 7.4 in 2010 to 21.7 in 2040 (DOSM, 2016). There will be more older people who need to be supported by the working-age population in the future.

Meanwhile, the fertility rate fell below the 2.1 national replacement level in 2021, falling from 4.9 children per woman in 1970 to 1.6 in 2022 (DOSM, 2023). The reasons behind Malaysian women’s declining fertility rate can be attributed to the increasing participation of women in the labor force, delay in marriage among women, and the spike in childcare costs in recent years (Bakar & Abdullah, 2010; Hartani *et al.*, 2015; Jones, 2007; Tey *et al.*, 2012; Tang & Tey, 2017).

Concerns about income security and the ability of most Malaysian adults to live well in old age are a result of several structural problems, including the lack of social protection coverage and adequacy, as well as low earnings that result in poor retirement savings. As a result, transfers from family members are a major source of income for many Malaysian individuals, particularly older persons (Masud *et al.*, 2008). Strong familial ties and a culture of filial piety are also common among Malaysians (Aziz & Yusoff, 2012). Therefore, intergenerational transfers are a recurrent pattern among Malaysian families, independent of their motivations, which could either be driven by old-age security, unselfish altruism, or even paying back earlier educational expenditures made for the children (Lillard & Willis, 1997).

The flow and direction of intergenerational transfers are determined by a number of factors. The intergenerational transfer debate is important because the average family size in Malaysia is expected to become smaller due to declining birth rates and fertility rates. As a result, financial support from families will soon decline, as evidenced in numerous studies (Chou, 2010; Knodel *et al.*, 2000; Logan & Bian, 2003; Zimmer & Kwong, 2003).

Using Malaysia Ageing and Retirement Survey (MARS) Wave-1 data, this study intends to analyze the factors associated with the amount of intergenerational transfers between three generations in Malaysia, from the

perspective of respondents and their parents, as well as respondents and their children.

Living in a multigenerational household that extends to three generations is quite common in Malaysia. For example, in MARS Wave-1 data, it is found that 10.8% of respondents live together with their children and parents under the same roof. The household structure can be a significant factor in determining the pattern of intergenerational transfers in Malaysia.

In this paper, three research questions will be addressed:

- (1) What are the patterns and flow of intergenerational transfers in Malaysia, whether upstream or downstream?
- (2) How do sociodemographic and socioeconomic backgrounds affect the pattern of intergenerational transfers in Malaysia?
- (3) What motivates intergenerational transfers in Malaysia?

Findings from this study can help policymakers better comprehend Malaysia’s aging population, especially with regard to old-age financial security. Furthermore, it can serve as valuable input in policy formulation to improve coverage and adequacy of existing social protection programs, strengthen family support systems, and raise public awareness on the importance of having good financial management.

## 1.1. Motives, flow, and factors associated with intergenerational transfers

Willis (1979) proposed the old-age security hypothesis, in which individuals in traditional society rely on transfers from their children for financial security during old age. Financial support given to parents may occur out of the altruistic behavior of the children (Becker, 1974). It can also act as an exchange or payment for services provided by the parents such as taking care of grandchildren and helping with domestic chores (Bernheim *et al.*, 1985). The parental repayment theory, which holds that parents may receive financial assistance in exchange for prior human capital expenditures they made, such as paying for their children’s education, is another primary driver (Becker & Tomes, 1976).

Intergenerational financial transfers, particularly upstream transfers from younger to older generations, are commonly observed in developing countries due to a lack of formal pension coverage and stable income during retirement (Chan, 2005; Knodel *et al.*, 2000; Lillard & Willis, 1997; Logan & Bian, 2003, Zimmer & Kwong, 2003).

There are also several past studies documenting the factors associated with the amount of intergenerational

financial transfers. Overall, it has been observed that respondents who are younger, male, working adults, better educated, have higher incomes, are healthier, and have more parents or children tend to provide greater financial support to their parents or children. At the same time, they receive less financial assistance in return. Conversely, it has been shown that older, female, lower-income, and less educated people give their parents or children less money but also receive more from them (Chou, 2010; Khan, 2013; Logan & Bian, 2003; Masud *et al.*, 2008; Sloan *et al.*, 2002). Living arrangements were also found to be a significant predictor of intergenerational transfers (Silverstein *et al.*, 2006).

Varying patterns of intergenerational transfers may also be seen across ethnic groups as a result of differences in their cultural and socioeconomic backgrounds. For instance, Bumiputera (including Malay, and Bumiputera Sabah, and Sarawak) has the lowest mean household income, at RM 7,093, compared to Chinese (RM 9,895) and Indian (RM 8,216) (DOSM, 2019). Therefore, Bumiputera is expected to be more dependent on financial transfers from their parents and children, compared to other ethnic groups. On the other hand, considering their greater financial capacity, respondents who are Chinese and Indian are anticipated to provide more financial transfers to their parents and children. However, Bumiputera (Sabah and Sarawak) are expected to receive lesser financial transfers from their parents or children while providing it at a lesser amount than Malay. This can be supported by the fact that Sabah and Sarawak have the second and sixth lowest median household income, respectively, among all states and territories in Malaysia.

## 2. Data and methods

MARS Wave-1 is a nationwide longitudinal survey on aging and retirement that was carried out between 2018 and 2019 by the Social Wellbeing Research Centre (SWRC). MARS Wave 1 involved 5,613 respondents aged 40 years and older living in Malaysia.

MARS Wave-1 is part of the harmonized database including the U.S. Health and Retirement Survey; Survey of Health, Ageing, and Retirement Europe; and the Japanese Study of Ageing and Retirement. MARS has 260 questions that fall under five main components: background information of the respondents and family members, health and health care utilization, work, and employment, income and expenditure, as well as savings and assets.

With regards to the intergenerational transfers, MARS respondents were asked whether they received

or gave financial and non-financial support (*e.g.*, providing food or clothing, looking after grandchildren, assisting parents in daily activities, *etc.*) from and to their parents, siblings, and children. For financial support, respondents were asked to indicate which family members they give or receive financial support from, their frequency (either on a monthly or yearly basis), and the amount in Ringgit Malaysia (RM). For respondents who live together with their children or parents, the survey asked them to indicate the amount of financial support that is excluded from any shared living costs such as rent, utility, and food. The sample is chosen among respondents who still have living children or parents.

### 2.1. Statistical analysis and conceptual framework

To determine the distribution of intergenerational transfers, descriptive analysis was first conducted on all dependent and independent variables. This was followed by bivariate analysis. Subsequently, multiple linear regression analysis was performed to examine the significant factors that are associated with the amount of intergenerational financial transfers between respondents and their children or parents. IBM SPSS 26.0 was used to conduct the statistical analysis for this study.

This study has four dependent variables to indicate four different flows of intergenerational financial transfers, particularly to and from respondents and children, as well as to and from respondents and parents. The dependent variables were derived from the total amount of financial transfers between respondents and their children or parents. These amounts were transformed into logarithmic form to mitigate data skewness and ensure a normal distribution. Since the dependent variables are expressed in the natural log form, the interpretation of their coefficients in the multiple regression models is made in percentage terms. The financial transfer amount that is recorded on an annual basis is converted into a monthly basis for standardization. The conceptual framework for this study is illustrated in [Figure 1](#).

The independent variables for this study include age, gender, ethnicity, education, marital status, living arrangement, employment status, health status, number of living parents/children, income, and financial assistance received from the government. All the independent variables are categorical. This study hypothesizes that there are significant variations in the factors associated with intergenerational transfers that took place between the respondents and their children or parents.

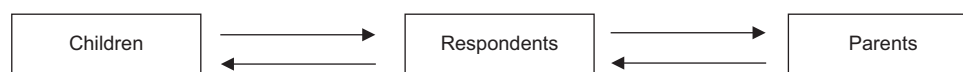


Figure 1. Conceptual framework of intergenerational transfers

### 3. Results

#### 3.1. Profile of respondents and amount of financial transfers

More respondents reported having living children (92.3%, or 5,181 respondents) than living parents (46.6%, or 2,614 respondents). The majority of the respondents had between 1 – 3 children (43.6%) and 4 – 6 children (43.9%). Only 12.5% of the respondents had more than 7 children. On the other hand, more than half of the respondents had only one living parent while only 3.2% still had all four living parents, including parents-in-law. About 31% of the respondents also had at least one parent and one child alive.

Among respondents who have living children, the pattern declines with age. There are more male (57%) than female respondents (43%). Malay comprised about 60% of the respondents, followed by Bumiputera (Sabah and Sarawak) (22.3%), Indian and Others (10.5%), and Chinese (10.1%). Bumiputera (Sabah and Sarawak) consists of various Bumiputera ethnicities living in Sabah and Sarawak, including Iban, Dusun, Bajau, and Bugis. Meanwhile, the category “Others” refers to respondents of mixed parentage and those having permanent residence status. About a third quarter of the respondents had a primary school qualification, while only 12% had a tertiary level of education. More than 80% of the respondents had a spouse, while the rest had no spouse (either never married, widowed, divorced, or separated). The majority of the respondents lived together with their children (77.6%). The proportion of respondents who are currently working and homemakers is quite similar, at 38%. About 20% have retired while 5% are not working due to labor market reasons (e.g., unemployed, temporarily laid off, on sick leave, disabled, and unable to work). Half of the respondents reported having good health. Only 12% admitted they have poor health. Slight more than a quarter of the respondents (28%) had no income, while 11.3% earned more than RM 3,000. About 15% of the respondents received financial assistance from the government. With regards to non-financial support, 17.1% reported taking care of their grandchildren, while about 20% helped their children with household chores (Table 1).

Similarly, the proportion of respondents who still have living parents declines with their age. There are more male (57.5%) than female (42.5%) respondents in this sample. The biggest proportion is Malay (59.2%), followed

by Bumiputera (Sabah and Sarawak) (22.6%), Indian and Others (9.5%), and Chinese (8.8%). The majority of respondents are well-educated, possessing at least a secondary (59.0%) or tertiary level of education (16.6%). About nine out of ten respondents had a spouse. In terms of living arrangements, about 80% lived with their parents. Slightly more than half of the respondents are currently working, followed by homemakers (30.5%), retired (11.7%), and not working due to labor market reasons (4.7%). Sixty percent of the respondents reported having good health, while only 7.7% had poor health. Almost one-quarter of the respondents (24%) had no income, while 16% earned more than RM 3,000. About one out of five respondents received financial assistance from the government. Those who took care of their grandchildren account for 16.4% of the sample, while 18.3% helped their children with household chores (Table 2).

Overall, there is an upstream flow of financial transfers. More respondents were observed to be receiving financial support from their children (48.1%), than providing it (41.4%). The median amount received by the respondents from their children is RM 283 monthly. Meanwhile, respondents reported giving lower financial support to their children with a median of RM 252/month.

The proportion of respondents giving financial support to their parents is 20.7%, substantially higher than the amount transferred in the opposite direction (2.1%). The median monthly amount given to parents is RM 100, whereas the median amount received from parents is RM 50 (Table 3).

#### 3.2. Bivariate analysis

##### 3.2.1. Giving and receiving financial transfers

Tables 4 and 5 compare the distribution of respondents, whether they gave or received financial transfers from four different situations, *that is*, none, children only, parents only, or both.

The proportion of those who did not provide any financial support to their children or parents is found to be prevalent among respondents who are males, older, Chinese, had a lower level of education, had no spouse, currently not working, earned lower income, and had poorer health. Meanwhile, the percentage of respondents who provided financial transfers only to their children was observed to be higher among those who are female, younger, Malay, Bumiputera (Sabah and Sarawak), had a

**Table 1. Distribution of respondents with living children**

Variables	<i>n</i>	Percentage
Age		
40 – 49 years	1,276	24.6
50 – 59 years	1,699	32.8
60 – 69 years	1,339	27.0
70 – 79 years	666	12.8
80 years and above	147	2.8
Gender		
Male	2,956	57.0
Female	2,232	43.0
Ethnic groups		
Malay	2,964	57.1
Chinese	524	10.1
Indian & Others	544	10.5
Bumiputera (Sabah and Sarawak)	1,156	22.3
Education level		
No schooling	675	13.0
Primary	1,503	29.0
Lower secondary	1,079	20.8
Upper secondary	1,331	25.7
Tertiary	1,600	11.6
Marital status		
With spouse	4,213	81.2
Without spouse	975	18.8
Living with children		
No	1,115	22.7
Yes	3,854	77.6
Current employment status		
Not working due to labor market reasons	235	4.5
Retired	1,004	19.4
Homemaker	1,962	38.0
Currently working	1,968	38.1
Self-reported health status		
Poor	612	11.8
Moderate	1,956	37.8
Good	2,612	50.4
Number of living children		
1 – 3 children	2,262	43.6
4 – 6 children	2,276	43.9
7 – 9 children	531	10.2
More than 10 children	119	2.3
Income class		
No income	1,449	28.0
Less than RM 1,000	1,485	28.7

(Cont'd...)

**Table 1. (Continued)**

Variables	<i>n</i>	Percentage
RM 1,001 – RM 1,999	1,167	22.6
RM 2,000 – RM 2,999	483	9.3
More than RM 3,000	583	11.3
Received government financial assistance		
No	4,345	77.4
Yes	836	14.9
Taking care of grandchildren		
No	4,651	82.9
Yes	960	17.1
Helping with household chores		
No	4,504	80.3
Yes	1,107	19.7

higher education level, had a spouse, currently working, earning a higher income, in better health status, as well as received financial assistance from the government. Similarly, those providing financial support to both of their children and parents is higher among respondents who are younger, Malay, with tertiary education, had a spouse, had more living parents, currently working, received higher income, are healthier, not receiving government financial assistance, took care of their grandchildren and helped their children with household chores.

In the opposite direction, the proportion of respondents who did not receive any financial transfers from their children or parents is higher among respondents who are males, younger, Bumiputera (Sabah and Sarawak), had a higher level of education and income, had a spouse, had more living parents, are currently working, healthier, as well as those who had received financial assistance from the government. However, the percentage of respondents who received financial support from children only is prevalent among respondents who are female, older, Malay, had a lower level of education and income, had a spouse, had more children, had retired, had poorer health status, and did not receive any financial assistance from the government. On the other hand, those who reported having received financial transfers from both children and parents are observed to be higher among respondents who are female, younger, Malay, and had a spouse.

### 3.3. Multiple regression analysis

#### 3.3.1. Financial transfers between respondents and children

All variables were found to be statistically significant in determining the total amount of financial transfers given

**Table 2. Distribution of respondents with living parents**

Variables	<i>n</i>	Percentage
Age		
40 – 49 years	1,228	46.9
50 – 59 years	1,012	38.6
60 – 69 years	338	12.9
70 – 79 years	39	1.5
80 years and above	2	0.1
Gender		
Male	1,505	57.5
Female	1,114	42.5
Ethnic groups		
Malay	1,550	59.2
Chinese	230	8.8
Indian& others	248	9.5
Bumiputera (Sabah and Sarawak)	591	22.6
Education level		
No schooling	137	5.2
Primary	502	19.2
Lower secondary	622	23.7
Upper secondary	924	35.3
Tertiary	434	16.6
Marital status		
With spouse	342	13.1
Without spouse	2,277	86.9
Living with parents		
No	554	22.0
Yes	1,960	78.0
Currently employment status		
Not working due to labor market reasons	122	4.7
Retired	305	11.7
Homemaker	797	30.5
Currently working	1,388	53.1
Current health status		
Poor	200	7.7
Moderate	842	32.2
Good	1,572	60.1
Number of living parents		
1 parent	1,424	54.5
2 parents	773	29.6
3 parents	333	12.7
4 parents	84	3.2
Income class		
No income	617	23.6
Less than RM 1,000	651	24.9

(Cont'd...)

**Table 2. (Continued)**

Variables	<i>n</i>	Percentage
RM 1,001 – RM 1,999	651	24.9
RM 2,000 – RM 2,999	283	10.8
More than RM 3,000	412	15.8
Received government financial assistance		
No	2,077	79.5
Yes	537	20.5
Taking care of grandchildren		
No	2,029	83.6
Yes	399	16.4
Helping with household chores		
No	1,983	81.7
Yes	445	18.3

**Table 3. Description of transfers**

	Respondents with children	
	Percentage	Median monthly amount (RM)*
Financial transfers to children	41.4	252
Financial transfers from children	48.1	283
	Respondents with parents	
	Percentage	Median monthly amount (RM)*
Financial transfers to parents	20.7	100
Financial transfers from parents	2.1	50

Note: \*1 Malaysian ringgit=0.21 U.S. dollar (as of September 18, 2023).

to children, except for marital status, living arrangement, health status, and government financial assistance (Table 6). Meanwhile, in the opposite direction, the variables that are not statistically significant are gender, marital status, and living arrangement (Table 7).

Older respondents were observed to give a lesser amount of financial support to their children, compared to younger respondents. For example, respondents aged more than 70 years gave 48.1% lesser financial transfers amount to their children, compared to respondents aged 40 – 49 years. In contrast, the amount that older respondents (aged 60 – 69 years) received from their children increased by 13.9% compared to younger respondents.

Female respondents were found to give 12.9% lesser financial support amount to their children, compared to male respondents. However, they were also found to receive 1.3% lesser financial support amount from their children compared to male respondents, though it is not statistically significant.

Table 4. Bivariate analysis (giving financial transfers)

Variables	Given to (%)				$\chi^2$
	None	Children only	Parents only	Both	
Gender					7.927 <sup>b</sup>
Male	54.6	37.2	2.2	6.0	
Female	50.9	40.9	2.1	6.1	
Age groups					730.309 <sup>c</sup>
40 – 49 years old	31.0	52.6	3.0	13.4	
50 – 59 years old	42.6	49.1	2.8	5.4	
60 – 69 years old	70.2	26.1	1.4	2.3	
70 years old and above	79.8	17.4	0.6	2.2	
Ethnic groups					250.492 <sup>c</sup>
Malay	47.1	41.5	2.7	8.7	
Chinese	70.1	23.0	3.3	3.6	
Indian & Others	60.9	30.1	2.6	6.4	
Bumiputera (Sabah and Sarawak)	56.8	43.1	0.1	0.1	
Education level					651.309 <sup>c</sup>
No schooling	79.8	19.4	0.3	0.6	
Primary school	64.8	31.7	1.4	2.1	
Lower secondary school	50.1	43.3	1.6	4.9	
Upper secondary school	38.6	49.1	3.5	8.9	
Tertiary education	30.4	47.5	4.2	17.9	
Marital status					188.427 <sup>c</sup>
Without spouse	72.5	24.4	1.0	2.1	
With spouse	48.5	42.1	2.4	7.0	
Number of living children					28.760 <sup>c</sup>
1 – 3	54.8	36.4	2.5	6.3	
4 – 6	50.5	40.7	2.1	6.6	
7 and above	55.8	40.2	0.9	3.0	
Number of living parents					1038.991 <sup>c</sup>
0	70.1	29.9			
1	39.8	45.8	5.0	9.3	
2	28.0	52.4	4.7	14.8	
3	23.3	54.0	2.5	20.2	
4	25.9	45.7	3.7	24.7	
Living with children					2.486
Yes	54.2	38.5	2.2	5.1	
No	52.9	38.5	2.2	6.4	
Living with parents					1.879
Yes	53.5	38.3	2.1	6.0	
No	50.9	39.9	2.3	6.9	
Employment status					611.100 <sup>c</sup>
Working now	31.9	53.8	2.9	11.4	
Not working due to labor market reasons	64.7	29.4	1.7	4.3	

(Cont'd...)

Table 4. (Continued)

Variables	Given to (%)				$\chi^2$
	None	Children only	Parents only	Both	
Retired	68.8	27.4	1.3	2.5	
Homemakers	64.6	30.7	1.9	2.8	
Monthly income					456.511 <sup>c</sup>
<RM 1,000	63.1	32.4	1.5	3.0	
RM 1,001 – RM 1,999	44.0	48.1	2.0	5.9	
RM 2,000 – RM 2,999	42.6	44.3	2.7	10.4	
RM 3,000 and above	28.7	47.7	5.3	18.2	
Health status					140.853 <sup>c</sup>
Good	46.1	42.9	3.0	8.0	
Moderate	57.7	36.3	1.4	4.6	
Poor	67.6	29.1	1.0	2.3	
Received government financial assistance					30.990 <sup>c</sup>
No	53.1	37.9	2.5	6.5	
Yes	52.9	43.3	0.4	3.5	
Taking care of grandchildren					2.124
No	52.8	39.0	2.2	5.9	
Yes	54.0	37.4	1.8	6.8	
Helping with household chores					6.879 <sup>a</sup>
No	52.9	39.2	2.2	5.7	
Yes	53.6	36.9	1.9	7.7	

Note: <sup>a</sup> $p < 0.10$ , <sup>b</sup> $p < 0.05$ , <sup>c</sup> $p < 0.01$ .

Indian and Others respondents provided 16.6% more financial transfers to their children than Malay. However, other ethnic groups, Chinese and Bumiputera (Sabah and Sarawak) are not statistically significant in the analysis. Meanwhile, Chinese, Indian, and Others respondents were found to receive 63.2% and 25.3%, respectively, more financial transfers from their children.

The amount given to children was also found to be increasing with the level of education of the respondents. Against those with no schooling experience, respondents with tertiary education provided the highest financial transfers to their children (91.4%). However, respondents with a lower level of education received fewer financial transfers amount from their children. Those with no schooling experience received 58.5% lesser financial support from their children, compared to respondents with a tertiary education.

Expectedly, respondents who were working gave 11.7% more financial transfers amount to their children. On the contrary, those who have retired or as homemakers received 26.8% and 42.4%, respectively, more financial transfers from their children compared to working respondents. The amount of financial transfers given to

children also decreases as health deteriorates, although it is not statistically significant. Surprisingly, our findings revealed respondents with moderate or poor health received less financial support from their children, compared to respondents in good health.

Respondents with more than seven children gave the highest, at 27.7% more financial transfers compared to respondents who had between one to three children. Similarly, in the opposite direction, the amount of financial transfers received from children increased with the number of children.

Respondents earning higher income were observed to provide more financial support amount to their children. Respondents with an income of more than RM 3,000 gave the highest financial transfers to their children (85.8%). However, it is observed that respondents earning low income tend to receive lower financial support from their children compared to respondents with higher income. Respondents who earned less than RM 1,000 received 22.4% lesser financial transfers from their children. Respondents who received financial assistance from the government were found to receive lesser financial support from their children.

Table 5. Bivariate analysis (receiving financial transfers)

Variables	Received from (%)				$\chi^2$
	None	Children only	Parents only	Both	
Gender					47.979 <sup>c</sup>
Male	50.9	48.5	0.5	0.2	
Female	42.6	55.7	0.8	1.0	
Age groups					412.188 <sup>c</sup>
40 – 49 years old	68.9	28.6	1.6	0.9	
50 – 59 years old	45.7	53.5	0.2	0.6	
60 – 69 years old	36.3	63.2	0.2	0.3	
70 years old and above	35.7	63.6	0.5	0.2	
Ethnic groups					42.751 <sup>c</sup>
Malay	44.4	54.0	0.7	0.8	
Chinese	49.6	49.4	0.8	0.2	
Indian & Others	49.7	48.6	1.1	0.6	
Bumiputera (Sabah and Sarawak)	52.4	47.6	-	-	
Education level					240.611 <sup>c</sup>
No schooling	40.0	59.8	0.1	-	
Primary school	37.9	61.3	0.3	0.5	
Lower secondary school	44.9	53.7	0.7	0.7	
Upper secondary school	53.3	44.8	1.0	0.8	
Tertiary education	69.9	28.8	1.2	0.2	
Marital status					83.370 <sup>c</sup>
Without spouse	34.5	64.7	0.4	0.4	
With spouse	50.3	48.5	0.7	0.6	
Number of living children					275.945 <sup>c</sup>
1 – 3	59.2	39.1	1.1	0.6	
4 – 6	40.4	58.8	0.3	0.5	
7 and above	30.1	69.1	0.2	0.6	
Number of living parents					378.440 <sup>c</sup>
0	39.1	60.9	-	-	
1	48.4	49.5	0.9	1.1	
2	63.3	34.7	1.0	1.0	
3	69.6	26.1	2.8	1.6	
4	77.8	16.0	4.9	1.2	
Living with children					0.759
Yes	46.9	52.2	0.5	0.4	
No	47.6	51.1	0.6	0.6	
Living with parents					5.029
Yes	47.0	51.8	0.6	0.6	
No	51.1	48.1	0.7	0.2	
Employment status					310.100 <sup>c</sup>
Working now	61.5	36.7	1.0	0.9	
Not working due to labor market reasons	47.2	51.1	0.9	0.9	

(Cont'd...)

Table 5. (Continued)

Variables	Received from (%)				$\chi^2$
	None	Children only	Parents only	Both	
Retired	34.4	65.4	0	0.2	
Homemakers	39.4	59.7	0.6	0.4	
Monthly income					161.020 <sup>c</sup>
<RM 1,000	42.1	56.9	0.4	0.5	
RM 1,001 – RM 1,999	47.4	51.4	0.5	0.7	
RM 2,000 – RM 2,999	51.8	46.4	1.5	0.4	
RM 3,000 and above	68.8	29.6	1.2	0.3	
Health status					83.565 <sup>c</sup>
Good	53.2	45.4	0.8	0.7	
Moderate	41.6	57.7	0.4	0.4	
Poor	39.9	58.8	0.7	0.7	
Received government financial assistance					123.421 <sup>c</sup>
No	44.0	54.8	0.6	0.6	
Yes	64.5	34.7	0.8	-	
Taking care of grandchildren					1.305
No	47.4	51.4	0.6	0.6	
Yes	46.8	52.2	0.6	0.3	
Helping with household chores					3.289
No	47.8	51.0	0.6	0.5	
Yes	44.7	54.3	0.5	0.6	

Note: <sup>a</sup> $p < 0.10$ , <sup>b</sup> $p < 0.05$ , <sup>c</sup> $p < 0.01$ .

### 3.3.2. Financial transfers between respondents and parents

All variables that determine the financial support amount given by respondents to their parents, except for age, gender, and living arrangement, are statistically significant (Table 8). Meanwhile, five independent variables were found to be significant in determining the total amount of financial transfers that the respondents received from their parents, which are age, gender, ethnicity, and marital status (Table 9).

Compared to Malay, all other races were observed to provide more financial support amount to their parents. Respondents with a higher education level had more living parents, not working due to labor market reasons, and earned a higher income also were observed to give more financial transfers to their parents. However, those with spouses who had poorer health conditions and received financial assistance from the government were observed to provide less money to their parents.

Meanwhile, older respondents and being Indian and Others enabled them to receive more financial support from their parents. However, respondents who are female

or had a spouse were observed to receive lower financial transfers from their parents.

## 4. Discussion

Female respondents were observed to provide lesser financial support amount to their children compared to their male counterparts. Compared to men, women in Malaysia tend to be outside of the labor force, fulfilling their roles as housewives. These women's lack of participation in the workforce restricts their financial capacity to support for their children. Unfortunately, compared to male respondents, they also received less financial support from their parents or children.

These findings are concerning because their lack of participation in the labor market hinders them from earning a regular income through paid work, which in turn prevents them from saving enough money for old age. They will therefore be more financially dependent on their children (Hamid *et al.*, 2004). Masud *et al.* (2008) have cautioned that Malaysian women are more likely to face poverty in their old age because of the possibility of inadequate financial support from their children – especially if their children have low salaries.

**Table 6. Multiple regression result (financial support given to children)**

No. of observation	5,181		
F-statistics	31.410		
R-squared	0.256		
Adj. R-squared	0.248		
Variable	Coefficient	Standard error	t-statistics
Age			
40 – 49 years old (reference)			
50 – 59 years old	-0.037	0.055	-0.676
60 – 69 years old	-0.489 <sup>c</sup>	0.075	-6.492
More than 70 years old	-0.481 <sup>c</sup>	0.101	-4.780
Gender			
Male (reference)			
Female	-0.129 <sup>c</sup>	0.050	-2.587
Ethnicity			
Malay (reference)			
Chinese	0.112	0.100	1.113
Indian & Others	0.166 <sup>a</sup>	0.086	1.936
Bumiputera (Sabah and Sarawak)	-0.098	0.061	-1.607
Education level			
No schooling (reference)			
Primary school	0.061	0.110	0.555
Lower secondary school	0.378 <sup>c</sup>	0.111	3.395
Upper secondary school	0.573 <sup>c</sup>	0.111	5.165
Tertiary	0.914 <sup>c</sup>	0.124	7.349
Marital status			
Without spouse (reference)			
With spouse	0.042	0.077	0.545
Living arrangement			
Not living with children (reference)			
Living with children	0.066	0.056	1.195
Current employment status			
Working now	0.117 <sup>b</sup>	0.059	1.964
Not working due to labor market reasons	0.036	0.138	0.258
Retired	-0.004	0.083	-0.050
Homemakers (reference)			
Self-reported health status			
Good health (reference)			
Moderate health	-0.080	0.051	-1.573
Poor health	-0.115	0.089	-1.293
Number of living children			
1 – 3 children (reference)			
4 – 6 children	0.246 <sup>c</sup>	0.051	4.835
More than 7 children	0.277 <sup>c</sup>	0.078	3.533

(Cont'd...)

Table 6. (Continued)

Variable	Coefficient	Standard error	t-statistics
Income group			
<RM 1,000 (reference)			
RM 1,000 – RM 1,999	0.298 <sup>c</sup>	0.059	5.071
RM 2,00 – RM 2,999	0.470 <sup>c</sup>	0.080	5.886
More than RM 3,000	0.858 <sup>c</sup>	0.081	10.644
Received government financial assistance			
No (reference)			
Yes	0.017	0.064	0.257
C	4.645 <sup>c</sup>	0.154	30.235

Note: ap<0.10, bp<0.05, cp<0.01.

Nevertheless, although female respondents might not be able to contribute financially to their children as much as the male respondents, they still provide non-financial support, such as helping with household chores, and taking care of the grandchildren. About 17% of female respondents from MARS Wave-1 reported taking care of their grandchildren.

The results also revealed that there is an upstream flow of intergenerational transfers, from the younger to the older generation, similar to a trend described by Lillard & Willis (1997). As for the motives, our findings confirm the existence of the old-age security hypothesis, whereby as the respondents get older, they are expected to receive more financial support from their children rather than providing it.

We also observed that low-income respondents are more financially dependent on their children compared to those with higher incomes, although the actual amount received is smaller. Low wages and salaries received throughout most of the working period may be the cause of this predicament, which left them unable to sustain their livelihood on their own. Eventually, this forces them into a position where they must rely on their children for financial support. This puts a burden on the working-age population and is further exacerbated if the children are unable to secure better jobs that can provide them with better salaries and benefits than their parents, thus catapulting them into financial insecurity or worse, trapping them in an endless poverty cycle.

Our findings also showed that respondents who received government assistance were found to be getting fewer financial transfers from their children. This demonstrates how the government's financial assistance plays a crucial role in easing the financial burden that the younger generation has in providing for their parents.

On a positive note, the findings are in line with altruistic behavior, in which respondents having a higher level of education and income were observed to provide more financial support to their parents or children. The results also validate the parental repayment hypothesis, which postulates that parents' earlier investments in human capital were repaid in proportion to the respondents' income and educational attainment. This is supported by the fact that the investment in higher education within Malaysian households has been increasing over the decades. The proportion of the Malaysian labor force having a tertiary education has been increasing over the last several decades. Only 6.1% of the Malaysian labor force had a tertiary education in 1982, compared to around 31.8% in 2021 (DOSM, 2021).

Bumiputera (Sabah and Sarawak) respondents were found to give more financial support amount to their parents than Malay respondents, following a similar pattern to Chinese and Indian and Others respondents. Earlier, we proposed Bumiputera (Sabah and Sarawak) will provide lesser financial support amount to their parents, considering they have lower income in general. Although the pattern in providing financial support to parents for Bumiputera (Sabah and Sarawak) is similar to Chinese, Indian, and others, the motives behind these transfers can be varied.

Chinese and Indian and Others respondents can provide more financial transfers to their parents since their average household income is higher than Malay. Therefore, they can provide more money to their parents, despite their parents might not be too financially dependent on them. On the other hand, Bumiputera (Sabah and Sarawak) respondents may need to provide their parents with greater financial support because their parents are reliant on them. This is supported by the fact that across states in Malaysia, Sabah has the highest incidence of absolute poverty, while

**Table 7. Multiple regression result (financial support received from children)**

Variable	Coefficient	Standard error	t-statistics
No. of observation	5,181		
F-statistics	10.765		
R-squared	0.088		
Adj. R-squared	0.080		
<b>Age</b>			
40 – 49 years old (reference)			
50 – 59 years old	0.090	0.076	1.191
60 – 69 years old	0.139 <sup>a</sup>	0.080	1.739
More than 70 years old	0.100	0.090	1.102
<b>Gender</b>			
Male (reference)			
Female	-0.013	0.052	-0.252
<b>Ethnicity</b>			
Malay (reference)			
Chinese	0.632 <sup>c</sup>	0.085	7.428
Indian & Others	0.253 <sup>c</sup>	0.083	3.053
Bumiputera (Sabah and Sarawak)	-0.057	0.065	-0.882
<b>Education level</b>			
No schooling	-0.585 <sup>c</sup>	0.126	-4.638
Primary school	-0.369 <sup>c</sup>	0.113	-3.261
Lower secondary school	-0.190 <sup>a</sup>	0.115	-1.656
Upper secondary school	-0.257 <sup>c</sup>	0.112	-2.304
<b>Tertiary (reference)</b>			
<b>Marital status</b>			
Without spouse (reference)			
With spouse	-0.022	0.061	-0.354
<b>Living arrangement</b>			
Not living with children (reference)			
Living with children	0.056	0.056	1.002
<b>Current employment status</b>			
Working (reference)			
Not working due to labor market reasons	0.094	0.125	0.749
Retired	0.268 <sup>c</sup>	0.071	3.760
Homemaker	0.424 <sup>c</sup>	0.063	6.724
<b>Current health status</b>			
Good health (reference)			
Moderate health	-0.138 <sup>c</sup>	0.052	-2.671
Poor health	-0.112	0.076	-1.478
<b>Number of living children</b>			
1 – 3 children (reference)			
4 – 6 children	0.137 <sup>b</sup>	0.054	2.534
More than 7 children	0.322 <sup>c</sup>	0.075	4.379

(Cont'd...)

Table 7. (Continued)

Variable	Coefficient	Standard error	t-statistics
Income group			
Less than RM 1,000	-0.224 <sup>c</sup>	0.106	-2.115
RM 1,000 – RM 1,999	-0.020	0.110	-0.184
RM 2,000 – RM 2,999	0.213	0.125	1.710
More than RM 3,000 (reference)			
Received government financial assistance			
No (reference)			
Yes	-0.548 <sup>a</sup>	0.081	-6.802
C	5.423 <sup>c</sup>	0.160	33.798

Note: <sup>a</sup> $p < 0.10$ , <sup>b</sup> $p < 0.05$ , <sup>c</sup> $p < 0.01$ .

Sarawak has the third highest (DOSM, 2019). A study by Mohd *et al.* (2018) also found there is a high probability of poverty among older persons in Sabah, as compared to other states.

Our findings also revealed that those with worse health conditions are unable to provide financial support to their parents. Since they might not be able to work and have an inconsistent income flow, respondents with poor health will find it difficult to provide for their children. Unfortunately, they were also observed to receive lower financial support from their children, compared to respondents with better health status. These results highlighted the issue of financial security for those with poor health conditions, considering they may need more money for medical equipment purchases or treatment expenses. The lack of financial support may put higher financial stress on them.

As mentioned earlier, children were often perceived as a provider of financial security for parents during old age, particularly in developing countries. Thus, having a higher number of children is sometimes preferred compared to having fewer children. Our findings are consistent with Logan & Bian (2003), who found that the number of children is positively related to the amount of support received by older parents in China.

#### 4.1. Policy recommendations

Despite that the act of giving financial support to the family can be viewed as a selfless act, it raises huge concerns about the financial security of older persons in the future, considering Malaysia's average family size is expected to decline. Going forward, Malaysia should strive to improve the social protection system, by adopting the life-cycle approach and extending the coverage of social insurance, particularly for women and informal workers.

Policymakers may consider introducing a universal social pension that provides a minimum monthly income to senior citizens in Malaysia, instead of giving ad-hoc cash transfers which are implemented under a framework reportedly fraught with inclusion and exclusion errors. The implementation of a public pension program may help to supplement older persons with basic income to mitigate their lack of retirement savings. The provision of a minimum income for older persons in Malaysia will reduce their risk of falling into old-age poverty, as well as their dependency on the working-age population. Universal social pension programs have already been introduced in neighboring countries such as Thailand and Vietnam.

The government also needs to work together with the Employees Provident Fund (EPF) and employers to figure out the best approach to strengthen retirement savings for workers in the private sector. Any formal programs run by the government should fortify the family network and encourage more familial support toward older persons, rather than crowding it out, to preserve a strong filial piety culture among Malaysians. For example, Singapore introduced priority housing schemes and tax incentives for adult children who live with their older parents (Chan, 2005).

Human capital expenditure financed by parents plays a critical role in shaping the outcome of their children. Thus, establishing a strong social safety net is essential for easing the working-age population's financial burden for supporting their parents. It will also facilitate younger parents to allocate more financial resources for their children's development, instead of having to financially support their parents. This will ultimately bring greater benefits to the country in the future.

**Table 8. Multiple regression result (financial support given to parents)**

Variable	Coefficient	Standard error	t-statistics
No. of observation	1,160		
F-statistics	18.046		
R-squared	0.29		
Adj. R-squared	0.276		
<b>Age</b>			
40 – 49 years old (reference)			
50 – 59 years old	-0.078	0.083	-0.940
60 – 69 years old	-0.010	0.120	-0.083
More than 70 years old	-0.024	0.163	0.145
<b>Gender</b>			
Male (reference)			
Female	-0.089	0.073	-1.211
<b>Ethnicity</b>			
Malay (reference)			
Chinese	0.500 <sup>c</sup>	0.132	3.798
Indian & Others	0.323 <sup>c</sup>	0.125	2.572
Bumiputera (Sabah and Sarawak)	0.260 <sup>c</sup>	0.093	2.802
<b>Education level</b>			
No schooling (reference)			
Primary school	-0.063	0.234	-0.272
Lower secondary school	0.149	0.230	0.649
Upper secondary school	0.269	0.227	1.183
Tertiary	0.657 <sup>c</sup>	0.241	2.726
<b>Marital status</b>			
Without spouse (reference)			
With spouse	-0.414 <sup>c</sup>	0.116	-3.565
<b>Living arrangement</b>			
Not living with parents (reference)			
Living with parents	-0.011	0.111	-0.096
<b>Current employment status</b>			
Working	0.106	0.096	1.101
Not working due to labor market reasons	0.433 <sup>b</sup>	0.205	2.115
Retired	0.151	0.145	1.047
<b>Homemaker (reference)</b>			
<b>Current health status</b>			
Good health (reference)			
Moderate health	-0.201 <sup>c</sup>	0.080	-2.494
Poor health	-0.547 <sup>c</sup>	0.163	-3.367
<b>Number of living parents</b>			
1 living parent (reference)			
2 living parents	0.320 <sup>c</sup>	0.081	3.945
3 living parents	0.400 <sup>c</sup>	0.107	3.718
4 living parents	0.452 <sup>b</sup>	0.185	2.450

(Cont'd...)

Table 8. (Continued)

Variable	Coefficient	Standard error	t-statistics
Income group			
<RM 1,000 (reference)			
RM 1,000 – RM 1,999	0.217 <sup>b</sup>	0.095	2.285
RM 2,000 – RM 2,999	0.765 <sup>c</sup>	0.115	6.625
More than RM 3,000	1.011 <sup>c</sup>	0.116	8.691
Received government financial assistance			
No (reference)			
Yes	-0.342 <sup>c</sup>	0.101	-3.376
C	4.058 <sup>c</sup>	0.262	15.510

Note: <sup>a</sup> $p < 0.10$ , <sup>b</sup> $p < 0.05$ , <sup>c</sup> $p < 0.01$ .

Table 9. Multiple regression result (financial support received from parents)

No. of observation	117		
F-statistics	1.191		
R-squared	0.259		
Adj. R-squared	0.042		
Variable	Coefficient	Standard error	t-statistics
Age			
40 – 49 years old (reference)			
50 – 59 years old	-0.208	0.419	-0.497
60 – 69 years old	0.574	0.556	1.032
More than 70 years old	1.200 <sup>a</sup>	0.687	1.749
Gender			
Male (reference)			
Female	-0.797 <sup>b</sup>	0.377	-2.111
Ethnicity			
Malay (reference)			
Chinese	0.787	0.652	1.206
Indian & Others	0.912 <sup>a</sup>	0.547	1.666
Bumiputera (Sabah and Sarawak)	0.429	0.625	0.687
Education level			
No schooling	0.016	1.021	0.015
Primary school	-0.664	0.644	-1.031
Lower secondary school	0.183	0.623	0.294
Upper secondary school	0.292	0.599	0.488
Tertiary (reference)			
Marital status			
Without spouse (reference)			
With spouse	-0.713 <sup>a</sup>	0.414	-1.724
Living arrangement			
Not living with parents (reference)			
Living with parents	-0.174	0.617	-0.282

(Cont'd...)

Table 9. (Continued)

Variable	Coefficient	Standard error	t-statistics
Current employment status			
Working (reference)			
Not working due to labor market reasons	-0.168	0.603	-0.278
Retired	-0.002	0.696	-0.003
Homemaker	0.507	0.412	1.229
Current health status			
Good health (reference)			
Moderate health	0.223	0.392	0.569
Poor health	1.037	0.647	1.604
Number of living parents			
1 living parent (reference)			
2 living parents	0.474	0.459	1.033
3 living parents	0.813	0.491	1.654
4 living parents	0.334	0.735	0.455
Income group			
Less than RM 1,000	-0.643	0.701	-0.916
RM 1,000 – RM 1,999	-0.458	0.725	-0.632
RM 2,000 – RM 2,999	-0.577	0.751	-0.768
More than RM 3,000 (reference)			
Received government financial assistance			
No (reference)			
Yes	-0.080	0.416	-0.192
C	4.449 <sup>c</sup>	0.837	5.317

Note: <sup>a</sup> $p < 0.10$ , <sup>b</sup> $p < 0.05$ , <sup>c</sup> $p < 0.01$ .

## 5. Conclusions

The present study investigates the factors associated with the amount of intergenerational transfers, particularly financial transfers, made between Malaysian older adults with their children or parents. Altogether, our findings revealed there is an upstream transfer from younger to older generations. Based on the multiple regression analysis, all variables, except for the living arrangement, are revealed to be statistically significant in determining the amount of financial transfers between respondents and their children, or parents.

This study is not without limitations. The multiple regression analysis excluded non-financial intergenerational transfers such as providing food or clothing, looking after grandchildren, and assisting parents in daily activities. The inclusion of these variables in future research will allow for a more extensive analysis of this issue, particularly in explaining the exchange motive for services provided by the parents.

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## Conflict of interest

The authors declare that they have no competing interest.

## Author contributions

*Conceptualization:* Norma Mansor

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*Writing – original & draft:* Muhammad Amirul Ashraf Abd Ghani, Halimah Awang

*Writing – review & editing:* Halimah Awang, Norma Mansor

## Ethics approval and consent to participate

The study protocol was approved by the institutional ethics review board of Universiti Malaya (Reference Number: UM.TNC2/UMREC-341). Written informed consent was obtained from study participants.

## Consent for publication

Both verbal and written consent were obtained from the respondents before the survey interview to publish their data in this study in aggregate form only.

## Availability of data

Data from MARS can be obtained from <https://swrc.um.edu.my/mars-data>.

## Further disclosure

The findings from this study were presented at the 12<sup>th</sup> Association of Pacific Rim Universities (APRU) Population Ageing Virtual Conference 2022.

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## REPORT

## Problems and perspectives on environmental component of quality of life: A case study from the Carpathian region of Ukraine

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## Abstract

Quality of life is a complex and multidimensional concept that reflects the level of development across various spheres of society. This paper focuses on one of the most important yet underdeveloped aspects. The study aims to assess the impact of environmental components on the quality of life in the Carpathian region of Ukraine and to present the authors' approach to improving it. Multiple regression analysis was conducted using annual statistical data on mortality rates, air, and water pollutants, gross regional product per capita, and foreign direct investment in the Carpathian region of Ukraine from 2001 to 2020. The analysis showed a direct negative impact of water and air pollution on the mortality rate in the region. The study also noted that foreign investment can sometimes increase mortality, indicating that the Carpathian region may act as a "haven for polluters" for foreign investors, which requires further detailed studies. The Carpathian Eco-Way Strategy was developed to address the region's most urgent ecological issues. It focuses on restoring natural capital, ensuring environmental cleanliness, transitioning to a green economy, and promoting environmentally efficient behavior among residents, visitors, and businesses. The study presents a model of environmentally efficient behavior that illustrates the interaction between legal and informational mechanisms and individual socio-psychological characteristics. Such behavior involves an active component and aims to preserve and improve the environment. The Eco-Way Strategy and model for environmentally efficient behavior development presented in the article are not only applicable to the Carpathian region of Ukraine; they can also be used as a basis for state policy development tools to solve environmental problems in other regions or countries. The authors' methodological approach can serve as the framework for further studies in this field.

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(iryna.yeleyko@lnu.edu.ua)**Citation:** Ryndzak, O., Ukrainets, L., & Gerlach, I. (2025). Problems and perspectives on environmental component of quality of life: A case study from the Carpathian region of Ukraine. *International Journal of Population Studies*, 11(4): 119-134. <https://doi.org/10.36922/ijps.4487>**Received:** August 9, 2024**1st revised:** August 28, 2024**2nd revised:** October 25, 2024**3rd revised:** November 20, 2024**4th revised:** December 16, 2024**5th revised:** December 26, 2024**6th revised:** January 9, 2025**7th revised:** January 13, 2025**Accepted:** March 3, 2025**Published online:** March 27, 2025**Copyright:** © 2025 Author(s).

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## 1. Introduction

Quality of life is a key indicator of the social and economic development of countries and regions. Enhancing quality of life has become a primary goal of international development. However, economic growth is often achieved at the expense of natural

resource depletion and environmental pollution. Growing environmental challenges and increasing global awareness of their impact have led to a more comprehensive approach to quality-of-life assessments, incorporating environmental factors. The implementation of the European Green Deal, which seeks to balance economic growth with environmental sustainability, underscores the need to revise quality-of-life standards and emphasizes research on its ecological determinants.

This study evaluates the impact of environmental and economic factors on the quality of life in the Carpathian Region of Ukraine and presents an approach to improving its environmental component.

The Carpathian Region covers nearly one-tenth of Ukraine's territory and consists of four oblasts: Zakarpattia, Ivano-Frankivsk, Lviv, and Chernivtsi. It is a region of significant ecological value, containing 22% of Ukraine's forests, 26% of its nature reserve lands, 36% of its river runoff water resources, and 42% of its rare underground mineral water deposits (Kravtsiv, 2013, p. 6). In addition, the region shares borders with five countries – Poland, Romania, Moldova, Hungary, and Slovakia. As ecological issues do not have clearly defined boundaries, research on environmental problems in this region is of international interest and importance. These factors determined the choice of the Carpathian Region of Ukraine as the object of this study.

The research is significant because it addresses the pressing issue of environmental degradation in the Carpathian region and its direct impact on the quality of life, particularly with regard to mortality rates. The novelty of this research lies in its comprehensive analysis of the interactions between environmental, economic, and social factors within a specific regional context. Unlike other studies that primarily advocate for eco-friendly behavior, this research offers a structured framework for understanding environmentally efficient behavior – an approach aimed at both preserving and improving the environment, which is crucial for the region's sustainable development.

The multiple regression analysis has practical implications, as understanding these dynamics can support policymakers and health professionals in developing strategies to improve life expectancy and public health outcomes. Moreover, the findings from this study contribute to the broader body of knowledge and provide a foundation for future research on mortality and its determinants. The insights gained can also help guide nations in crafting targeted interventions and policies that promote sustainable development and the long-term well-being of human populations. While multiple

regression analysis is considered a standard regression model, it is not inherently robust, as it can be sensitive to outliers, multicollinearity, and violations of assumptions such as linearity and homoscedasticity. Thus, the study underscores the significance of using robust statistical models that can effectively handle violations of these assumptions to inform data-driven decisions that enhance human health and longevity.

The article consists of six sections. The relevance and significance of the study are presented in Section 1. Section 2 provides a literature review and research background. Section 3 highlights the methodological approach and data used in the study. The results of the multiple regression analysis are presented in Section 4. Section 5 is dedicated to the presentation of the Carpathian Eco-Way Strategy. Limitations of the study and main conclusions are covered in Section 6.

## 1.1. Literature review background

The relevance and urgency of quality-of-life issues have attracted significant interest from scientists and experts. According to Keles (2012), quality of life is a global phenomenon that affects billions of people in both developing and developed countries. It is a broad concept encompassing various aspects of societal well-being (Keles, 2012, p.24) and includes multiple dimensions: Physical, socio-cultural, economic, and environmental. Researchers worldwide have examined the impact of different factors on quality of life. For example, one of the latest publications has shown the positive impact of digital finance development on the population's health (Liping & Minizhe, 2024).

A key focus in modern research is the measurement of quality of life. Conventionally, two main approaches are used: subjective and objective (Ostasiewicz, 2012). Subjective indicators reflect an individual's perception of their quality of life and overall life satisfaction, typically assessed through sociological surveys. In contrast, the objective approach evaluates quality of life based on statistical indicators.

Scientists at the Ptoukha Institute for Demography and Social Studies of the National Academy of Sciences of Ukraine have developed a comprehensive methodology for measuring quality of life that incorporates both subjective and objective indicators (Libanova *et al.*, 2013). In subsequent research, they compared different methodological approaches based on population surveys and subjective assessments used by organizations such as the Organization for Economic Co-operation and Development, the European Union, and the Commonwealth of Independent States (Libanova *et al.*, 2020).

As an important aspect of quality-of-life issues, this article focuses on the environmental component related to the concept of sustainable development. Some researchers (Trusina & Jermolajeva, 2021, p. 298) use the concept of sustainable development to determine the impact of the economic, environmental, and social systems on human development. A high quality of life is sometimes linked to high natural resource consumption, which led to the introduction of the concept of “sustainable quality of life.” This concept emphasizes a balance between maintaining a high standard of living while ensuring ecological and social sustainability (Wiesli *et al.*, 2021). Sustainable development, therefore, involves protecting, preserving, and conserving the natural environment for future generations. Its success depends on achieving environmental stability alongside a high quality of life (Yusoff, 2020).

The primary goal of sustainable development is to enhance quality of life, which is evaluated using various factors and indicators. Among these, the environmental dimension is recognized as one of the most influential (Štreimikienė, 2015).

Modern methodologies for assessing quality of life increasingly incorporate environmental indicators (Rybalova *et al.*, 2021). Ukrainian researchers (Yeliseyeva & Proshkina, 2021) have studied the impact of environmental factors on quality of life by comparing economic and environmental indicators. They also developed the Eco-Index, a set of indicators tailored to Ukraine's specific characteristics (Yeliseyeva & Proshkina, 2021). It is also worth mentioning the investigation of the socioeconomic indicators that affect the quality of life of the population in Ukraine. Four groups of factors related to the socioeconomic situation of Ukrainian households were selected: Economic status (11 factors), education (five), health (three), and population (three) (Kravets & Didenko, 2022).

One of the earliest assessments of the potential consequences of Russia's full-scale war on Ukraine's quality of life was conducted by scientists at the Ptoukha Institute for Demography and Social Studies of the National Academy of Sciences of Ukraine. Drawing on established trends from past decades, the researchers analyzed the war's destructive effects and explored prospects for mitigating its negative impact (Cherenko *et al.*, 2023).

Despite the significance of the concept of “quality of life,” there is still no universally accepted definition. Broadly speaking, “quality” refers to an attribute or set of characteristics inherent in a phenomenon, process, or object. It also denotes the extent to which an object's properties conform to specific standards, scientific norms, or the expectations and needs of individuals, groups, or society as a whole.

The *World Encyclopaedia Britannica* defines quality of life as “the degree to which an individual is healthy, comfortable, and able to participate in or enjoy life events” (Jenkinson, 2016). However, this concept remains ambiguous, as it encompasses both an individual's personal experience and overall living conditions.

To provide a more comprehensive understanding of the quality of life and highlight the importance of its environmental component, Ryndzak (2021, p. 154) proposed the following definition: Quality of life is a complex, multidimensional concept that reflects the level and sustainability of social development and characterizes population and their living environment, as well as human impact on the environment and reflects the assessment of life.

The various components of quality of life—economic, environmental, social, mental, and political – are interconnected and influence one another (Figure 1). However, the strongest link exists between environmental and social factors, particularly health conditions, life expectancy, and mortality. For instance, according to World Health Organization (WHO) estimates, nearly a quarter of all global deaths are linked to environmental factors (WHO, 2022).

One of the most widely used indicators of life quality is mortality rate. It provides valuable insights into the health, living conditions, and socioeconomic development of the population (Aimbetova *et al.*, 2022; Liang *et al.*, 2023). High mortality rates often reflect inadequate healthcare access, poor nutrition, and the prevalence of diseases, all of which degrade quality of life. Lower mortality rates, on the other hand, are typically associated with better healthcare, improved sanitation, higher income levels, and enhanced education, signaling a higher standard of living. The analysis of various studies showed that a better quality of life is associated with a lower mortality risk (Phyo *et al.*, 2020). Environmental factors, such as pollution and access to clean water significantly impact mortality rates, serving as indicators of both environment conditions and overall living standards. As a standardized measure, mortality

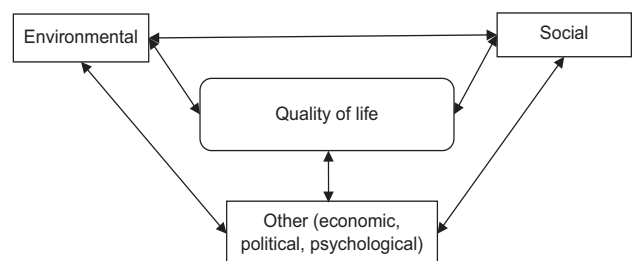


Figure 1. Main components of quality of life  
Source: Authors' own representation.

rate facilitates comparisons across regions or countries, providing a consistent metric to assess how various factors influence life quality. While mortality rates are powerful indicators, they may not capture all aspects of quality of life, such as mental health, social well-being, or individual satisfaction. However, given these data are fully available for the period of the study, it is appropriate to use them in our analysis.

## 2. Data and methods

### 2.1. Data sources

The study drew on socioeconomic and environmental data from 2001 to 2020 to examine mortality trends in the Carpathian region of Ukraine. All data were obtained from the State Statistics Service of Ukraine, except for water pollution indicators, which were sourced from the State Agency of Water Resources of Ukraine. Mortality rates, a central variable, were calculated as the median rate across four oblasts – Zakarpattia, Ivano-Frankivsk, Lviv, and Chernivtsi. Socioeconomic indicators such as gross regional product (GRP) per capita and foreign direct investment (FDI) highlight economic conditions and investment dynamics. Environmental factors include emissions of air pollutants and discharge of contaminated water, both of which showed declining trends during the study period. In addition, government expenditures on environmental protection and healthcare provide insight into policy-driven efforts to mitigate negative environmental and health impacts. This combination of data allows for a comprehensive understanding of the factors influencing mortality in the region.

### 2.2. Methods

To study the impact of environmental and economic factors on the mortality rates in the Carpathian region as a whole, and in its constituent oblasts (Zakarpattia, Ivano-Frankivsk, Lviv, and Chernivtsi), we used regression analysis. The multiple regression and least squares methods are the standard mathematical and statistical instruments for assessing the relationships between these factors (Chen *et al.*, 2021; Huang *et al.*, 2020).

Multiple regression models are essential for analyzing complex relationships between socioeconomic, environmental, and health-related factors. They are particularly useful for extracting valuable insights from large datasets and mathematically modeling the relationships between independent and dependent variables. By understanding these relationships, researchers can predict the value of the dependent variable based on the known values of the independent variables. In the context of public health, mortality rates are influenced

by many variables, including environmental conditions, economic status, and social determinants. Therefore, applying multiple regression models offers a powerful approach to studying how these factors collectively impact mortality rates.

The ordinary least squares (OLS) method was chosen to estimate the model due to its simplicity, efficiency, and widespread applicability in regression analysis. OLS minimizes the sum of squared residuals, ensuring the best linear unbiased estimates under the Gauss–Markov assumptions, which include linearity, homoscedasticity, no autocorrelation, and the absence of perfect multicollinearity. OLS is particularly advantageous because it provides interpretable coefficients, which indicate the magnitude and direction of the impact of each independent variable on the dependent variable. In this study, OLS helps quantify how socioeconomic factors, such as GRP and FDI, alongside environmental indicators, such as pollutant emissions and public expenditures, influence mortality rates. Moreover, including differenced data and lagged variables allows for capturing temporal effects and delayed responses, adding depth to the analysis. Using this method, the research gains insights into the intricate dynamics between public health and its determinants, supporting evidence-based policymaking for regional development.

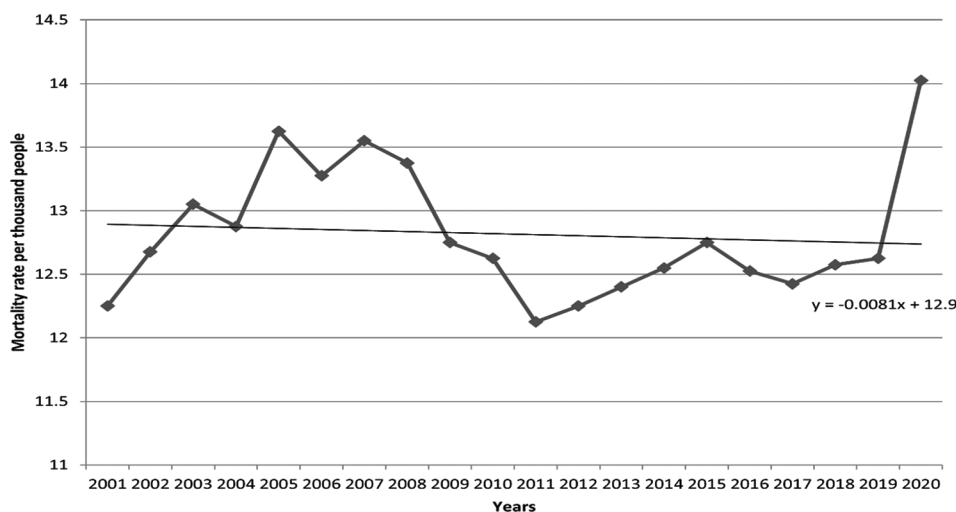
The basic model is as follows:

$$Y_t = a + \beta_1 GRP_t + \beta_2 FDIR_{t-1} + \beta_3 PolAir_t + \beta_4 PolWater_t + \beta_5 Env_t + \beta_6 Health_t + \mu \quad (1)$$

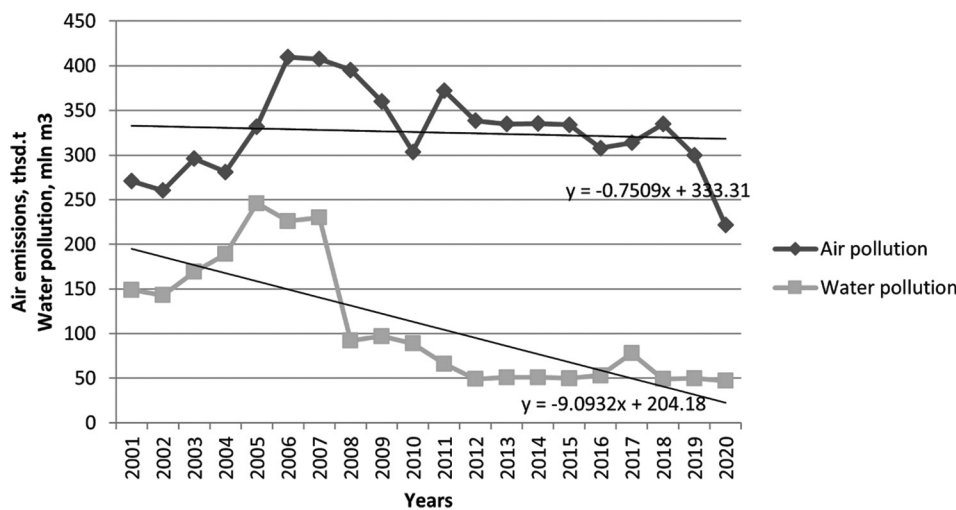
The dependent variable  $Y_t$  represents the mortality rate in the Carpathian region of Ukraine per thousand people at time  $t$  during the study period (2001 – 2020). It was calculated as the median mortality rate of the four oblasts of the Carpathian Region of Ukraine. Between 2001 and 2020, a slight decrease in mortality was observed in the region (Figure 2). The significant increase in 2020 can be attributed to the impact of the COVID-19 pandemic. The data were obtained from the State Statistics Service of Ukraine.

- $GRP_t$  represents the GRP per capita in the Carpathian region. It helps determine the volume of the internal regional market and indicates the level of welfare in the region. Its effect on the dependent variable was expected to be negative.
- $FDIR_{t-1}$  refers to the amount of FDI in the region, with a 1-year lag. The lag indicator was used because some time must pass between the moment of investment and the commencement of active operations in polluting industries. The impact of FDI on the dependent variable was expected to be positive.

- $PolAir_t$  represents the emission of pollutants into the atmosphere in the Carpathian region, while  $PolWater_t$  refers to the discharge of contaminated return water into the surface runoff in the region. Both indicators showed a declining trend during the research period (Figure 3), although at different rates. Both were expected to directly impact the dependent variable.
  - $Env_t$  represents government expenditure on environmental protection in the Carpathian region. It allows for the indirect consideration of state environmental policy on public health. The coefficient for this indicator in the regression model was expected to be negative.
  - $Health$  refers to government expenditures on healthcare in the Carpathian region. As with the previous variable, the coefficient of this indicator in the regression model was expected to be negative.
  - $\mu$  represents the residual term.
- Differencing was applied to the variables to address potential non-stationarity issues and enhance the analytical robustness. This transformation ensures that the analysis captures changes over time rather than static levels, which may be influenced by broader structural factors unrelated to the study's scope.



**Figure 2.** The mortality rate in the Carpathian region per 1,000 people  
 Source: Authors' own representation based on data from the State Statistics Service of Ukraine.



**Figure 3.** Emissions of pollutants into the atmosphere and surface waters in the Carpathian region, from 2001 to 2020  
 Source: Authors' own representation based on the data from the State Statistics Service of Ukraine and the State Agency of Water Resources of Ukraine.

**2.3. Operationalization of variables**

Precise measures and operationalization of variables were employed to comprehensively analyze the factors influencing mortality rates in the Carpathian region. The dependent variable, “mortality rate,” represents the number of deaths per 1,000 individuals, calculated as the median rate across the region’s four constituent oblasts: Zakarpattia, Ivano-Frankivsk, Lviv, and Chernivtsi. This measure provides a standardized and reliable indicator of public health trends over the study period.

Independent variables were carefully chosen to capture the socioeconomic and environmental dimensions influencing mortality. GRP per capita serves as a proxy for regional economic prosperity, representing total economic output divided by the population. This variable highlights the overall economic welfare of the region and its potential impact on health outcomes. FDI, measured with a 1-year lag, reflects external economic activities and the possible introduction of industrial or polluting activities. The lagged values allow for the time required for investments to impact the region’s socioeconomic and environmental dynamics.

Environmental indicators include emissions of air pollutants (*PolAir*) and the discharge of contaminated water into surface runoff (*PolWater*). These variables were obtained from official government sources and are proxies for environmental quality and potential health risks. Both indicators are expressed in tons per year to standardize and facilitate comparisons across time. In addition, government expenditures on environmental protection (*Env*) and healthcare (*Health*) were included to account for policy interventions aimed at improving environmental conditions and public health. These variables were expressed in inflation-adjusted monetary units to reflect actual spending levels.

**3. Results**

Before proceeding directly to model analysis, it is important to examine the data for statistical problems. The biggest issue that can arise in this type of research is multicollinearity, which can distort the results. [Table 1](#) shows the correlation matrix of our variables. Multicollinearity is a concern when the correlation exceeds 0.8. However, no critical correlation values were observed between our variables. High (but not critical) correlations were noted between GRP per capita and FDI variables in the region, as well as GRP per capita and environmental spending.

We analyzed the model using the least squares method, which is the most commonly used approach for such models. The constructed regression equation is as follows:

$$Y_t = 11,153 - 0.005GRP_t + 0.004FDIR_{t-1} + 0.315PolAir_t + 0.893PolWater_t - 0.078Env_t + 0.017Health_t + 0.012 \quad (II)$$

To ensure the robustness of the regression analysis, a series of diagnostic tests were conducted to address potential statistical issues. Autocorrelation was evaluated using the Durbin–Watson statistic, which yielded values within acceptable ranges, indicating no significant autocorrelation in the residuals. Heteroscedasticity was tested using the Breusch–Pagan test, revealing no significant violations of homoscedasticity. This confirmed that the variance of residuals remains consistent across observations, satisfying one of the key assumptions of the OLS method.

The normality of residuals was assessed through graphical methods, such as Q–Q plots and the Shapiro–Wilk test. Both approaches confirmed that residuals align with normal distribution assumptions, ensuring the validity of statistical inferences drawn from the model. A correlation matrix was constructed to address potential multicollinearity ([Table 2](#)). None of the correlations between independent variables exceeded the critical threshold of 0.8, indicating no severe multicollinearity issues.

**Table 1. Correlation matrix of variables of the econometric model determining the impact of environmental and socioeconomic factors on mortality in the Carpathian region**

Parameter	GRP <sub>t</sub>	FDIR <sub>t-1</sub>	PolAir <sub>t</sub>	PolWater <sub>t</sub>	Env <sub>t</sub>	Health <sub>t</sub>
GRP <sub>t</sub>	1.0	-	-	-	-	-
FDIR <sub>t-1</sub>	0.6	1.0	-	-	-	-
PolAir <sub>t</sub>	-0.3	0.01	1.0	-	-	-
PolWater <sub>t</sub>	-0.3	0.004	0.1	1.0	-	-
Env <sub>t</sub>	0.6	0.05	-0.4	-0.4	1.0	-
Health <sub>t</sub>	0.5	0.3	0.01	0.01	0.02	1.0

Source: Authors’ own calculations.

Abbreviations: *Env*: Government expenditure on environmental protection in the Carpathian region; *FDIR<sub>t-1</sub>*: Amount of foreign direct investment in the region, with a 1-year lag; *GRP*: Gross regional product; *Health*: Government expenditures on healthcare in the Carpathian region; *PolAir<sub>t</sub>*: Emission of pollutants into the atmosphere in the Carpathian region; *PolWater<sub>t</sub>*: Discharge of contaminated return water into surface runoff in the region; *t*: Time.

**Table 2. Diagnostic test results**

Diagnostic test	Result
Durbin–Watson statistic	1.8314
Breusch–Pagan test	2.71
Shapiro–Wilk test	0.982776
Multicollinearity check	Correlation values below 0.8 threshold

Source: Authors’ own calculations.

Endogeneity concerns were addressed by incorporating lagged variables, such as FDI with a 1-year lag, to capture delayed effects and reduce simultaneity bias. In addition, differencing the data helped mitigate issues related to non-stationarity, further enhancing the model's reliability. These diagnostic checks and methodological adjustments ensure that the model's results are robust and credible, providing a strong foundation for analyzing the impact of socioeconomic and environmental factors on mortality rates.

These diagnostic test results underscore the rigor of the analytical framework and the attention given to addressing potential statistical and methodological issues. The Breusch–Pagan test for heteroscedasticity yielded a test statistic value of 2.71, which was compared to the Chi-squared critical value of 0.4378 at 6° of freedom. As the test statistic exceeds the critical value, there is weak evidence suggesting potential heteroscedasticity in the model.

The results of regression analysis for the general model are presented in Table 3.

An analysis of the 2001 – 2020 indicators for the Carpathian region reveals a strong correlation between improved socioeconomic conditions and reduced mortality rates, supporting the expectation that higher living standards contribute to better health outcomes. Specifically, the data indicate that as socioeconomic conditions improve, mortality rates decline, emphasizing the critical role of welfare in public health. Furthermore, the coefficients for variables related to water and air pollution,

as well as environmental protection, were statistically significant, indicating that these environmental factors play a critical role in influencing mortality. The signs of these coefficients support the hypothesis that higher pollution levels are associated with increased mortality, while stronger environmental protection efforts are linked to lower mortality rates. This reinforces the idea that economic welfare and environmental quality are essential in improving public health and reducing mortality in the region.

Notably, water pollution has more than twice the impact on mortality compared to air pollution. This result aligns with previous studies (Kjellstrom *et al.*, 2006), which demonstrate that air pollution contributes up to 0.6% of the disease burden in developing regions, while water pollution may contribute as much as 0.9%.

The indicator of foreign investment in the region was also statistically significant and showed a positive sign. This finding supports the hypothesis that foreign investments, particularly in industries that exploit the region's rich natural resources, often contribute to environmental pollution and, consequently, higher mortality rates. Meanwhile, the healthcare expenditure coefficient was positive but not statistically significant, suggesting that increased healthcare spending alone does not necessarily lead to improved health outcomes.

In addition, separate analyses of the same set of factors for each oblast in the Carpathian region were conducted. The results (Table 4) are largely consistent with the overall model, reinforcing the broader findings of this study.

Notable differences were observed in the coefficient for FDI in Ivano-Frankivska oblast. Unlike the other oblasts and the Carpathian region as a whole, FDI growth in this oblast was associated with a reduction in mortality rates, indicating a positive impact on the population's quality of life. This discrepancy may be attributed to the structure of foreign investments in the region and warrants further investigation. While most studies suggest that FDI inflows generally enhance life expectancy through direct and indirect channels (Aalipour *et al.*, 2023; Beşe & Kalayci, 2021), some evidence indicates that foreign investment can negatively affect public health and increase mortality, particularly in middle- and high-income countries (Chiappini *et al.*, 2022, pp. 24 – 26). This suggests that, while FDI generally promotes economic growth and improved living standards, it may also introduce adverse effects, such as environmental degradation or inequitable resource distribution.

The analysis of healthcare expenditures in Lvivska and Chernivetska oblasts reveals an unexpected trend: higher

**Table 3. Impact of environmental and economic factors on mortality in the Carpathian region**

Variable	General model	Std	p-value
GRP <sub>t</sub>	-0.005	0.00	0.001
FDIR <sub>t-1</sub>	0.004	0.00	0.093
PolAir <sub>t</sub>	0.315	0.01	0.033
PolWater <sub>t</sub>	0.893	0.01	0.003
Env <sub>t</sub>	-0.078	0.01	0.045
Health <sub>t</sub>	0.017	0.14	0.909
Constant	11.153	8.5	0.002
R-squares		0.763	
Observations		20	

Source: Authors' own calculations.

Abbreviations: *Env*: Government expenditure on environmental protection in the Carpathian region; *FDIR<sub>t-1</sub>*: Amount of foreign direct investment in the region, with a 1-year lag; *GRP*: Gross regional product; *Health*: Government expenditures on healthcare in the Carpathian region; *PolAir<sub>t</sub>*: Emission of pollutants into the atmosphere in the Carpathian region; *PolWater<sub>t</sub>*: Discharge of contaminated return water into surface runoff in the region; *Std*: Standard deviation; *t*: Time.

**Table 4. Impact of environmental and economic factors on mortality by oblast in the Carpathian region**

Oblast	Variable	Coefficients	Std	p-value
Zakarpatska	$GRP_t$	-0.014	0.00	0.071
	$FDIR_{t-1}$	0.015	0.01	0.051
	$PolAir_t$	0.043	0.02	0.073
	$PolWater_t$	1.192	0.05	0.050
	$Env_t$	-0.010	0.02	0.051
	$Health_t$	-0.922	0.55	0.115
	Constant	19.397	5.75	0.005
	R-squares		0.704	
	Observations		20	
Ivano-Frankivska	$GRP_t$	-0.240	0.00	0.050
	$FDIR_{t-1}$	-0.067	0.00	0.011
	$PolAir_t$	0.204	0.01	0.096
	$PolWater_t$	2.056	0.02	0.002
	$Env_t$	-0.090	0.00	0.050
	$Health_t$	-0.851	0.63	0.203
	Constant	25.038	9.01	0.016
	R-squares		0.697	
	Observations		20	
Lvivska	$GRP_t$	8.223	0.00	0.751
	$FDIR_{t-1}$	0.002	0.00	0.006
	$PolAir_t$	0.022	0.01	0.010
	$PolWater_t$	0.518	0.02	0.008
	$Env_t$	3.456	0.00	0.342
	$Health_t$	0.218	0.29	0.136
	Constant	9.102	7.39	0.240
	R-squares		0.712	
	Observations		20	
Chernivetska	$GRP_t$	-0.673	0.00	0.096
	$FDIR_{t-1}$	-0.240	0.01	0.846
	$PolAir_t$	0.427	0.34	0.023
	$PolWater_t$	0.629	0.06	0.003
	$Env_t$	-0.611	0.02	0.072
	$Health_t$	0.812	0.49	0.261
	Constant	3.628	5.28	0.504
	R-squares		0.740	
	Observations		20	

Source: Authors' own calculations.

Abbreviations: *Env*: Government expenditure on environmental protection in the Carpathian region; *FDIR<sub>t-1</sub>*: Amount of foreign direct investment in the region, with a 1-year lag; *GRP*: Gross regional product; *Health*: Government expenditures on healthcare in the Carpathian region; *PolAir*: Emission of pollutants into the atmosphere in the Carpathian region; *PolWater*: Discharge of contaminated return water into surface runoff in the region; *Std*: Standard deviation; *t*: Time.

healthcare spending correlates with increased mortality. However, this relationship was statistically significant only in Lvivska oblast, where the coefficient reached a significance of 10%. This counterintuitive finding may reflect inefficiencies in public fund allocation or systemic flaws in healthcare policies. Ineffective spending, lack of targeted interventions, and resource mismanagement could mean that increased investments in healthcare fail to yield meaningful improvements in health outcomes, as seen in Lvivska oblast.

The multiple regression model confirms several key hypotheses regarding the impact of environmental and economic factors on mortality rates in the Carpathian region. As expected, economic development and improved regional welfare were associated with lower mortality rates. Higher living standards typically lead to better access to healthcare, improved nutrition, and healthier living conditions, all of which contribute to increased life expectancy. Similarly, the analysis highlights the beneficial effects of increased environmental protection expenditures, indicating that investments in pollution reduction and natural resource conservation have a tangible positive impact on public health.

The findings underscore the harmful effects of environmental degradation, particularly water and air pollution, on mortality in the Carpathian region. While both types of pollution negatively impact public health, the data indicate that water pollution has a significantly stronger influence on mortality than air pollution. This may be due to the region's dependence on water sources for agriculture, drinking, and other essential needs, making water quality a critical determinant of health outcomes. Contaminated water can lead to various illnesses, including gastrointestinal diseases, which disproportionately affect vulnerable populations, such as children and the elderly.

The empirical data also supports the hypothesis that the Carpathian region has become a "haven for polluters" in the context of FDI. In both Zakarpatska and Lvivska oblasts, a direct correlation between FDI growth and increasing mortality rates was observed. This finding suggests that foreign investment may be linked to activities that harm the environment, such as industrial projects that prioritize profit over sustainable practices. As the Carpathian region borders many European Union members, foreign investment may often be directed to Ukraine to avoid stricter European environmental legislation (Levinson & Taylor, 2008; Tang, 2015; Duan *et al.*, 2021). It can be assumed that foreign investments in the Carpathian region are directed mainly to polluting enterprises, harming public health. Thus, Ukraine, with lenient environmental

regulation, is becoming a haven for polluters. The lack of stringent environmental regulations allows foreign investors to operate in ways that degrade natural resources and negatively impact public health. Official statistical data on FDI in Zakarpattia and Lviv highlight a concentration in manufacturing-related industries, particularly the automotive and machinery sectors (NBU, 2024). In Zakarpatska oblast, FDI often targets enterprises producing car components, leveraging the region's proximity to European markets and lower operational costs. Lviv attracts significant foreign investment in information technology and manufacturing, particularly in textiles and food processing, which align with the region's skilled workforce and infrastructure. Both regions also see foreign capital flowing into the energy and mining sectors, often associated with less stringent environmental regulations. This investment pattern underscores the dual impact of FDI, fostering economic growth while potentially increasing environmental and health-related challenges.

However, in Ivano-Frankivska oblast, a different pattern emerged: FDI growth was associated with a reduction in mortality, potentially due to a more sustainable structure of investments or different industrial profiles. This divergent result highlights the need for further research into how the specific nature and sectors of foreign investments shape health outcomes across different regions.

The results regarding healthcare expenditures were also mixed. While the hypothesis that increased healthcare spending reduces mortality was confirmed for Zakarpatska oblast, the opposite effect was observed in Lvivska oblast, likely due to the inefficacy of state health policies. In other oblasts, healthcare spending was not found to have a statistically significant impact on mortality. These findings underscore the complexity of public health dynamics, where simply increasing spending is not enough – effective allocation, proper management, and the design of targeted health interventions are crucial to ensuring that healthcare investments lead to tangible improvements in population health.

Thus, the regression analysis validated the hypotheses about the negative impact of water and air pollution on the population's quality of life in the Carpathian region. These variables led to increased mortality rates. At the same time, GRP per capita and expenditure on environmental measures for the region decreased mortality. In addition, foreign investments sometimes lead to increased mortality, which requires a more detailed study of their structure and indicates the need for improvements in regional investment policies. This challenges the assumption that all investments are beneficial and calls for a more nuanced approach to regional investment strategies.

## 4. Discussion

While the regression analysis provides valuable insights into the factors influencing mortality in the Carpathian region, several limitations must be acknowledged. The reliance on aggregated-level data for the four oblasts introduced the risk of ecological fallacy, where relationships observed at the group level may not accurately reflect individual-level dynamics. For example, variations within oblasts or among specific population subgroups may remain obscured, potentially leading to oversimplified conclusions. Median mortality rates and other aggregate measures may not capture short-term fluctuations or localized phenomena, such as disease outbreaks or environmental disasters.

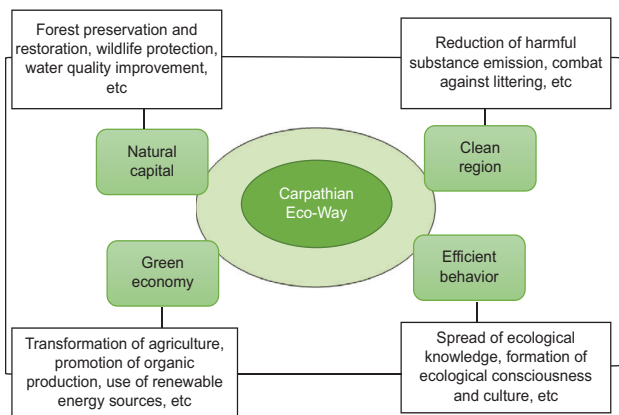
Methodologically, while differencing and lagging variables address issues, such as non-stationarity and simultaneity bias, these techniques may also reduce the richness of the data by focusing solely on changes rather than absolute levels. Furthermore, while comprehensive, the selection of variables may exclude other relevant factors, such as behavioral, cultural, or institutional influences, which could play a critical role in shaping mortality outcomes.

Finally, the studies temporal scope (2001 – 2020) limits its applicability to ongoing developments, such as the long-term effects of the COVID-19 pandemic. As the pandemic significantly impacted mortality rates in 2020, caution is warranted when generalizing findings to future periods or attributing trends solely to the factors analyzed. Addressing these limitations in future research could involve incorporating micro-level data, exploring additional variables, and extending the temporal range to enhance the robustness and applicability of the findings.

As the analysis showed a negative impact of environmental problems on the quality of life of the population in the Carpathian region, ways to address these problems and overcome the environmental crisis must be found. One such solution is the implementation of policy measures consolidated within the Carpathian Eco-Way strategic initiative. The strategy framework stipulates the achievement of several major and interdependent objectives: preserving and restoring natural capital in the Carpathian region, ensuring the cleanliness of the air, water, and land, transitioning to a green economy, and developing an environmentally efficient behavior model for economic entities, residents, and visitors of the region (Figure 4).

### 4.1. Objective 1: Preservation of the natural capital of the Carpathians

The achievement of this objective requires the development and implementation of measures to protect and rehabilitate



**Figure 4.** Elements and directions of the strategy for improving the environmental component of the quality of life in the Carpathian region of Ukraine.

Source: Authors' own elaboration.

forests, parks, and other green spaces. It is essential to recognize that forests are not only an important economic resource but also a habitat for 80% of terrestrial animals and plants. Humanity would not have survived without trees and forests, as they provide oxygen, food, wood, and other resources while absorbing carbon. Approximately one billion people globally depend on forest products (wild meat, edible insects, edible plant products, mushrooms, and fish) to some extent (FAO & UNEP, 2020, p. 19). Forests also contribute to physical and psychological health. Numerous studies demonstrate the positive impact of forest walks on cardiovascular and respiratory systems, immunity enhancement, and stress reduction. Therefore, the slogan “Healthy Forests Mean Healthy People,” used by many programs and initiatives in the last decade, is well-supported (Suzuki, 2020).

The problem of forest preservation and rehabilitation is particularly relevant for the Carpathian region of Ukraine, which faces significant threats and requires special attention and protection from the state. Indeed, over 2,000 unique plant species grow in this region, with relic species and endemics preserved, and its breach forests are included in the UNESCO World Heritage. Nevertheless, logging in the Carpathian mountaintops has increased threefold since 2001. According to experts, one-third part of the logging is illegal (Bezpiatchuk, 2020). Illegal logging in the Carpathian region caused Ukrainian hryvnia 18.3 million in damage to the state in 2020 and Ukrainian hryvnia 7.1 million in the first half of 2021 (Marchuk, 2021).

This highlights the urgent problem of combatting illegal logging in the Carpathian region and across Ukraine. Despite some measures taken by the government (such as the implementation of the Wood Electronic Accounting system), the situation with illegal logging remain largely

unchanged. The Carpathian region and Ukraine continue to lose forests – one of their most valuable resources – due to legislative gaps, overlapping control functions between the State Forestry Agency and the State Environmental Inspection, an inefficient judicial system, and high corruption levels within forestry. International expert commissions argue that an incorrectly constructed governance system in the forestry sector is a fundamental problem and a source of corruption (Ukraine Crisis Media Center, 2020). This fosters the emergence of various schemes. For instance, healthy wood is destroyed under the guise of sanitary felling and exported as firewood or timber. Logging beyond the designated areas is another common violation, with actual felling areas sometimes being twice as large as specified in the documentation. Moreover, trees within the reserve fund continue to be destroyed, and wood continues to be exported without the necessary documents.

Preservation of the forests in the Carpathian region requires an integrated approach and a solution to a range of problems across multiple levels. First and foremost, the governance system in forestry should be improved at the national level. In particular, economic, regulatory, and supervisory functions should be clearly delineated among the relevant public authorities. Coordination of activities and increased interaction between agencies are important to solving the tasks assigned to them and adequately responding to the main economic and social challenges.

The system of environmental control currently requires reform. Expanding the powers of the State Environmental Inspection (e.g., allowing it to immediately suspend logging rather than going through a judicial procedure) would enable an immediate response to violations. The ability to conduct unscheduled inspections, expand the range of people who can initiate them, and increase fines for impeding inspectors' work would strengthen environmental enforcement. Moreover, simplifying the procedure of proving violations to law enforcement agencies is necessary. The establishment of supervisory councils at the local level to monitor timber harvesting, transportation, and sales would strengthen the environmental control system in the forestry sector of the Carpathian region. To reduce shadow markets, these councils could cooperate with lumber mills and widely involve the community in their activities. The efficiency of such cooperation would benefit from the creation of specific mobile applications designed to immediately verify and report illegal logging. For example, Romania's “Inspectorul Padurii” application (Popescu, 2018) allows users to enter the registration number of a harvester. If the number is not found in the database, the harvester does not have an official permit to

transport timber and should be reported to the authorities. Moreover, increased responsibility through substantial fines for both loggers and consumers, as well as criminal liability for purchasing illegally harvested timber, could further reduce illegal logging.

It is worth emphasizing that deforestation in the Carpathian region has contributed to climate change, landslides, and, subsequently, frequent large-scale floods. For instance, in June 2020, 300 towns and villages were affected by floods, and 500 km of roads were damaged (Bratyuk, 2020). Therefore, reducing continuous felling and transitioning to sustainable methods of logging (e.g., selective cutting) is necessary. As forests are important for moisture retention on mountain slopes, the preservation of soils should be considered in the standards for logging.

The United Nations General Assembly has declared 2021 – 2030 as the Decade of Ecosystem Restoration, which provides an opportunity to support the large-scale restoration of degraded forest landscapes, increasing environmental sustainability and efficiency and contributing to the achievement of many Sustainable Development Goals. Some countries have already made commitments under the Bonn Challenge that aim to restore 350 million hectares of degraded and deforested landscapes by 2030, with Sustainable Development Goal 15.3 targeting land degradation neutrality by 2030. There are also regional initiatives, such as the Great Green Wall (a project led by the African Union to combat desertification in the south), the African Forest Landscape Restoration Initiative, Initiative 20 × 20 in Latin America, and ECCA30 in Europe, the Caucasus, and Central Asia (Wilkie, 2021).

In November 2021, at the Conference of the Parties 26 Climate Change Conference in Glasgow, 110 countries, representing 85% of the world's forests, signed the Declaration to preserve and regenerate forests (Ministry of Ecology and Natural Resources of Ukraine, 2021). Ukraine joined the Declaration and pledged to stop deforestation and initiate the restoration of forest cover by 2030.

Several presidential orders in Ukraine focus on nature and environmental preservation. For instance, Order No. 381/2017, “On Additional Measures on Forestry Development, Rational Nature Management, and Natural Reserve Fund Objects Preservation,” and Order No. 511/2019, “On Some Measures on Forests Preservation and Rational Use of Forest Resources.” The Green Country project, launched in June 2020 in Ukraine, aimed to significantly increase forested areas. Within this initiative, the Order of the President of Ukraine, “On Some Measures on Forests Preservation and Rehabilitation” (No. 228/2021 as of June 7, 2021), was issued to launch the environmental project titled “Large-Scale Reforestation of

Ukraine.” Its implementation involves planting one billion new trees within 3 years. By late November 2021, about 38 million trees had been planted, including five million in the Carpathian region (Zelena, 2021).

However, reforestation is not just about planting trees. It involves restoring balance among the environmental, social, and economic benefits of forests and land use. In some cases, natural regeneration of local plants is the best approach, while in others, planting trees and vegetation can accelerate the recovery of health and productivity of degraded landscapes (Wilkie, 2021). The Great Green Wall is an example of the latter approach.

It is worth mentioning that illegal and mass deforestation is not the only issue contributing to drastic climate change and deteriorating quality of life. Illegal fishing, poaching of large carnivores, and the killing of wild birds also affect nature. For instance, according to environmentalists, 40 – 50 brown bears are illegally killed annually in the region, despite fewer than 200 remaining in the Carpathians (Malovanyi, 2020). The population of Romania plays a critical role in preventing their extinction. Therefore, the animal protection system should be strengthened by increasing accountability for lawbreakers, using advanced technologies (such as drones and mobile applications to record and report violations), and encouraging strong public involvement. Mineral and thermal waters are unique natural resources in the Carpathian region. To preserve them, the protection of sanitary zones around these resources should be reinforced, and excessive pumping should be prohibited, as it leads to contamination and depletion of the sources.

## 4.2. Objective 2: “Clean” region

The implementation of Objective 2 aims to reduce air and water pollution and address littering in the territory. The Carpathian region has the highest river density in Ukraine, surpassing other regions 4 – 7 times. However, the problem of quality drinking water remains pressing, as significant amounts of agrochemicals, wastewater, and industrial waste enter the region's reservoirs. The following measures are needed to address this problem: Rationalizing freshwater use; establishing water protection zones and coastal protection zones for water bodies; reconstructing existing centralized water supply and sewerage systems and creating new ones where necessary; and modernizing existing water treatment facilities and sewerage networks. To reduce industrial water pollution, it is essential to strengthen control over compliance with legislation and standards by economic entities, as well as increase penalties for violations.

The level of pollutant emissions into the atmosphere from stationary sources varied across the oblasts of the

region. Ivano-Frankivska and Lvivska oblasts were of particular concern. According to *Ivano-Frankivska Oblast Development Strategy 2021 – 2027*, Ivano-Frankivska oblast alone accounts for 11% of the country's total carbon dioxide emissions. The electricity, gas, water production and distribution, and mining sectors are significant contributors to pollution. For instance, VP "Burshtynska TES" of the AT "DTEK Zahidenerho" in Ivano-Frankivska oblast produces 83% of the total harmful substance emissions in the region. These companies need to modernize their filters, and in general, a transition to renewable energy sources is vital. In particular, the Energy Opportunities for Zakarpatska Oblast Communities project outlines three pilot models for autonomous energy provision from renewable sources in local communities, including the creation of micro-networks in mountain areas.

To address the problem of industrial and household waste and package accumulation, it is essential to support the international 3R initiative: Reduce waste production, reuse materials, and recycle. This includes establishing a separate collection and sorting system for household and packaging waste, improving waste treatment for both industrial and household waste, and improving the level of environmental awareness in the region.

### 4.3. Objective 3: Green regional economy

The green economy model promotes economic growth while ensuring environmental sustainability. According to United Nations environmentalists, a green economy enhances human well-being, reduces social inequality, mitigates environmental risks, and prevents depletion of resources (EaP Green, 2017, p. 9). Through the declarations signed in the Eastern Partnership framework, Ukraine has pledged to adhere to the principles of a green economy. This commitment calls for a radical transformation in natural resource management, industry, and societal attitudes. The agro-industrial sector is considered the most critical area in transitioning to a green economy, as it impacts various aspects of sustainable development.

### 4.4. Objective 4: Environmentally efficient behavior

Overcoming the environmental crisis depends on human activity, consciousness, and culture. Therefore, developing a behavior model that positively impacts the environment is necessary. Environmentally efficient behavior refers to a system of human actions and attitudes that preserves the environment and improves its condition (Figure 5).

On one hand, such behavior should be developed through the environmentalization of educational and training processes for people of all ages, active dissemination of information about the natural environment, and a

heightened awareness of anthropogenic impact (e.g., the negative consequences of illegal logging for both nature and people). On the other hand, strict environmental legislation and efficient enforcement mechanisms should be in place. Moreover, applying all types of punishment (administrative, disciplinary, and criminal) to economic entities and consumers is essential. This requires reforming the judicial system and combating corruption at all levels. Environmental discipline, which forms the basis of environmental conscience and culture, is developed depending on the value-needs structure of individuals, as well as environmental awareness and an understanding of the penalties for environmental offenses (such as compliance with environmental law, standards, and regulations, as well as timely fulfillment of obligations).

Environmental conscience reflects an entity's axiological position and attitude toward the natural environment. It is based on environmental awareness, an understanding of one's responsibility to the environment, the need to preserve nature, and the ways to address environmental problems. Environmental culture is developed based on environmental knowledge and conscience, forming a new paradigm of human thinking and eco-centric behavior norms. It is built on the harmony and cohesion of humans and the environment, rather than their opposition.

Individuals simultaneously play various societal roles, so human behavior can be divided into three groups, each defining the main activity peculiar to each group. As an economic entity, an individual should comply with environmental law, switch to renewable energy sources, treat waste, switch to organic products and eco-packaging, etc.

Consumers who engage in environmentally friendly behavior are essential to solving environmental problems. They conserve water, gas, and energy, minimize their use of paper, disposable tableware, and plastic bags, and purchase eco-friendly and certified wood products.

We believe that the development of environmentally friendly behavior can only be achieved through the symbiosis of informational and regulatory mechanisms. Their effectiveness depends, in part, on human characteristics. Indeed, the interaction between these mechanisms can lead to environmentally neutral or justified human behavior. Environmentally friendly behavior is not only based on environmental awareness and discipline but also on intrinsic motivation and an active human position. Environmentally friendly behavior is not only based on environmental awareness and discipline but also on intrinsic motivation and an active human position (for example, support and participation in environmental initiatives). Environmental volunteering

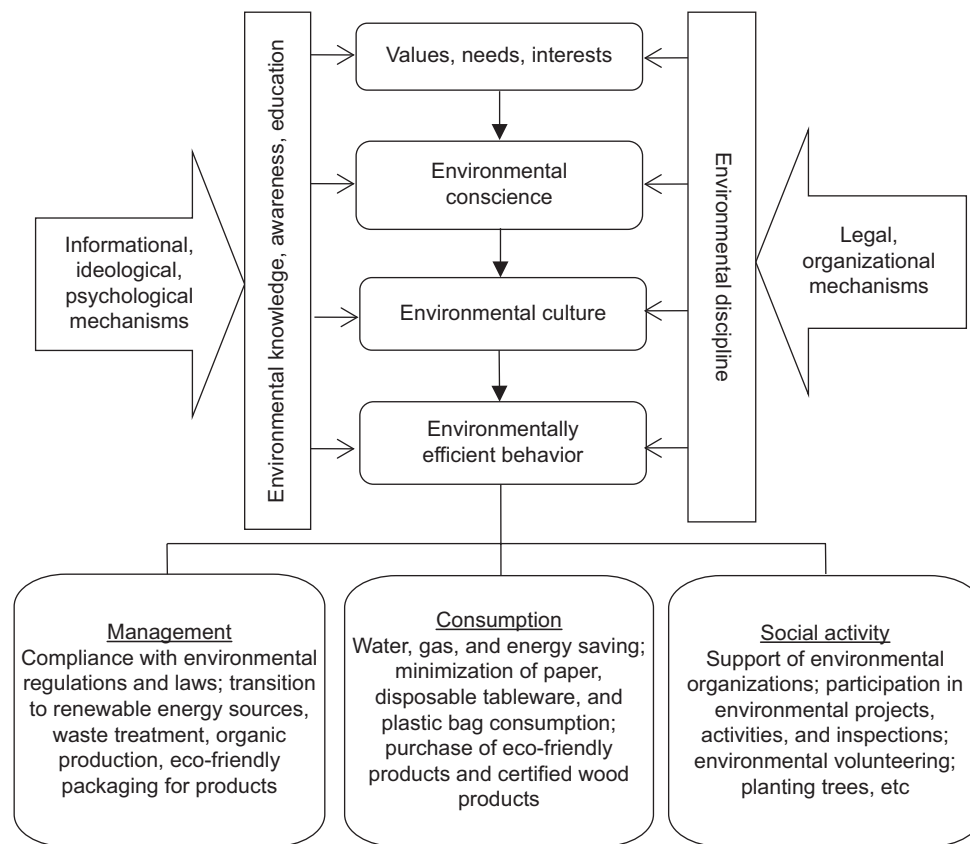


Figure 5. Model of developing environmentally efficient behavior  
Source: Authors' own elaboration.

is another important aspect, mainly focused on cleaning areas such as roads or roadways. Local inspections of illegal logging, as well as pollution of water, air, and soil, and efforts to combat illicit dumping, are essential in the Carpathian region.

### 5. Conclusion

Quality of life is a comprehensive concept that encompasses different aspects of human functioning, which can be difficult to cover in a single study. Therefore, this paper focused on the environmental component – one of the most urgent and insufficiently addressed problems. As the regression analysis showed, environmental factors have a negative impact on the population's quality of life in the Carpathian region. In response, the Carpathian Eco-Way Strategy was presented, aimed at overcoming the environmental crisis and enhancing the environmental component of the quality of life in the Carpathian region of Ukraine. The strategy outlines the achievement of the following interdependent objectives: The preservation and restoration of the natural capital in the Carpathian region, ensuring the cleanliness of air, water, and land, transitioning to a green economy, and developing a model of environmentally efficient behavior

for economic entities, residents, and visitors of the region. A range of priority tasks is set within each objective. The success of achieving the first three goals is grounded in the environmentally friendly behavior of the population, defined as a system of human actions and attitudes directed at preserving and improving the environment. This research provides a model for developing environmentally efficient behavior that highlights the interaction between external mechanisms (legal and informational) and individual socio-psychological characteristics. It also outlines the main features of environmentally efficient behavior for individuals as economic entities, consumers, and members of society.

The study offers a new perspective on how to foster sustainable practices among various stakeholders in the region. This interdisciplinary approach provides valuable insights for policymakers, environmentalists, and economists alike. Further research should focus on specific methods and ways to address pollution in the water, soil, and air in the Carpathian region.

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## Conflict of interest

The authors declare that they have no competing interests.

## Author contributions

*Conceptualization:* Olha Ryndzak

*Formal analysis:* Lilia Ukrainets

*Investigation:* All authors

*Methodology:* Olha Ryndzak

*Writing – original draft:* Olha Ryndzak

*Writing – review & editing:* Lilia Ukrainets, Iryna Gerlach

## Ethics approval and consent to participate

Not applicable.

## Consent for publication

Not applicable.

## Availability of data

The data used in the study were obtained from the open databases of the State Statistics Service of Ukraine and the State Agency of Water Resources of Ukraine.

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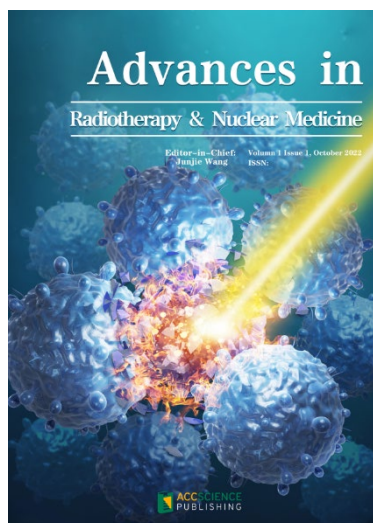
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