



Original research article

Social, digital, and educational inequalities as determinants of health: evidence from four national contexts in Europe and Latin America

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Abstract

Background: Health inequalities are shaped by broader social, digital and educational disparities. Examining their interconnections is essential for understanding structural determinants of health across different socioeconomic contexts.

Aim: To analyse how health inequalities are intertwined with social, digital, and educational inequalities in diverse national settings.

Methods: Comparable secondary statistical indicators of social, digital, educational, and health inequalities were analysed for Mexico, El Salvador, Slovenia, and Croatia. An Erasmus+ educational project was examined as an illustrative intervention addressing multilevel inequalities.

Results: Marked socioeconomic and digital disparities were observed in Latin America and Europe, reflected in weaker social protection, limited digital infrastructure, lower educational attainment, and poorer health. These domains are structurally interconnected and mutually reinforcing across the life course. The project case suggests that strengthening digital competencies and active learning in nursing education may enhance professional empowerment and support more equitable health engagement.

Conclusion: Health inequalities are embedded in multidimensional structural conditions. Addressing social protection, education, and digital access is central to reducing persistent health disparities and advancing health equity.

Keywords: Cross-cultural comparison; Educational status; Health disparities; Internet access; Nursing education; Socioeconomic factors

Introduction

Social inequalities, characterised by the uneven distribution of income, resources, opportunities, and privileges within and between societies (Warwick-Booth, 2013), are structurally reproduced. Theoretical approaches from Marx, Weber, Durkheim, Spencer, and Bourdieu, emphasise that inequalities are embedded in structural arrangements and institutional practices rather than resulting solely from individual differences. Social inequalities are multidimensional, generate cumulative disadvantages, and evolve through economic, demographic, and technological change. Structural disadvantages in income, education, and social status determine who gains access to digital resources and skills. Parayil (2005) notes that rising income *per capita* does not reduce wealth disparities; on the contrary, income and wealth have become increasingly concentrated in the digital age.

These structural inequalities are reflected in the digital domain through the digital divide, characterised by unequal

access to the internet and digital technologies (Ragnedda and Muschert, 2013), and through digital inequalities, which refer to differences in how digital technologies are used (Torres-Albero et al., 2014). Limited access to digital resources deepens exclusion and social stratification. Digital inequalities are closely intertwined with social inequalities, affecting education and employment (Ho et al., 2025). The main concern regarding the digital divide is that the info-poor risk becoming further marginalised in societies where digital skills are vital for education and employment (Norris et al., 2001).

Limited resources and restricted access to digital technologies and competencies contribute to educational inequalities by hindering educational participation, learning opportunities, and upward social mobility, and exposing low- and medium-qualified workers to precarious employment and declining mobility opportunities (European Commission, 2022; Ragnedda and Muschert, 2013).

These intersecting social, digital, economic, and educational disparities are reflected in health inequalities. Health is shaped by social determinants and environmental condi-

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tions that produce avoidable health inequalities (Drobne et al., 2026; Marmot, 2005; Marmot and Allen, 2014). Despite global improvements, WHO (2025) reports persistent and widening gaps in health and well-being, with poorer populations systematically experiencing worse health outcomes. Life expectancy has increased overall, but unequally, differing by up to 18 years between high- and low-income countries. Such trends are considered avoidable, reflecting inequalities rooted in policy choices and social structures (WHO, 2025). Life-course perspectives show that prolonged exposure to adverse conditions accumulates over time, producing long-term health disparities (Kuh et al., 2003).

Limited digital access further restricts access to e-health services and digital public health resources (Van Deursen and Helsper, 2018). Individuals with lower socioeconomic status or limited educational attainment often experience restricted access to health-promoting resources, such as quality healthcare services, healthy environments, and reliable health information (Solar and Irwin, 2010). Addressing health inequalities requires integrated strategies that focus on the structural determinants of health, rather than healthcare provision alone (WHO, 2025). While the theoretical links between social, digital, educational, and health inequalities are well established, empirical research that comparatively maps these dimensions across diverse socioeconomic contexts remains limited. This study addresses this gap by integrating evidence from Central European and Latin America (LA) settings, providing a comparative perspective on how these barriers are reflected globally.

Against this background, the present study adopts a comparative descriptive approach to map the co occurrence of social, digital, educational, and health inequalities across four different socio-economic national contexts: Mexico, El Salvador, Croatia, and Slovenia. Drawing on international statistical databases and qualitative primary data, this study aims to demonstrate how health inequalities are closely intertwined with social, digital, and educational inequalities across selected socioeconomic contexts. To complement the macro level comparative mapping, the study includes a qualitative case example from an Erasmus+ educational project in nursing education implemented in LA, illustrating how educational and digital initiatives may help reduce capability gaps that emerge from structurally unequal settings. The project outputs were not analysed as an intervention producing measurable health outcomes, but as an example of an educational intervention that may support digital inclusion and professional empowerment.

This paper pursues two objectives:

- 1) *to compare and descriptively map social, digital, educational, and health inequalities across four countries from (upper-)middle-income and high-income contexts;*
- 2) *to illustrate, through a case example, the potential of targeted educational initiatives in nursing education to support efforts to address selected aspects of social, digital, and health inequalities in upper middle-income countries.*

Materials and methods

This paper employs a comparative descriptive design, combining secondary quantitative data with primary qualitative data from an educational case example. Four countries – El Salvador and Mexico from LA, Croatia and Slovenia from Europe (EU) – were purposively selected to represent contrasting socioeconomic contexts. This enables comparison between up-

per-middle-income and high-income countries with differing levels of social protection, digital infrastructure, and educational capacity. The LA countries also participated in the Erasmus+ project analysed in the qualitative component.

Comparable secondary data were obtained from official international databases (ILOSTAT, 2025; WHO, n.d., World Bank, 2025). Indicators captured social, digital, educational, and health inequalities, including income distribution, employment, poverty, digital access and infrastructure, educational investment and participation, and key health outcomes and system capacity. Data from 2023, or the most recent comparable year available, were prioritised. When indicators from identical years were unavailable, adjacent years were used to reflect structural patterns rather than precise contemporaneous differences. The quantitative analysis is descriptive and comparative, focusing on cross country patterns without causal inference.

The qualitative component draws on an Erasmus+ educational project entitled Smartnurse – Developing Teachers' and Nursing Students' Competencies in Digital Nursing (2021–2023) implemented at five HEIs: two public institutions in Mexico and three institutions in El Salvador (one public, two private). Two in-person focus groups were conducted with 11 teachers (at least two from each HEI; three men and eight women). Both focus groups took place on 8 June 2023 in person and were moderated by experienced qualitative researchers, fluent in Spanish and English. The discussion followed a semi-structured protocol focused on experiences with project activities and perceived impacts on teaching and learning. The session was audio-recorded and transcribed. Students' feedback was collected as part of project monitoring through a post-intervention questionnaire, completed by 1,185 students from all five HEIs between January and September 2022. Interview transcripts and students' feedback were translated into English prior to analysis. Translation accuracy was verified by several bilingual project team members to ensure that the translated texts accurately reflected the original meaning, cultural context, and nuances of the expressions used, thereby minimising potential misinterpretations. Inductive coding and qualitative content analysis were conducted independently by two researchers from Slovenia, aiming to thematically identify recurring themes related to digital and educational practices within the project context. Themes related to impacts on digital access, educational participation, and professional capacities were identified and interpreted in relation to broader inequality dimensions. Any uncertainties related to language, cultural meanings, or contextual interpretation were resolved through discussions with project partners – teachers from Mexico and El Salvador – who are fluent in Spanish and English and familiar with the contexts of the five participating HEIs. Final interpretations were reviewed and validated by a co-author from Mexico with extensive knowledge of local context. This process strengthened the credibility of the analysis through investigator triangulation. The analysis was intended to contextualise the comparative findings, rather than to evaluate causal effects on health outcomes. Participation was voluntary, informed consent was obtained from all participants, and data were anonymised.

Results

In this section we present a descriptive comparison of selected indicators across four countries, highlighting cross country contrasts and recurring patterns across social, digital, edu-

cational, and health domains. Quantitative results are supported by tables, while qualitative findings are presented as an illustrative case example to contextualise the comparative patterns.

Social inequalities

In comparative terms, based on official statistics of the World Bank (2025) and ILOSTAT (2025) (Table 1), Mexico and El Salvador differ markedly from Slovenia and Croatia across multiple indicators of social inequalities. Inequalities are present both between and within countries. Inequality is generally lower in European countries than elsewhere in the world, as in the list of top 10 countries with lowest inequality among inhabitants, seven European countries occupy the top 10 slots (World Bank, 2025). Slovenia is in second place worldwide, meaning it is a country with one of the most egalitarian distributions of income in the world (*very low inequality*). Croatia is a country with low inequality and egalitarian income distribution (34th place). In contrast, the analysed LA countries have greater income inequality among their inhabitants. Among the 171 countries in the world, El Salvador belongs to those with moderate inequality (118th place) and Mexico to the group of countries with high inequality (141st place).

When comparing cross-country data for social inequalities, the disparity between the two regions is also particularly striking. In 2023, Slovenia's GDP *per capita* was more than

twice that of Mexico and six times higher than El Salvador. Croatia also considerably exceeds both LA countries, though it still lags behind Slovenia. These differences are aligned with the structural gaps in productivity, labour market stability, and welfare systems between analysed high-income European and middle-income LA economies. Comparable data on average monthly gross wages show Slovenia's average wages are roughly double those of Croatia and six times higher than in Mexico and El Salvador. Data of average monthly earnings of employees shows that relative purchasing power in Slovenia is almost twice as high as in Croatia, and more than four times higher than in Mexico and El Salvador.

Slovenia and Croatia demonstrate relatively high employment rates combined with moderate to low unemployment. In Mexico and El Salvador, employment rates are ten points lower, despite similarly low official unemployment levels. The share of the population living below the upper-middle-income poverty line remains high in El Salvador and Mexico, while Croatia and Slovenia exhibit near-universal economic security, consistent with higher income levels and stronger welfare systems. Vulnerable employment is considerably more prevalent in El Salvador and Mexico than in Croatia and Slovenia. Employment is reflected in housing conditions. The proportion of people living in slums is substantially present in both El Salvador and Mexico, whereas it is nearly negligible in Croatia and Slovenia.

Table 1. Selected indicators of social inequalities

Indicator/Data	Year	El Salvador	Mexico	Croatia	Slovenia	Source, indicator
Land area (thousand km ²)		20.7	1,964.4	56.6	20.3	World Bank, AG.LND.TOTL.K2
Population (million)	2023	6.3	130.9	3.9	2.1	World Bank, SP.POP.TOTL
Gini coefficient (Income/expenditure); 1 – total equality, 100 – total inequality	2022	38.8 (118th place)	43.5 (141st place)	30.0 (34th place)	24.3 (2nd place)	World Bank, SI.POV.GINI
GDP <i>per capita</i> (\$)	2023	5,365.44	13,826.13	21,865.46	32,610.11	World Bank, NY.GDP.PCAP.CD
Employment rate (% of working age population)	2023	63.2	61.2	70.4	74.2	World Bank, SL.EMP.TOTL.SP.ZS
Unemployment rate (% of labour force)	2023	4.4	2.9	6.6	3.3	World Bank, SL.UEM.TOTL.Z
Vulnerable employment, total (% of total employment) (modelled ILO estimate)	2023	31.5	26.1	7.96	10.6	World Bank, SL.EMP.VULN.ZS
Average monthly earnings of employee (\$)	2023	450.14	502.36	1,547.16	2,987.35	https://ilostat.ilo.org/topics/wages/
Average monthly earnings of employee (\$, PPP converted)	2023	918.21	833.56	2,381.47	4,487.36	https://ilostat.ilo.org/topics/wages/
Poverty headcount ratio at \$8.30 a day (2021 PPP) (% of population)	2022	32.7	27.4	2.4	0.2	World Bank, SI.POV.UMIC
Population living in slums (% of urban population)	2022	16.47714	17.6	0.52712	0.52712	World Bank, EN.POP.SLUM.UR.ZS

Digital inequalities

A comparison of selected indicators of digital inequality reveals that Mexico performs closer to EU levels on some indicators, whereas El Salvador remains significantly constrained (Table 2). Unequal digital infrastructure is reflected in internet use, which is lowest in El Salvador and highest in Slovenia, while in Mexico and Croatia the internet is used by more than 80% of the population. Cybersecurity readiness, measured by secure servers per million people, shows that Slovenia and Croatia outperform Mexico and El Salvador. Fixed broadband sub-

scription rates in Slovenia and Croatia are nearly three times higher than El Salvador's, and Mexico lies in between, with broadband penetration roughly double that of El Salvador but still below EU levels. Household internet connection represents the most acute disparity: only one third of households in El Salvador and almost three quarters in Mexico have internet access, compared with nearly universal access in the two EU countries. This coincides with more limited educational and labour-market opportunities in lower-access contexts. On the other hand, El Salvador records an exceptionally higher level

of using mobile data, indicating reliance on mobile networks where fixed infrastructure is limited. Low-income households and rural residents in these countries are more likely to lack

access to reliable internet, which constrains participation in education, employment, and digital governance.

Table 2. Selected indicators of digital inequalities

Indicator	Year	El Salvador	Mexico	Croatia	Slovenia	Source, indicator
Individuals using the Internet (% of population)	2023	67.7	81.2	83.2	90.4	World Bank, IT.NET.USER.ZS
Fixed broadband subscriptions (per 100 people)	2023	11.63	20.09	28.47	31.88	World Bank, IT.NET.BBND.P2
Mobile cellular subscriptions (per 100 people)	2023	179.71	111.56	117.11	129.23	World Bank, IT.CEL.SETS.MA.ZS
Households with internet access at home (% of households)	2023	34.2	71.7	89.6	93.7	World Bank, HH.INT.ACCESS
Secure internet servers (per 1 million people)	2023	181.79	412.12	29,421.56	63,978.54	World Bank, IT.NET.SECR.P6

Educational inequalities

Cross-country comparison of education indicators shows educational disparities mirror socioeconomic inequalities, with better educational systems in analysed EU countries than in LA (Table 3). Public investment in education, measured as a share of GDP, is markedly lower in El Salvador than in Slovenia. When compared with differences in GDP *per capita*, this investment gap becomes even more pronounced, indicating more limited fiscal capacity to support educational systems. Teacher–pupil ratios illustrate systemic differences: classroom

density in El Salvador and Mexico is roughly double that in Croatia and Slovenia, which has implications for instructional quality and learning outcomes. While attendance in primary school is almost universal, access to higher education follows a clear regional divide. Tertiary gross enrolment is considerably lower in El Salvador and Mexico compared with Croatia and Slovenia, signalling persistent inequality in progression to advanced education levels. There is also around twice as large a share of adolescents who are not in education, employment, or training in the analysed LA countries as in European ones.

Table 3. Selected indicators of educational inequalities

Indicator	Year	El Salvador	Mexico	Croatia	Slovenia	Source, indicator
Government expenditure on education (% of GDP)	2021	3.58	4.24	4.09	5.39	World Bank, SE.XPD.TOTL.GD.ZS
Tertiary level – Gross enrollment ratio (% of population)	2022	32.4	47.5	81.2	80.1	World Bank, SE.TER.ENRR
Pupil–teacher ratio, primary (pupils per teacher)	2016	28.3	26.7	13.5	13.8	World Bank, SE.PRM.ENRL.TC.ZS
Adolescents not in education, employment or training (% of population ages 15–24)	2023	20.34	22.03	13.17	7.38	World Bank, SL.UEM.NEET.ZS

Health inequalities

Cross-national comparison of core health indicators from World Bank and WHO databases (Table 4) demonstrates differing long-term health outcomes linked to socioeconomic and healthcare system capacities. Life expectancy at birth differs by nearly 10 years between El Salvador (72.1 years) and Slovenia (82.0 years), with Mexico and Croatia positioned in between. Mortality indicators reveal even sharper contrasts. Infant mortality in El-Salvador and Mexico is more than double that in Croatia, and nearly five times higher than in Slovenia. Under-five mortality rate, an indicator sensitive to early-childhood healthcare services, shows a similar pattern, with rates in El Salvador and Mexico far exceeding those in both EU countries. Maternal mortality exhibits an even more pronounced divide: El Salvador and Mexico record levels more than ten times higher than Croatia and Slovenia, reflecting differences

in access to high-quality maternal and obstetric care. Mortality gaps underscore systemic inequalities in preventive measures, healthcare service availability, and socioeconomic conditions.

Regarding healthcare-system accessibility, health expenditure as a share of GDP is similarly high in El Salvador and Slovenia. However, actual *per capita* spending is substantially higher in Slovenia due to its higher GDP *per capita*. In El Salvador, high expenditure is accompanied by considerable out-of-pocket costs, indicating a heavier financial burden on households. Out-of-pocket spending is even higher in Mexico, whereas Croatia and Slovenia maintain more protective financing structures.

Health-system capacity indicators reinforce these disparities. The density of physicians (medical doctors) is substantially lower in El Salvador and Mexico than in Croatia and Slovenia. This indicates more limited availability of physicians and

represents one of the lowest levels among OECD countries. Similarly, hospital bed capacity shows El Salvador and Mexico

operate with significantly more constrained inpatient infrastructure than Croatia and Slovenia.

Table 4. Selected indicators of health inequalities

Indicator	Year	El Salvador	Mexico	Croatia	Slovenia	Source, indicator
Life expectancy at birth (years)	2023	72.1	75.1	78.5	82.0	World Bank, SP.DYN.LE00.IN
Infant mortality rate (per 1,000 live births)	2023	9.2	10.8	3.9	1.8	World Bank, SP.DYN.IMRT.IN
Maternal mortality ratio (per 100,000 live births)	2023	39.0	42.0	3.0	3.3	WHO GHO (MMR)
Under-five mortality rate (per 1,000 live births)	2023	10.4	12.5	4.6	2.2	World Bank, SH.DYN.MORT
Current health expenditure (% of GDP)	2022	9.8	5.7	7.2	9.6	World Bank, SH.XPD.CHEX.GD.ZS
Out-of-pocket expenditure (% of current health expenditure)	2022	31.6	39.1	9.2	12.4	World Bank, SH.XPD.OOPC.CH.ZS
Medical doctors (per 10,000 people)	2022	15.66	25.88	30.09	33.67	WHO GHO (HWF_0001)
Hospital beds (per 1,000 people)	2021	1.1	1.0	5.6	4.3	World Bank, SH.MED.BEDS.ZS

Addressing multidimensional inequalities through project activities: an illustrative case

To contextualise the comparative results, this subsection illustrates the potential of targeted educational interventions to support efforts addressing selected aspects of social, digital, educational and health inequalities in LA: the Erasmus+ Smartnurse – Developing Teachers' and Nursing Students' Competencies in Digital Nursing project (2021–2023). Within this context, the project focused on integration of digital educational technology (DET) into nursing education. The project aimed to modernise nursing education in project partner HEIs in LA: two HEIs from Mexico and three from El Salvador. Program partners were HEIs from Slovenia and Finland coordinating the project.

The project enabled partner HEIs from LA to purchase essential ICT equipment; a resource already standard for teachers (and accessible also for students) in Slovenia and Croatia, but previously unavailable for teachers in LA HEIs. As noted by teachers from the University of El Salvador, the project ensured that each employee at the country's largest public university received personal computers for their work for the first time. This basic infrastructural investment represented an attempt to directly address social and digital inequalities identified in the previous subsection and enabled teachers to participate in digital academic and clinical environments on more equal footing with their European peers.

The project activities focused on fostering the development of digital competencies among nursing teachers and students to promote the use of digital technology to support addressing inequality in health and access to healthcare services in the region. These efforts were particularly directed toward the prevention and management of non-communicable diseases (NCD) in primary healthcare, emphasising patient empowerment for self-care (Huuskonen et al., 2024). During the project, an educational methodology was developed, emphasising active learning and the integration of DET into nursing curricula. Teacher training contributed to the advancement of digital and teaching competencies, enabling a more active learning approach to educating future nurses (Huuskonen et

al., 2024). Twelve training sessions were conducted, averaging 46 HEI teachers per session (Gogova et al., 2024).

Qualitative accounts from teachers and students provide further insight into experiences in practice. A change in approach to patients and community engagement was discussed in focus groups. Teachers observed that project activities facilitated a paradigm shift, prompting students to embrace a patient-centred approach. As one teacher explained, illustrating the transfer of active learning into practice:

"We, as teachers, started teaching as we were taught [during the project]. Then the students, you see, some of them anticipated and provided health education as we were teaching them and that was fascinating to me, because they really transferred [this approach into their clinical practice]: this is how I am learning, this is how I am teaching, and they replicated it with their patients."

Active learning approaches were internalised by students and transferred into patient interactions, demonstrating a shift toward more autonomous and reflective clinical practice. This transformation is poised to have profound implications for future nursing interventions.

Students also emerged as change agents. Their technological fluency and enthusiasm for active learning influenced teachers. As one teacher reported: *"They have even given us new suggestions for apps that we had no idea about."* Their success in applying digital tools in clinical environments was particularly impactful. In clinical settings, nursing students supported healthcare staff unfamiliar with information systems. A teacher reported: *"They told us that our students have come to teach us how to use the tablets, how to use the computer, because here we did not know how to use the SIS [op. Health Information System]."* Reversal of traditional hierarchies demonstrated the practical value of educational innovation beyond academic contexts to enhance the use of digital solutions in clinical settings.

Students recognised the potential to transfer their newly acquired knowledge and technological skills into clinical practice, supporting patients, families, and communities in achieving better health outcomes through preventive activities. As one student noted: *"I believe that with this new strategy, we can not only help the patient, but also the family and caregivers."*

(...) *We use digital tools in patient care and attention, as well as in health promotion and education.*" Participants perceived that educational changes were not limited to the classroom but extended into behavioural changes in clinical settings.

It is important to acknowledge that in certain rural and economically disadvantaged areas, limited access to digital infrastructure poses a significant barrier. These populations often remain unreachable through digital health initiatives. Students reported restricted access to digital infrastructure, including poor internet connectivity, lack of financial resources for internet access, and inadequate technical equipment, all of which hinder the implementation of digital health solutions. Access barriers also affected their learning experience, as one student noted: *"You can learn a lot with these types of tools, but due to my low signal on this day, I could not see the activity."* These limitations affect healthcare professionals and the communities they serve, and illustrate the structural limits of digital health in regions with uneven infrastructure. Although locally and temporally limited, participants described visible and meaningful improvements in digital inclusion, educational practice, and community health engagement. They also offered valuable insights into how educational innovation can support equity goals in low-resource contexts.

Discussion

This study highlights that health inequalities are embedded in social, digital, and educational structures across the four countries analysed. The comparative findings indicate that patterns of social stratification are systematically reflected in differential access to digital resources, educational opportunities and, ultimately, health. The results support a multidimensional understanding of inequality. Rather than operating independently, these dimensions of inequality appear to co-occur and reinforce one another across national contexts. The study is limited to secondary data and limited national scope, including methodological and temporal differences; therefore, the findings do not allow causal inferences or regional generalisations. The study contributes a cross-national perspective integrating social, educational, digital, and health dimensions. By combining international comparable indicators across diverse socioeconomic contexts, the results illustrate how these dimensions cluster across domains. These findings are consistent with existing literature on social determinants of health and digital inequality, which emphasises the cumulative and structural nature of disadvantage over the life course (Braveman and Gottlieb, 2014; Western et al., 2025).

With regard to social inequalities, the results show that Mexico and El Salvador are characterised by higher poverty, greater labour market vulnerability, worse housing conditions, and weaker social protection compared with Slovenia and Croatia. These patterns align with differences in welfare regimes and economic capacity. In line with life course perspectives, prolonged exposure to such conditions may contribute to persistent disadvantages that extend into educational and health outcomes. The concentration of poverty, low-wage employment, and housing precarity in Mexico and El-Salvador exemplifies cumulative disadvantage, where limited economic capital restricts access to other forms of capital, including digital and educational resources.

Digital inequalities further differentiate the analysed contexts. Limited access to fixed broadband and household internet connectivity in the LA countries coincides with lower digital system capacity, while reliance on mobile connectiv-

ity reflects infrastructural constraints. Slovenia and Croatia demonstrate near-universal home internet access and much higher cybersecurity capacity, while Mexico occupies an intermediate position. Dependence on mobile internet connectivity in El Salvador reflects infrastructural gaps and reinforces digital exclusion for low-income groups. These patterns align with digital divide theory (Norris, 2001; van Dijk, 2005), showing that unequal access to infrastructure and skills reflects and reinforces socioeconomic stratification.

Similarly, educational inequalities reflect these structural differences. Lower public investment in education, higher classroom density, and reduced participation in tertiary education in LA could lead to more constrained opportunities for skill development and upward mobility. These identified disparities resonate with the literature on skills polarisation, which shows that inequalities in digital access translate into unequal educational outcomes and labour-market trajectories (OECD, 2015). As demonstrated using global statistical data, deficits in digital access and skills contribute directly to educational stratification, limiting progression to tertiary education among disadvantaged groups.

Cross-country differences in social, digital, and educational conditions co-occur with marked differences in health outcomes and healthcare system capacity. Lower life expectancy, higher mortality indicators, and weaker health-system resources in Mexico and El Salvador align with socioeconomic and institutional constraints within countries. High out-of-pocket expenditure further indicates limited financial protection, which may exacerbate existing health inequalities. These disparities translate into persistent gaps in health security and overall well-being. This highlights that social, educational, and digital inequalities are mutually reinforcing dimensions of health inequalities. Cross-national patterns align with life-course perspectives (Kuh et al., 2003), which emphasise that early-life socioeconomic disadvantage accumulates and manifests in poorer adult health outcomes. Although our study does not allow causal inference, findings indicate that reducing health inequalities requires approaches that go beyond healthcare systems, as inequalities are embedded within interconnected social, educational, and digital structures. Policies that strengthen digital infrastructure, ensure equitable access to education, and build institutional capacity may therefore represent important upstream strategies for addressing long-term health disparities, particularly in low-resource settings.

OECD (2025) highlights that although global educational attainment has increased, access to tertiary education remains strongly shaped by socioeconomic background. Learners from disadvantaged families are significantly less likely to reach higher education, limiting social mobility and reinforcing unequal labour-market outcomes. Educational, digital, and health inequalities are mutually reinforcing: restricted educational access constrains digital literacy and access to digital health resources, while poor health further reduces opportunities for education and inclusion, perpetuating cumulative disadvantage.

The Erasmus+ project is presented as an illustrative meso-level educational case example that contextualises these macro level patterns. Qualitative findings suggest that strengthening digital competencies and active learning approaches in nursing education may support professional empowerment and enhance engagement in educational and clinical settings. Findings indicate improved inclusion, professional confidence, and capacity-building within participating HEIs. These insights highlight potential mechanisms through which educational initiatives can contribute to digital and educational inclusion in low-resource settings.

The project represents a good practice example of an educational initiative aiming to address multidimensional inequalities within a limited context. Students reported increased professional confidence and a shift from perceived subordination toward greater equality within healthcare teams. Many participants originate from socioeconomically disadvantaged and rural areas, where health inequalities are pronounced. Qualitative findings suggest that by strengthening critical thinking and digital competencies, the project may support their professional empowerment. This shift may contribute to improved quality of care and more equitable health, illustrating how educational interventions can expand agency and reshape professional identity in structurally disadvantaged settings. Due to limited healthcare access, HEIs in LA implement community-based projects with vulnerable groups. Digital skills may support more equitable access to health information, reducing educational and digital divides and strengthening students and communities. Strengthening research competencies further reinforces institutional capacity as a mediator of inequality within the social determinants of health framework (Solar and Irwin, 2010). In low-income settings, social and digital inequalities strongly shape educational attainment and health outcomes. Higher educational attainment is associated with better health literacy and health. Increasing burdens of NCD further reveal structural weaknesses in unequal health systems. Preventive and digitally supported educational approaches can help reduce these disparities (Chavez and Nam, 2020; Heerman et al., 2024; Santamaria et al., 2025). Although such initiatives often target limited groups, they may generate institutional and normative effects, serving as catalysts for longer-term change in disadvantaged contexts.

This study does not assess causal relationships nor measure the impact of educational interventions on health outcomes. Instead, it provides a descriptive mapping of co occurring inequalities and an illustrative example of how educational initiatives may support efforts to address selected capability gaps within structurally unequal settings.

Conclusion

This study confirms that health inequalities are embedded in social, digital, and educational structures that vary systematically across national contexts. The comparative analysis across four countries highlights persistent differences between the LA and European settings in terms of economic security, digital access, educational capacity, and health outcomes. These inequalities do not operate in isolation, but co occur and align across domains, reflecting structural conditions shaped by welfare systems, institutional capacity, and socioeconomic context.

The findings underline the importance of addressing structural determinants of health, including social protection, access to education, and digital infrastructure, particularly in middle income and low resource settings. While the study does not assess causal relationships, the descriptive patterns observed across countries are consistent with existing evidence on cumulative disadvantage and life course inequalities.

The Erasmus+ project is presented as an illustrative educational case example that provides contextual insight into how targeted initiatives in nursing education may support digital and educational inclusion in disadvantaged contexts. Qualitative findings suggest perceived changes in teaching practices, professional confidence and engagement with digital tools, while also highlighting the structural limits of such initiatives

in settings characterised by persistent infrastructural and socioeconomic constraints.

The study contributes a comparative descriptive mapping of multidimensional inequalities and demonstrates the value of integrating macro level indicators with illustrative educational experiences. These findings support the relevance of integrated, cross sectoral approaches that link education, digital inclusion, and social policy as part of strategies to address health inequalities, while recognising the need for further research to assess long term and causal effects.

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Ethical aspects and conflict of interest

The authors have no conflict of interest to declare.

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