Disability Clusters and Socioeconomic Factors in Myanmar: Identifying Spatial Patterns and Associations

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ABSTRACT

Background

Despite persons affected by disability are expected to increase, limited support services and disparities in resource allocation exist in Myanmar which hinder persons with disabilities in accessing essential needs. This highlights the urgent need for spatial analysis through Geographic Information System (GIS) to better understand distribution of disability, socioeconomic correlations, and inform targeted policy interventions.

Objective

To provide hotspot clusters of disability prevalence across all districts of Myanmar and examine their distribution based on socioeconomic status along with the spatial autocorrelation patterns using Geographic Information System.

Method

District Level Report of 2019 of Myanmar Intercensal Survey was used. The data were processed and analysed using Quantum Geographic Information System and GeoDa programmes. Univariate and bivariate spatial analysis were performed using Global and Local Moran's I statistics along with Local Indicators of Spatial Association to identify spatial clusters of disability rates.

Result

The overall prevalence of disability was 12.9 per 100 population in Myanmar. Seven hotspots were identified along the Western Region of Myanmar (Moran's I value of 0.318). In bivariate Local Indicators of Spatial Association analysis, the literacy rate (Moran's I: 0.216), child dependency ratio (Moran's I: 0.137) and old dependency ratio (Moran's I: 0.259) exhibited significant association with disability prevalence.

Conclusion

This study demonstrated the demographic disparities in distribution of disability prevalence. Moreover, the spatial relationships between socioeconomic factors and disability were identified, offering a foundational understanding for necessary interventions and demonstrating the value of spatial analysis in shaping healthcare strategies.

KEY WORDS

Disability, Myanmar, Spatial analysis

INTRODUCTION

Globally, 1 in every 6 people are experiencing disability.[1] The number is expected to increase due to aging, climate change, disasters, chronic illness, road traffic injuries, unsafe working conditions and conflicts.

The United Nations Population Fund (UNFPA) estimated that over 650 million persons (15% of population) lived with disabilities in the Asia and Pacific region in 2022.[3] However, disability prevalence is underreported in Asia and the Pacific with official figures ranging from 1% in Lao People's Democratic Republic to 24% in New Zealand because of diverse definitions and data collection methods.[2] In Myanmar, an estimated 5.9 million people (13% of the population) were living with disabilities in 2019 with numbers expected to rise due to poverty, aging and limited support services.[4]

Disability is the result of the interaction between impairments such as mobility, cognition or psychological difficulties and barriers.[2] In Myanmar, persons with disabilities are more vulnerable to rights violations and job loss than those without disabilities.[4] Evidence showed that disability-inclusive employment could increase GDP by 1-7%.[2] Disparities in resource allocation and service delivery particularly in remote areas, limit access to care, education, employment, and assistive devices.[4]

While several studies have emphasized the importance of identifying challenges for effective disability-inclusive strategies, knowledge about disability distribution in Myanmar remains limited.[4,5] Geographic Information Systems (GIS) serve as suitable tools for understanding health distribution patterns and their connections to environmental factors, infrastructure, and healthcare access. By utilizing both direct and proxy variables, GIS supports more efficient resource allocation and planning for targeted interventions.[6,7] Therefore, this study aimed to identify hotspot clusters of disability prevalence across all districts of Myanmar and examine distribution based on socioeconomic status along with spatial autocorrelation patterns using GIS methodology to inform disability policy and planning.

METHODS

Myanmar is situated in Southeast Asia and lies between 9˚ 32'N and 28˚ 31'N latitudes, 92˚10'E and 101˚11'E longitudes bordered by China, Laos, Thailand, India, Bangladesh and the Andaman Sea. It covers 676,578 square kilometres with a coastline of 1,385 miles. The country's topography includes western mountain ranges (the Himalayan foothills), central plains (the Ayeyawady Delta) and eastern hilly regions (the Shan Plateau). Myanmar is divided into 15 administrative divisions which include 7 states, 7 regions and one union territory (Nay Pyi Taw). Each of these states and regions is further divided into 80 district levels.[8] In this study, the country administrative boundaries up to district levels were extracted from Myanmar Information Management Unit (MIMU).[9]

The dependent variable, the prevalence of disability and independent variables such as literacy rate, population data, child dependency ratio, old dependency ratio, labour force participation rate and urbanization were extracted from publicly published District-Level Report of the 2019 Myanmar Intercensal Survey published by the Ministry of Labour, Immigration and Population.[10] Only the summary statistics reported in the published document were used. The raw microdata were not requested or accessed for this study. While this report is not a raw dataset, it provides standardized and disaggregated district-level indicators compiled using rigorous methodology. In the mentioned report, persons with disability were measured for any kind of six disability functions such as seeing, walking or climbing steps, remembering or concentrating, hearing, self-care and communication using full set of Washington Group questions.[11] A person with at least one of those disabilities was considered a person with disability in this study. The intercensal survey presented data for individuals aged 5 years and older which is consistent with the Washington Group guideline. The 2019 Myanmar Intercensal Survey report included data for 71 districts. For nine districts, including Danu Self-Administered Zone, Hopan, Kokang Self-Administered Zone, Matman, Maungdaw, Maruk-U, Naga Self-Administered Zone, Pa Laung Self-Administered Zone, and Pa-O Self-Administered Zone, key variables were not reported and were recorded as missing values in the dataset. These districts were included in spatial analysis where appropriate with missing data handled accordingly.

Literacy rate data were extracted from the 2019 Myanmar Intercensal Survey report. In this report, literacy is defined as the ability to both read and write in any language. The literacy rate reflects the proportion of individuals aged 15 years and above who self-reported being able to read and write. Nighttime light data were extracted from the VIIRS Stray Light Corrected Nighttime Day/Night Band Composites from the Earth Observation Group at the Payne Institute for Public Policy, Colorado School of Mines.[12]

The raw data for this study was prepared, validated and cleaned thoroughly ensuring its accuracy and reliability. After validation, spatial and non-spatial data were integrated using Quantum GIS (QGIS) version 3.36 (Maidenhead) creating a shapefile for further analysis. Using QGIS, we visualized the prevalence of disability in Myanmar. Following this, a detailed spatial analysis was conducted using GeoDa version 1.22.

Global and Local Moran's statistics were applied to identify spatial autocorrelation in the prevalence of disability among the districts.[13,14] Global Moran's I was employed to detect broad trends across the entire country while Local Moran's I was used to pinpoint clusters or hotspots at the local areas. The equation to calculate Global Moran's I was:

$I=n/S_o \times (Z_i Z_j W_{ij})/(Z_i^2)$ (Eq.1)

and the equation to compute Local Moran's I was:

$I_1=Z_i/S_1 \times Z_j W_{ij}$ (Eq.2)

where n represents the total number of districts, S0 denotes the sum of all spatial weights, Z indicates the deviation of the variable from its mean, S1 is the sum of all squared deviations and Wij is the spatial weight between district i and j. This study was approved by the Research and Ethics Committee (REC) of University of Medicine, Yangon under the reference number, 66/UM1, REC, 2023.[1]

This study employed Local Indicators of Spatial Association (LISA) to assess the spatial autocorrelation of disability prevalence among the districts. Additionally, local Moran's I within the LISA framework was also applied to determine whether individual regions were part of a spatial cluster with similar disability rate values (i.e., high-high or low-low clusters) or to explore spatial outliers (i.e., high-low or low-high clusters). A spatial weight matrix with three clusters of K- nearest neighbours was employed for both univariate and bivariate analysis. This study applied 999 permutations to evaluate the statistical significance of the clusters, with a significance level of $p < 0.05$.

RESULTS

The overall prevalence of disability was 12.9 per 100 population in Myanmar. The highest prevalence was found in Langkho district (24.8 per 100 population), whereas the lowest was found in Mohnyin district with 4.9 per 100 population. The quantile (Equal Count) map indicated the highest deciles (16-24.8 per 100 population in 19 districts (Matupi, Mawlamyine, Yangon (East), Pathein, Pyapon, Maubin, Gangaw, Nyaung-U, Puta-O, Thayet, Mindat, Magway, Falam, Kyaukpyu, Hakha, Hpa-An, Pyay, Myaungmya and Langkho districts) (Figu. 1).

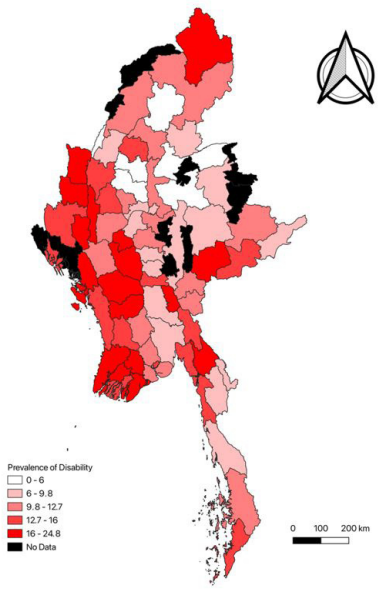
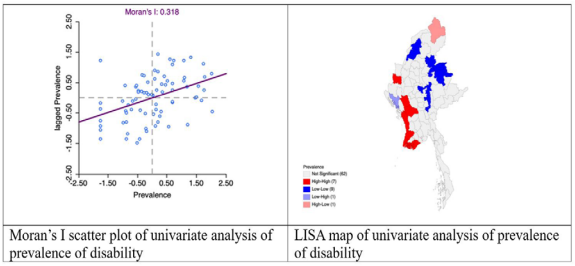


Figure 1. Spatial distribution of prevalence of disability



Moran's I scatter plot of univariate analysis of prevalence of disability | LISA map of univariate analysis of prevalence of disability

Figure 2. Moran's I and LISA map of prevalence of disability in Myanmar

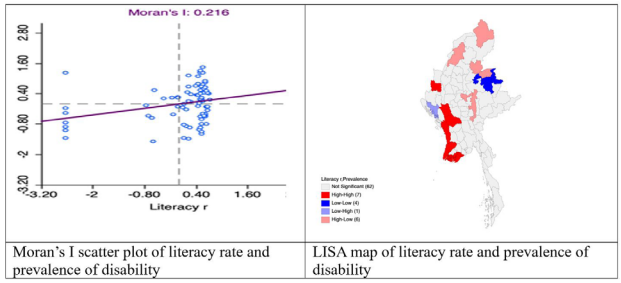
The prevalence of disability has positive spatial autocorrelation between the neighboring districts with a Moran's I value of 0.318 and a z-score of 4.153 and indicate spatial significance (Fig. 2). High-high (HH) clusters or hotspots, indicating areas with high prevalence of disability that are surrounded by three neighboring districts with similarly high disability rates. These clusters were identified in Pyapon, Labutta, Pathein, Thandwe, Thayet, Minbu and Hakha. Conversely, Low-low (LL) clusters representing low disability rates surrounded by three districts with similarly low disability rate, were identified in Hkamti, Bhamo, Muse, Pa Laung Self-Administered Zone, Kokang Self-Administered Zone, Lashio, Hopang, Kyaukse and Taunggyi districts (Table 1).

Table 1. Prevalence of disability in Myanmar using LISA

Moran's I	LISA				p-value
	HH	HL	LH	LL	
0.318	Pyapon* Labutta** Pathein* Thandwe* Thayet** Minbu** Hakha*	Puta-O*	Mrauk-U*	Hkamti* Bhamo* Muse** Pa Laung Self-Administered Zone* Kokang Self-Administered Zone* Lashio** Hopang** Kyaukse* Taunggyi**	0.05* 0.01** 0.001***

Note: HH: High-High, HL: High-Low, LH: Low-High, LL: Low-Low, Significance levels: $p < 0.05$ (*), $p < 0.01$ (**), $p < 0.001$ (***)

There was a statistically significant positive correlation between the literacy rate and the prevalence of disability (Moran's I= 0.216) (Fig. 3).



Moran's I scatter plot of literacy rate and prevalence of disability | LISA map of literacy rate and prevalence of disability

Figure 3. Spatial analysis of literacy rate and disability prevalence using LISA

LISA analysis identified areas with a high concentration of literacy rates and a high prevalence of disability, where neighboring districts also presented similarly high values which were seen in Pyapon, Labutta, Pathein, Thandwe, Thayet, Minbu and Hakha districts. In contrast, there were 4 clusters of a low concentration of literacy rate and disability patients with low values in the surrounding 3 districts (Cold-spot or low-low clusters) such as Pa Laung Self-Administered Zone, Kokang Self-Administered Zone, Lashio and Hopang districts. Additionally, Mrauk-U district was identified as a unique Low-High (LH) cluster, where literacy rates were low, but disability prevalence was high (Table 2).

Table 2. Spatial analysis of literacy rate and disability prevalence using LISA

Moran's I	LISA				p-value
	HH	HL	LH	LL	
0.216	Pyapon* Labutta** Pathein* Thandwe* Thayet** Minbu** Hakha*	Puta-O* Hkamti* Bhamo* Muse** Taung-gyi** Kyaukse*	Mrauk-U*	Hopang** Kokang Self-Adminis-tered Zone* Lashio** Pa Laung Self-Adminis-tered Zone*	0.05* 0.01** 0.001***

Note: HH: High-High, HL: High-Low, LH: Low-High, LL: Low-Low, Significance levels: p < 0.05 (*), p < 0.01 (**), p < 0.001 (***)

Table 3. Spatial analysis of population density and disability prevalence using LISA

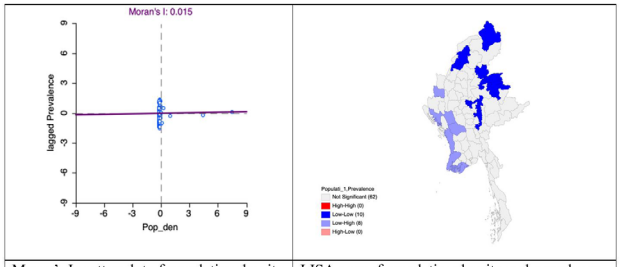
Moran's I	LISA				p-value
	HH	HL	LH	LL	
0.015			Pyapon* Labutta** Pathein* Thand-we* Thayet** Minbu** Hakha* Mrauk-U*	Puta-O* Hkamti* Bhamo* Kokang Self-Administered Zone* Pa Laung Self-Adminis-tered Zone* Lashio** Hopang** Muse** Taunggyi** Kyaukse*	0.05* 0.01** 0.001***

Note: HH: High-High, HL: High-Low, LH: Low-High, LL: Low-Low, Significance levels: p < 0.05 (*), p < 0.01 (**), p < 0.001 (***)

No significant spatial autocorrelation was observed between population density and disability prevalence (Moran's I value of 0.015), suggesting population density did not exhibit a strong spatial relationship with the prevalence of disability (Table 3) (Fig. 4).

Nighttime Lights (NTL): A Proxy for Economic Development

There was no spatial autocorrelation between nighttime lights (NTL) and prevalence of disability with Moran's I value of -0.017, suggesting that nighttime light intensity did not exhibit a strong spatial relationship with the prevalence of disability (Table 4) (Fig. 5).



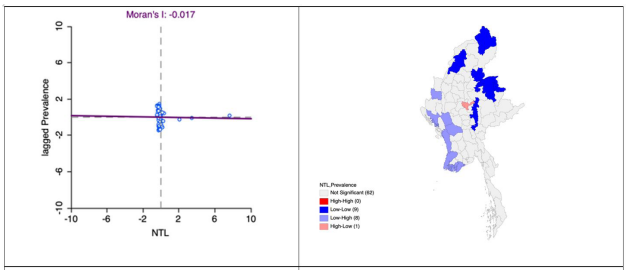
Moran's I scatter plot of population density and prevalence of disability | LISA map of population density and prevalence of disability

Figure 4. Spatial analysis of population density and disability prevalence using LISA

Table 4. Spatial analysis of density of Nighttime Lights (NTL) and disability prevalence using LISA

Moran's I	LISA				p-value
	HH	HL	LH	LL	
-0.017		Ky-aukse*	Pyapon* Labutta** Pathein* Thand-we* Thayet** Minbu** Hakha* Mrauk-U*	Puta-O* Hkamti* Bhamo* Pa Laung Self-Adminis-tered Zone* Kokang Self-Administered Zone* Lashio** Hopang** Muse** Taunggyi**	0.05* 0.01** 0.001***

Note: HH: High-High, HL: High-Low, LH: Low-High, LL: Low-Low, Significance levels: p < 0.05 (*), p < 0.01 (**), p < 0.001 (***)



Moran's I scatter plot of nighttime light and prevalence of disability | LISA map of nighttime light and prevalence of disability

Figure 5. Spatial analysis of density of Nighttime Lights (NTL) and disability prevalence using LISA

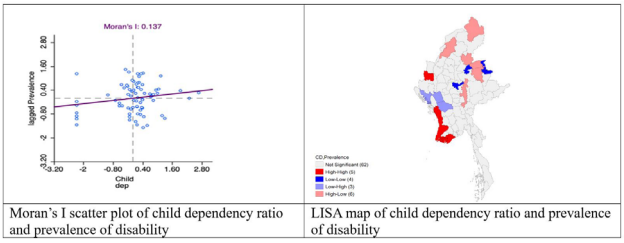
Child Dependency Ratio: The Burden of Youth Support

There was a spatial autocorrelation of child dependency ratio and a distribution pattern in the same directions with the prevalence of disability (Moran's I of 0.137) (Fig. 6). The LISA analysis indicated 5 Hotspots or High-High clusters between the high proportion of child dependency and the prevalence of disability surrounded by three districts with similar values in Pyapon, Labutta, Pathein, Thandwe and Hakha. On the other hand, 4 clusters of a district with a low child dependency ratio and low disability rate surrounded by 3 low values districts (Cold-spot or low-low clusters) were found in Kokang Self-Administered Zone, Pa Laung Self-Administered Zone, Hopang and Kyaukse districts (Table 5).

Table 5. Spatial analysis of child dependency ratio and disability prevalence using LISA

Moran's I	LISA				p-value
	HH	HL	LH	LL	
0.137	Pyapon* Labutta** Pathein* Thandwe* Hakha*	Taunggyi** Muse** Lashio** Puta-O* Hkamti* Bhamo*	Thayet** Minbu** Mrauk-U*	Kokang Self-Administered Zone* Pa Laung Self-Administered Zone* Hopang** Kyaukse*	0.05* 0.01** 0.001***

Note: HH: High-High, HL: High-Low, LH: Low-High, LL: Low-Low, Significance levels: p < 0.05 (*), p < 0.01 (**), p < 0.001 (***)

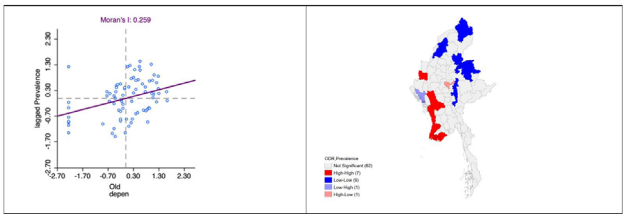


Moran's I scatter plot of child dependency ratio and prevalence of disability | LISA map of child dependency ratio and prevalence of disability

Figure 6. Spatial analysis of child dependency ratio and disability prevalence using LISA

Old Dependency Ratio: Aging and Its Contribution to Disability Rates

The old dependency ratio has a significant positive spatial autocorrelation the prevalence of disability (Moran's I= 0.259) (Fig. 7). LISA analysis indicated districts with hotspots for a concentration of old dependency ratio and a high disability prevalence in Pyapon, Labutta, Pathein, Thandwe, Hakha, Thayet and Minbu districts, whereas, cold spots were found in Pa Laung Self-Administered Zone, Kokang Self-Administered Zone, Hopang, Taunggyi, Muse, Lashio, Puta-O, Hkamti and Bhamo districts (Table 6).



Moran's I scatter plot of old dependency ratio and prevalence of disability | LISA map of old dependency ratio and prevalence of disability

Figure 7. Spatial analysis of old dependency ratio and disability prevalence using LISA

Urbanization

Urbanization did not have a strong spatial relationship with the prevalence of disability by bivariate analysis (Moran's I value: -0.069) (Table 7) (Fig. 8).

DISCUSSIONS

The prevalence of disability has a positive spatial autocorrelation with a Moran's I value of 0.318. This

Table 6. Spatial analysis of old dependency ratio and disability prevalence using LISA

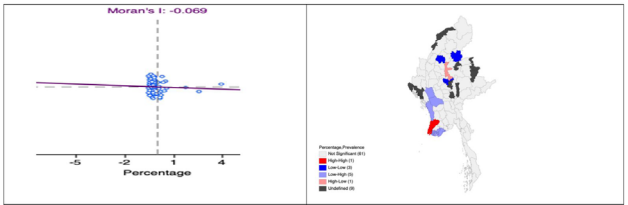
Moran's I	LISA				p-value
	HH	HL	LH	LL	
0.259	Pyapon* Labutta** Pathein* Thandwe* Hakha* Thayet** Minbu**	Kyaukse*	Mrauk-U*	Hopang** Kokang Self-Administered Zone* Pa Laung Self-Administered Zone* Taunggyi** Muse** Lashio** Puta-O* Hkamti* Bhamo*	0.05* 0.01** 0.001***

Note: HH: High-High, HL: High-Low, LH: Low-High, LL: Low-Low, Significance levels: p < 0.05 (*), p < 0.01 (**), p < 0.001 (***)

Table 7. Spatial analysis of urbanization and disability prevalence using LISA

Moran's I	LISA				p-value
	HH	HL	LH	LL	
-0.069	Pathein*	Pyinoolwin**	Mrauk-U* Pyapon* Labutta* Thandwe* Thayet* Minbu*	Bhamo* Kyaukse* Kawlin*	0.05* 0.01** 0.001***

Note: HH: High-High, HL: High-Low, LH: Low-High, LL: Low-Low, Significance levels: p < 0.05 (*), p < 0.01 (**), p < 0.001 (***)



Moran's I scatter plot of urbanization and prevalence of disability | LISA map of urbanization and prevalence of disability

Figure 8. Spatial analysis of urbanization and disability prevalence using LISA

indicated that disability prevalence was not randomly distributed but influenced by spatial factors. Nearby districts tend to exhibit similar prevalence rates due to shared socioeconomic factors and other factors.[2] Our findings align with international evidence from diverse geographic contexts including Iran, Sweden, China, India, Japan, North Africa and the United States all demonstrating positive spatial autocorrelation in disability prevalence.[15-22] This consistency across different countries and healthcare systems suggests that spatial clustering of disability is a universal phenomenon, likely driven by common underlying mechanisms such as environmental determinants, healthcare accessibility, and socioeconomic gradients.

Moreover, high-high (HH) clusters where the prevalence of disability was elevated in one district and its nearest three surrounding districts were primarily located in Western regions of Myanmar, potentially affected by environmental hazards such as flooding or cyclones which can lead to disabilities and agricultural hazards such as mechanical and occupational injuries.[23] Low-low (LL) clusters where the prevalence of disability was lower in an area surrounded by three low prevalence districts were identified in northern or mountainous regions where lower population density and distinct social conditions might contribute to lower disability prevalence. These spatial patterns have significant implications for health system planning and resource allocation. The clustering of high disability prevalence creates both challenges and opportunities: while it concentrates the burden in specific regions, it also enables targeted, geographically-focused interventions that can achieve greater impact per investment. The findings underscore the need for differentiated approaches that address region-specific risk factors while ensuring equitable access to disability services across Myanmar's diverse geographic and socioeconomic landscape.[4]

The LISA analysis revealed significant spatial patterns in the relationship between literacy rates and the prevalence of disability in Myanmar. Districts such as Pyapon, Labutta, Pathein, Thandwe, Thayet, Minbu and Hakha exhibited hotspot clustering indicating areas with high literacy rates and high prevalence of disability (HH) clusters. This finding suggests that the presence of a literate workforce in these areas that could be leveraged to develop inclusive employment opportunities for individuals with disabilities.[24] In contrast, the Mrauk-U district is identified as a Low-High (LH) cluster reflecting spillover effects or regional disparities highlighting the influence of neighboring areas with high disability prevalence on the district. These clusters suggested a potential inverse relationship where lower literacy levels may contribute to higher disability rates. Factors such as limited access to education, poor health literacy and socioeconomic challenges likely perpetuate these patterns resulting in delayed diagnosis and management of disabling conditions.[4] The Indian study indicated that a unit increase in illiteracy among people with disability was associated with a 0.123 percentage point decreased in employment in urban areas.[25] Therefore, this finding highlighted the significant barrier that illiteracy presented for people with disability in accessing employment opportunities, particularly in urban settings where jobs often required higher educational qualifications or skills.[24] World Report on Disability by World Health Organization (WHO) stated that addressing literacy barriers in areas with a high concentration of individuals with disabilities could be a critical strategy for reducing disability rates and improving overall health equity.[26] Furthermore, the spatial analysis in this study supported the idea of improving literacy and education in specific areas with high disability prevalence could be an effective means of promoting better health outcomes and economic opportunities.

The LISA analysis identified five High-High (HH) clusters of child dependency ratio and prevalence of disability. This clustering highlighted significant socioeconomic pressures where a high proportion of dependents (children) in the population may strain family and community resources, limiting the ability to provide adequate care and healthcare for individuals with disabilities. Districts with high child dependency ratios often faced challenges such as lower income levels, limited access to education and overburdened healthcare systems, exacerbating the prevalence of disability due to delayed diagnosis and insufficient treatment options. Additionally, this also highlighted the extra burdens borne by the people with disabilities. A study from China indicated that a higher child dependency ratio adversely impacts the mental health of the workforce primarily due to the financial strain associated with education expenses.[27] Therefore, high-burden districts require integrated interventions that address the dual challenges of child dependency and disability prevalence. Key strategies should include community-based family support programs, employment generation initiatives, strengthened compulsory education implementation, comprehensive health promotion activities with expanded immunization coverage, and healthcare infrastructure improvements designed to serve both pediatric and disability populations effectively.

Furthermore, High-High (HH) clusters of high old dependency ratio with a high prevalence of disability in Pyapon, Labutta, Pathein, Thandwe, Hakha, Thayet and Minbu districts with elevated values in the surrounding areas were also explored. This spatial pattern highlighted the challenges posed by aging populations and the associated prevalence of disabilities in these regions. Older adults are more prone to age-related health issues, chronic illnesses and disabilities, which increases the burden on families and strains local healthcare systems (UNESCAP, 2016). In districts with high old dependency ratios, the significant proportion of elderly individuals relying on the working-age population created additional economic and social pressures. Similarly, Thayet, Minbu, Thandwe and Hakha districts experienced geographic and infrastructure-related constraints exacerbating the inadequacy of elderly care services. This dual burden of aging and disability overburdens local healthcare facilities, especially in resource-limited settings where preventive healthcare services, rehabilitation programs and long-term care support may be insufficient. A study from China highlighted that the old-age dependency ratio negatively impacts the mental health of the workforce largely due to the burden of healthcare responsibilities within households.[27] So, targeted implementation should be focused on healthcare infrastructure, including preventive care and long-term care facilities, promote healthy aging, early detection of age-related disabilities and chronic disease management.

This was the first study exhibiting the applicability of spatial analysis in the distribution of disease or health conditions for actionable implications in Myanmar. However, due to the changes in the health care system of Myanmar during COVID-19 and political instability since 2021, the impacts of those had not been able to consider in this study for current situation.[28] However, this study informed the importance of demographic disparities, literacy rate, child dependency and old dependency for the necessary intervention for the people with disabilities. Furthermore, this research approach can effectively be applied to identify priority areas for targeted health interventions across different health contexts in Myanmar.

Despite this study filled the critical research gap in Myanmar by innovative way, there are certain limitations that must be acknowledged. Firstly, this study relies on the latest available secondary data from 2019, it could limit to reflect the current situation of Myanmar. Additionally, the prevalence of disability may be underreported due to political situation or stigma or cultural factors in some regions. Future research could address our limitation by collecting updated data and adding additional variables which could reflect current situation of Myanmar.

CONCLUSION

There was significant geographic variation in disability prevalence across Myanmar with the highest prevalence was identified in Langkho district and the lowest in Mohnyin district. Disability prevalence showed positive spatial autocorrelation forming clusters of high prevalence (hotspots) in districts like Pyapon, Labutta, Pathein, Thandwe, Thayet, Minbu and Hakha districts. Sociodemographic factors such as literacy rate, child dependency ratio and old dependency ratio exhibited significant spatial correlations with disability. However, no significant spatial relationship was found between disability prevalence and urbanization, population density or nighttime light intensity. This study underscores the spatial relationships between socioeconomic factors and disability, offering a foundational understanding for necessary interventions and demonstrating the value of spatial analysis in shaping healthcare strategies.

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REFERENCES

1. WHO. Disability: World Health Organization [WHO] 2023 [updated 7 March; cited 2025 January 15]. Available from: https://www.who.int/news-room/fact-sheets/detail/disability-and-health.
2. UNESCAP. Disability: The facts: United Nations Economic and Social Commission for Asia and the Pacific [UNESCAP]; 2016 [cited 2025 January 16]. Available from: https://www.unescap.org/sites/default/files/Disability%20The%20Facts.pdf.
3. UNFPA. Are persons with disabilities included in the effort to leave no-one behind? [n.p]: United Nations Population Fund [UNFPA] 2022.
4. MIMU. Disability in Myanmar (2014-2019): a MIMU Analytical Brief. [n.p.]: Myanmar Information Management Unit [MIMU]; 2021.
5. Bawi SV. Participation of People with Disabilities in the Myanmar Labor Market: The Role of Vocational Training. Vaddhanaphuti C, editor. Chiang Mai: Regional Center for Social Science and Sustainable Development; 2018. 102 p.
6. Fletcher-Lartey SM, Caprarelli G. Application of GIS technology in public health: successes and challenges. *Parasitology*. 2016;143(4):401-15.
7. Sornlorm K, U ES, Laohasiriwong W, Thi WM. Exploring demographic, healthcare, and socio-economic factors as predictors of COVID-19 incidence rate: A spatial regression analysis. *PLoS One.* 2024 Oct 28;19(10):e0312717. doi: 10.1371/journal.pone.0312717. PMID: 39466800; PMCID: PMC11515982.
8. MIMU. Myanmar: Country Overview: Myanmar Information Management Unit [MIMU]; [n.d.] [cited 2025 January 16]. Available from: https://themimu.info/country-overview.
9. MIMU. Myanmar District Boundaries MIMU v9.4: Myanmar Information Management Unit [MIMU]; 2023 [cited 2025 January 5]. Available from: https://geonode.themimu.info/layers/geonode%3Ammr_polbnda_adm2_250k_mimu.
10. DOP. 2019 Inter-censal survey: district level. Office No. 48, Nay Pyi Taw: Ministry of Labour, Immigration and Population; 2020.
11. Statistics TWGoD. The Washington Group Short Set on Functioning:Question Specifications. 2017.
12. Mines CSo. Night Time Light: Payne Institute for Public Policy; [n.d.] [cited 2025 January 25]. Available from: https://payneinstitute.mines.edu/eog/nighttime-lights/.
13. Moran PA. The interpretation of statistical maps. Journal of the Royal Statistical Society. Series B (Methodological). 1948 Jan 1;10(2):243-51.
14. Anselin L. Local indicators of spatial association—LISA. Geographical analysis. 1995;27(2):93-115.
15. Goli A, Kermany FS, Askarian M. Spatial Prevalence of Intellectual Disability and Related Socio-Demographic Factors in Iran, Using GWR: Case Study (2006). *Int J Prev Med.* 2014 Mar;5(3):313-25. PMID: 24829716; PMCID: PMC4018641.
16. Ng N, Sandberg M, Ahlström G. Prevalence of older people with intellectual disability in Sweden: a spatial epidemiological analysis. *J Intellect Disabil Res.* 2015 Dec;59(12):1155-67. doi: 10.1111/jir.12219. Epub 2015 Aug 26. PMID: 26306552.
17. Qiu N, Cheng J, Zhang T. Spatial disparity and structural inequality in disability patterns across Tianjin municipality: A multiple deprivation perspective. *Habitat Int.* 2022 Dec 1;130:102685.
18. Yadav J, Nilima, Sharma P. Regional pattern of disabilities and socioeconomic disadvantage among youth in India: a geospatial analysis. *GeoJournal*. 2022;87(5):3759-74.
19. Ohashi K, Fujiwara K, Tanikawa T, Bando K, Aoki T, Ogasawara K. Differences in spatial patterns of long-term care depending on severity in Hokkaido, Japan. *Geospat Health.* 2022 May 16;17(1). doi: 10.4081/gh.2022.1077. Erratum in: Geospat Health. 2022 Aug 29;17(2). doi: 10.4081/gh.2022.1137. PMID: 35579241.
20. Amaghouss J, Ibourk A. Socio-economic determinants of the prevalence of disability in Morocco: Empirical evidence from spatial data. *Reg Sect Econ Stud.* 2020;20(2):79-96.
21. Nikolova SP, Small E, Campillo C. Geo-social and health disparities among persons with disabilities living in Monterrey, Nuevo Leon and Dallas, Texas. *Disabil Health J.* 2015 Jul;8(3):434-42. doi: 10.1016/j.dhjo.2015.03.004. Epub 2015 Mar 16. PMID: 25908017.

22. Lu H, Wang Y, Liu Y, Holt JB, Okoro CA, Zhang X, et al. County-Level Geographic Disparities in Disabilities Among US Adults, 2018. *Prev Chronic Dis*. 2023;20:E37.

23. IOM. Country Factsheet: Myanmar. Online: International Organization of Migration [IOM]; 2024.

24. Naraharisetti R, Castro MC. Factors associated with persons with disability employment in India: a cross-sectional study. BMC Public Health. 2016 Oct 7;16(1):1063. doi: 10.1186/s12889-016-3713-6. PMID: 27717343; PMCID: PMC5055706.

25. WHO. World report on disability. 2011.

26. Fang D. The Effect of Household Dependency Ratio on the Mental Health of Workforce: Evidence From China. *Front Public Health.* 2022 Apr 8;10:848114. doi: 10.3389/fpubh.2022.848114. PMID: 35462824; PMCID: PMC9024124.

27. Bank W. Analysis of Access to Essential Health Services in Myanmar 2021-2023 (English). Washington, D.C.: World Bank Group; 2024. Contract No.: 31 Jan.