

# The Second International Spinal Cord Injury (InSCI) Community Survey in Thailand: Overview of Bio-Psycho-Social Perspectives of Individuals with Spinal Cord Injury

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## ABSTRACT

**Objectives:** To describe the health status, socioeconomic characteristics, and spinal cord injury (SCI) profiles of individuals with SCI living in the community in Thailand

**Study design:** Descriptive cross-sectional study

**Setting:** Fourteen hospitals across Thailand

**Participant:** Thai individuals with SCI living in the community who had previously received rehabilitation at participating hospitals and who met the inclusion criteria were invited to participate in the second International Spinal Cord Injury (InSCI) community survey in Thailand.

**Methods:** Participants completed the Thai-translated version of the second InSCI questionnaire. After data cleaning, bio-psycho-social aspects were analyzed descriptively.

**Results:** A total of 693 respondents were included. Most participants were male (74.9%), paraplegic (65.4%), and had incomplete lesions (65.4%), with traumatic causes (79.2%). The median age at the time of the survey was 49 years (IQR: 38-62), and the median duration of SCI was 8 years (IQR: 5-14). Nearly half were married or cohabiting (46.9%), 64.1% needed assistance, and 55.7% lived in urban areas. Over half (51.4%) had completed

secondary education, while 64.5% reported a household income below 17,200 baht per month. Most respondents were covered by the Thai universal health coverage scheme (68.4%), and 51.1% were satisfied with their general health. The three most prevalent secondary health conditions were spasticity (77.5%), pain (71.1%), and bowel problems (70.4%). The percentage of receiving treatment was lowest for sexual problems (12.8%).

**Conclusions:** The majority of Thais with SCI in the community had traumatic, incomplete paraplegics, experienced multiple secondary health conditions, reported low socioeconomic status, needed assistance, and only half were satisfied with their overall health

**Keywords:** spinal cord injury, secondary health conditions, rehabilitation, socioeconomic status, surveys and questionnaires

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## Introduction

In 2013, the World Health Organization (WHO), in collaboration with the International Spinal Cord Society (ISCoS), published the International Perspective on Spinal Cord Injury

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(IPSCI) to raise awareness of the situation of individuals with spinal cord injury (SCI) living in the community. The report emphasized that SCI has profound impacts on health, functioning, and social participation, and that individuals with SCI require ongoing healthcare and supportive environments to maintain their quality of life (QoL).<sup>1,2</sup> Environmental barriers, inadequate policies, and insufficient services can further restrict participation and access to care.<sup>2</sup> Therefore, country-specific data are essential for informing effective healthcare systems and policies for people with SCI.<sup>2</sup>

To address this need, the International Spinal Cord Injury (InSCI) community survey, an initiative within the learning health system for spinal cord injury (LHS-SCI), was launched in 2017 by Swiss Paraplegic Research at Nottwil in collaboration with ISCoS and the International Society of Physical and Rehabilitation Medicine (ISPRM) aimed at understanding the lived experiences of people with SCI and monitoring the societal and health system responses across all WHO regions.<sup>3</sup> Researchers from 22 countries, including Thailand, participated in the first InSCI community survey (2017-2018), which generated important international, regional, and national evidence on body function impairments,<sup>4</sup> health status, socio-economic and work situation,<sup>5</sup> environmental barriers,<sup>6</sup> and QoL among individuals with SCI.<sup>1</sup>

Findings from the first Thai InSCI community survey revealed a high prevalence of secondary health conditions, such as spasticity (74.4%), pain (61.1%), and bowel problems (65.6%).<sup>4</sup> The employment rate (39.5%) was low compared with the general population (74.2%).<sup>5</sup> There were significant environmental barriers affecting QoL for individuals with SCI in Thailand.<sup>6</sup> In addition, individuals rehabilitated at SCI-specialized rehabilitation facilities (SSRFs) had better outcomes than those treated at non-SSRFs.<sup>7</sup> However, the first survey had limitations, including a relatively small sample size and limited national representativeness, which constrained its ability to provide robust evidence for service planning, system development, and policy decisions, particularly regarding equitable access to SCI-specialized rehabilitation services.

To address these gaps and to provide updated, nationally representative information, the Thai InSCI research team conducted the second InSCI survey. This second survey aimed to expand participant recruitment across regions and hospital levels and to update data on SCI characteristics, secondary health conditions, socioeconomic status, and QoL among individuals with SCI living in the community in Thailand. The objective of this first overview report was to update SCI characteristics, secondary health conditions, socioeconomic status, and QoL of Thais with SCI living in the community. This will further identify important issues for subsequent analyses of the second InSCI survey, which may inform improvements in rehabilitation services, healthcare systems, and policy development in Thailand.

## Methods

This study was part of the InSCI community survey, a cross-sectional survey conducted in 31 countries worldwide.<sup>8</sup> This study also contributes data within the framework of the LHS-SCI to provide contextualization.<sup>3,9,10</sup>

### Study design

This cross-sectional study is reported in accordance with the STROBE guidelines for cross-sectional studies (version 4).<sup>11</sup>

### Setting

Physiatrists from 14 hospitals agreed to participate in the second InSCI survey in Thailand and conducted the survey after receiving ethical approval from the Institutional Review Board (IRB) or Research Ethical Committee (REC) of each hospital. These hospitals were purposively selected based on their capacity to provide rehabilitation services for individuals with SCI and to ensure geographic representation across the country. Among the 14 participating hospitals, the ratio of SSRFs to non-SSRF hospitals was 2:12.

The study included hospitals from various regions of Thailand to represent differences in healthcare systems and SCI rehabilitation settings across the country (Figure 1):

- North Region (4): Maharaj Nakorn Chiang Mai Hospital, Nakornping Hospital, Phayao Hospital, and Nan Hospital.
- Northeast Region (3): Sunpasitthiprasong Hospital, Udonthani Hospital, and Thabo Crown Prince Hospital.
- South Region (2): Songklanagarind Hospital and Maharaj Nakhonsithammarat Hospital.
- West-Central-East Region (5): Sirindorn National Medical Rehabilitation Institute, Siriraj Hospital, Ratchaburi Hospital, Somdech Phra Nangchao Sirikit Hospital, and Burapha University Hospital.

### InSCI questionnaire Thai version

According to the InSCI standards for questionnaire translation, step 1 involved two translators from different backgrounds (a physiatrist and a nurse) independently translating the questionnaire. Step 2 had both translators discussing and developing a preliminary synthesis version. In step 3, an expert committee consisting of the translators, health professionals, a language expert, a methodologist, and 2-3 individuals with SCI who had different impairment levels reviewed, finalized, and submitted the Thai translation of the questionnaire to the study center for approval.

The second InSCI questionnaire consisted of personal information (excluding name and date of birth), SCI lesion characteristics, energy and feeling, health problems, activity and participation, independence of activities of daily living, work, environmental factors, health care services, COVID-19 vaccination status, personal factors, QoL and general health, physical activity, and health status. In addition to the original 76 questions in the second InSCI questionnaire, the Thai InSCI research team agreed to include 12 additional ques-

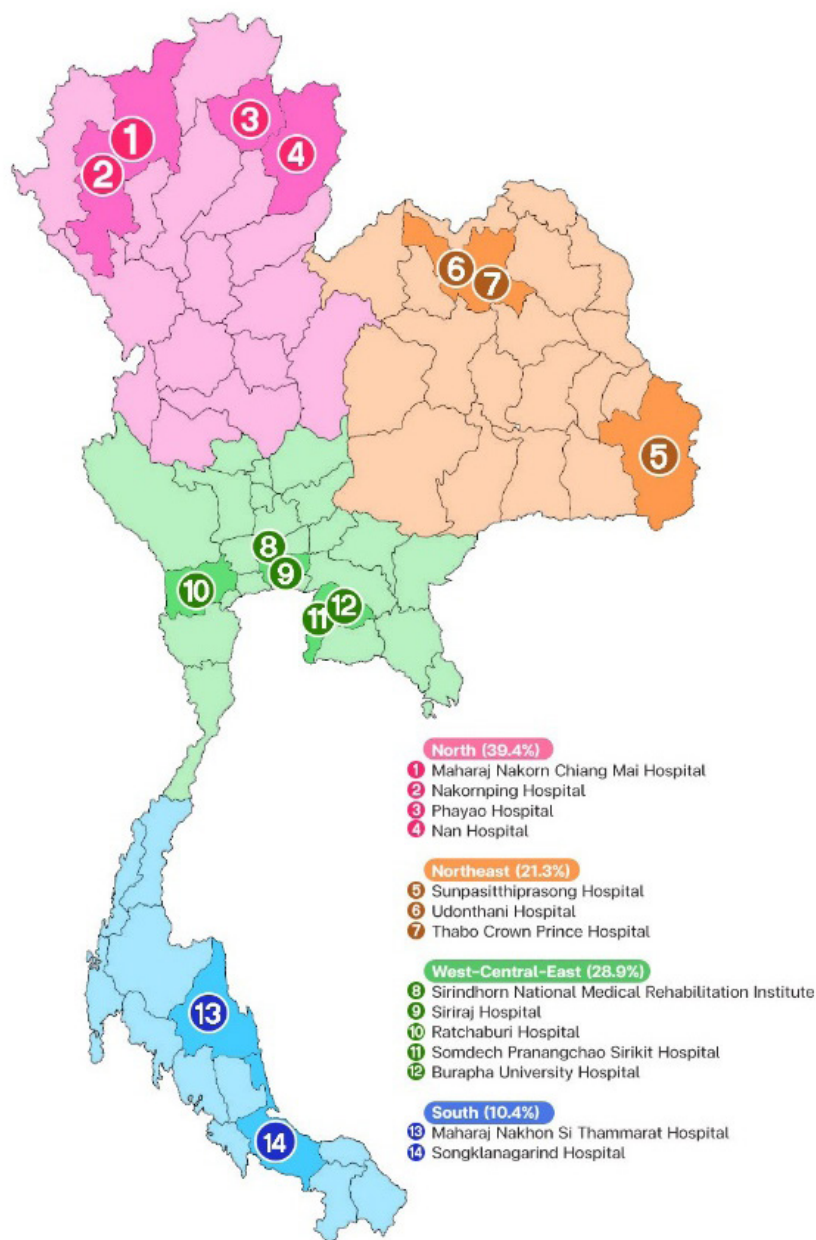


**Figure 1.** Regional distribution of respondents in the second International Spinal Cord Injury (InSCI) survey in Thailand

tions relevant to the Thai rehabilitation services and the Thai health system. After obtaining approval from the study center, the final Thai version of the questionnaire, comprising 88 questions, was completed by 10 individuals with SCI to test the electronic database system.

### Participants

The inclusion criteria were Thai ethnicity, having either traumatic or non-traumatic SCI, being at least 18 years old, having experience living in the community after receiving medical rehabilitation, being capable of answering the questionnaire, and providing consent. Traumatic SCI included injuries such as cauda equina syndrome, while non-traumatic SCI included spinal cord lesions caused by vascular disease, infection, autoimmune diseases, cancer, toxins, or radiation. Exclusion criteria included congenital diseases such as spina

bifida, neurodegenerative diseases like multiple sclerosis, amyotrophic lateral sclerosis, peripheral nerve damage, being currently in post-acute rehabilitation, being in the process of adjusting to antidepressant medication, having communication difficulties due to traumatic brain injury, or having fully recovered with minimal functional impairments.

Potential participants were identified from hospital rehabilitation records of the participating hospitals. The sampling frame included participants in the first Thai InSCI survey who were confirmed to be alive, plus newly identified individuals with SCI who had been rehabilitated at the participating hospitals. From this contact list, a weighted sampling approach by hospital was applied to ensure proportional representation. Contact details were verified, and the list was cleaned using RStudio to ensure following inclusion and exclusion criteria.

### Sample size

The total number of potential participants in the contact list was 1,283, including 283 living individuals from the first InSCI survey cohort list and 1,000 from the new cohort list who were randomly selected using the *dplyr* package in RStudio and employing a weighted sampling approach for each hospital. The total expected number of respondents for data analysis was 1,000, comprising about 70.0% of those on the contact list.

### Data collection

Data collection in Thailand began in January 2023 after Maharaj Nakorn Chiang Mai Hospital, the first hospital, received REC approval in September 2022. Notably, each hospital began data collection on different dates based on their REC/IRB approval dates.

The researchers and research assistants contacted each of the individuals on the contact list either by telephone or by mail. If telephone contact failed, they were invited to provide consent and complete the InSCI questionnaire either face-to-face on-site, by completing a paper questionnaire themselves, or by telephone interview. Standardized training for all researchers and research assistants was conducted to minimize interview bias, and a uniform interview guide and identical questionnaire were used across all data-collection modes. Afterwards, all questionnaires were checked for completeness and sent to one of the two research coordinators (PK or TD). One of the research assistants then uploaded the questionnaire data to the InSCI electronic database system at the study center in Switzerland. In accordance with the Personal Data Protection Act and the data transfer agreement, participants' names and personal identification numbers were not included in the questionnaires, and all data could only be retrieved upon approval from the study center.

The data collection ended in June 2024, which aligned with the timeline of the second InSCI survey. After receiving the data cleaning list from the InSCI study center, the two study coordinators contacted all researchers to verify any missing, incorrect, or questionable data. The confirmed correct data was then submitted to the study center. Data retrieval and analysis began after the study center finalized the data cleaning process.

### Variables

In accordance with the study's objective, not all questionnaire items were reported; only those related to demographic and socioeconomic status, SCI characteristics, secondary health problems, QoL, and general health were selected for inclusion in this report. General health conditions were rated as excellent, very good, good, fair, and poor, and were compared to health in the previous year as much better, somewhat better, about the same, somewhat worse, and much worse. Secondary health problems in the last 3 months were rated by respondents as none, mild, moderate, severe, or

extreme, along with whether they received treatment (e.g., taking medication). QoL in the last 14 days was rated as very poor, poor, neither poor nor good, good, and very good. Overall satisfaction with household income was rated on a visual analog scale from 1 (completely dissatisfied) to 10 (completely satisfied). Subjective social status was assessed using a 10-rung ladder, asking patients to place themselves on it relative to others in Thailand.

### Statistical methods

Descriptive statistics were used to achieve the objectives of this report. Categorical data are presented as numbers and percentages, and continuous data are reported as mean and standard deviation (SD) or median and interquartile range (IQR), for data regarding demographic and SCI characteristics, living and socioeconomic situations, QoL, and health in general among individuals with SCI living in the community in Thailand. Based on InSCI variables, injury level was only categorized as either paraplegia or tetraplegia. Root-level lesions, such as cauda equina syndrome, were not analyzed or reported separately. The secondary health conditions rated as mild to extreme problems after SCI during the last 3 months were grouped into dichotomous (yes/no) variables for analysis to reduce recall and reporting bias and to avoid sparse data in low-prevalence severity categories. Missing data was reported, and no imputation was applied.

### Results

When the data collection was closed, there were 725 respondents: 206 from the first survey of 283 and 519 from the new participant list of 1,000, and 555 non-respondents, of which 378 could not be contacted, 69 who died before or after the invitation, 62 who rejected the invitation, 25 with exclusion criteria, 5 having cognitive impairment, 2 having a language barrier, 2 moving abroad, 4 duplicate names, and 8 for unknown reasons. Three had not completed the questionnaire submission. After the data cleaning process, 32 respondents were excluded due to complete neurological recovery (26) or due to exclusion criteria (6). According to the study's objective, those who reported full recovery of sensation, motor function, as well as bladder and bowel control were excluded from the data analysis. Only those reported as having paraplegia or tetraplegia with complete or incomplete lesions were included in the report. As a result, data from 693 respondents, 202 (29.1%) from the first InSCI cohort and 491 (70.9%) from the newly recruited cohort, were included in the data analysis, as shown in Figure 2. In terms of the four main regions, 273 (39.4%) lived in the north, 200 (28.9%) in the west-central-east, 148 (21.3%) in the northeast, and 72 (10.4%) in the south.

Table 1 shows the demographic characteristics of the 693 respondents; 74.9% were males. The median age at SCI onset was 37 years (IQR: 25-52), and at the time of the survey was 49 years (IQR: 38-62). The median duration of

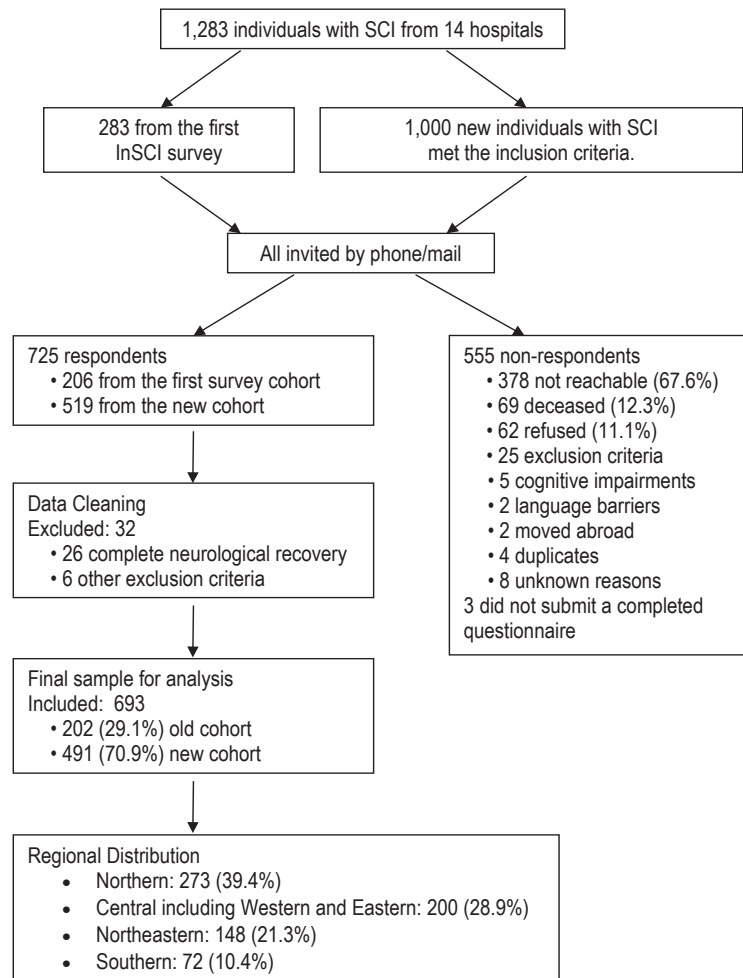


**Figure 2.** Recruitment process for the second International Spinal Cord Injury (InSCI) community survey in Thailand

**Table 1.** Basic sociodemographic characteristics of respondents

| Variables                                                | Results<br>(n = 693) |
|----------------------------------------------------------|----------------------|
| Sex, male <sup>1</sup>                                   | 520 (75.0)           |
| Marital status, married/cohabiting <sup>1</sup>          | 325 (46.9)           |
| Highest educational level: higher secondary <sup>1</sup> | 356 (51.4)           |
| Living in urban area <sup>1</sup>                        | 384 (55.7)           |
| Living alone <sup>1</sup>                                | 43 (6.2)             |
| Assistance, yes <sup>1*</sup>                            | 444 (64.1)           |
| • Family                                                 | 421 (60.8)           |
| • Friend                                                 | 34 (4.9)             |
| • Paid assistant                                         | 45 (6.5)             |
| Household income per month, < 17,200 Baht <sup>1</sup>   | 447 (64.5)           |
| Age at the time of survey, years <sup>2</sup>            | 49 (38-62)           |
| Age at SCI onset, years <sup>2</sup>                     | 37 (25-52)           |
| Duration of SCI, years <sup>2</sup>                      | 8 (5-14)             |

\*More than one choice could be chosen. SCI, spinal cord injury

<sup>1</sup>Number (%), <sup>2</sup>median (interquartile range, IQR)

SCI was 8 years (IQR: 5-14). Regarding education, 51.4% had completed higher secondary school. Of the respondents, 46.9% were married/cohabiting. A majority (64.1%) needed assistance, primarily from family members, and 55.7% lived in urban areas. Regarding socioeconomic status, 64.5% had

household incomes below 17,200 baht per month. All respondents had health insurance, with 68.4% covered under the universal coverage scheme. The remainder were covered by the social security scheme (15.6%) or the civil servant benefit scheme (13.6%).

Table 2 shows that the majority of respondents were paraplegic (65.4%), had incomplete SCI lesions (65.4%), and suffered from traumatic causes (79.2%). Among the traumatic causes, traffic accidents were the most prevalent, followed by falls higher than one meter and accidents during work, whereas spinal degeneration was most prevalent among the non-traumatic causes, followed by infection.

Table 3 presents the general health status. Most respondents rated their health as good (42.1%). Compared with their health in the previous year, the majority reported that their health was about the same (34.3%).

Secondary health problems rated as mild to extreme within the last three months are shown in Table 4.

Missing data, where the individual did not report their health for each secondary health condition, was noted, and no imputation was performed. The percentage of secondary health problems was highest for spasm/spasticity (77.5%) and lowest for respiratory problems (21.2%), whereas the

**Table 2.** Spinal cord injury (SCI) level, severity, and causes

| Variables                   | Results    |
|-----------------------------|------------|
| Level of SCI, paraplegia    | 453 (65.4) |
| Severity of SCI, incomplete | 453 (65.4) |
| Traumatic causes*           | 549 (79.2) |
| • Traffic accident          | 341 (49.2) |
| • Fall > 1 meter            | 102 (14.7) |
| • Accident during work      | 46 (6.6)   |
| • Violence                  | 37 (5.3)   |
| • Fall < 1 meter            | 23 (3.3)   |
| • Sports accident           | 5 (0.7)    |
| • Leisure activity accident | 7 (1.0)    |
| • Iatrogenic                | 6 (0.9)    |
| • Others                    | 10 (1.4)   |
| Non-traumatic causes*       | 144 (20.8) |
| • Spinal degeneration       | 54 (7.8)   |
| • Infection                 | 27 (3.9)   |
| • Benign tumor              | 22 (3.2)   |
| • Malignant tumor           | 13 (1.9)   |
| • Vascular disease          | 13 (1.9)   |
| • Others                    | 16 (2.3)   |

N (%). \*More than one cause was allowed to be chosen

**Table 3.** Current general health conditions compared with the previous year

| Current general health condition | Results (n = 693) | Compared with the previous year's health condition | Results (n = 693) |
|----------------------------------|-------------------|----------------------------------------------------|-------------------|
| Excellent                        | 12 (1.7)          | Much better                                        | 102 (14.7)        |
| Very good                        | 58 (8.4)          | Somewhat better                                    | 219 (31.6)        |
| Good                             | 292 (42.1)        | About the same                                     | 238 (34.3)        |
| Fair                             | 258 (37.2)        | Somewhat worse                                     | 109 (15.7)        |
| Bad                              | 73 (10.5)         | Much worse                                         | 25 (3.6)          |

N (%)

percentage of those who had received treatment was high for pressure injury (83.1%), UTI (82.4%) and bladder dysfunction (79.9%) and low for sexual dysfunction (12.8%) and sleep problems (32.6%). In addition, 13.2% reported current smoking and 31.8% mentioned having other health problems such as diabetes (8.2%), heart disease (2.6%), and cancer (1.8%). For Body Mass Index (BMI), 15.9% of respondents were classified as underweight (BMI < 18.5 kg/m<sup>2</sup>), 37.1% as normal weight (18.5-22.9 kg/m<sup>2</sup>), 24.4% as overweight (23.0-24.9 kg/m<sup>2</sup>), and 27.7% as obese (BMI ≥ 25.0 kg/m<sup>2</sup>) based on WHO BMI criteria for Asians.<sup>12</sup>

Satisfaction with household income, subjective social status, and QoL in the last 14 days is shown in Figure 3. Most respondents rated their satisfaction with household and subjective social status as 5 or below, indicating dissatisfaction, while QoL was rated as good.

## Discussion

This second InSCI survey in Thailand recruited more participants from all regions of the country, unlike the first, which had two-thirds from one hospital in the north and the rest from three other hospitals in the central region.<sup>13,14</sup> This wider recruitment doubled the total number of respondents in the second survey compared to the first (693 vs. 320), representing the largest national database of individuals with SCI ever reported in Thailand and improving national representativeness.

Respondent characteristics and trends, overall demographics and injury details were similar to those in the first survey. Most were male, lived in urban areas, had completed secondary education, relied mainly on family caregivers, and reported low household income. Compared to earlier find-

**Table 4.** Prevalence of secondary health conditions rated as mild to extreme problems after SCI during the last 3 months, and the percentage receiving treatment for such conditions (N = 693)

| Secondary health conditions        | With problems (mild to extreme) |             |                | Receiving treatment |             |                |
|------------------------------------|---------------------------------|-------------|----------------|---------------------|-------------|----------------|
|                                    | Missing data (n)                | Results (n) | Percentage (%) | Missing data (n)    | Results (n) | Percentage (%) |
| Spasm/spasticity                   |                                 | 537         | 77.5           | 6                   | 342         | 63.7           |
| Pain                               |                                 | 493         | 71.1           | 4                   | 283         | 57.4           |
| Bowel problems                     |                                 | 488         | 70.4           | 5                   | 289         | 59.2           |
| Sleep problems                     |                                 | 377         | 54.5           | 4                   | 123         | 32.6           |
| Sexual problems                    | 1                               | 357         | 51.5           | 4                   | 46          | 12.8           |
| Bladder problems                   |                                 | 344         | 49.6           | 4                   | 275         | 79.9           |
| Joint contract                     |                                 | 323         | 46.6           | 4                   | 160         | 49.5           |
| Urinary tract infection            | 1                               | 244         | 35.3           | 5                   | 201         | 82.4           |
| Postural hypotension               |                                 | 238         | 34.4           | 4                   | 63          | 26.5           |
| Circulation problems               |                                 | 203         | 29.3           | 4                   | 50          | 24.6           |
| Injury caused by loss of sensation |                                 | 193         | 27.9           | 4                   | 80          | 41.5           |
| Autonomic dysreflexia              |                                 | 180         | 26.0           | 4                   | 79          | 43.9           |
| Pressure ulcer                     |                                 | 178         | 25.7           | 4                   | 148         | 83.1           |
| Respiratory problems               |                                 | 147         | 21.2           | 5                   | 43          | 29.3           |

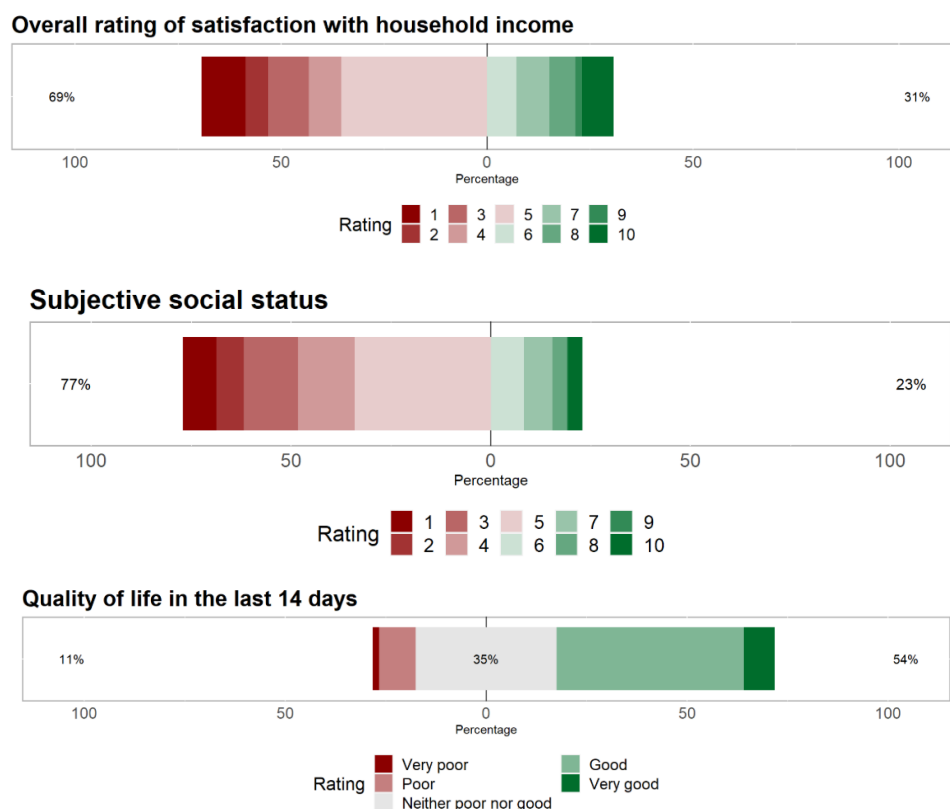


**Figure 3.** Satisfaction with household income, subjective social status, and quality of life

ings,<sup>13,14</sup> there was a slight increase in the age at injury onset, a higher percentage of males (from 71.2% to 74.9%), an increase in tetraplegia (from 26.0% to 35.0%), and a decrease in complete SCI rates (from 44.0% to 33.0%). Additionally, traumatic causes declined from 86.0% to 79.0%. The duration of SCI remained about the same at 8 years. These changes indicate a rise in non-traumatic causes, tetraplegics, and incomplete SCI. Traffic-related injuries continued to be the leading cause, making up nearly half of traumatic SCIs.<sup>15</sup> This highlights the ongoing need for stronger road safety measures, especially for the prevention of motorcycle-related injuries.

Regarding health insurance, the majority (68.4%) were enrolled in the universal health coverage scheme as expected, and 73.5% were registered as people with disabilities. These two figures are slightly increased from the previous reports<sup>13,14</sup> and confirm that the majority of Thais are covered by one of the health insurance schemes, which can lessen personal and/or family financial burdens for healthcare. All respondents had physical disabilities due to SCI. However, registration as a person with disability (PWD) in Thailand is voluntary under national legislation, explaining why the registration rate was below 100%.

Some secondary health conditions showed improvement. The prevalence of urinary tract infection (UTI) declined from 44.9% in the first survey to 35.3% in the current study. This may reflect the quality of bladder care, bladder training, and access to appropriate healthcare services. A recent

study across three countries in the Southeast Asia (SEA) region found that bladder management and UTIs affect the QoL of people with SCI.<sup>16</sup> QoL is influenced by multiple biopsychosocial factors. Therefore, factors related to bladder management, such as bladder training and different methods of bladder emptying, and QoL should be further explored. However, bladder dysfunction itself remained common and comparable across surveys. Similarly, the prevalence of pressure injury remained relatively stable compared to the first survey (25.7% and 27.2%).<sup>4</sup> Still, it was slightly higher than the earlier cross-sectional study of pressure injury by one hospital with SSRFs in Thailand 20 years ago.<sup>17</sup> Our study of combined InSCI data from three SEA countries found that independence in toileting and independence in relieving weight were protective against pressure injury, whereas bowel, bladder, sexual dysfunction, spasticity, and impaired sensation were associated with a higher pressure injury risk. Rehabilitation by SSRFs may further reduce the risk of pressure injuries.<sup>18</sup>

Malnutrition is a known risk factor for pressure injury. Nutritional status was not addressed in the previous study.<sup>18</sup> In the second survey, 43.6% of respondents were classified as malnourished (underweight or obese) based on the WHO BMI cutoff for Asians.<sup>12</sup> In individuals with chronic SCI, it is recommended to lower the cutoff point for obesity to 22 kg/m<sup>2</sup> because they generally have up to 15% more body fat than BMI-matched able-bodied controls. When the cutoff point is lowered to 22 kg/m<sup>2</sup>, the proportion of obese individuals

increases to about 50.0%.<sup>19</sup> Therefore, further analyses of nutritional inadequacy, body composition, and health consequences, including cardiometabolic complications and pressure injury risk, are essential for developing effective prevention strategies after SCI.

Despite generally positive self-rated health, conditions such as spasticity (77.5%), pain (71.1%), and bowel dysfunction (70.4%) remain prevalent or poorly managed. These rates were higher than in the first survey, where the figures were 74.4%, 61.6%, and 65.6%, respectively.<sup>4</sup> Fewer individuals with bowel dysfunction received treatment compared to those with bladder dysfunction, highlighting limited access to healthcare. Over 50.0% of respondents also reported sexual dysfunction and/or sleeping problems, with the latter remaining stable while reports of sexual problems increased.<sup>4</sup> Only 12.8% received treatment for sexual problems, with 75% of respondents being male and 46.9% married or cohabiting. This aligns with a study in Thailand showing that over half of 56 Thai men with SCI had sexual desire, but fewer than a third had sufficient erection, and only a third had received sex education.<sup>20</sup> Additionally, postural hypotension requires more attention, with its prevalence rising from 26.6% to 34.4% compared with the first survey.<sup>4</sup> Only one-fourth of those affected received treatment, making it a significant barrier to maintaining sitting in a wheelchair. Further investigation is needed to understand the long-term issues related to postural hypotension in Thais with SCI.

This overview report shows that although the majority rated their QoL as good/very good, secondary health problems are prevalent. Whether these are outcomes of the Intermediate Care (IMC) for patients with traumatic SCI, launched in 2018 and implemented in 2019 to increase access to medical rehabilitation services during the first 6 months from onset and achieve optimal functional independence,<sup>21,22</sup> cannot be confirmed yet, as functional outcomes were not included in this report, but are planned to be analyzed and reported in subsequent reports.

This study's strength lies in its large, representative sample from various hospitals. However, the proportion of respondents from the north (39.4%) was higher than the proportion in the general population (18.0%) as reported in 2023.<sup>23</sup> To reduce recall bias, individuals with cognitive impairment and depression were excluded. Standardized training minimized interview bias, and a uniform guide and questionnaire were used across all interview types. Completed questionnaires were checked for completeness before data entry. However, respondents needed at least 30 minutes to complete them and because the data were self-reported rather than obtained from medical records there was a risk of reporting bias.

## Conclusions

The second InSCI community survey in Thailand provides national level evidence of the long-term bio-psycho-social status of individuals with SCI. Although most respondents

rated their QoL as good or very good, many secondary health conditions remain prevalent and require greater clinical attention, highlighting the importance of continuous, comprehensive care and the critical role of the universal health coverage scheme in providing healthcare access, particularly for this vulnerable population. Future analyses using the existing InSCI database will focus on functional outcomes and their associations with secondary health conditions, as well as healthcare access, to better inform improvements in rehabilitation services and health policy for individuals with SCI in Thailand.

## Ethical approval

This study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the Research Ethics Committees (RECs), Ethics Committees (ECs), or Institutional Review Boards (IRBs) of all participating hospitals. Approvals were granted by the Research Ethics Committee, Faculty of Medicine, Chiang Mai University (approved on September 27, 2022; EC No. REH-2565-09157); Research Ethics Committee, Thabo Crown Prince Hospital (approved on August 19, 2022; EC No. 65/2565); Research Ethics Committee, Nakornping Hospital (approved on September 12, 2022; EC No. 075/65); Institutional Review Board, Faculty of Medicine Siriraj Hospital, Mahidol University (approved on September 26, 2022; EC No. COA No. Si 693/2022; Protocol No. 611/2565 [IRB3]); Research Ethics Committee, Somdech Phra Nangchao Sirikit Hospital (approved on October 4, 2022; EC No. Protocol RP 0030/65; COA-NMD-REC049/65); Research Ethics Committee, Phayao Hospital (approved on October 11, 2022; EC No. COA No. 179); Human Research Ethics Committee of Ratchaburi Hospital (approved on October 17, 2022; EC No. COA-RBHEC 033/2022); Research Ethics Committee, Sirindhorn National Medical Rehabilitation Institute (approved on October 26, 2022; EC No. 65033); Ethics Committee, Sunpasitthiprasong Hospital (approved on November 2, 2022; EC No. COA code 080/2565); Research Ethics Committee, Maharaj Nakhonsithammarat Hospital (approved on November 4, 2022; EC No. COA: B011/2565); Research Ethics Committee, Udonthani Hospital (approved on January 20, 2023; EC No. UDH REC No. 9/2566); Research Ethics Committee, Nan Hospital (approved in February 2023; EC No. COA No. 008; Nan Hospital REC No. 008/2566); Research Ethics Committee, Faculty of Medicine, Prince of Songkla University (approved on March 31, 2023; EC No. REC.65-323-11-1); and Institutional Review Board, Faculty of Medicine, Burapha University (approved on January 17, 2024; EC No. IRB1-004/2567).

## Conflict of interest disclosure

The authors confirm that there is no conflict of interest related to the manuscript.

## AI generative declaration

Generative AI was used only for language editing and clarity improvement. The authors retain full responsibility for all scientific content and conclusions.

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## Data availability

The data supporting the findings of this study are available upon request from the corresponding author [PK] but are not publicly available.

## Author contributions

Apichana Kovindha: conceptualization, methodology, formal analysis, writing-original draft, review & editing, funding acquisition, supervision

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