


ORIGINAL ARTICLE

The prevalence of pressure ulcers in community-dwelling older adults: A study in an Indonesian city

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The objectives of this study were to investigate the prevalence and the characteristics of pressure ulcers (PU) in community-dwelling older adults in Indonesia, including specific characteristics of the PU patients and their use of formal and informal care. A cross-sectional design was used for the study, with 325 participants aged 60 years or older, randomly chosen from the general community. The overall PU prevalence and the PU prevalence excluding category 1 were 10.8% (95% confidence interval [CI], 5.8-15.8) and 5.2% (95% CI 0.2-10.2), respectively. Category 1 PUs were mostly (34.3%) located on knees and toes, while category 2 and higher PUs were mostly (70.4%) located on the shoulder, sacrum, and hip. The main factors that contributed strongly to PUs among older adults in the community were the degree of physical activity, problems with sensory perception, and having a history of stroke. None of the participants with a PU received wound care or information about PUs from formal caregivers and only 11.4% received wound care from family caregivers. This study shows that pressure ulcers in community-dwelling older adults in Indonesia are a relevant and largely unaddressed problem. Developing an intervention program to manage the PU problem in the community is recommended.

KEYWORDS

access of care, community, older adults, participant's characteristics, pressure ulcers

1 | INTRODUCTION

Pressure ulcers (PUs) are a serious problem in health care settings globally. A PU is “a localized injury to the skin and/or the underlying tissue, usually over a bony prominence, as a result of pressure or pressure in combination with shear.”¹ PUs cause considerable patient suffering from pain,² affect the patient's quality of life emotionally, physically, and socially,^{3,4} and even put patients at increased risk of death.^{5,6} In addition, PUs lead to an economic burden on health care systems.^{7,8}

In the last few decades, many studies on PU prevalence and PU care have been published internationally. Systematic

review studies show a wide range of PU prevalence rates among hospitalised patients: 3.1% to 30.0% in the United States (US), 1% to 54% in Europe, 6% in Australia, and 2.7% to 16.8% in Asia.^{9,10} To reduce the prevalence of PUs, various preventive measures and treatments have been implemented in hospitals all over the world.^{11,12}

However, PUs do not develop only in hospitals: in many cases, PUs have already been developed prior to hospital admission. Studies have shown that the prevalence of community-acquired PUs, i.e. those present at hospital admission, ranged from 3.3% to 11.1%.^{13–15} A study executed in New England (US) showed that 70.6% of the

patients who already had PUs before hospital admission were living at home before entering hospital, were mostly older adults (mean age 72.7 years), and only 21.4% of them had received home care services prior to admission.¹⁴

The occurrence of PUs and their burden in community-dwelling older adults is a serious issue,^{5,8,14,16,17} one that also exists in Indonesia, which has around 23 million older adults (people aged 60 years or older).^{18,19} One study found that 44% of all PU patients in Indonesian hospitals already suffered from their PUs before hospital admission. Furthermore, almost all of them were older adults who lived at home and none had received home care services before hospital admission.¹⁶ However, the magnitude of the PU problem among older adults living at home in Indonesia is still unclear. Furthermore, it is difficult to measure the prevalence of PUs, because not all Indonesian older adults who suffer from serious illnesses receive care in the hospital; they prefer to stay at home and receive care from their families, with or without formal care supervision.¹⁸ No research has been conducted on the prevalence of PUs in community-dwelling older adults in Indonesia, nor is there evidence on whether community-dwelling older people with PUs receive formal or informal PU care.

Consequently, this study aims to report on the prevalence of PUs in the general population of community-dwelling older adults in a city in Indonesia. Furthermore, the ulcer characteristics, the specific characteristics of PU participants, and their use of formal and informal care are explored.

2 | METHODS

2.1 | Design and setting

This study used a cross-sectional design and was conducted in Bandung, the capital city of the West Java province. There

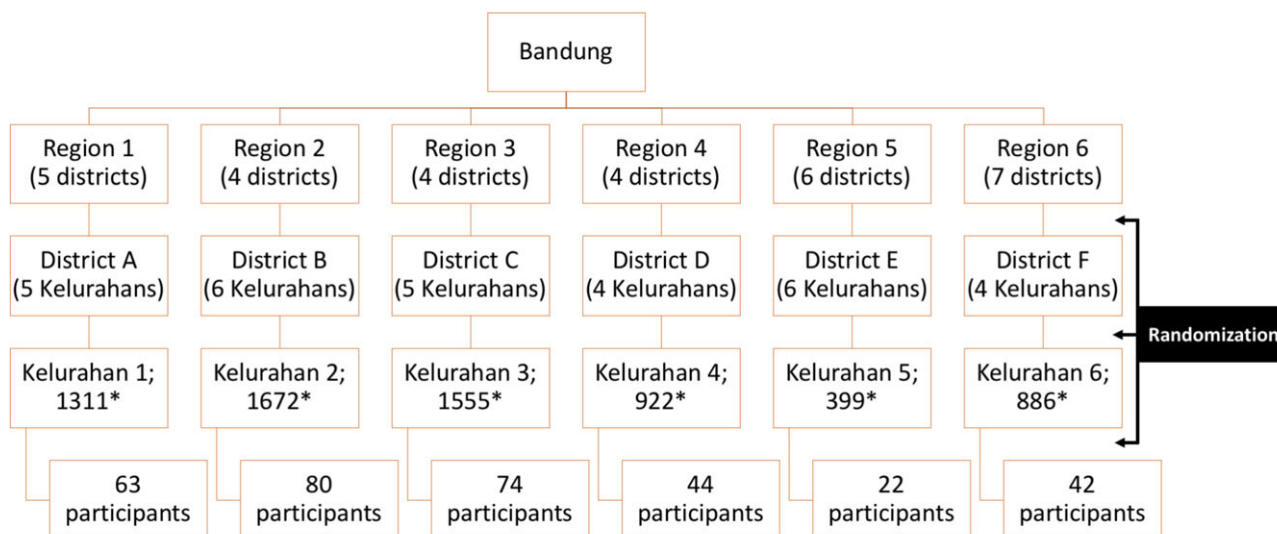
Key Messages

- the prevalence of pressure ulcers (PUs) is a relevant care problem in community-dwelling older adults in Indonesia
- it is necessary to improve self-care among older adults in the community to prevent the development of more severe PU categories. A special focus on care post-stroke might decrease the prevalence of PUs in the community
- older adults living in the community in Indonesia barely make use of formal health care, and formal and informal caregivers pay little attention to the provision of PU care. Further research should focus on barriers to and facilitators for providing both formal and informal PU care in the community

are 30 districts in Bandung, making up the six regions of the city. Every district has smaller municipalities, called “Kelurahan.” One Kelurahan was randomly selected from each of the six regions. If a selected Kelurahan agreed to share the list of its residents older than 60 years, the Kelurahan was included in this study (Figure 1).

2.2 | Participants

Based on the definition used by the Indonesian Ministry of Health, people who are 60 years of age or older are considered to be older adults.¹⁹ Of the 6745 older adults in the six selected Kelurahan, 325 participants were randomly selected to participate in this study. The sample size was calculated using the formula of $n = \frac{Z^2 P (1-P)}{d^2}$ where n is the sample size, Z is the Z statistic for a level of confidence, P is the expected prevalence or proportion, and d is the precision.²⁰ In our study, we used an expected prevalence (P) of 30%



* Population of older adults

FIGURE 1 Sample selection process

(based on the results of previous studies^{5,16,21} and precision (*d*) of 5%. The number of participants in each Kelurahan was calculated based on the ratio of its older adults within the total population in the six Kelurahan (Figure 1). With the exception of people with unstable blood pressure and/or respiration rates, who were excluded from the study, all older adults who agreed to participate were included, irrespective of whether they suffered from health problems and/or had used health care services in the last month.

2.3 | Measurement instruments

After being adapted to the community setting, the validated Indonesian version of the International Prevalence Measurement of Care Quality (LPZ-International) questionnaire was used in this study.^{22,23} PUs were assessed by skin inspection. The characteristics (PU category and PU location) of the ulcers were assessed according to NPUAP-EPUAP-PPPIA guidelines¹ including the following categories: category 1, “non-blanchable erythema”; category 2, “partial thickness”; category 3, “full thickness skin loss”; category 4, “full thickness tissue loss”; category unstageable, category “depth unknown”; and category suspected deep tissue injury, “depth unknown.”¹ As PU category 1 is difficult to establish, all ulcers were assessed using a transparent strip. The following participant characteristics were measured: age, gender, cohabitation (alone vs. with spouse or children and other relatives), skin colour (white, light brown, brown, and dark brown), types of reported diseases (participant's self-reported diseases), body mass index, PU risk (measured with Braden scale item scores), and the level of care dependency (measured with the care dependency scale [CDS]). Last, access to and use of formal care (the extent to which participants had active health care insurance, had been in contact with a health care provider in the last month, and had received PU care treatment and received information about PU care) were measured, as was access to informal PU care (whether or not participants received wound care treatment from family caregivers.)

To assess a participants' risk of PUs, the Braden scale was used.^{24,25} This scale has been used in several Asian countries as a screening instrument for PU risk,^{16,26,27} both in the hospital and in the community setting.^{14,26,28} The validity and reliability of the Indonesian version of the Braden Scale have been confirmed.²² The Braden scale measures six items: sensory perception, moisture, activity, mobility, nutrition, and friction/shear. Each item can be scored on a scale of 1 to 4 or, in the case of friction/shear, 1 to 3.²⁵ A score ≤ 18 on the Braden scale score was used to categorise people as being at-risk.^{6–23,29}

The CDS measures the degree of physical and psychosocial care dependency and covers 15 items: eating and drinking, continence, body posture, mobility, day and night pattern, dressing and undressing, body temperature, hygiene, avoidance of danger, communication, contact with others,

sense of rules and values, daily activities, recreational activities, and learning ability.^{30,31} Each item has 5-point Likert scale categories ranging from 1 (completely dependent) to 5 (almost independent). A patient's total score ranges from 15 to 75, and the lower the total score, the more care dependent a patient is.³¹ The cross-cultural psychometric test of the CDS has been published³² and can be used in different countries. The Indonesian version of this instrument has been validated.²²

2.4 | Data collection procedure

Six alumni of the faculty of Nursing Universitas Padjadjaran who had passed the national competency assessment as registered nurses were independently recruited as enumerators, and were divided into three teams of two persons. All enumerators received 7 to 8 hours of training from the first two authors (SPS and EAS) on using the adopted validated Indonesian version of the LPZ-International questionnaire. Data collection took place in the home of each participant. If there was information that could not be collected from the selected participant because of the inability to communicate (for instance because of cognitive impairment), their families or informal caregivers were allowed to provide the necessary information. All PUs found were documented through photographs and discussed later among the enumerators to categorise the PU, based on NPUAP-EPUAP-PPPIA guidelines.¹

2.5 | Ethical considerations

Two governmental institutions that have responsibilities in health care and community protection approved the research project before it was undertaken (the Indonesian Health Care Agency #070/13472-Dinkes and the National Unity Agency, Politics and Protection of the Regional People #070/3177/Bakesbangpol). The enumerators first had to inform the participants and collect written consent from them or their family. Participants were not obligated to participate and could refuse participation before and during the assessment procedure.

2.6 | Statistics

Data was analysed using IBM SPSS Statistics 25 (IBM Corp, Armonk, New York, New York). PU prevalence was defined as the proportion of all participants who suffered from one or more PUs on the day of assessment. The PU prevalence was calculated both with and excluding category 1. In cases where a participant had more than one PU, only the highest PU grade was used in the prevalence calculation. The characteristics of PU participants as well as their ulcer characteristics were described using percentages for categorical variables and means with standard deviation for continuous variables. Bivariate comparison analyses were conducted using either the Mann-Whitney *U*-test (age,

Braden Scale items, CDS sum score, and body mass index) or the χ^2 test (gender, cohabitation, education, skin colour, and number/ group of diseases reported) to test whether the characteristics of participants with a PU and participants without a PU were significantly different ($P < 0.05$). The characteristics on which the two groups were significantly different were further analysed using a logistic regression analysis (backward Likelihood Ratio method).

3 | RESULTS

Data collection was performed in October and November 2017. All participants selected ($n = 325$) agreed to participate. The mean age of the participants was 72.1 years and 67.7% of the participants were women. More than half (67.7%) of the participants were living together with a spouse, children, and/or other relatives.

3.1 | PU prevalence

The overall prevalence of PU categories 1 to 4, and unstageable and suspected deep tissue injury “deep unknown” was 10.8% (95% confidence interval [CI], 5.8-15.8). The prevalence of PUs excluding of category 1 was 5.2% (95% CI 0.2-10.2).

3.2 | The characteristics of PUs

Table 1 shows detailed characteristics of the PUs. As shown in this table, there were a total of 35 participants with a PU, with an overall total of 70 wounds. Half of the participants (51.4%) suffered from PUs within category 1. The PUs in categories 2, 3, and suspected deep tissue injury “depth unknown” were accounted to be 17.1%, 15.7%, and 5.7%, respectively. No PUs in categories 4 and unstageable “depth unknown” were found in this study. The dominant places of PU category 1 were on knees (21.4%) and toes (12.9%),

while the dominant places of PUs excluding category 1 were the sacrum (25.9%), shoulder (25.9%), and hip (22.2%). All PUs found were community-acquired PUs; none of the PU participants had a history of hospital-acquired PUs.

3.3 | Characteristics of PU participants

Table 2 shows the characteristics of non-PU participants and PU participants. It appears that participants with a PU were significantly older, reported more stroke history, were more care-dependent, more at risk of Pus, and had lower scores on the five Braden scale items (sensory perception, moisture, activity, mobility, and friction/shear) in comparison with participants without a PU.

The nine variables that were significantly different between the two groups (age, the number of participants with a history of stroke, total CDS score, PU risk and Braden scale items sensory perception, moisture, activity, mobility, and friction/shear) were included for further multivariate comparison analysis. This logistic regression analysis showed that the variables that are related to PU prevalence among older adults in the community were the Braden scale item “activity” (OR 0.6; 95% CI 0.385-0.947), having had a stroke (OR 0.3; 95% CI 0.123-0.743) and the Braden scale item “sensory perception” (OR 0.3; 95% CI 0.158-0.571).

3.4 | Access and use of formal and informal care

Table 3 describes the extent to which the participants had health care insurance and used formal care. The use of formal care was measured by asking participants whether they had visited primary health care services in the previous month, consulted a private doctor, visited a hospital as an outpatient, or were hospitalised and/or received a home visit from a formal caregiver. Results show no significant differences between PU and non-PU participants with regard to their access to and use of formal care. The majority of participants in both groups (78.8%) had health care insurance and

TABLE 1 Pressure ulcer (PU) characteristics of community-dwelling older adult PU participants ($n = 35$ participants and 70 wounds)

| Characteristics of PUs | Category 1 PU n (%) | Category 2 PU n (%) | Category 3 PU n (%) | Category 4 PU n (%) | Unstageable n (%) | Susp. deep tissue n (%) |
|--|---------------------|---------------------|---------------------|---------------------|-------------------|-------------------------|
| The highest PU category per subject ($n = 35$ subjects) | 18 (51.4) | 5 (14.3) | 9 (25.7) | 0 (0.0) | 0 (0.0) | 3 (8.6) |
| Number of PU wounds per category ($n = 70$ wounds) | 43 (61.4) | 12 (17.1) | 11 (15.7) | 0 (0.0) | 0 (0.0) | 4 (5.7) |
| Locations of PU wounds ($n = 70$ wounds) | | | | | | |
| Knees | 15 (21.4) | — | — | — | — | — |
| Hip | 4 (5.7) | 2 (2.9) | 3 (4.3) | — | — | 1 (1.4) |
| Toes | 9 (12.9) | — | — | — | — | — |
| Sacrum | 1 (1.4) | 4 (5.7) | 3 (4.3) | — | — | — |
| Elbow | 8 (11.4) | — | — | — | — | — |
| Shoulder | 0 (0.0) | 4 (5.7) | 3 (4.3) | — | — | — |
| Heel | 2 (2.9) | 1 (1.4) | — | — | — | 3 (4.3) |
| Ankle | 4 (5.7) | — | — | — | — | — |
| Buttock | 0 (0.0) | 1 (1.4) | 2 (2.9) | — | — | — |

TABLE 2 Characteristics of participating community-dwelling older adults (n = 325)

| Participant characteristics (N = 325) | Non-PU (n = 290) | PU (n = 35) | Total (N = 325) | Bivariate analysis | Multivariate analysis | |
|---|------------------|-------------|-----------------|--------------------|-----------------------|-------------------|
| | | | | P-value | P-value | Exp B (95% CI) |
| Mean age (SD) | 71.8 (7.9) | 74.8 (7.8) | 72.1 (8) | 0.026* | NS | |
| Female, n (%) | 200 (69) | 20 (57.1) | 220 (67.7) | 0.158 | — | — |
| Cohabitation, n (%) | | | | | | |
| a. Alone | 33 (11) | 3 (9) | 36 (11.1) | 0.715 | — | — |
| b. Spouse | 23 (8) | 4 (11) | 27 (8.3) | | — | — |
| c. Spouse and/or children | 26 (9) | 6 (17) | 32 (9.8) | | — | — |
| d. Spouse and/or children and other relative(s) | 198 (68) | 22 (63) | 220 (67.7) | | — | — |
| Skin color | | | | | | |
| a. White | 12 (4.1) | 1 (2.9) | 13 (4) | 0.151 | — | — |
| b. Light brown | 232 (80) | 26 (74.3) | 258 (79.4) | | — | — |
| c. Brown | 41 (14.1) | 7 (20) | 48 (14.8) | | — | — |
| d. Dark brown | 5 (1.7) | 1 (2.9) | 6 (1.8) | | — | — |
| Diseases | | | | | | |
| Reported at least one health problem, n (%) | 223 (76.9) | 31 (11.4) | 254 (78.2) | 0.114 | — | — |
| Health problem reported | | | | | | |
| Hypertension, n (%) | 90 (40.4) | 6 (19.4) | 96 (37.8) | 0.089 | — | — |
| Stroke, n (%) | 35 (15.7) | 17 (54.8) | 52 (20.5) | 0.001* | 0.009** | 0.3 (0.123-0.743) |
| Digestive problem, n (%) | 26 (11.7) | 5 (16.1) | 31 (12.2) | 0.311 | — | — |
| Respiratory problem, n (%) | 29 (13) | 0 (0) | 29 (11.4) | 0.050 | — | — |
| Coronary heart disease, n (%) | 25 (11.2) | 1 (3.2) | 26 (10.2) | 0.235 | — | — |
| Rheumatoid Arthritis, n (%) | 24 (10.8) | 0 (0) | 24 (9.4) | 0.077 | — | — |
| Diabetes, n (%) | 17 (7.6) | 4 (12.9) | 21 (8.3) | 0.206 | — | — |
| Immobility and injury, n (%) | 12 (5.4) | 4 (12.9) | 16 (6.3) | 0.060 | — | — |
| Genitourinary problem, n (%) | 7 (3.1) | 1 (3.2) | 8 (3.1) | 0.873 | — | — |
| Others, n (%) | 54 (24.2) | 7 (22.6) | 61 (24) | 0.844 | — | — |
| Sum score care dependency scale (range 15-75), mean (SD) | 64 (13.4) | 44.1 (20) | 61.8 (15.5) | 0.000 | NS | — |
| Braden scale item, mean (SD) | | | | | | |
| a. Sensory perception | 3.8 (0.4) | 3.1 (0.8) | 3.8 (0.5) | 0.000* | 0.000** | 0.3 (0.158-0.571) |
| b. Moisture | 3.3 (0.8) | 3 (0.6) | 3.3 (0.8) | 0.002* | NS | |
| c. Activity | 3.5 (0.8) | 2.4 (1) | 3.4 (0.9) | 0.000* | 0.028** | 0.6 (0.385-0.947) |
| d. Mobility | 3.5 (0.7) | 2.6 (1.1) | 3.4 (0.8) | 0.000* | NS | — |
| e. Nutrition | 3.5 (0.7) | 3.4 (0.8) | 3.5 (0.7) | 0.459 | | — |
| f. Friction and shear | 2.9 (0.4) | 2.4 (0.8) | 2.8 (0.5) | 0.000* | NS | — |
| Participant at risk (Braden scale score \leq 18), n (%) | 49 (16.9) | 18 (51.4) | 67 (20.6) | 0.000* | NS | — |
| Body Mass Index, mean (SD) | 24.7 (5.5) | 26.2 (7.1) | 24.8 (5.6) | 0.216 | — | — |

Abbreviations: CI, confidence interval; NS, non-significant; PU, pressure ulcer.

*Differences were assumed significant at $P < 0.05$ for a CI of 95%.

**Variables were assumed related at $P < 0.05$ for a CI of 95%.

56.3% of the participants had made use of formal care in the previous month. Almost all PU participants had health care insurance, but less than half of them (45.7%) had actually used formal care in the previous month, and only 2.9% had received a visit from a formal caregiver. However, none of the participants with a PU received formal PU care or wound treatment at home, in a health care clinic or at the hospital.

This means that the formal care they received was focused on something other than their PUs. With regard to informal care, only four of 35 PU participants had received wound treatment from a family caregiver. Finally, none of the participants or their family members had received any information about PUs or PU care from formal health care providers.

TABLE 3 The health insurance and access of formal and informal care services by pressure ulcer (PU) participants (n = 35)

| Access and use of health care | Non-PU (n = 290) | PU (n = 35) | Total (N = 325) | P-value |
|---|------------------|-------------|-----------------|---------|
| Participant is covered by health insurance | 224 (77.2) | 32 (91.4) | 256 (78.8) | 0.151 |
| Participant accessed a health care service in the previous month (eg, primary health care/private doctor/outpatient hospital visit) | 126 (43.4) | 16 (45.7) | 183 (56.3) | 0.798 |
| Participant was hospitalised in the previous month | 7 (2.4) | 0 (0) | 7 (2.2) | 0.353 |
| Participant received home visit by formal health care provider in the last month | 4 (1.4) | 1 (2.9) | 5 (1.5) | 0.502 |
| Participant received information about PU from any formal health care providers | 0 (0) | 0 (0) | 0 (0) | — |
| PU participant received wound care treatment from any formal health care provider (n = 35 participants) | Not available | 0 (0) | Not available | — |
| PU participant received wound care treatment from family (n = 35 participants) | Not available | 4 (11.4) | Not available | — |

4 | DISCUSSION

This study provides a first insight into the prevalence and care of PUs among community-dwelling older adults in a city in Indonesia. The results show that the prevalence rate of all PUs including category 1 and the prevalence rate of PUs excluding category 1 were 10.8% and 5.2%, respectively. The factors that strongly relate to PUs among older adults in the community were the degree of physical activity, a problem in sensory perception (assessed with the Braden Scale), and having a history of stroke. Although most participants with PUs had health care insurance, none of them had received formal wound care and/or any information about PU (care) from their formal health care providers. Last, for the most participants, family members did not provide PU care at home.

The PU prevalence among older adults in the general population in Bandung could be said to be high. Based on these numbers and considering the number of inhabitants in Bandung, it is expected that around 11 000 to 32 000 people aged 60 years or older living at home suffer from PUs.²⁰ However, no other studies presently report on the prevalence of PUs among community-dwelling older adults in the general population. Some studies have reported on the prevalence of community-acquired PUs among hospitalised older adults; these studies show prevalence rates of 3.3% in Sweden, 3.5% in Indonesia, 7.4% in New England (US), and 11.1% in Malaysia. Although these studies report on community-acquired PUs, the participants were all hospitalised. This means that community-dwelling older adults who were not hospitalised were not included in these studies. Therefore, it is difficult to compare these results with those found in our study. If our results are compared with the prevalence rate of PUs developed in four hospitals in Indonesia (8.0%),¹⁶ the PU problem is relevant in community-dwelling older adults in Indonesia.

More than half (61.4%) of the PUs found in our population were classified as being within category 1. Interestingly, PUs in category 1 were mostly found on the toes and knees; PUs in these locations are found only rarely in other studies.^{13,14,16,21,33–37} A possible reason for this may be related to the Indonesian habits of praying and sitting in a position with pressure on one's knees or toes (called “sujud

(prostrated)” and “bersila (sit on knees)”) repeatedly and for longer periods of time. These habits were also found among Bangladeshi immigrants in Greece, where almost 17% of diabetic patients had dermatologic changes (called “prayer marks”) on the lower region of their left foot because of pressure.³⁸ It is likely that this prevalence will decrease if people are better informed about the prevention and treatment of category 1 PUs.¹ Older adults could, for instance, select a support surface (eg, thick layer) while sitting and praying, or use a chair while performing such activities. Therefore, it is necessary to improve self-care among older adults in the community to prevent the development of more severe PU categories.

Most of the PUs in categories 2 and 3 were located on the hip, sacrum, and shoulder. These body parts usually show PUs when patients sleep in lying postures for a long time without regular repositioning; this may be because of many factors.¹ In our study, many participants who suffered from these PUs were immobile, suffered from sensory perception problems and had a history of stroke. These three factors might be the most important risk factors for developing a PU in this target group. Although our analyses adjusted for the effect of various confounders, it seems likely that these three risk factors are interrelated: having a stroke is associated with activity limitation³⁹ and activity limitation is a risk factor for developing PUs.⁴⁰ Also, our results show that stroke had been reported by more than half (54.8) of PU participants, while only 20.5% of the participants without a PU had a stroke history. Therefore, a special focus on stroke care might decrease the prevalence of PUs in the community.

This study also shows that the availability of health insurance did not ensure the use of formal care, illustrated by the fact that almost all (91.4%) of the PU participants were insured, but only 45.7% had accessed health care services in the previous month. Furthermore, even though some of the PU participants used formal care, none of them had received formal care focused on PU treatment from hospital nurses, community nurses, or a home/wound care agency. Further research should focus on the reasons why older adults barely make use of formal health care, and on the reasons why formal caregivers give little attention to the provision of PU care.

Almost none of the PU participants received PU care from family members, even though the majority (63%) of them were living with family and other relatives. As the family can be a good support system for preventing the development of PU problems at home,⁴¹ this is a missed opportunity. However, it is unknown what knowledge and skills family members have regarding PUs and PU care and how they cope with the PU problem at home. Further research focused on exploring family knowledge, attitude, and skills regarding PU problems is recommended, especially in Indonesia where taking care of parents to the end of their lives is common.

4.1 | Study limitations

This study has limitations. First, considering the large area of Indonesia, the results of this study cannot be generalised to all Indonesian urban areas. However, the results do give a clear overview of the prevalence of PUs in the community in the region of Bandung. Second, the measurement of PU category 1 could be biased, as participants might have had marks looking similar to PUs but which were actually caused by praying postures. However, the PUs were assessed by two nurses, recorded in photographs, and the results were discussed among all the enumerators to confirm that those wounds met the criteria of PU category 1.¹ In addition, most participants had light brown skin, which made it easy to assess PU category 1 using a transparent strip.

5 | CONCLUSION

This study shows that PUs are a relevant problem in community-dwelling older people in an urban area in Indonesia, with an overall prevalence rate including category 1 of 10.8% and a prevalence rate excluding category 1 of 5.2%. Although most people had health care insurance, they did not receive any formal care for PU treatment. Therefore, much attention must be paid to PU care in general, including the prevention and treatment of PUs by formal caregivers. Because of the fact that in Indonesia family is a very important source of informal care, the education and instruction of family caregivers regarding the prevention and treatment of PUs calls for serious attention.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to report.

Author contribution

SPS, EAS, IA, YA, CL, RJGH, IE, and JMGAS designed the study. SPS, EAS, and IA organised the data collection and conducted the data analyses. YA, CL, RJGH, IE, and JMGAS checked the results of data analyses. SPS prepared the manuscript draft. YA, CL, RJGH, IE, and JMGAS provided their expertise by giving feedback on and revising the manuscript.

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