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Prevalence and risk factors associated with falls among community-dwelling and institutionalized older adults in Indonesia

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Abstract

Objective: To assess the prevalence and social and health correlates of falls and fall risk in a sample of community-dwelling and institutionalized older Indonesians.
Methods: This cross-sectional study was conducted July–August 2018 in three regions in Indonesia. Adults aged 60 years and above (n=427) were recruited via random sampling from community clinics and public and private elderly homes. They responded to interview-administered questions and provided measurements on sociodemographics and various health variables, including falls and fall risk. Fall risk was assessed with the STEADI (Stopping Elderly Accidents, Deaths, & Injuries) screen. Multivariable logistic regression was conducted to estimate associations with fall and fall risk.
Results: In the year immediately preceding the study, 29.0% of participants had suffered a fall. Approximately one-third of women (31.1%) and one-fifth of men (20.4%) reported a fall in the past year, and 25.4% of community dwellers and 32.7% of institutionalized older adults had fallen. The overall proportion of fall risk was 45.4%, 49.0% among women, 38.0% among men, 50.5% in the institutionalized setting, and 40.4% in the community setting. In adjusted logistic regression analysis, older age (OR: 1.89, CI: 1.06, 3.37), private elderly home setting (OR:2.04, CI: 1.10, 3.78), and being female (OR: 0.49, CI: 0.30, 0.82) were associated with falls in the preceding 12 months. Older age (80-102 years) (OR: 2.55, CI: 1.46, 4.46), private elderly home residence (OR: 2.24, CI: 1.19, 4.21), lack of education (OR: 0.51, CI: 0.28, 0.93), memory problems (OR: 1.81, CI: 1.09, 2.99), and arthritis (OR: 2.97, CI: 1.26, 7.00) were associated with fall risk by the STEADI screen. In stratified analysis by setting, being female (OR: 0.49, CI: 0.25, 0.95) and living in urban areas (OR: 1.97, CI: 1.03, 3.76) were associated with falls in the institutionalized setting, and having near vision problems (OR: 2.32, CI: 1.09, 4.93) was associated with falls in the community setting. Older age (OR: 2.87, CI: 1.36, 6.07) was associated with fall risk in the institutionalized setting, and rural residence (OR: 0.37, CI: 0.15, 0.93) and having a joint disorder or arthritis (OR: 4.82, CI: 1.28, 16.61) were associated with fall risk in the community setting.
Conclusion: A high proportion of older adults in community and institutional care in Indonesia have fallen or were at risk of falling in the preceding 12 months. Health variables for fall and fall risk were identified for the population overall and for specific populations in the home care and community setting that could help in designing fall-prevention strategies.

Introduction

Injurious falls in older adults have been identified as a significant public health problem.[1,2] In community-based studies among older adults (60 years and older), the past-year fall prevalence was 17.2% in Singapore,[3] 4.1% in Malaysia,[4] and 31% in rural India.[5] In the past two years in Indonesia, the prevalence of falls among community-dwelling older adults (50 years and older) was 12.8%.[6] In a population of institutionalized older adults (60 years and older) in Malaysia in the past 12 months, 32.8% and 13.3% of study participants were, respectively, at high or moderate risk for falling.[7] Homebound or semi-homebound older adults in South Korea were found to be 50% more likely to experience a fall than non-homebound individuals.[8] In Indonesia, there is a lack of information on fall and fall risk in institutional care and on fall risk in community dwellers.

Effective fall prevention programs need to include a fall and a fall risk assessment to target interventions.[9] Risk factors for falling in older adults include sociodemographic and health condition variables. Sociodemographic

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risk factors include older age,[3,10-12] female sex,[3,13,14] lower socioeconomic status,[14] rural residence,[13] living alone,[15] and residence in an institutional care setting.[8] Health condition risk factors for falls among older adults may include specific chronic conditions such as stroke,[16,17] diabetes,[16] arthritis,[8,17] and poor cognitive functioning.[6,13,17] Other health risk factors include visual difficulties,[16,17] hearing problems,[18,19] urinary incontinence,[6,16,17] and depression.[6-8,13]

To successfully include fall-prevention health care programming,[13,20] the government of Indonesia requires epidemiological data on fall and fall risk. To address this gap, this study aims to assess the prevalence and social and health correlates of falls and fall risk in a sample of community-dwelling and institutionalized older Indonesians.

Methods

Sample population and procedure

A cross-sectional study was conducted July–August 2018 in three provinces on the island of Java: DKI Jakarta, West Java (Bandung), and Yogyakarta. From the total number of public elderly homes in Jakarta (n=4), Bandung (n=4), and Yogyakarta (n=2), three public elderly homes were randomly selected, two in Jakarta and one in Yogyakarta. From the total number of private elderly homes in Jakarta (n=19), Bandung (n=5), and Yogyakarta (n=2), four private elderly homes were randomly selected, one in Jakarta and three in Bandung. From the total number of primary health care centers in Jakarta (n=341), Bandung (n=74), and Yogyakarta (n=121), seven primary health care centers were randomly selected, three in Jakarta, three in Bandung and one in Yogyakarta.

The inclusion criteria were 60 years of age and older, able to communicate, and agreement to complete the assessment. Total care elderly who were bed-ridden were excluded from the study as they could not perform independent care. Moreover, this consideration is subjected to the homogeneity of the risk of falls among study participants. Identification of potential participants was based on a list provided by the elderly home officer and in the community by a social worker active in the Elderly Integrated Development Post, a position developed by the primary health center in the community. The respondents who met the inclusion criteria were chosen randomly for study inclusion.

The sample size calculation for regression analysis was based on Van Voorhis and Morgan:[21] the overall model is 50+8k, in which k is the number of independent variables, and an analysis for individual variables model is 104+k. In this study, as there are six independent variables, the overall model sample size is 50+8x6 = 98, and overall is 104+6 = 110. Thus, the minimum sample size for this study is 110 per model. In this study, we have four models: community, health care organization, past year fall occurrence, and fall risk STEADI models. Thus, the minimum sample size is 98x4 = 392.

The questionnaire, initially in English, was translated by two independent bilingual translators into Bahasa, and another bilingual translator, who did not know the original questionnaire, back-translated the reconciliated target language version. Before study participation, written informed consent was obtained from all participants. The study was approved by the Ethical Committee of the Faculty of Public Health, Universitas Indonesia, Indonesia, approval number 125/UN2.F10/PPM.00.02/2018.

Measures

Outcome variables

Fall was assessed with the questions, "Have you fallen in the past year?"[22]
Fall risk was assessed with the 12-item STEADI (Stopping Elderly Accidents, Deaths, & Injuries) screen.[22] A summary score of four or greater was indicative of fall risk.[22] Cronbach alpha for the STEADI in this sample was 0.79.

Exposure variables

Socio-demographic factor questions included age, sex, education, residential status, living status, region, and care setting.
Depression was assessed with the 15-item Geriatric Depression Scale (GDS) (Short Form), with scores of 6 or more indicative of depression.[23,24] Cronbach's alpha for the GDS in this sample was 0.91.
Visual impairment was assessed by first asking the study participants whether they have "a problem with their vision," and if so, a visual acuity test was performed, and "visual impairment was defined as presenting or best-corrected visual acuity less than 20/40 (better eye)."[25]

Other chronic conditions were assessed based on the list of chronic diseases from the Comprehensive Geriatric Assessment tools (CGA).[26] The list consisted of hypertension, heart disease, lung disease, stroke, TIA, diabetes mellitus, Parkinson's disease, osteoporosis, cancer, leukemia, hepatitis, HIV, herpes, chronic ulcer disease, and others. Hypertension was assessed by blood pressure measurement. Other chronic conditions were identified by asking the elderly or family and caregiver for triangulation.

Data analysis

Descriptive statistics were calculated to describe the sample and occurrence of fall and fall risk. Logistic regression (forced entry) was used to estimate the association with past 12-month fall and fall risk, separately, for the whole sample and also stratified by the study setting (institutionalized and community). Variables significant in bivariate analyses were subsequently included in a multivariable logistic regression model with fall and fall risk. Independent variables included sociodemographic and health variables. Potential multicollinearity between variables was assessed with variance inflation factors, none of which exceeded a critical value. $P < 0.05$ was considered significant. All analyses were done with STATA software version 13.0 (Stata Corporation, College Station, TX, USA).

Results

Sample characteristics and bivariate analysis with falls and fall risk

The total sample included 427 persons 60 years and older (median age 71 years, IQR=14.0, age range 60-102 years) in three regions (133 in Jakarta, 146 in Yogyakarta, 148 in Bandung); the response rate was 85.4%. The proportion of women was 67.9%, 49.9% were community dwellers, 29.0% in public residential care, and 21.1% in private elderly homes. Almost one-third of the participants (30.7%) had no formal education, and 56.2% resided in rural areas. Regarding health variables, 18.5% scored positive for depression, 22.7% had impaired near vision, 24.1% had a memory problem, 11.7% arthritis, 13.3% a urinary problem, and 14.3% a cardiovascular disorder.

The proportion of participants who had suffered a fall in the past year was 29.0%. Almost one-third of women (31.1%) and one-fifth of men (20.4%) reported a fall in the past year, as well as 25.4% of community dwellers and 32.7% of institutionalized older adults. The fall risk, measured with the STEADI screen, was 45.4% overall, 49.0% among women, and 38.0% among men. The prevalence of falling in the past 12 months was 32.7% in the institutionalized setting, and 25.4% in the community and the fall risk was 50.5% in the institutionalized setting and 40.4% in the community setting (**see Table 1**).

Associations with past year fall and fall risk

In adjusted logistic regression analysis, older age, private institutional care setting, and being female were associated with falling in the previous 12 months. Older age (80-102 years), private elderly home setting, having no education, memory problems, and arthritis were associated with fall risk on the STEADI screen (**see Table 2**).

Associations with past year fall stratified by setting

In adjusted logistic regression analysis, being female and having an urban residence was associated with falling in the past 12 months in the institutionalized setting, and having near vision problems was associated with falling in the community setting (**see Table 3**).

Associations with fall risk stratified by setting

In adjusted logistic regression analysis, older age was associated with fall risk in the institutionalized setting, and rural residence and having a joint disorder or arthritis were associated with fall risk in the community setting (**see Table 4**).

Table 1: Sample characteristics and bivariate analysis between socio demographic factors, health conditions and past year fall and fall risk

	Sample	Total sample		Home care sample		Community sample	
Variable		**Past year fall**	**Fall risk (STEADI)**	**Past year fall**	**Fall risk (STEADI)**	**Past year fall**	**Fall risk (STEADI)**
		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Sociodemographics							
All	427	124 (29.0)	194 (45.4)	70 (32.7)	108 (50.5)	54 (25.4)	86 (40.4)
Age (in years)							
60-69	185 (43.3)	39 (21.1)	63 (34.1)	18 (28.1)	25 (39.1)	21 (17.4)	38 (31.4)
70-79	137 (32.1)	43 (31.4)	63 (46.0)	26 (32.5)	36 (45.0)	17 (29.8)	27 (47.4)
80-102	105 (24.6)	42 (40.0)**	68 (64.8)***	26 (37.1)	47 (67.1)**	16 (45.7)**	21 (60.0)**
Care setting							
Elderly home (public)	124 (29.0)	30 (24.2)	51 (41.1)	---	---	---	---
Elderly home (private)	90 (21.1)	40 (44.4)	57 (63.3)				
Community	213 (49.9)	54 (25.4)***	86 (40.4)***				
Sex							
Female	290 (67.9)	96 (33.1)	142 (49.0)	54 (37.2)	80 (55.2)	42 (29.0)	62 (42.8)
Male	137 (32.1)	28 (20.4)**	52 (38.0)*	16 (23.2)*	28 (40.6)**	12 (17.6)	24 (35.3)
Region/city							
Jakarta	133 (31.1)	29 (21.8)	47 (35.3)	23 (29.1)	14 (25.9)	6 (11.1)	33 (41.8)
Yogyakarta	146 (34.2)	35 (24.0)	53 (36.3)	12 (17.4)	26 (33.8)	23 (29.0)	27 (39.1)
Bandung	148 (34.7)	60 (40.5)***	94 (63.5)***	35 (53.0)**	46 (56.4)***	25 (30.5)*	48 (72.7)***
Education							
None	130 (30.7)	47 (36.2)	71 (54.6)	21 (33.3)	38 (60.3)	26 (38.8)	33 (49.3)
Less than middle school	174 (41.0)	47 (27.0)	74 (42.5)	23 (33.3)	32 (46.4)	24 (22.9)	42 (40.3)
Middle school or more	120 (28.3)	30 (25.0)	47 (39.2)*	26 (32.1)	37 (45.7)	4 (10.3)**	10 (25.6)
Residential status							
Rural	240 (56.2)	66 (27.5)	109 (45.4)	18 (22.8)	34 (43.0)	48 (29.8)	75 (46.6)
Urban	187 (43.8)	58 (31.0)	85 (45.5)	52 (38.5)*	74 (54.8)	6 (11.5)**	11 (21.2)***
Living status							
Lives with relatives	---	---	---	---	---	39 (22.7)	66 (37.5)
Lives alone						15 (40.5)*	20 (54.1)
Health conditions							
Depression	79 (18.5)	31 (39.2)*	---	15 (34.1)	---	16 (45.7)**	---
Vision problem (near)	97 (22.7)	39 (40.2)**	55 (56.7)*	17 (36.2)	26 (55.3)	22 (44.0)***	29 (58.8)**
Vision problem (far)	24 (5.6)	11 (45.8)	13 (54.2)	6 (42.9)	7 (50.0)	6 (50.0)	6 (60.0)
Osteoporosis	42 (9.8)	15 (35.7)	27 (64.3)**	8 (42.1)	14 (73.7)*	7 (30.4)	13 (56.5)
Memory problem	103 (24.1)	38 (36.9)*	60 (58.3)**	22 (40.0)	35 (63.6)*	16 (33.3)	25 (52.1)
Joint disorder/arthritis	50 (11.7)	22 (44.0)*	36 (72.0)***	11 (42.3)	18 (69.2)*	11 (45.8)*	18 (75.0)***
Urinary problem	57 (13.3)	24 (42.1)*	33 (57.9)*	13 (52.0)*	14 (56.0)	11 (34.4)	19 (59.4)*
Defecation problem	43 (10.1)	17 (39.5)	28 (65.1)**	8 (40.0)	14 (70.0)	9 (31.9)	14 (60.9)*
Diabetes	46 (10.8)	14 (30.4)	26 (56.5)	10 (31.3)	18 (56.3)	4 (28.6)	8 (57.1)
Parkinson's disease	21 (4.9)	5 (23.8)	12 (57.1)	2 (15.4)	8 (61.5)	3 (37.5)	4 (50.8)
Cardiovascular disease (Stroke, heart disease, light stroke)	61 (14.3)	31 (39.2)	30 (49.2)	12 (32.4)	20 (54.1)	6 (25.0)	10 (41.7)

***P<0.001, **P<0.01. *P<0.05

Table 2: Associations with past year fall and fall risk (using logistic regression)

Variable	Past year fall		Fall risk (STEADI)	
	COR (95% CI)	AOR (95% CI)	COR (95% CI)	AOR (95% CI)
Sociodemographics				
Age (in years)				
60-69	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
70-79	**1.71 (1.03, 2.84)**	1.53 (0.89, 2.23)	**1.65 (1.05, 2.59)**	1.40 (0.85, 2.30)
80-102	**2.50 (1.47, 4.23)**	**1.89 (1.06, 3.37)**	**3.56 (2.15, 5.88)**	**2.55 (1.46, 4.46)**
Care setting				
Elderly home (public)	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Elderly home (private)	**2.51 (1.40, 4.50)**	**2.04 (1.10, 3.78)**	**2.47 (1.42, 4.32)**	**2.24 (1.19, 4.21)**
Community	1.05 (0.64, 1.78)	1.10 (0.64, 1.90)	0.97 (0.62, 1.52)	1.01 (0.61, 1.67)
Sex				
Female	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Male	**0.52 (0.32, 0.84)**	**0.49 (0.30, 0.82)**	**0,64 (0.42, 0.97)**	065 (0.40, 1.04)
Education				
None	1 (Reference)	--	1 (Reference)	1 (Reference)
Less than middle school	0.68 (0.42, 1.10)		**0.51 (0.39, 0.96)**	0.76 (0.46, 1.26)
Middle school or more	0.61 (0.35, 1.05)		**0.53 (0.32, 0.87)**	**0.51 (0.28, 0.93)**
Residential status				
Rural	1 (Reference)	---	1 (Reference)	---
Urban	1.19 (0.78, 1.80)		1.00 (0.68, 1.47)	
Health conditions				
Depression	**1.76 (1.06, 2.94)**	1.30 (0.74, 2.28)	Not included	---
Vision problem (near)	**1.94 (1.22, 3.12)**	1.58 (0.93, 2.66)	**1.80 (1.14, 2.84)**	1.24 (0.74, 2.09)
Vision problem (far)	2.17 (0.95, 4.99)	---	1.45 (0.63, 3.31)	---
Osteoporosis	1.40 (0.72, 2.75)	---	**2.35 (1.21, 4.56)**	1.71 (0.80, 3.63)
Memory problem	**1.61 (1.01, 2.59)**	1.43 (0.85, 2.39)	**1.98 (1.28, 3.10)**	**1.81 (1.09, 2.99)**
Joint disorder/arthritis	**2.12 (1.16, 3.87)**	1.52 (0.73, 3.16)	**3.56 (1.86, 6.83)**	**2.97 (1.26, 7.00)**
Urinary problem	**1.96 (1.11, 3.49)**	1.52 (0.75, 3.04)	**1.79 (1.02, 3.14)**	0.98 (0.48, 2.01)
Defecation problem	1.69 (0.88, 3.25)	---	**2.45 (1.26, 4.74)**	1.50 (0.65, 3.44)
Diabetes	1.08 (0.55, 2.10)	---	1.65 (0.89, 3.06)	---
Parkinson's disease	0.75 (0.27, 2.10)	---	1.64 (0.68, 3.98)	---
Cardiovascular disease (Stroke, heart disease, light stroke)	1.03 (0.57, 1.86)	---	1.19 (0.69. 2.05)	---

COR= Crude Odds Ratio; AOR= Adjusted Odds Ratio; CI=Confidence Interval; Bold=significant

Table 3: Associations with past year fall stratified by setting (using logistic regression)

Variable	Fall in home care setting		Fall in community setting	
	COR (95% CI)	AOR (95% CI)	COR (95% CI)	AOR (95% CI)
Sociodemographics				
Age (in years)				
60-69	1 (Reference)	--	1 (Reference)	1 (Reference)
70-79	1.23 (0.60, 2.52)		2.02 (0.97, 4.23)	1.51 (0.68, 3.87)
80-102	1.51 (0.73, 3.13)		**4.01 (1.78, 9.06)**	2.02 (0.80, 5.12)
Sex				
Female	1 (Reference)	1 (Reference)	1 (Reference)	--
Male	**0.51 (0.27, 0.98)**	**0.49 (0.25, 0.95)**	0.59 (0.26, 1.08)	
Education				
None	1 (Reference)	--	1 (Reference)	1 (Reference)
Less than middle school	1.02 (0.50, 2.11)		**0.49 (0.25, 0.96)**	0.71 (0.34, 1.48)
Middle school or more	0.97 (0.48, 1.95)		**0.19 (0.06, 0.59)**	0.37 (0.10, 1.46)
Residential status				
Rural	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Urban	**2.12 (1.13, 3.40)**	**1.97 (1.03, 3.76)**	**0.31 (0.12, 0.77)**	0.37 (0.10, 1.46)
Living status				
Lives with relatives	--		1 (Reference)	1 (Reference)
Lives alone			**2.40 (1.14, 5.05)**	1.85 (0.77, 4.43)
Health conditions				
Depression	1.07 (0.53, 2.16)	---	**3.10 (1.46, 6.60)**	2.01 (0.86, 4.67)
Vision problem (near)	1.22 (0.62, 2.40)	---	**3.22 (1.63, 6.34)**	**2.32 (1.09, 4.93)**
Vision problem (far)	1.59 (0.53, 4.79)	---	3.14 (0.87, 11.31)	---
Osteoporosis	1.56 (0.60, 4.07)	---	1.33 (0.52, 3.43)	---
Memory problem	1.54 (0.84, 2.92)	---	1.67 (0.83, 3.37)	---
Joint disorder/arthritis	1.60 (0.69, 3.70)	---	**2.87 (1.20, 6.87)**	**2.02 (0.73, 5.63)**
Urinary problem	**2.51 (1.08, 5.83)**	2.31 (0.97, 5.52)	1.68 (0.75, 3.76)	---
Defecation problem	1.42 (0.55, 3.65)	---	2.07 (0.84, 5.10)	---
Diabetes	0.92 (0.41, 2.08)	---	1.19 (0.36, 3.97)	---
Parkinson's disease	0.36 (0.08, 1.65)	---	1.81 (0.42, 7.85)	---
Cardiovascular disease (Stroke, heart disease, light stroke)	0.99 (0.46, 2.10)	---	0.98 (0.37, 2.61)	---

COR= Crude Odds Ratio; AOR= Adjusted Odds Ratio; CI=Confidence Interval; Bold=significant

Table 4: Associations with fall risk stratified by setting (using logistic regression)

Variable	Fall risk in home care setting		Fall risk in community setting	
	COR (95% CI)	AOR (95% CI)	COR (95% CI)	AOR (95% CI)
Sociodemographics				
Age (in years)				
60-69	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
70-79	1.28 (0.65, 2.49)	1.26 (0.62, 2.56)	1.28 (0.65, 2.49)	1.64 (0.84, 3.26)
80-102	**3.19 (1.57, 6.47)**	**2.87 (1.36, 6.07)**	**3.19 (1.57, 6.46)**	2.29 (0.98, 5.36)
Sex				
Female	1 (Reference)	1 (Reference)	1 (Reference)	---
Male	**0.56 (0.31, 0.99)**	0.60 (0.32, 1.12)	0.73 (0.40, 1.33)	
Education				
None	1 (Reference)	---	1 (Reference)	1 (Reference)
Less than middle school	0.55 (0.28, 1.11)		0.69 (0.37, 1.27)	0.86 (0.44, 1.68)
Middle school or more	0.54 (0.28, 1.05)		**0.36 (0.15, 0.84)**	0,67 (0.22, 2.00)
Residential status				
Rural	1 (Reference)	---	1 (Reference)	1 (Reference)
Urban	1.61 (0.92, 2.81)		**0.31 (0.15, 0.64)**	0.37 (0.15, 0.93)
Living status				
Lives with relatives	---	---	1 (Reference)	---
Lives alone			1.96 (0.96, 4.01)	
Health conditions				
Vision problem (near)	1.28 (0.67, 2.46)	---	**2.57 (1.34, 4.91)**	1.75 (0.86, 3.60)
Vision problem (far)	0.98 (0.33, 2.90)	---	2.31 (0.63, 8.43)	---
Osteoporosis	**3.01 (1.04, 8.68)**	2.34 (0.77, 7.14)	2.08 (0.87, 5.00)	---
Memory problem	**2.06 (1.10, 3.88)**	1.91 (0.98, 3.72)	1.85 (0.97, 3.55)	---
Joint disorder/arthritis	**2.45 (1.02, 5.91)**	2.44 (0.95, 6.18)	**5.34 (2.02, 14.09)**	**4.82 (1.28, 16.61)**
Urinary problem	1.29 (0.56, 2.98)	---	**2.49 (1.16, 5.36)**	0.89 (0.32, 2.28)
Defecation problem	2.48 (0.92, 6.73)	---	**2.55 (1.05, 6.19)**	1.56 (0.49, 4.93)
Diabetes	1.31 (0.62, 2,80)	---	2.07 (0.69, 6.19)	---
Parkinson's disease	1,62 (0.51, 5.11)	---	1.50 (0.37, 6.17)	---
Cardiovascular disease (Stroke, heart disease, light stroke)	1.19 (0.59, 2.42)	---	1.06 (0.45, 2.52)	---

COR= Crude Odds Ratio; AOR= Adjusted Odds Ratio; CI=Confidence Interval; Bold=significant

Discussion

The study aimed to investigate the prevalence and social and health correlates of falls and fall risk in a sample of community-dwelling and institutionalized older Indonesians. A high proportion of participants had suffered a fall in the past 12 months (29.0% overall, 32.7% in-home care, and 25.4% in the community) and 45.4% overall (50.5% in-home care and 40.4% in the community) were at risk for a fall. The finding of 32.6% fall prevalence in the home care setting was similar to a study among institutionalized elders in Malaysia (32.8%).[7] The fall risk prevalence in the home care setting was 50.5%, which is much higher than in the study among institutionalized elders in Malaysia (13.3%).[7] Some of these differences may be related to the different fall risk screens used: the Malaysia study used the 4-item Fall Risk Assessment Tool (FRAT),[7] while this study used the 12-item STEADI.[22] The past 12-month fall prevalence in the community setting (25.4%) was higher than in older adults in previous community surveys in Indonesia (50 years and older, past 2 years, 12.8%),[6] Singapore (60 years and older, past 12 months, 17.2%),[3] Thailand (60 years and older, past 6 months, 18.7%),[27] Malaysia (60 years and older, past 12

months, 4.1%),[4] but was lower than in Italy (65 years and older, past 12 months, 28.6%)[16] and in rural India (60 years and older, past 12 months, 31%).[5] Possible reasons for some of the differences in the fall prevalence could be different methodologies used and different age groups.[7] We found a higher fall prevalence in home care (32.7%) than in the community setting (25.4%). Higher fall prevalence in institutionalized care than in the community setting was also found among older adults in Korea[8] and Malaysia.[4,7]

Consistent with previous studies,[3,10-12] we found an association between older age and fall and fall risk. In addition, in agreement with previous studies,[3,13,17] this study found that women were more likely than men to suffer a fall in the past 12 months. This gender disparity may be due to different levels of physical activity, muscle strength, bone density, and fatal fall rates between the genders.[28] Some studies found an association between residing in rural areas and falling,[13] this study found an association between urban residence and falling and rural residence and fall risk. Lower socioeconomic status was previously found to be associated with falls,[17] while this study did not find an association between educational level and fall occurrence but we did find an association between no education and fall risk. It is possible that women with a lower educational status reside primarily in certain environments which put them at greater fall risk.[29]

Urinary incontinence is a known risk factor for falls,[6,14,15,19] but we did not find an association between urinary problems and falling. Visual difficulties[16,17,30] are an established risk factor for falls and were also found in this study in the community setting. Poor cognitive functioning has been identified as a risk factor for falls,[13,17] while in this study, memory problems were associated with fall risk. Depression may be common among older people and there is evidence it is associated with increased fall risk,[13,19] but this study did not find such an association. Some studies reported an association between arthritis and falling,[8,17] while this study found such an association with fall risk in the community. Suggested reasons for this include "impaired muscle strength, postural instability, fatigue, joint pain, and reduced functioning."[31]

Limitations of the study

This study had several limitations. The self-reported assessment of the study measures may have its limitations. Recall bias of fall occurrence and survivor bias may limit the robustness of the findings. Furthermore, this study was based on cross-sectional data, and we can therefore not ascribe causality to any of the associated factors in the study. Circumstances of falls and consequences in terms of the type of injury were not assessed and should be evaluated in future studies. Moreover, certain variables, such as the number and type of medications taken, could also be another important risk factor and should be included in future studies.

Conclusions

A high proportion of older adults in the community and institutional care in Indonesia experienced a fall in the past 12 months or are at risk for a fall. Several sociodemographic (older age, female sex, private institutional care, no education, and urban residence for fall and rural residence for fall risk) and health (impaired vision, memory problem, and arthritis) factors for fall and fall risk were identified. This data could assist the home care and community setting caretakers in designing fall-prevention strategies.

Conflict of Interest: The authors declare no conflict of interest.

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How does this paper make a difference to general practice?

- The proportion of those suffering a fall was very common in the sample of community-dwelling (29.0%) and institutionalized (32.7%) elderly in Indonesia.
- Health care workers in primary care and institutionalized elderly care should enquire about fall risk factors identified in this study (older age, female sex, private institutional care, no education, impaired vision, memory problem, and arthritis).
- The STEADI screen may be used for assessing fall risk in Indonesia.

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