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Prevalence of Fall Risk Levels Among the Elderly Using M-IFRAT in Bualu Village: A Cross-Sectional Study

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Abstract

Introduction: Older adults are a vulnerable population at increased risk for various health issues, including falls. Assessing fall risk in the elderly is essential, as falls can lead to serious physical and psychological consequences and reduced quality of life. However, the prevalence of fall risk among older adults in Indonesia, particularly in Bali Province, remains underreported. This study aims to determine the prevalence of fall risk and identify associated characteristics and risk factors, offering insights into fall risk in rural communities using a multifactorial approach.
Methods: A descriptive, cross-sectional study was conducted using purposive sampling. Sixty-seven elderly individuals were selected based on inclusion and exclusion criteria. Fall risk was assessed using the Modified Indonesian Fall Risk Assessment Tool (M-IFRAT), chosen for its comprehensive evaluation of multiple risk factors compared to other tools.
Results: Among the 67 participants, 34.3% were identified as having a high risk of falling, primarily in the 60–79 age group. High fall risk was more prevalent among males, those with elementary education, individuals working as farmers or gardeners, and those with visual impairments. Additional contributing factors included poor balance, high fear of falling (FOF), slow walking speed, and abnormal step width.
Conclusion: This study highlights the prevalence and risk factors associated with falls among older adults in the Banjar Pande community, Bualu Village. The findings emphasize the need for targeted fall prevention strategies, including community-based interventions and health education programs, to reduce fall risk and improve the well-being of the elderly population.

Keywords: elderly, fall risk, prevalence of fall risk, Modified Indonesian Fall Risk Assessment Tool (M-IFRAT)

Introduction

Elderly individuals are defined as those aged 60 years and older, representing a vulnerable age group prone to various health issues often referred to as geriatric syndromes. These syndromes consist of nonspecific clinical conditions arising from multifactorial aging disorders, affecting multiple bodily systems simultaneously.[1,2] One such geriatric syndrome falls, which can be defined as a condition that results in an individual suddenly lying down or sitting at a lower level, potentially leading to injury. Falls are the second leading cause of accidental injury-related deaths globally, and the elderly are the age group most affected by fatal falls due to aging combined with an unwelcoming environmental context.[3] Measuring fall risk levels in older people is crucial, as it directly impacts the prevention of future falls, which can have serious consequences for their physical and mental health and overall quality of life.[4]

A similar study conducted by Rana and Syeda in 2024 reported a high prevalence of fall risk among older people in Layyah, Pakistan, using the Berg Balance Scale (BBS), with a prevalence rate of 32.5%.[5] Another study by Gultom et al. in 2024, focusing on fall risk in older people at the Tresna Werdha Sinta Rangkang Social Service Center in Central Kalimantan, utilized the Timed Up and Go Test (TUGT) and found a similar prevalence rate of 33.3%.[6]

In Indonesia, particularly in Bali Province, comprehensive and detailed data on fall risk prevalence among older people is still scarce. Badung Regency has a continuously increasing life expectancy, which is currently the highest in Bali Province.[7] South Kuta is a sub-district within Badung Regency with the fewest healthcare workers, potentially affecting the accessibility of regular fall risk assessments.[8] The Banjar Pande community in Bualu Village, Benoa, South Kuta, has the highest elderly population, totaling 180 individuals. This study aims to determine the prevalence of fall risk levels, describe the characteristics of the elderly (age, gender, body mass index, education level, occupation, independence, tobacco and alcohol consumption, medication use, and medical conditions), and outline fall risk factors (history of falls, balance, fear of falling, walking speed, and stride width) among the elderly in the Banjar Pande community using the Modified Indonesian Fall Risk Assessment Tool (M-IFRAT). This tool is a simple and easy-to-use multifactorial fall risk assessment instrument, offering a more comprehensive evaluation than other measurement instruments.[9] This study is descriptive-exploratory, aiming to describe the prevalence of fall risk, characteristics, and risk factors among older people without testing any initial hypotheses.

Methods

This study was conducted from February to April 2024 using a descriptive research design with a cross-sectional approach and purposive sampling method. The cross-sectional design was chosen as it provides a clear picture of the prevalence of fall risk and the characteristics and risk factors for falls among older people. Data collected encompassed a one-time measurement, without any repeated observations, by the characteristics of cross-sectional research design. The purposive sampling method was selected to ensure the inclusion of relevant and representative participants for the study's objectives, specifically elderly individuals at risk of falling. This may lead to selection bias, as the sample may not fully represent the entire elderly population. To mitigate bias, this study ensured that the selected participants met the inclusion criteria through a double verification process.

The research location was chosen based on several considerations, including the Banjar Pande community of Bualu Village, Benoa Sub-district, South Kuta. First, this location has the highest number of elderly individuals, totaling 180, making it representative for assessing fall risk prevalence among older people. Second, South Kuta, a sub-district with the fewest healthcare workers in Badung Regency, presents potential challenges in conducting timely fall risk measurements and identifying risk factors. The initial process of recruiting participants began with identifying elderly individuals registered in the community, with assistance from the head of the Banjar Pande community. From the total of 180 elderly individuals in the Banjar Pande community, the researchers determined the sample size using the descriptive cross-sectional formula according to Slovin: n=N1+N(e)2n = \frac{N}{1 + N(e)^2}n=1+N(e)2N, resulting in a sample size of 64.2. To ensure that the sample taken was sufficiently representative and to anticipate potential dropouts, the researchers added 5% to this number, resulting in a minimum required sample size of 67 individuals.

Sixty-seven elderly individuals from the Banjar Pande community were willing to participate in the study. They had generally good health, as indicated by a Mini-Mental State Examination (MMSE) score of ≥ 24, which was included in the inclusion criteria. Additionally, elderly individuals with severe hearing impairments, those using walking aids, and those with foot injuries were excluded. The primary measurement tool for this study was the Modified Indonesian Fall Risk Assessment Tool (M-IFRAT), which was used to assess the fall risk levels among older people. The researchers also employed several other measurement instruments, including the Timed Up and Go Test (TUGT) to assess balance, the Modified Falls Efficacy Scale Indonesian Version (M-FES I) to evaluate fear of falling, the 4 Meter Walk Test (4MWT) to measure walking speed, the Foot Print Test to assess stride width, the Barthel Index for measuring independence, the MMSE, and an assessment form to gather participant data. Each data collection session lasted 20-30 minutes per participant to ensure that the data collection process could be carried out efficiently without overburdening the participants.

M-IFRAT, developed by Nugraha in 2023, is a tool designed to assess fall risk levels and demonstrates good validity with an AUC of 0.76, a sensitivity of 71.15%, and a specificity of 73.26%, as well as good reliability with a Cronbach's alpha of 0.68 and a Kappa agreement of 77%. For this study, M-IFRAT scores were categorized into two groups: low fall risk (score < 11) and high fall risk (score ≥ 11). This cutoff selection is based on the guidelines Nugraha (2023) used, indicating that scores below 11 suggest a low fall risk, while scores of 11 or higher indicate a higher fall risk.[9] Local context relevance was considered, as social, cultural, and environmental factors, physical conditions, access to healthcare services, and local lifestyle habits could all influence fall risk among older people. The TUGT used to measure balance has shown test-retest reliability with an ICC coefficient of 0.982 (excellent) and inter-rater reliability reaching an ICC of 0.995 (excellent), according to research by Rosella Komala Sari et al. (2023).[10–12] The M-FES-I is a tool for measuring fear of falling that has been tested by Anggarani and Djoar (2020), demonstrating good validity (Cronbach alpha = 0.948) and reliability (I-CVI 0.857-1 and S-CVI 0.95).[13] The 4 Meter Walking Test (4MWT), used to assess walking speed, reported an ICC of 0.91 in a total sample, according to research conducted by Olsen and Bergland (2017).[14]The Foot footprint test is used to measure stride width, referring to research by Paramita et al. (2021), which indicates that the footprint test has intra-tester reliability (r = 0.921) and inter-tester reliability (r = 0.935 to 0.999).[15] The Barthel Index, according to research by Agung et al. (2006), demonstrates good validity with a significant correlation to the Katz ADL ($p < 0.01$, $r > 0.3$) and high reliability with a Cronbach's Alpha of 0.938 and ICC > 0.75.[16]

The study began by providing participants with information regarding the research, including its objectives, benefits, procedures, and the importance of conducting it, while obtaining informed consent for participation. The researchers then conducted interviews and measurements using the research instruments. Interviews were conducted by reading the questions on the research forms (MMSE questionnaire, M-IFRAT, M-FES I, Barthel Index, and assessment form). At the same time, measurements (TUGT, 4MWT, and Foot Print Test) were carried out in the participants' homes in areas free of obstacles (non-slippery, well-lit). The measurements were recorded in the measurement results column on the assessment form. Interviews took approximately 10-20 minutes, while the TUGT, 4MWT, and Foot Print Test measurements took around 10-15 minutes. This study had no missing data, as data collection was conducted under strict supervision to ensure completeness. To reduce bias, measurements were performed by multiple individuals who underwent briefing to ensure measurement consistency. Additionally, each participant's anonymity was guaranteed, with data stored using codes accessible only to the principal researcher.

Data analysis was performed using SPSS software, employing univariate analysis to describe the characteristics of the elderly (age, gender, education, occupation, independence, health behaviors and medication use, and medical conditions) and the distribution of fall risk factors (history of falls, balance, fear of falling, walking speed, and stride width). This approach was chosen because the study's primary aim was to provide a descriptive overview of fall risk prevalence and the associated risk factors among older people in the study location. Univariate tests were sufficient to describe the distribution of these characteristics and risk factors without necessitating complex causal relationship testing among variables. This aligns with the descriptive research design, focusing on understanding data distribution and the prevalence of phenomena at a specific point in time without requiring more complex multivariate analyses. Cross-tabulation analysis was also used to describe the distribution of elderly characteristics and fall risk

factors about fall risk. However, since univariate analysis was employed, this study did not formally test statistical relationships but instead described the frequency and proportions of the distribution of characteristics and risk factors. This study has been reviewed and approved by the Faculty of Medicine Ethics Committee, Udayana University, under number 0267/UN14.2.2.VII.14/LT/2024, dated January 19, 2024. The head of the Banjar Pande community in Bualu Village has also approved the study.

Results

This study employed a descriptive research design with a cross-sectional approach and purposive sampling method in the Banjar Pande community of Bualu Village. Out of a total population of 180 elderly individuals, 112 were considered accessible for the study. An exclusion process was subsequently conducted on 45 individuals who did not meet the research criteria: 25 elderly individuals had an MMSE score < 24, 5 individuals experienced severe hearing impairment, eight individuals used walking aids, two individuals had foot wounds, and five individuals were in poor general health. There were no dropouts. After the exclusion process, 67 individuals met the research criteria. Data were collected through interviews and measurements, and all 67 data points were analyzed with no missing data.

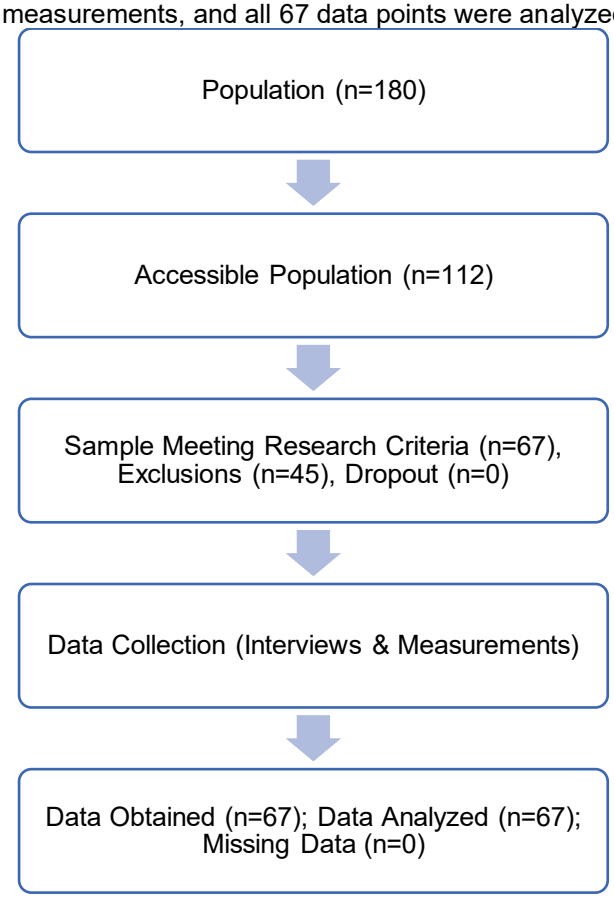

Figure 1. Flowchart

This study utilized univariate analysis to describe the prevalence, characteristics, and risk factors, as well as the distribution of these characteristics and risk factors concerning fall risk levels. The primary objective of this research was to provide a comprehensive overview of the characteristics and risk factors for falls without seeking significant relationships among variables.

The tables below summarize the key findings of this study related to fall risk among the elderly. Table 1 presents the distribution of fall risk levels identified in the study population. Table 2 outlines the sociodemographic characteristics of the 67 respondents. Table 3 details the respondents' functional and cognitive status**.** Table 4 describes health behaviors and medication use, and Table 5 provides an overview of the participants' medical conditions.

Table 1. Description of Fall Risk Levels in the Elderly

Fall Risk	Frequency	Percentage (%)	Mean ± SD
Low (< 11)	44	65.7	8.02 ± 1.50
High (≥ 11)	23	34.3	13.61 ± 1.99
Total	67	100	9.94 ± 3.15

Fall risk was assessed using the M-IFRAT instrument (Nugraha, 2021) and categorized into two groups: low fall risk (score <11) and high fall risk (score ≥ 11). According to Table 1, the average M-IFRAT score was 8.02 (SD=1.50). Twenty-three elderly individuals (34.3%) from the 67 assessed had high fall risk with an average M-IFRAT score of 13.61 (SD=1.99). The minimum score among participants was 4, while the maximum was 19.

Table 2. Sociodemographic Characteristics of Respondents (n = 67)

Variable	Category	Frequency (n)	Percentage (%)	Mean ± SD
Age (years)	60–69	38	56.7	64.16 ± 3.03
	70–79	22	32.8	72.45 ± 2.52
	≥80	7	10.4	82.71 ± 1.25
	Total	67	100.0	68.82 ± 6.69
Gender	Female	35	52.2	
	Male	32	47.8	
BMI Category	Underweight	11	16.4	16.31 ± 1.17
	Normal	22	32.8	20.81 ± 1.09
	Overweight	10	14.9	24.05 ± 0.55
	Obesity I	20	29.9	26.62 ± 1.24
	Obesity II	4	6.0	33.63 ± 5.19
	Total	67	100.0	23.06 ± 4.73
Education	Not Completed SD	15	22.4	
	SD	34	50.7	
	SLTP	5	7.5	
	SLTA	2	3.0	
	Bachelor's	1	1.5	
	Not Educated	10	14.9	
Employment	Farmer/Gardener	21	31.3	
	Self-Employed	15	22.4	
	Housewife	18	26.9	
	Laborer	4	6.0	
	Fisherman	1	1.5	
	Unemployed	8	11.9	

Table 3. Functional and Cognitive Status

Variable	Category	Frequency (n)	Percentage (%)	Mean ± SD
ADL (Barthel Index)	Independent (100)	53	79.1	100.00 ± 0.00
	Mild Dependence (91–99)	9	13.4	95.00 ± 0.00
	Moderate Dependence	5	7.5	90.00 ± 0.00
	Severe Dependence	0	0.0	–
	Total Dependence	0	0.0	–
	Total ADL	67	100.0	98.58 ± 2.99
Cognitive Function	Good (24–30)	67	100.0	27.57 ± 4.54

Table 4. Health Behavior and Medication Use

Variable	Category	Frequency (n)	Percentage (%)
Smoking	Yes	3	4.5
	No	64	95.5
Alcohol Consumption	Yes	1	1.5
	No	66	98.5
Sleeping Pills	Yes	3	4.5
	No	64	95.5
Anti-Diabetic Drugs	Yes	6	9.0
	No	61	91.0
Anti-Hypertensive Drugs	Yes	21	31.3
	No	46	68.7

Table 5. Medical Conditions

Condition	Yes (n)	%	No (n)	%
Osteoarthritis	30	44.8	37	55.2
Rheumatoid Arthritis	12	17.9	55	82.1
Gout	17	25.4	50	74.6
Osteoporosis	6	9.0	61	91.0
Asthma	7	10.4	60	89.6
Cancer	1	1.5	66	98.5
Heart Disease	10	14.9	57	85.1
Diabetes Mellitus	8	11.9	59	88.1
Vision Impairment	45	67.2	22	32.8
Hearing Impairment	16	23.9	51	76.1
Urinary Incontinence	13	19.4	54	80.6
Fecal Incontinence	7	10.4	60	89.6
Hypertension	28	41.8	39	58.2

The age were categorized into three age groups: young elderly (60-69 years), middle-aged elderly (70-79 years), and older elderly (80 years and above), based on the classification by the Central Statistics Agency (BPS).[17] The body mass index (BMI) in this study was categorized into five groups: underweight (score <18.5), normal BMI (score 18.5-22.9), overweight (score 23-24.9), obesity type 1 (25-29.9), and obesity type 2 (≥ 30) based on the classification of Asia Pasific.[18] The independence variable was categorized into five groups: independent elderly (score 100), mild dependence (score 91-99), moderate dependence (61-90), severe dependence (21-60), and total dependence (0-20), based on the Barthel Index instrument.[19]

The average age of respondents was 68.82 (SD=6.69), with the lowest age being 60 years and the highest being 84. Most participants fell into the 60-69 age range (38 individuals, 56.7%). The sample was predominantly female (35 individuals, 52.2%). The BMI of older people showed that most individuals (22 individuals, 32.8%) had a normal BMI (18.5-22.9). The educational status of most participants was elementary school (SD) (34 individuals, 50.7%). Most participants (53 individuals, 79.1%) were independent, as indicated by the Barthel Index score 100.

In terms of health behaviors, most elderly participants did not smoke (64 individuals, 95.5%) and consumed alcohol (66 individuals, 98.5%). Most respondents did not take sleeping pills (64 individuals, 95.5%), and only a few consumed anti-diabetic (6 individuals, 9%) and anti-hypertensive medications (21 individuals, 31.3%). The majority of respondents suffered from various medical conditions based on interviews with respondents, one of which is vision impairment in 45 individuals (67.2%). Table 6 presents a summary of fall risk factors identified in the study population.

Table 6. Description of Fall Risk Factors

Risk Factor	Frequency (n)	Percentage (%)	Mean ± SD
History of Falls			
Never	45	67.2	
Single Fall	13	19.4	
Multiple Falls	9	13.4	
Balance			
High Risk (≥ 13.5)	24	35.8	17.56 ± 3.44
Low Risk (< 13.5)	43	64.2	10.70 ± 1.77
Total	67	100	13.16±4.13
Fear of Falling			
Low (16-19)	29	43.3	17.03 ± 1.09
Moderate (20-27)	14	20.9	23.14 ± 2.14
High (28-64)	24	35.8	40.67 ± 10.57
Total	67	100	26.78 ± 12.45
Walking Speed			
Slow (< 0.8 m/s)	45	67.2	0.60 ± 0.12
Normal (≥ 0.8 m/s)	22	32.8	0.92 ± 1.32
Total	67	100	0.70 ± 0.19
Step Width			
Abnormal (<8 cm or >10 cm)	51	76.1	9.34 ± 6.62
Normal (8-10 cm)	16	23.9	9.18 ± 0.60
Total	67	100	9.30 ± 5.77

In Table 6, some continuous variables, such as balance, were categorized into two groups: low risk (<13.5) and high risk (≥13.5). The value of 13.5 was chosen as the threshold based on research by Barry et al (2014), which identified that a time of ≥13.5 seconds indicates a high fall risk.[20] Fear of falling was categorized into three groups: low fear of falling (score 16-19), moderate fear of falling (20-27), and high fear of falling (28-64), based on the M-FES I instrument by Anggarani and Djoar (2020).[21] Walking speed was categorized into two groups: slow (<0.8 m/s) and normal (≥0.8 m/s), based on the 4-Meter Walking Test (4MWT) from the research by Nguyen et al (2022).[22] Step width was categorized into regular step width (8-10 cm) and abnormal (<8 cm or >10 cm) based on measurements from the footprint test, referencing research by Paramita D et al (2021).[23]

Based on Table 3, most elderly respondents in the Banjar Pande community of Bualu Village had not experienced a fall in the past year, with 45 elderly individuals (67.2%) reporting never falling. A total of 13 individuals (19.4%) experienced a single fall, while nine individuals (13.4%) experienced multiple falls. Regarding balance, the average score on the Timed Up and Go Test (TUGT) was 13.16 seconds (SD=4.13), with minimum and maximum times of 6.3 seconds and 24.88 seconds, respectively. Most respondents had low risk balance, with 43 individuals (64.2%) classified as having low risk balance, while 24 individuals (35.8%) had high risk balance.

Regarding fear of falling, the average score on the M-FES I was 26.78 (SD=12.45), with a minimum score of 16 and a maximum score of 61. Among the respondents, 29 individuals (43.3%) reported low fear of falling, 14 individuals (20.9%) reported moderate fear or falling, and 24 individuals (35.8%) reported high fear of falling. The walking speed of older people, as measured by the 4MWT, averaged 0.70 m/s (SD=0.19), with a minimum speed of 0.33 m/s and a maximum of 1.34 m/s. Most respondents walked slowly (67.2%), while 22 individuals (32.8%) walked with normal speed. The average step width measured using the footprint test was 9.30 cm (SD=5.77), with the smallest step width recorded at 2 cm and the largest at 36 cm. Most respondents exhibited abnormal step width, with 51 individuals (76.1%) falling into this category, compared to 16 individuals (23.9%) with regular step width.

The following tables present a comparison of respondent characteristics and health-related factors based on fall risk levels. Table 7 shows the distribution of respondent characteristics according to their fall risk level. Table 8

describes health behaviors and medication use across different fall risk groups. Table 9 outlines the distribution of medical conditions based on the respondents' fall risk level.

Table 7. Characteristics of Respondents Based on Fall Risk Level

Characteristic	Category	Low Risk (n = 44)	%	High Risk (n = 23)	%
Age (years)	60–69	28	63.6	10	43.5
	70–79	12	27.3	10	43.5
	≥80	4	9.1	3	13.0
Gender	Female	24	54.5	11	47.8
	Male	20	45.5	12	52.2
BMI Category	Underweight	3	6.8	8	34.8
	Normal	16	36.4	6	26.1
	Overweight	5	11.4	5	21.7
	Obesity I	18	40.9	2	8.7
	Obesity II	2	4.5	2	8.7
Education	No Primary Education	7	15.9	8	34.8
	Primary School	23	52.3	11	47.8
	Junior High School	3	6.8	2	8.7
	High School	2	4.5	0	0.0
	Bachelor's Degree	1	2.3	0	0.0
	Not Educated	8	18.2	2	8.7
Occupation	Farmer/Gardener	9	20.5	12	52.2
	Self-Employed	11	25.0	4	17.4
	Housewife	16	36.4	2	8.7
	Laborer	2	4.5	2	8.7
	Fisherman	0	0.0	1	4.3
	Unemployed	6	13.6	2	8.7
ADL	Independent	35	79.5	18	78.3
	Mild Dependency	5	11.4	4	17.4
	Moderate Dependency	4	9.1	1	4.3
	Severe/Total Dependency	0	0.0	0	0.0

Table 8. Health Behavior and Medication Use Based on Fall Risk Level

Characteristic	Category	Low Risk (n = 44)	%	High Risk (n = 23)	%
Smoking	Yes	3	6.8	0	0.0
	No	41	93.2	23	100.0
Alcohol Consumption	Yes	1	2.3	0	0.0
	No	43	97.7	23	100.0
Sleeping Pills	Yes	1	2.3	2	8.7
	No	43	97.7	21	91.3
Anti-Diabetic Medications	Yes	3	6.8	3	13.0
	No	41	93.2	20	87.0
Anti-Hypertensive Medications	Yes	12	27.3	9	39.1
	No	32	72.7	14	60.9

Table 9. Medical Conditions Based on Fall Risk Level

Medical Condition	Yes (Low)	%	Yes (High)	%
Osteoarthritis	17	38.6	13	56.5
Rheumatoid Arthritis	5	11.4	7	30.4
Gout	10	22.7	7	30.4
Osteoporosis	3	6.8	3	13.0
Asthma	4	9.1	3	13.0
Cancer	1	2.3	0	0.0
Heart Disease	3	6.8	7	30.4
Diabetes Mellitus	3	6.8	4	17.4
Vision Impairment	26	59.1	19	82.6
Hearing Impairment	6	13.6	10	43.5
Urinary Incontinence	0	0.0	13	56.5
Fecal Incontinence	1	2.3	6	26.1
Hypertension	15	34.1	13	56.5

The elderly aged 60-69 years have the highest proportion of low fall risk at 63.6%, while those aged 70-79 years and above 80 years predominantly exhibit high fall risk at 43.5% and 13%, respectively. Female elders have a higher proportion of low fall risk at 54.5%, whereas male elders predominantly exhibit high fall risk at 52.2%. Elders in the underweight (34.8%), overweight (21.7%), and obesity type 2 (8.7%) category predominantly have a high fall risk, while those with normal and obesity type 1 categories exhibit low fall risk at 36.4% and 40.9%, respectively. Regarding

education, elders who did not complete primary school and those who attended junior high school exhibit high fall risk at 34.8% and 8.7%, respectively. Elders working as farmers/gardeners, laborers, and fishermen dominate the high fall risk category at 52.2%, 8.7%, and 4.3%, respectively. The majority of independent elders (79.5%) experience low fall risk. Notably, all individuals who smoke and consume alcohol have a low fall risk, while the majority of elderly individuals who consume medications pills and with medical conditions exhibit high fall risk.

To further examine the relationship between various risk factors and fall risk levels in the elderly, Table 10 presents the distribution of identified risk factors in relation to fall risk categories. This table highlights which factors are more prevalent among those at higher risk of falling.

Table 10. Distribution of Risk Factors Related to Fall Risk Levels in the Elderly

Risk Factor	Fall Risk Level			
	Low		High	
	n	%	n	%
Fall History				
Never	36	81.8	9	39.1
Single Fall	5	11.4	8	34.8
Multiple Falls	3	6.8	6	26.1
Balance				
High Risk	11	25	13	56.5
Low Risk	33	75	10	43.5
Fear of Falling (FOF)				
Low	23	52.3	6	26.1
Moderate	11	25	3	13
High	10	22.7	14	60.9
Walking Speed				
Slow	28	63.6	17	73.9
Normal	16	36.4	6	26.1
Step Width				
Abnormal	34	77.3	17	73.9
Normal	10	22.7	6	26.1

Based on Table 10, elderly individuals who have not fallen in the past year have the highest proportion of low fall risk (81.8%). In contrast, those who have experienced a single fall and multiple falls in the past year show high fall risk, with eight individuals (34.8%) and six individuals (26.1%), respectively. Those with high-risk balance have the highest proportion of high fall risk (56.5%), whereas those with low risk balance predominantly exhibit low fall risk (75%). Among those with low and moderate fear of falling, most have low fall risk (52.3%) and (25%), while those with high fear of falling exhibit high fall risk at 60.9% respectively. Elderly individuals with slow walking speed have the highest proportion of high fall risk (73.9%), while those with normal walking speed predominantly exhibit low fall risk (36.4%). Furthermore, individuals with abnormal step width have the highest proportion of low fall risk (77.3%), while those with regular step width predominantly exhibit high fall risk (26.1%).

Discussion

This descriptive-exploratory study aims to describe the prevalence of fall risk, characteristics, and risk factors among older people without testing an initial hypothesis. The results indicate that the prevalence of fall risk among older people in the low-risk category is 44 individuals (65.7%), while the high-risk category comprises 23 individuals (34.3%). These findings align with the research conducted by Rana and Syeda (2024), which investigated the prevalence of fall risk among 120 elderly individuals using the Berg Balance Scale (BBS).[5] In that study, 32.5% of older people were at high risk of falling, while 35% and 32.5% were categorized as medium and low risk, respectively (Rana & Syeda, 2024). Additionally, research by Gultom et al. (2024) involving 30 elderly individuals using the Timed Up and Go Test (TUGT) also revealed similar results, with 33.3% of older people at high risk of falling, and 30% and 36.7% categorized as medium and low risk.[6]

These findings highlight that the high prevalence of fall risk among older people necessitates effective prevention strategies, including developing community-based prevention programs or health education initiatives. This study also contributes to the literature by focusing on the elderly population in rural areas, which has rarely been the subject of previous research. By addressing this gap, the study's findings can enhance understanding of fall risk prevalence among older people, particularly in rural areas that present different socioeconomic and environmental risk factors compared to urban regions. These results have broader implications, especially for countries with a rapidly increasing elderly population facing similar socioeconomic challenges.

The study predominantly included elderly individuals aged 60-69 years, totaling 38 participants (56.7%), most of whom were classified as low risk for falls (63.6%). Conversely, the categories of elderly aged 70–79 years and 80 years and older had higher proportions of individuals at high risk of falling (43.5% and 13%, respectively). Research by Susilo et al. in 2017 indicated that elderly individuals aged 70–79 years have a nine-fold increased risk of falling compared to those aged 60–69 years due to aging factors, such as decreasing in muscle strength and bone mass, also by the limitation range of joint motion.[24]

Regarding gender, the study was dominated by females, with 35 individuals (52.2%), while males comprised 32 individuals (47.8%). This proportion is relatively balanced, with a slightly higher number of elderly females, which may influence the higher life expectancy of women.[25] Female elderly individuals predominantly fell into the low-risk

category (54.5%), whereas male elderly individuals were more likely to be classified as high-risk (52.2%). This aligns with research by Kakara et al. in 2023, which found that elderly males are more likely to experience fatal falls due to a tendency to neglect fall prevention, while females tend to be more cautious.[26]

Elderly individuals in the low BMI category had the highest prevalence of high fall risk (13.6%). In contrast, those in the standard and high BMI categories predominantly exhibited low fall risk (34.1% and 52.3%, respectively). According to Kim et al. (2024), low BMI is significantly associated with fall risk and mortality related to sarcopenia, which can lead to declines in muscle mass and physical function.[27]

Regarding education, most respondents had completed elementary school, totaling 34 elderly individuals (50.7%). This aligns with a study by the Central Statistics Agency (BPS) based on the 2023 Profile of the Elderly Population, which indicated that elderly individuals typically have an education level of elementary school or equivalent (32.42%).[28] Elderly individuals with incomplete elementary or junior high school education predominantly had high fall risk (34.8% and 8.7%, respectively), while those with education levels of elementary school, high school, bachelor's degree, and no formal education primarily exhibited low fall risk, with 23 individuals (52.3%), two individuals (4.5%), one individual (2.3%), and eight individuals (18.2%), respectively. Lee et al. (2021) noted that a low education level is a fall risk factor due to a lack of understanding regarding fall prevention. Conversely, elderly individuals without formal education tend to have lower fall risk thanks to family supervision and a safe environment.[29]

Regarding employment, 21 elderly individuals (31.3%) worked as farmers/gardeners, reflecting the dominance of professions related to the socioeconomic context in rural areas. Those working as farmers/gardeners, laborers, and fishermen had the highest prevalence of high fall risk, with 12 individuals (52.2%), two individuals (8.7%), and one individual (4.3%), respectively. This may occur because these jobs involve heavy physical activity and unsafe working environments.[30]

The majority of respondents (82.1%) classified as independent had low fall risk (97.7%). According to de Paula et al. (2024), independent elderly individuals possess better physical capabilities, enabling them to avoid falls by enhancing strength, flexibility, and body balance.[31]

Most respondents were non-smokers (95.5%) and had a high fall risk of 23 individuals (100%). Several studies have indicated that higher smoking rates are associated with recurrent fall risk.[32] This suggests that various other factors influence fall risk. The majority of respondents also did not consume alcohol (98.5%) and had a high fall risk of 23 individuals (100%). Research by Guo et al. (2023) found no significant relationship between alcohol consumption and fall risk. This issue has frequently been debated without reaching a consistent conclusion. Light to moderate alcohol consumption has often been associated with reduced frailty levels among the elderly.[33]

A total of 31.3% of elderly individuals consumed antihypertensive medication, with 39.1% of them having a high fall risk. The use of multiple classes of antihypertensive drugs and changes in medication increase the risk of falls in the elderly.[34] Additionally, 67.2% of elderly individuals had visual impairments, with 82.6% of them experiencing a high fall risk. Gupta et al. (2023) stated that bilateral visual impairment doubles the risk of falls compared to unilateral impairment.[35]

Elderly individuals who had not fallen in the past year were predominantly at low fall risk (81.8%), whereas those with a history of single and multiple falls had a high fall risk of 34.8% and 26.1%, respectively. According to Lee et al. (2021), fall history is a significant risk factor for future falls. A previous fall experience can trigger a fear of falling, which in the short term may help reduce risk but, in the long term, can limit activity and decrease physical function.[36]

Elderly individuals with high risk balance predominantly had a high fall risk (56.5%). According to Jia et al. (2019), found that impaired balance is one of the most significant predictive factors for future falls (approximately 2 years ahead), which can affect a person's ability to perform basic activities such as walking or moving around, thereby increasing the risk of falls. In addition, poor balance has a significant negative impact on quality of life. Balance problems are often associated with chronic conditions such as stroke, diabetes, and depression, which can increase the risk of falls.[37]

Elderly individuals with high fear of falling (FOF) were predominantly in the high fall risk category (60.9%). Those with high FOF tend to experience excessive fear of falling, which may result from previous falls or physical limitations that reduce their confidence.[38] Research by Young & Williams (2015) states that high FOF causes the elderly to have stiffening movement strategies, such as reducing the range of motion and speed of steps, so that the body is less responsive to environmental conditions. Visually, the elderly with FOF tend to look away too quickly from the step target, which increases the risk of stumbling. From a psychological perspective, FOF is related to anxiety that interferes with attention and motor control, because the elderly focus more on body movements than on movement goals. As a result, FOF not only limits movement, but also worsens the ability to adapt when moving.[39]

Most elderly individuals (73.9%) had slow walking speeds, with most of them in the high fall-risk category (73.9%). According to Adam et al. (2023), slow walking speed is often associated with muscle weakness, pain, balance disorders, or other health conditions that may increase fall risk.[40]

Most respondents (76.1%) had an abnormal step width but were predominantly in the low fall risk category (77.3%). This may be due to compensatory strategies, such as slowing down their steps, having safer environmental support, or avoiding high-risk activities. This suggests that step width is not the sole indicator of fall risk; other factors such as muscle strength, balance, vision, and hearing also play a role.[41]

This study provides insights into the prevalence, characteristics, and factors influencing fall risk among the elderly. However, it has several limitations. First, its generalizability is limited, as the sample was focused on elderly individuals in rural areas, which may not fully represent the general elderly population, particularly those living in urban areas with different cultural and environmental characteristics. Additionally, the use of purposive sampling may introduce selection bias. The limited sample size also restricts the generalization of the findings to a larger population. Second, some measurements were conducted using questionnaires, which may be influenced by subjective assessment,

potentially affecting the accuracy of the data obtained. Third, the analysis only employed univariate testing, which describes frequency distribution and proportions of characteristics and risk factors without examining statistical relationships between variables. Fourth, medical conditions were obtained through interviews without confirmation from a doctor, which may introduce information bias. Furthermore, the study duration was limited to two months, which may not be sufficient to capture long-term fall risk trends.

Conclusion

This study highlights that low education level, physically demanding occupations, visual impairment, high risk balance, slow walking speed, and abnormal step width contribute to fall risk among older adults. Those with a higher level of independence tend to have a lower risk of falling. Although most older adults in this study did not smoke or consume alcohol, other factors still influenced their fall risk. Additionally, a high fear of falling (FOF) affected mobility and confidence. The study's limitations include its focus on rural areas, use of purposive sampling, univariate analysis, medical conditions were collected through interviews without verification from a doctor, and short study duration. Further research with broader coverage and in-depth analysis is needed to develop effective fall prevention strategies.

References

1. Badan Pusat Statistik Indonesia. Statistik Penduduk Lanjut Usia 2024. 2024.
2. Wu D, Yu X, Li F, Qiao W, Chen X. Geriatric syndrome awareness and its determinants in China: a cross-sectional study. BMC Geriatr. 2024;24(1):1–12.
3. World Health Organization. Falls. 2021 [cited 2025 Jan 5]. Available from: https://www.who.int/news-room/fact-sheets/detail/falls
4. Vaishya R, Vaish A. Falls in older adults are serious. Indian J Orthop. 2020;54(1):69.
5. Rana A, Syeda RN. Prevalence of risk of fall in Layyah among geriatrics. J Health Rehabil Res. 2024;4(3):1–8.
6. Gultom M, Balyas B, Widodo SM, et al. The correlation of fall history, gender, nutrition status with TUGT among elderly. Barigas. 2024;2(3):101–5.
7. Badan Pusat Statistik Indonesia. Provinsi Bali dalam Angka 2024. 2024.
8. Badan Pusat Statistik Indonesia. Kabupaten Badung Dalam Angka Tahun 2023. 2023.
9. Nugraha S. M-IFRAT (Modification of Indonesian Fall Risk Assessment Tools): Instrumen Penilai Risiko Jatuh pada Lansia. Yogyakarta: Edupedia Publisher; 2023.
10. Nadhirah SA, Sari DRK. Uji validitas dan reliabilitas keseimbangan dinamis the Timed Up and Go test pada pasien stroke. J Kesehat Primer. 2024;9(2):121–30.
11. Sancar B, Doğan A, Taş S. Timed Up-and-Go test and sit-to-stand test in community-dwelling older person: inter and intraobserver reliability among Turkish nurses. Int J Older People Nurs. 2024;19(5).
12. Komalasari DR, Motik AF. Reliability test of the Timed Up and Go Test in elderly people with knee osteoarthritis. FISIO MU. 2024;5(2):129–40.
13. Martha AP, Djoar RK. Development and validation of the modified Falls Efficacy Scale Indonesian version. J Keperawatan Soedirman. 2020;15(1).
14. Cabanas-Valdés R, García-Rueda L, Salgueiro C, et al. Assessment of the 4-meter walk test test-retest reliability and concurrent validity and its correlation with the five sit-to-stand test in chronic ambulatory stroke survivors. Gait Posture. 2023;101:8–13.
15. Anniza M, Mayangsari R. Hubungan Footprint test terhadap Q angle pada remaja usia 12–15 tahun di SMP Muhammadiyah 2 Gamping Yogyakarta. J Varidika. 2020;32(2):103–15.
16. Hormozi S, Alizadeh-Khoei M, Sharifi F, et al. Iranian version of Barthel Index: validity and reliability in outpatients' elderly. Int J Prev Med. 2019;10(1):130.
17. Badan Pusat Statistik Jambi. Lansia yang berdaya, lansia yang merdeka. 2022 [cited 2025 Jan 25]. Available from: https://jambi.bps.go.id/id/news/2022/08/25/275/lansia-yangberdaya--lansia-yang-merdeka.html
18. World Health Organization. The Asia-Pacific perspective: redefining obesity and its treatment. 2000 [cited 2025 Apr 13]. Available from: https://iris.who.int/handle/10665/206936
19. Agung I, Soejono CH, Atmakusuma TD, Makmun D. Uji keandalan dan kesahihan Indeks Activity of Daily Living Barthel untuk mengukur status fungsional dasar pada usia lanjut di RSCM. 2006 [cited 2025 Jan 25]. Available from: https://lontar.ui.ac.id/detail?id=106623
20. Barry E, Galvin R, Keogh C, Horgan F, Fahey T. Is the Timed Up and Go test a useful predictor of risk of falls in community dwelling older adults: a systematic review and meta-analysis. BMC Geriatr. 2014;14(1):14.
21. Anggarani APM, Djoar RK. Development and validation of the Modified Falls Efficacy Scale Indonesian version. 2022.
22. Nguyen AT, Nguyen HTT, Nguyen HTT, et al. Walking speed assessed by 4-meter walk test in the community-dwelling oldest old population in Vietnam. Int J Environ Res Public Health. 2022;19(16):9788.
23. Paramita DAMDP, Saraswati PAS, Andayani NLN, Widnyana M. Gambaran lebar langkah pada lansia di Desa Buduk. Majalah Ilmiah Fisioterapi Indonesia. 2021;9(1):59.
24. Susilo W, Limyati Y, Gunawan D. The risk of falling in elderly increased with age growth and unaffected by gender. 2017;1.
25. Badan Pusat Statistik Indonesia. Angka harapan hidup (AHH) menurut provinsi dan jenis kelamin. 2024 [cited 2025 Jan 11]. Available from: https://www.bps.go.id/api/statistics-table/2/NTAxIzI=/angka-harapan-hidup-perempuan--2023.html

26. Kakara R, Bergen G, Burns E, Stevens M. Nonfatal and fatal falls among adults aged ≥65 years—United States, 2020–2021. MMWR Morb Mortal Wkly Rep. 2023. Available from: https://www.cdc.gov/mmwr/mmwr_continuingEducation.html
27. Kim E, Seol EM, Lee HJ. The association of body mass index on falls risk and mortality in hospitalized patients of different old-age categories requiring nutritional support. Clin Nutr Res. 2024;13(2):96.
28. Badan Pusat Statistik Indonesia. Statistik Penduduk Lanjut Usia 2023. 2023.
29. Febriyanti AP, Rizkiyah Inayatilah F, Angely A, Dirgantara P. Relationship between education level and understanding of fall risk increasing drugs in elderly. 2023;1(3):189–96.
30. Julimar. Faktor-faktor penyebab risiko jatuh pada pasien di bangsal neurologi RSUP Dr. M. Djamil Padang. 2018;8.
31. de Paula JGF, Gonçalves LHT, Nogueira LMV, Delage PEGA. Correlation between functional independence and risk of falls in older adults at three long-term care facilities. Rev Esc Enferm USP. 2020;54.
32. Kimura S, Suzuki C, Kitamura K, et al. Smoking, alcohol consumption, and risk of recurrent falls in community-dwelling Japanese people aged 40–74 years: The Murakami cohort study. Geriatr Gerontol Int. 2024.
33. Guo X, Tang P, Zhang L, Li R. Tobacco and alcohol consumption and the risk of frailty and falling: a Mendelian randomisation study. J Epidemiol Community Health. 2023;77(6):349–54.
34. Banu Z, Lim KK, Kwan YH, et al. Anti-hypertensive medications and injurious falls in an older population of low socioeconomic status: a nested case-control study. BMC Geriatr. 2018;18(1):1–9.
35. Gupta P, Man REK, Fenwick EK, et al. Associations between visual impairment, incident falls and fall frequency among older Asians: longitudinal findings from the Singapore Epidemiology of Eye Diseases Study. Br J Ophthalmol. 2023;107(11):1590–6.
36. Lee YY, Chen CL, Lee IC, Chen NC. History of falls, dementia, lower education levels, mobility limitations, and aging are risk factors for falls among the community-dwelling elderly: a cohort study. Int J Environ Res Public Health. 2021;18(17):9356.
37. Jia H, Lubetkin EI, DeMichele K, et al. Prevalence, risk factors, and burden of disease for falls and balance or walking problems among older adults in the U.S. Prev Med. 2019;126.
38. [Duplikat] Lihat nomor 36.
39. Young WR, Williams AM. How fear of falling can increase fall-risk in older adults: applying psychological theory to practical observations. Gait Posture. 2015;41(1):7–12.
40. Adam CE, Fitzpatrick AL, Leary CS, et al. Change in gait speed and fall risk among community-dwelling older adults with and without mild cognitive impairment: a retrospective cohort analysis. BMC Geriatr. 2023;23(1).
41. Menant JC, Menz HB, Chaplin C. Gait characteristics and falls. In: Falls in Older People. Cambridge: Cambridge University Press; 2021. p. 51–86.