



Original Article

Prevalence and Associated Factors of Frailty Among Elderly People in Taiwan[☆]Liang-Ju Chen^{1*}, Chin-Ying Chen², Bee-Horng Lue^{2,3}, Ming-Yueh Tseng⁴, Shwu-Chong Wu⁵

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ABSTRACT

Background: Frailty has begun to attract attention in recent years because it is associated with adverse health outcomes. The purpose of this study was to estimate the prevalence of frailty in elderly people in Taiwan and to examine the associated factors.

Methods: Data were extracted from a representative subsample of “The Coming of an Aging Society: An Integrative Study on Social Planning in Taiwan in 2025” that comprised 495 older adults. Multinomial logistic regression analyses were conducted to examine the relationships between frailty status and individual factors, health conditions, environmental factors, and activities.

Results: Among all the participants, 45.9% were classified as “nonfrail”, 45.9% exhibited “prefrailty”, and 8.3% were “frail”. After controlling for the dependent variables, the factors significantly influencing prefrailty were age [odds ratio (OR) = 1.07, $p < 0.001$], diabetes (OR = 2.18, $p < 0.01$), depressive syndrome (OR = 3.66, $p < 0.001$), and the number of activities in which the participants were involved (OR = 1.24, $p < 0.05$). The factors significantly influencing frailty were age (OR = 1.14, $p < 0.001$), non-Fukien ethnicity (OR = 3.01, $p < 0.05$), depressive syndrome (OR = 6.89, $p < 0.001$), diabetes (OR = 2.69, $p < 0.05$), and the number of activities in which the participants were involved (OR = 2.39, $p < 0.001$).

Conclusion: To prevent a decline in the functions of elderly people, the results of this study should be referenced when developing intervention strategies in which preventive actions are implemented to aid elderly people with particular risk factors such as diabetes, depression, and infrequent participation in social activities.

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1. Introduction

Frailty is a geriatric condition with multiple causes and risk factors, making it a crucial index of predisability; therefore, it is commonly used in gerontology. Fried et al¹ indicated that comorbidity is a risk factor of frailty, the outcome of which is disability. The advancement of frailty is a progressive process, developing in the order of nonfrailty, prefrailty, and frailty². Numerous studies

have indicated that frailty is a major predictor of activities related to disability^{3–6}. Frailty may also lead to adverse health outcomes, such as falling^{3,6}, hospitalization^{3,5}, early admission to health care facilities^{6,7}, and death^{3,5,6,8}. Frailty has a considerable influence on the independence and quality of life of elderly people, and available medical health care resources⁹. Therefore, frailty has begun to attract attention in recent years, and particular emphasis has been placed on its prevention.

Frailty can have a powerful influence on subsequent health status; therefore, this study was conducted to estimate the prevalence of frailty among elderly people in Taiwan according to the definition provided by Fried et al³. We also probed the factors influencing frailty to generate suggestions for policymakers regarding prevention of disability and promotion of health care among elderly people.

[☆] Conflicts of interest: All contributing authors declare no conflicts of interest.
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2. Materials and methods

2.1. Data source and research participants

The data were sourced from “The Coming of the Aging Society: An Integrative Study on Social Planning in Taiwan in 2025”, which was conducted in 2007. Household registration data in Taiwan were selected as the sampling frame, and stratified sampling with probability proportional to size was conducted to select the participants. The survey was authorized by the Center for Survey Research, RCHSS, Academia Sinica. No approval was obtained from an institutional review board for social science, but our interviewers signed a confidentiality agreement, and personal data could not be exposed. We also respected all the participants; they could reject the interview at any time.

A total of 781 participants from 25 villages were selected using systematic sampling and their frailty criteria were measured. Of the 781 participants, 503 underwent measurement, of whom eight were excluded because more than three items of frailty were missing. Therefore, the final analysis was conducted on 495 participants (Fig. 1).

2.2. Measurement of variables

Because no criteria were consistently applied to the study of frailty, we applied Fried et al's³ definition as an indicator of frailty, which provided a potential standardized definition for frailty and validated the measurements. The dependent variables were divided into three categories: “nonfrailty”, “prefrailty”, and “frailty”. Participants with more than three of the five criteria were categorized as those exhibiting frailty, with one to two criteria as those exhibiting prefrailty, and with none of the criteria as those exhibiting nonfrailty. These five criteria were weight loss, self-described exhaustion, weakness, slowness, and low physical activity³. Weakness was defined as grip strength in the slowest 20% of the participants, and was adjusted for sex and body mass index (BMI) quartiles. Slowness was defined as the time required to walk

a distance of 5 m by the slowest 20% of participants, and was adjusted for sex and height. Low physical activity was determined using the Taiwan International Physical Activity Questionnaire—Short Form (Taiwanese version of the IPAQ), which was used to calculate calorie consumption, and was defined as the calorie consumption by the lowest 20% for each sex. The content validity of the Taiwanese version of the IPAQ index was 0.994, language equivalence and meaning similarity between the English and Chinese versions was 0.992, and consistency value for the English and Chinese versions according to intraclass correlation coefficients was 0.704.

The dependent variables were as follows: (1) sociodemographic characteristics, such as sex, age, level of education, and ethnicity; (2) health conditions, comprising physical and psychological aspects (arthritis, cardiovascular diseases, and diabetes were included in the physical aspects, and disease information was provided by the participants. Interviewers asked the participants the following question: “Has the doctor informed you of any diseases that you may have?” The Center for Epidemiologic Studies Depression Scale¹⁰ was used to measure psychological aspects. The alpha internal consistency for the 11 items in the Center for Epidemiologic Studies Depression Scale was 0.81, which indicates that its reliability is satisfactory); (3) environmental factors, such as living arrangements and social support; and (4) participation in activities such as gatherings, leisure, religious activities, visiting friends and relatives, and chatting with neighbors.

2.3. Statistical analyses

SPSS version 19.0 (SPSS Inc., Chicago, IL, USA) was used to perform data analysis. A Chi-square test was applied to analyze the associations of frailty with factors such as sociodemographic characteristics, health conditions, environmental factors, and participation in activities. Multinomial logistic regression was applied to test the influence of the factors on the level of frailty, and an enter method was used to test the influence of all associated factors. The predictor variables were sociodemographic characteristics, health

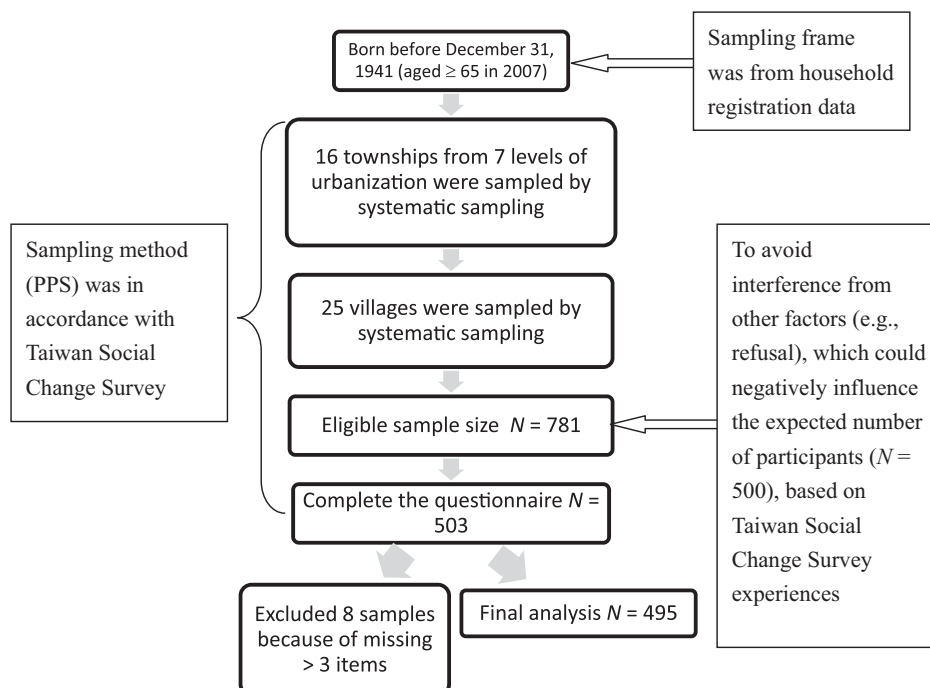


Fig. 1. Flowchart of sampling. PPS = probability proportional to size.

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