Sociodemographic Differences in Multimorbidity : A Closer Look from Indonesian Family and Life Survey

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Abstract. The prevalence of multimorbidity, the coexistence of two or more chronic diseases, is expected to increase, including in Indonesia. This phenomenon is associated with increased life expectancy and incidence of non-communicable diseases. Therefore, this study assesses the burden of multimorbidity in Indonesia by sociodemographic factors. The researchers analyzed cross-sectional data from the latest wave of IFLS conducted in 2014, the IFLS wave 5. The researchers included individuals aged 15 and above with blood pressure measurements (n= 32.256) from 13,536 households. Meanwhile, the researchers excluded individuals with missing data on BMI (183 individuals) or who had biologically implausible or extreme values (n=6). The analyses were then conducted on 32,067 individuals. The analyses comprised the ten most common self-reported chronic diseases diagnosis in IFLS-5. The findings revealed that the prevalence of self-reported multimorbidity in Indonesia was relatively high, at 9.32% (n= 2.989), with the highest proportion of multimorbidity reported among the elderly. Approximately 2.76% of the respondents (n- 885) reported having three or more chronic diseases. The most common combinations were hypertension and digestive problem (2.15%, n= 689), followed by hypertension and arthritis (1.79%, n= 574), and hypertension and high cholesterol (1.68%, n= 539). When stratified by sociodemographic factors, the researchers found a higher proportion of multimorbidity among females (11.01%, n= 3,530) compared to males (7.41%, n= 2.376), elderly (21.54%, n= 3.530) compared to younger adults, and previous smokers (20.90%, n= 6.072). People who were obese and overweight also reported a higher prevalence of multimorbidity (13.73%, n= 4.403 and 9.3%, n= 2.998, respectively). In addition, those living in urban areas had a higher proportion of multimorbidity (10.33%, n= 3.313) compared to rural areas (7.2%, n= 2.527). In conclusion, this study uncovered a relatively high prevalence of multimorbidity. People living in urban areas were overweight/obese and those who had low SES had a higher proportion of multimorbidity. With the nature of self-reported data and previously reported underdiagnosis of chronic diseases, screening to examine multimorbidity is needed.

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1 Introduction

Multimorbidity is the simultaneous occurrence of two or more chronic health conditions in an individual. Multimorbidity, also known as multiple chronic conditions, is more common in older adults over 60 years old [1]. Chronic diseases have also become an epidemic and are one of the leading causes of death in the world according to World Health Organization, and 74% of elderly individuals in Canada reported having one or more of 11 chronic conditions in 2008 [2]. However, a study in Scotland found a difference in the proportion of multimorbidity in the study population, where 59% of the population aged 65-74 years had multimorbidity, compared with 8.1% of the population aged 25-34 years [3].

Multimorbidity is also becoming a global public health issue due to global aging. Low- and middle-income countries (LMICs) were estimated to have a multimorbidity prevalence of 10-11%, which is predicted to increase in the coming years. The prevalence of multimorbidity in Southeast Asia also gradually increases from 4.5% at the beginning of the 21st century to about 10% in recent years [4]. In addition, the prevalence of multimorbidity, the coexistence of two or more chronic diseases, is expected to increase, including in Indonesia. Globally, multimorbidity is also a growing concern in healthcare.

The likelihood of multimorbidity is associated with some unhealthy lifestyle factors. Several lifestyle factors, such as tobacco use, physical inactivity, harmful use of alcohol, and unhealthy diet, have been identified as significant contributors to chronic diseases and multimorbidity [5]. Multimorbidity patients also often have poorer health outcomes, such as declined physical and mental functioning, higher mortality rates, and frailty. Therefore, they need a complex and structured care plan instead of a highly specialized but isolated approach to manage and treat multimorbidity [6]. In addition, individuals with multimorbidity have substantial treatment burdens, contributed by polypharmacy, multiple appointments, and treatment regimens for their multiple chronic diseases.

Specifically, Indonesia is the fourth most populous country globally, with a population of 270 million in 2020. It is estimated that the proportion of citizens aged 65 years and over within the national population will increase from 10% in 2020 to 16% in 2035 [7]. In this case, epidemiological transition and the growth of chronic disease prevalence are connected to socioeconomic development. The two most causes of multimorbidity are age and socioeconomic disadvantages. Multimorbidity also tends to happen more often and has an earlier onset in low socioeconomic settings [8]. Socioeconomic status (SES) inequalities may be reflected in unequal access to health care, participation in health activities, and life stressors, contributing to the increased burden of multiple chronic conditions. Furthermore, lower socioeconomic groups who suffer from multimorbidity will suffer more since they have limited access to diagnosis and the burden of expensive treatment [4].

Further, LMICs typically have low levels of government expenditure for health and inadequate health insurance coverage, which often results in higher out-of-pocket expenditure (OOPE) and the risk of impoverishing patients with chronic health conditions. The economic burden of multimorbidity is compounded by the fact that multiple healthcare specialists typically manage multimorbid patients in LMICs. It leads to inefficiencies with numerous hospital visits, polypharmacy, and suboptimal disease management. In addition, evidence from high-income countries (HICs) has found that apart from a negative impact on health outcomes, multimorbidity imposes substantial economic costs on individuals and households. It is because patients with multimorbidity incur large medical expenditures and are more likely to be absent from work [9]. Hence, this study aims to estimate the prevalence

of multimorbidity in Indonesia and assess further the burden of multimorbidity in Indonesia based on sociodemographic factors.

2 Methods

Indonesia is the fourth most populous country globally, with a population of 270 million people in 2020. Indonesia consists of five major islands: Java, Sumatra, Borneo, Sulawesi, and Papua, along with more than 17,000 other islands. This enormous population and the diverse geographical condition of Indonesia are a challenge to gathering representative data. In this study, the authors analyzed data from the Indonesian Family and Life Survey (IFLS). IFLS is a continuous longitudinal survey since 1983, the sample represented about 83% of the Indonesian population and contained over 30.000 individuals living in 13 of the 27 provinces in the country. For this study, the authors assessed cross-sectional data from the latest wave of IFLS conducted in 2014, the IFLS wave 5. The authors included individuals aged 15 and above with blood pressure measurements (n= 32,256) from 13,536 households. Meanwhile, the authors excluded individuals with missing data on BMI (183 individuals) or who had biologically implausible or extreme measurement values (6 individuals). Finally, analyses were then conducted on 32,067 individuals. Besides, the ten most common self-reported chronic diseases diagnose in IFLS-5 included stomach problems, hypertension (self-reported and measured), arthritis, asthma and lung diseases, high cholesterol, diabetes, heart attack or cardiovascular disease (CVD), kidney problems, liver problems, and TBC, included in the analyses. Moreover, there were two types of variables in the analyses: the binary variable that tells whether a person has 2 or more morbidity and the count variable which is the number of morbidities in each person. Furthermore, there were multiple self-reported biological variables (age, sex, smoking status, and body mass index (BMI)) and sociodemographic variables (level of education, area of residence) that could affect multimorbidity. In this study, BMI status classification used WHO classification to determine underweight, normal, overweight, and obese. This study was approved by the Ethics Committee of Faculty of Medicine, Universitas Sebelas Maret with ethical clearance number 65/UN27.06.11/KEP/EV/2022 and protocol ID of 01/02/05/2022/61.

3 Results

3.1 Prevalence of Multimorbidity

Table 1. Prevalence of Multimorbidity

Multimorbidity	All self-reported		With measured hypertension	
	n (%)	**SE**	**n (%)**	**SE**
Two or more diseases	2.989 (9.32%)	0.16	3.476 (10.84%)	0.17
Three or more diseases	885 (2.76%)	0.09	911 (2.84%)	0.09
Number of diseases				
0	21.661 (67.55%)	0.26	18.567 (57.90%)	0.28
1	7.420 (23.14%)	0.24	(31.26%)	0.26
2	2.104 (6.56%)	0.14	10.024 (8.00%)	0.15
3	657 (2.05%)	0.08	689 (2.15%)	0.08
≥4	224 (0.70%)	0.08	218 (0.68%)	0.08

The prevalence of self-reported multimorbidity found in this study was relatively high, at 9.32% (n= 2.989), for people having two or more diseases. Approximately 2.76% (n= 885) of the respondents reported having three or more chronic diseases. The prevalence of self-reported was consistently always lower than the diagnosed one through measured hypertension. The prevalence of multimorbidity mostly occurred at having two diseases (6.56%, n= 2.104), and lower prevalence was found constantly below 1% (n= 321) in people having four diseases and more. The detailed prevalence of multimorbidity can be found in table 1. Each prevalence is presented within each category in percentage compared with non-multimorbidity with a total of a hundred percent.

3.2 Type of Disease in Multimorbidity

The most common combinations of multimorbidity were hypertension and digestive problem (2.15%, n= 689), followed by hypertension and arthritis (1.79%, n= 574) and hypertension and high cholesterol (1.68%, n= 539). The least found combinations were TBC and kidney problems (0.02%, n= 6), liver and kidney problems (0.03%, n= 10), and liver and TBC (0.03%, n= 10) (Figure 1).

	Hypertension (%)	Diabetes (%)	TBC (%)	Lung (%)	CVD (%)	Liver (%)	Arthritis (%)	High cholesterol (%)	Kidney (%)	Stomach (%)
Hypertension (%)	11.94									
Diabetes (%)	0.94	2.16								
TBC (%)	0.15	0.08	0.96							
Lung (%)	0.78	0.15	0.22	4.54						
CVD (%)	0.64	0.17	0.07	0.23	1.61					
Liver (%)	0.13	0.07	0.03	0.06	0.04	0.98				
Arthritis (%)	1.79	0.32	0.08	0.34	0.30	0.05	5.00			
High cholesterol (%)	1.68	0.58	0.05	0.29	0.31	0.10	0.67	4.00		
Kidney (%)	0.33	0.09	0.02	0.07	0.11	0.03	0.17	0.19	1.33	
Stomach (%)	2.15	0.34	0.15	0.92	0.46	0.26	1.12	0.90	0.35	12.95

Figure 1. Type of Disease in Multimorbidity

3.3 Sociodemographic Factors in Multimorbidity

When stratified by sociodemographic factors, the researchers found a higher proportion of multimorbidity among females (11.01%, n= 3.530) compared to males (7.41%, n= 2.376), elderly (21.54%, n= 6.907) compared to younger adults, and previous smokers (20.90%, n= 6.702) compared to current smokers and those who never smoked. In addition, people who were obese and overweight also reported a higher prevalence of multimorbidity (13.73%, n= 4.403 and 9.35%, n= 2.998, respectively). Besides, people with elementary school or lower-level education had a higher prevalence (11.79%, n= 3.781) compared to those with high school education (7.24%, n= 2.322), but the prevalence was found higher in people with university/college degrees (10.87%, n= 3.486). Moreover, those living in urban areas had a higher proportion of multimorbidity (10.33%, n= 3.313) compared to rural areas (7.88%, n= 2.527) (Table 2).

Table 2. Sociodemographic Factors in Multimorbidity

	Multimorbidity (Two or more diseases)			
	All self-reported		**With measured hypertension**	
	n (%)	SE	n (%)	SE
Overall	32.067 (9,62%)		32.067 (9,62%)	
Sex				
Male	2.376 (7.41%)	0.21	3.021 (9.42%)	0.24
Female	3.530 (11.01%)	0.24	3.880 (12.10%)	0.25
Age Group				
<18	536 (1.67%)	0.27	661 (2.06%)	0.30
18-29	1.100 (3.43%)	0.20	1.106 (3.45%)	0.20
30-44	2.354 (7.34%)	0.24	2.620 (8.17%)	0.26
45-59	5.371 (16.75%)	0.47	6.365 (19.85%)	0.50
≥60	6.907 (21.54%)	0.69	8.610 (26.85%)	0.75
Smoking Status				
Never	3.194 (9.96%)	0.21	3.601 (11.23%)	0.22
Current	2.004 (6.25%)	0.24	2.565 (8.00%)	0.27
Past	6.072 (20.90%)	1.04	7.770 (24.23%)	1.10
BMI Status				
Underweight (<18.5)	2.181 (6.80%)	0.39	2.383 (7.43%)	0.41
Normal (18.5-24.9)	2.177 (6.79%)	0.22	2.427 (7.57%)	0.23
Overweight (25.0-29.9)	2.998 (9.35%)	0.41	3.678 (11.47%)	0.45
Obese (≥30.0)**Level of Education**≤Elementary school	4.4.03 (13.73%) 3.781 (11.79%) 2.322 (7.24%) 3.486 (10.87%)	0.35 0.30 0.20	5.230 (16.31%) 4.515 (14.08%) 2.636 (8.22%)	0.37 0.33 0.21
High school		0.48	3.999 (12.47%)	0.51
University/college				
Residence Area				
Rural	2.527 (7.88%)	0.23	2.947 (9.19%)	0.25
Urban	3.313 (10.33%)	0.22	3.848 (12.00%)	0.24

4 Discussion

In this study, the researchers analyzed data from the Indonesian Family and Life Survey (IFLS) and finally conducted the study on 32,067 individuals. In sociodemographic factors, the researchers found that females had a higher proportion (11.01%) than males (7.41%). This finding aligns with one population-based cross-sectional study in West Asia, stating that 25.0% of women were diagnosed with multimorbidity, and 13.4% of men were diagnosed with multimorbidity, thus showing that women had a higher prevalence of multimorbidity [10]. Another study in Scotland also showed that women had more prevalence of multimorbidity than men (30.9% vs 21.2%) [3].

A study in Indonesia revealed that people living in urban areas had a higher prevalence of multimorbidity than in rural areas [11]. Another study in China exhibited that people living in urban areas had a higher proportion of multimorbidity than in rural areas (70.6% and 60.3%, respectively) [12]. That study has the same statement as this current finding that people living in urban areas had a higher prevalence of multimorbidity whether it was from self-reported cases (10.3% vs 7.9%) or diagnosed cases (12.0% vs 9.2%).

However, a study in Indonesia based on Riskesdas (Basic Health Research) 2018 uncovered that people who were living in urban areas had a higher percentage of overweight and obesity cases [13]. Based on this study's findings, people with obese (13.73%) and overweight (9.35%) reported a higher prevalence of multimorbidity. These findings are consistent with the cohort study in the UK that the prevalence of multimorbidity is associated with increasing BMI [14]. In addition, the high prevalence of multimorbidity in this study's findings could be linked with the prevalence of obesity cases in Indonesia (more than 18 years old) increasing over the years (2013-2018) [15]. Increasing BMI is the risk of cardiometabolic multimorbidity from double in overweight people up to ten times in severely obese people compared with BMI-healthy people [16]. Related to that, a cross-sectional study in Canada showed that the likelihood of multimorbidity is increased along with their smoking status, whether a current smoker or a past smoker [17]. This study's findings also revealed that past smokers had a higher prevalence of multimorbidity. Nevertheless, it is not in line with this study's findings that the current smoker had the lowest proportion of multimorbidity.

Moreover, this study stated that people in elementary school or lower–level education had a higher prevalence in multimorbidity compared to those in high school education. This finding has a different statement from a study in Indonesia, stating that multimorbidity cases increased along with respondent educational level [7]. Another study in Spain has shown that the impact of multimorbidity was two times greater than at the highest educational level [18]. However, the researchers also found that the prevalence increased in people with university/college degrees. It aligns with a review study in Indonesia that multimorbidity cases would increase along with their education level [4].

In Asian countries, a cross-sectional study on associated sociodemographic factors with multimorbidity showed an association between increasing age and multimorbidity, in which more than 50% of the population had multimorbidity at the age of 60 years [19]. In addition, a study from Canada about self-reported prevalence in multimorbidity asserted that there were differences (10%) between the general population report and primary care clinical practices [20]. These multiple studies agree with this study's findings that in Indonesia, self-reported multimorbidity was relatively high (9.2%) with the highest proportion in the elderly. It denotes that with the nature of self-reported data and previously reported underdiagnosis of chronic diseases, screening to examine the multimorbidity case is still needed. Underdiagnosed data might lead to underestimating cases. Therefore, there might be a potential benefit from integrating information to increase the case information to screen the important health care needs of the population [21].

From the data, the prevalence of self-reported was consistently always lower than the diagnosed ones, indicating that there might still be many undetected cases. One of the reasons might be underdiagnosing in Indonesia. Other than that, in another national survey in Indonesia (Riskesdas 2018), the authors found that self-reported disease prevalence was lower than the diagnosed patients in the hypertension and heart disease section [22].

Furthermore, this study showed that the most common chronic diseases underdiagnosed were hypertension, diabetes, and tuberculosis. These findings align with a study in Indonesia that the prevalence of undiagnosed diabetes mellitus was high; there were 4.1% prevalence of undiagnosed diabetes, from a total of 5.6% diabetic population in Indonesia [23]. One review study in Africa also revealed that the proportions of patients with presumed not diagnosed tuberculosis were 48.5% in passive and 92.8% in active case-finding studies [24]. Another study in Bangladesh also exhibited that there was a substantial proportion (59.9%) of undiagnosed hypertension cases [25].

In this study's findings, the most common combinations were hypertension and digestive problem (2.15%). On the other hand, different findings showed in Ghana that the highest conditions were hypertension and diabetes mellitus (36.6%) [26]. Hence, it is essential to develop a screening tool to examine multimorbidity. Preventing and improving the way to manage multimorbidity are also still needed for developing sustainable care systems [27].

5 Strength and Limitations

This study has several limitations. First, the self-reported nature of multimorbidity the researchers reported was a probe to reporting bias. Thus, the structured questionnaire with trained enumerators becomes an important measure to address this reporting bias. Second, the IFLS initially covered 13 provinces in Indonesia; hence, it should be taken cautiously for representativeness to the Indonesian population. Despite this limitation, the strength of this study is that it used the Indonesian Family and Life Survey (IFLS) which represented 83% of the Indonesian population and comprehensive topics, not only regarding health status but also social and economic backgrounds.

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