Journal of Health Economic and Policy Research
JHEPR Vol. 2 No. 2 Year 2024
ISSN 3025-5198

Incidence of Non-Communicable Diseases in Urban and Rural Areas of Indonesia

Putri Ramadani[1*], Aina Shofi Salsabila Nur Amalia[2], Naw Htoo Kalu Paw[3]

[1]Center for Health Economics Studies, Universitas Muhammadiyah Purwokerto, Purwokerto, Indonesia
[2]Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia
[3]Medical Superintendent KBC Hospital, Insein, Myanmar

Article Information:

- ***Submitted*** : *June 26th 2024*
- ***Revised*** : *July 28th 2024*
- ***Accepted*** : *July 29th 2024*

***Corresponding author:**
putriramadani2113@gmail.com

DOI: https://doi.org/10.30595/jhepr.v2i2.179

Abstract

Background: NCDs were known of causing 74% of deaths worldwide, and 77% of all these deaths are in low- and middle-income countries. The prevalence of NCD in Indonesia has increased over the past five years as it has in the majority of other Low Middle-Income Countries (LMICs) in the Asia Pacific area. The objective of this study is to examine the incidence of non-communicable diseases (NCDs) in urban and rural areas.

Methods: This study used secondary data from the Indonesian Family Life Survey conducted in 2014-2015 (wave 5). A total of 16,204 households and 50,148 individuals were interviewed by the IFLS-5 in 2014-2015. The data reflects the entire country of Indonesia and was collected by stratified random sampling from province to residence level. We involved respondents between the ages of 18 and 64 as the inclusion criterion for this research. The exclusion criteria include those with unknown or incomplete data. A total of 26,437 participants were involved in this study.

Results: People with CKD were nearly the same in urban and rural areas (55.91% and 44.09%); cholesterol disease (76.16% and 23.84%); CVD (63.38% and 36.62%); hypertension (62.57% and 37.43%); diabetes (74.42% and 25.58%); stroke (67.65% and 32.35%).

Conclusion: Chronic kidney disease was nearly equal in both urban and rural; while cholesterol, cardiovascular, hypertension, diabetes, and stroke were higher in urban areas. This could be worthwhile to consider as part of improving NCD prevention and treatment.

Keywords: *Non-communicable, Rural, Urban*

Introduction

Non-Communicable Diseases (NCDs) are currently a global health concern. NCDs were known of causing 74% of deaths worldwide, and 77% of all these deaths are in low- and middle-income countries (LMICs)[1]. As noted by WHO, people in LMICs typically do not have access to primary health care programs for the early identification and treatment of NCD risk factors causing delayed treatments and NCD-related deaths[2]. In Indonesia, the NCDs prevalence such as diabetes, hypertension, and stroke has increased over the past five years as it has in the majority of other Low Middle-Income Countries (LMICs) in the Asia Pacific area[3]. Diseases namely stroke (21.1%), heart disease (12.9%), diabetes mellitus (6.7%), and high blood pressure problems (5.3%) are the top four diseases in Indonesia[4].

Health problems associated with NCDs have not been resolved in all regions of Indonesia, including urban and rural areas. The rate of NCDs was generally acknowledged to be higher in urban than in rural areas as urban residents are more prone to smoke, be sedentary, consume unhealthy diets, and engage in other risky habits[5]. Diseases like diabetes, hypertension, dyslipidemia, physical inactivity, and overweight were higher in the urban area as compared to the rural area[6]. However, in rural areas, information gaps, lack of understanding and awareness of NCD, and limited access to health services can somehow increase NCD risk factors. Therefore, the two regions have characteristics that are equally at risk of increasing the prevalence of NCDs[7].

Indonesia government already made many efforts to tackle the number of CVD. One of the notable programs is NCD Integrated Development Post or well known as Posbindu PTM as a preventive measure. The goal of Posbindu PTM is to facilitate screening and early management of NCDs. Health promotive approach is usually caried out by Public Health Center (Puskesmas). Wide variety of NCD may bring a challenge in program planning to deteremine the best approach to solve NCD problem[8,9].

This study was conducted to determine whether there are differences in the distribution of NCD prevalence in urban and rural areas. Understanding the differences of NCDs in urban and rural areas will contribute to better decision making in the disease prevention, by knowing the high prevalent disease in those two areas and its risk factor.

Methods

Study Design and Sampling

The data for this study were secondary data sourced from the Rand Corporation Indonesia Family Life Survey, wave 5 (IFLS-5). A total of 16,204 households and 50,148 individuals were interviewed by the IFLS-5 in 2014-2015. The data reflects the entire country of Indonesia and was collected by stratified random sampling from province to residence level. A cross-sectional study was conducted with people between the ages of 18 and 64 as the inclusion criterion for this research. The exclusion criteria include those with unknown or incomplete data. The study involved 26,437 participants.

Measurement

The outcome of this study was the incidence of NCDs comprising of cholesterol, cardiovascular, hypertension, diabetes, and stroke. The presence of NCDs was determined either through self-reporting or a physical examination. The examination by professional nurses validated the diagnosis for hypertension and hypercholesterolemia by measuring blood pressure and total cholesterol levels. Cardiovascular referred to the person who has cardiovascular disease. Diabetes referred to people who diagnosed with diabetes type 1 and 2. The independent factors were sociodemographic factors including gender, age, marital status, and residence.

Statistical Analysis

In this study, an observational analytic approach is used. The characteristics are determined through descriptive research. The factors associated with metabolic diseases are determined through inferential research using simple logistic regression at the bivariate stage. Initial models involve independent variables with Wald test p-value <0.25. Backward Elimination is used to decide the factors related to metabolic diseases in the multivariable model stage by using multiple logistic regression. The analysis utilized STATA version 10.

Result

Demographic Characteristic

Based on Table 1, there were 12,392 of females and 14,045 males in Indonesia passed our inclusion and exclusion criteria with an average of age 36.62027 (±11.8197). Among them, 79.18% were single and 20.82% were married. Based on the educational aspect, it was 16.09%, 32,86%, 20%, and 31.05% for respective graduates of university, senior high school, junior high school, and elementary school. While according to the region, it was 60% in urban area and 40% stayed in rural area.

Table 1. Baseline Characteristic of Metabolic Disease in Indonesia

Characteristics		Number	%
Gender	Female	12,392	46.87
	Male	14,045	53.13
Age	Mean (±SD)		36.62027 (±11.8197)
	Median (min: max)		35 (18:64)
Marital Status	Single	20,933	79.18
	Married	5,504	20.82
Education	University	4,253	16.09
	Senior High School	8,688	32.86
	Junior High School	5,288	20.00
	Elementary	8,208	31.05
Residence	Urban	15,863	60.00
	Rural	10,574	40.00

Based on Table 1, there were 12,392 of females and 14,045 males in Indonesia passed our inclusion and exclusion criteria with an average of age 36.62027 (±11.8197). Among them, 79.18% were single and 20.82% were married. Based on the educational aspect, it was 16.09%, 32,86%, 20%, and 31.05% for respective graduates of university, senior high school, junior high school, and elementary school. While according to the region, it was 60% in urban area and 40% stayed in rural area

Spread of Metabolic Disease among People in Rural and Urban Areas in Indonesia

Generally, the prevalence of metabolic disease shown in table 2 are under 5%, except for hypertension. Hypertension have prevalance of 11.35%, the only metabolic disease with prevalence more than 5%. The second highest prevalence was cholesterol, with percentage of 4.33%. While the lowest percentage was stroke with only 0.51%.

Table 2. Prevalence of Metabolic Disease

Characteristic (N=26437)	No		Yes	
	N	%	N	%
Cholesterol	25,292	95.67	1,145	4.33
Cardiovascular	26,052	98.54	385	1.46
Hypertension	23,437	88.65	3,000	11.35
Diabetes	25,874	97.87	563	2.13
Stroke	26,301	99.49	136	0.51

According to Table 3, the incidence of chronic kidney disease among people in Indonesia was 1.41%, comprising of 55.91% in urban and 44.09% in rural. People with cholesterol disease were 4.33% with 76.16% in urban and 23.84% in rural. People suffered from cardiovascular disease were 1.46% with 63.38% and 36.62% in urban and rural areas respectively. Those suffered from hypertension were 11.35% comprising of 62.57% in urban and 37.43% in rural. People diagnosed with diabetes were 2.13% with 74.42% in urban and 25.58% in rural. For people

ISSN 3025-5198

diagnosed with stroke, on the other hand, 0.51% with 67.65% in urban and 32.35% in rural area.

Table 3. Distribution of Metabolic Disease among People in Rural and Urban Areas

Characteristic	Urban		Rural	
	N	%	N	%
Cholesterol (N=26437)				
No	14,991	59.27	10,301	40.73
Yes	827	76.16	273	23.84
Cardiovascular (N=26437)				
No	15,619	59.95	10,433	40.05
Yes	244	63.38	141	36.62
Hypertension (N=26437)				
No	13.986	59.67	9,451	40.33
Yes	1,877	62.57	1,123	37.43
Diabetes (N=26437)				
No	15,444	59.69	10,430	40.31
Yes	419	74.42	144	25.58
Stroke (N=26437)				
No	15,771	59.96	10,530	40.04
Yes	92	67.65	44	32.35

Discussion

The result obtained according to sociodemographic baseline characteristic with respondents of 60% in urban area and 40% stayed in rural area showed various rates of NCDs incidence (Table 1). This is in line with the notion that the two regions have characteristics that are equally at risk of increasing the prevalence of NCDs[7]. According to the recent study in China, the prevalence of NCDs increased in rural regions, going from 15.3% in 2003 to 29.5% in 2013, and the growth in incidence rates there has outpaced that in cities where the corresponding rates were 27.7% and 36.7%, respectively[10]. Additionally, due to a lack of medical resources and health care system coverage, rural NCD patients are at risk for illnesses that can be fatal as a result of NCD complications[10]. The illnesses including lethal diseases like stroke and even chronic kidney disease (CKD).

Based on the result, the incidence of CKD among people in Indonesia was 1.41%, comprising of 55.91% in urban and 44.09% in rural (Table 2). The number is roughly equal for both regions. Globally, CKD prevalence of 5 stages was 13.4% (11.7–15.1%) mean (95%CI). CKD has a high global prevalence with a consistent estimated global CKD prevalence of between 11 to 13% with the majority stage 3[11]. It shows that both regions require somewhat equal attempts to decrease the incidence of CKD.

Alongside CKD, the number of people with cholesterol disease were also higher in urban with 76.16% compared to 23.84% in rural (Table 2). High total cholesterol and low-density lipid cholesterol (LDL-c) were more elevated in urban areas than in migrant and rural regions[12]. Studies state that urban residents have a higher cholesterol incidence rate than rural areas, which is 20% for low-income urban residents and 44% for high-income urban residents. This is due to the lack of ability of urban residents to apply balanced nutrition consumption. The high purchasing power of urban residents causes residents to tend to consume a lot of fast food and low fiber[13]. CKD incidence is at a staggering 23.84% in rural areas from this research, which cannot be underestimated.

People suffered from cardiovascular disease were 1.46% with 63.38% and 36.62% in urban and rural areas respectively (Table 2). On the other hand, based on the study of cardiovascular disease risk factor prevalence and estimated 10-year cardiovascular risk scores in Indonesia, the prevalence of high CVD risk was not highly different with 31.6% in urban (CI 30.7–32.5%), 28.7% in semi-urban (CI 27.3–30.1%), and 26.2% in rural areas (CI 25.2–27.2%)[14]. From the broader view, the number of deaths due to CVD-related causes between 1990 and 2013 increased by 66% in low- and middle-income countries and recently about 80%. In Southeast Asia, especially, CVDs such as ischemic heart disease (IHD) and stroke have become the main cause of premature deaths[15]. Urban people may have bad dietary habits due to easy access to fast food (high calory food). These dieatary habits may lead to metabolism disease that increase the risk of getting CVD. Its also possible the higher rates of hypertension may contribute to CVD in urban areas[16,17].

People suffered from hypertension were 11.35% comprising of 62.57% in urban and 37.43% in rural (Table 2). It was only gently different to another the research resulted 44.5% in urban and 41.1% in rural areas[18]. Regarding the awareness it increased from 37% in 2007 to 44.9%in 2014-2015, but a decline in the percentage of treatment which was from 25% in 2007 to 11.5% in 2014-2015[19]. However, the proportion of reported treatment was significantly lower in this study than in LMICs, including China and Vietnam. The ratio of this awareness was also comparable to statistics reported from China, Vietnam, and globally in LMICs. Urban areas have a greater rate of hypertension awareness and treatment than rural ones. This can be due to limited access to healthcare services by rural communities[19]. High rates of smoking in rural areas may increase the probabilites of getting hypertension, since smoking become a big part of rural people lives[20].

People diagnosed with diabetes were 74.42% in urban and 25.58% in rural (Table 2). The result showed improvement compared to the data from

2007-2014, where the number of people in urban and rural residential childhood suffered from diabetes were only slightly different. It was 56.6% (age 20-40) and 42.1% (age >40) in urban, while 43.4% and 57.9% in rural for the respective age[21]. However, the data from International Diabetes Federation estimated the number of diabetes patients (in 1000s) in Indonesia was 19,465.1, and expected to increase to 23,328.0 in 2030 and 28,569.9 in 2045[22]. Since there is no guarantee that the number will decrease in both urban and rural areas, it is vital to accelerate the preventive and curative measures.

For people diagnosed with stroke, on the other hand, 0.51% with 67.65% in urban and 32.35% in rural area (Table 2). This goes in line with a study implying that stroke causes death by 15.9% in residents aged 45-54 years in urban areas[23]. Urban residents have a higher risk of stroke than rural areas[24]. Another study states that rural residents have higher risk factors for stroke, such as hypertension and diabetes[25]. This suggests that both urban and rural residents have the same risk of stroke and impact on other diseases such as hypertension and diabetes.

The increase in some aforementioned NCDs awareness such as CVD, hypertension, and diabetes may be linked to community-based integrated coaching positions that allow early community participation in hypertension detection[18]. The effort namely NCD Integrated Development Post (Posbindu PTM) that had been conceived in 2011. The above data show that more should be done despite some improvement in NCD preventive and medication awareness. Effective treatment should be significantly improved both in urban and rural regions.

Conclusions

Based on the research, it can be concluded that the incidence of chronic kidney disease was nearly equal in both urban and rural; cholesterol disease was higher in urban; cardiovascular diseases were higher in urban; hypertension was higher in urban; diabetes was higher in urban; and stroke was also higher in urban areas. This could be worthwhile to consider this as part of improving NCD prevention and treatment.

Acknowledgment

This work was independent of the funders, who had no role in the study design, analysis of data, writing of the manuscript, or the decision to submit for publication.

Ethical Clearance

The IFLS has been reviewed and approved by Institutional Review Boards, the United States, and Gadjah Mada University, Indonesia

Author Contribution

Study design	:	TU, KL
Data acquisition	:	TU, KL, AQS, FG
Data analysis	:	TU, AQS, FG, GP, SP
Manuscript writing	:	KL, AQS, FG, GP, SP

Competing Interests

The authors declare there was no conflict of interest in this study.

Abbreviation

NCD	:	Non-Communicable Disease
LMIC	:	Low-Middle Income Country
CKD	:	Chronic Kidney Disease
CVD	:	Cardiovascular Disease
IFLS	:	Indonesia Family Life Survey
Posbindu PTM	:	Pos Pembinaan Terpadu Penyakit Tidak Menular (Non-Communicable Disease Integrated Development Post)

References

1. Siddiqi, K. Non-communicable diseases key facts by WHO. *Public Health: An action guide to improving health* (2022).
2. Checkley, W. *et al.* Management of NCD in low-And middle-income countries. *Glob Heart* **9**, 431–443 (2014).
3. Kemenkes RI. Hasil Riset Kesehatan Dasar Tahun 2018. *Kementrian Kesehatan RI* **53**, 1689–1699 (2018).
4. Purnamasari, D. The Emergence of Non-communicable Disease in Indonesia. *Acta Med Indones* **50**, 273–274 (2018).
5. Sujarwoto & Maharani, A. Participation in community-based healthcare interventions and non-communicable diseases early detection of general population in Indonesia. *SSM Popul Health* **19**, 101236 (2022).
6. Oommen, A. M., Abraham, V. J., George, K. & Jose, V. J. Prevalence of risk factors for non-communicable diseases in rural & urban Tamil Nadu. *Indian Journal of Medical Research* **144**, 460–471 (2016).
7. Tasmini, T. *et al.* Kadar glukosa darah dan tekanan darah pada penduduk pedesaan dan perkotaan di Daerah Istimewa Yogyakarta. *Journal of Community Empowerment for Health* **1**, 45–53 (2018).
8. Maliangkay, K. S., Rahma, U., Putri, S. & Istanti, N. D. Analisis Peran Promosi Kesehatan Dalam Mendukung Keberhasilan Program

Pencegahan Penyakit Tidak Menular Di Indonesia. *Jurnal Medika Nusantara* **1**, 108–122 (2023).
9. Wahidin, M., Agustiya, R. I. & Putro, G. Beban penyakit dan program pencegahan dan pengendalian penyakit tidak menular di indonesia. *J Epidemiol Kesehat Indones* **6**, 105–112 (2023).
10. Liu, X. *et al.* Cohort Profile: The Henan Rural Cohort: A prospective study of chronic non-communicable diseases. *Int J Epidemiol* **48**, 1756-1756J (2019).
11. Al-Shdaifat, E. A. & Manaf, M. R. A. The economic burden of hemodialysis in Jordan. *Indian J Med Sci* **67**, 103–116 (2013).
12. Lazo-Porras, M. *et al.* Low HDL cholesterol as a cardiovascular risk factor in rural, urban, and rural-urban migrants: PERU MIGRANT cohort study. *Atherosclerosis* **246**, 36–43 (2016).
13. Ekonomi, S., Indeks, D. a N., Tubuh, M., Pria, I. M. T. & Dalam, D. Kaitannya Dengan Faktor Risiko Penyakit Jantung Koroner Di Perdesaan Dan Perkotaan Bogor-Jawa Barat. *Jurnal Gizi dan Pangan* **5**, 15–25 (2010).
14. Maharani, A. *et al.* Cardiovascular disease risk factor prevalence and estimated 10-year cardiovascular risk scores in Indonesia: The SMARThealth Extend study. *PLoS One* **14**, 1–13 (2019).
15. Shafiq, M. *et al.* Cohort profile: LIFE course study in CARdiovascular disease Epidemiology (LIFECARE). *Int J Epidemiol* **47**, 1399-1400G (2018).
16. Arsyad, D. S. *et al.* Modifiable risk factors in adults with and without prior cardiovascular disease: findings from the Indonesian National Basic Health Research. *BMC Public Health* **22**, 660 (2022).
17. Naomi, W. S., Picauly, I. & Toy, S. M. Faktor Risiko Kejadian Penyakit Jantung Koroner. *Media Kesehatan Masyarakat* **3**, 99–107 (2021).
18. Peltzer, K. & Pengpid, S. The Prevalence and Social Determinants of Hypertension among Adults in Indonesia: A Cross-Sectional Population-Based National Survey. *Int J Hypertens* **2018**, (2018).
19. Hussain, M. A., Al Mamun, A., Reid, C. & Huxley, R. R. Prevalence, awareness, treatment and control of hypertension in Indonesian adults aged ≥40 years: Findings from the Indonesia Family Life Survey (IFLS). *PLoS One* **11**, 1–16 (2016).
20. El Islamy, I. *et al.* Faktor Determinan Kejadian Hipertensi di Desa Sikeben Kecamatan Sibolangit Kabupaten Deli Serdang. *Jurnal Ilmiah Universitas Batanghari Jambi* **23**, 601–607 (2023).
21. Tanoey, J. & Becher, H. Diabetes prevalence and risk factors of early-onset adult diabetes: results from the Indonesian family life survey. *Glob Health Action* **14**, (2021).
22. Federation, I. D. Diabetes Atlas Indonesia. *Diabetes Report 2000-2045* https://www.diabetesatlas.org/data/en/country/94/id.html (2023).
23. Budi, H. & Bahar, I. Faktor Resiko Stroke Hemorragic Pada Pasien Usia Produktif. *Jurnal Sehat Mandiri* **12**, 29–36 (2017).
24. Howard, G. Rural-urban differences in stroke risk. *Prev Med (Baltim)* **152**, 106661 (2021).
25. Kamin Mukaz, D. *et al.* Rural/urban differences in the prevalence of stroke risk factors: A cross-sectional analysis from the REGARDS study. *Journal of Rural Health* **38**, 668–673 (2022).