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Assessing the Risk of Hypertensive Nephropathy in the Elderly: A Critical Examination of a Silent Threat

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Abstract

Background: Hypertension has been a prevalent condition among the elderly within the community, often receiving insufficient attention from those affected. Based on screening data, it was found that 52.63% of the 57 elderly people in Awiligar had blood pressure in the hypertension category. This high prevalence indicates that this population is at high risk for cardiovascular and kidney complications.
Objectives: This community service initiative seeks to facilitate the early detection of cardio-renal risk among the elderly population in Awiligar, Bandung Regency, in light of the high prevalence of hypertension and the potential for chronic kidney complications.
Methods: The method for implementing this community service activity consists of Health Screening and Health Education.
Result: The screening results revealed a high prevalence of hypertension, with 52.63% of participants exhibiting BP ≥ 140/90 mmHg. Urine laboratory findings indicated significant abnormalities, notably Proteinuria in 42.11% (24 individuals) and Hematuria in 21.05% (12 individuals). Furthermore, a high prevalence of metabolic risk indicators was observed. The elevated prevalence of proteinuria, in conjunction with the high incidence of hypertension, serves as a significant marker of early kidney damage within this population.
Conclusion: The conclusion of this initiative underscores the necessity for immediate medical follow-up and community-based health education interventions aimed at managing cardio-renal risk factors to prevent the progression of Chronic Kidney Disease.

A. Introduction

The increase in life expectancy in Indonesia has led to a rise in the prevalence of Non-Communicable Diseases (NCDs), particularly among the elderly (aged ≥ 60 years) (Aashima et al., 2022; Hustrini et al., 2022; Jadoul et al., 2024). Two main NCDs that are often interconnected and impose a significant health burden are Hypertension and Chronic Kidney Disease (CKD) (Hustrini et al., 2022; Institute for Health Metrics and Evaluation (HME), 2023). Hypertension, known as the silent killer, is a major risk factor for serious complications, including stroke, coronary heart disease, and permanent kidney damage (Hunter et al., 2021). The epidemiological profile of West Java in 2024 indicates a growing crisis in metabolic health, evidenced by 332,683 documented cases of hypertension and 50,941 cases of diabetes mellitus undergoing clinical intervention (West Java Communication and Informatics Service, 2026). This trend is particularly pronounced among the elderly population in Bandung Regency, where the geriatric demographic defined as individuals aged 65 and older has increased by 27% over the past five years, reaching a total of 242,539 individual (Bandung Regency Health Office, 2025). As life expectancy in this region rises to 75.23 years,

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the same report stated that the prevalence of cardiometabolic diseases has emerged as the primary contributor to morbidity and mortality. The clinical severity of these conditions is highlighted by local inpatient data, which identifies cerebral infarction (12.59%) and renal failure (7.38%) as the first and third leading causes of death, respectively. Moreover, renal failure has become the leading cause for outpatient visits (7.16%), closely followed by diabetes mellitus. Awiligar, as part of Bandung Regency, faces similar challenges prevalent in the region; it was observed that 52.63% of the 57 elderly individuals in Awiligar exhibited blood pressure levels within the hypertension category (BP ≥ 140/90 mmHg). This high prevalence suggests that this population is at significant risk for cardiovascular and renal complications.

At the community level, facilities such as the Cibeunying Public Health Centre report elevated consultation rates for both hypertension and diabetes, underscoring an urgent need to evaluate the specific risk of hypertensive nephropathy (Bandung Regency Health Office, 2025). The primary research gap is identified in the lack of localized, community-based diagnostic data for early-stage hypertensive nephropathy in rural and suburban areas such as Awiligar. Although macro-level statistics suggest an increasing trend, there is a deficiency of detailed evidence concerning the subclinical renal status of hypertensive elderly individuals within this specific community. The imperative for public health to incorporate urine screening, particularly for Proteinuria and Haematuria, is of paramount importance. These indicators serve as markers of glomerular damage, facilitating the early detection of silent nephropathy well before there is an elevation in serum creatinine levels or the manifestation of physical symptoms. Additionally, the inclusion of Leukocyte and Nitrite testing is essential for the differential diagnosis of Urinary Tract Infections (UTIs), which frequently complicate renal health assessments in the elderly population (Frank H, 2023). By adopting these cost-effective and high-yield diagnostic tools, we can shift from a high-cost approach to kidney disease to a sustainable model.

B. Methods

The community health program took place in Awiligar, Bandung Regency, on July 26-27, 2025. It involved 57 elderly people aged 57-85, chosen from local health records. Participants were informed about the study, and their consent was obtained. Their privacy was protected, and the study followed ethical guidelines to ensure safety and benefits for the elderly. The program included an interactive lecture to raise awareness about high blood pressure and diabetes. Experts used visual aids and demonstrations to explain these conditions and lifestyle changes like reducing salt and controlling sugar intake. Participants received educational leaflets to take home. The program's success was measured by testing participants' knowledge before and after the session. The health screening phase used standard methods to find early signs of organ damage. Physical exams included weight and blood pressure checks. Blood tests measured fasting blood sugar, uric acid, and cholesterol. Urine tests through 10 parameters dipsticks checked for protein, blood, white blood cells, and nitrites, with results verified by two observers. Data from these screenings were analyzed to understand the health of the elderly in Awiligar. Abnormal findings and rates of high blood pressure and protein in urine were categorized. The program also identified high-risk individuals who were referred for further care.

C. Results and Discussion

1. Results

Participants Characteristics

Awiligar, located within the Cimenyan District of the Bandung Regency, represents a significant periurban interface characterized by its varied topography and elevated residential clusters. Demographically, the area have a substantial portion of the population transitioning into the geriatric category. The community's character is defined by a dual-economic structure; while historically agrarian, it has evolved into a densely populated residential zone that frequently encounters geographical barriers to centralized healthcare facilities (BPS Statistic Indonesia Bandung Regency, 2024). This physical isolation, combined with a high concentration of elderly residents (aged 60 and above), creates a specific public health vulnerability. The Awiligar community relies heavily on local primary health centres yet the prevalence of chronic, non-communicable diseases remains high.

Table 1. General Characteristics

Category	Frequency (n=57)	Percentage (%)
Gender		
Female	38	67
Male	19	33
Total	57	100
Age Category		
Pre Elderly (45-59 years)	22	39
Elderly (≥ 60 years)	27	47
High Risk Elderly (≥ 70 or ≥60 years with comorbidity)	8	14
Total	57	100

The demographic profile of participants in Awiligar exhibits a typical geriatric distribution prevalent in West Java, with a predominant female representation of 66.67% compared to 33.33% males. The majority of individuals are classified as Elderly (≥60 years), comprising 47% of the population. This is followed by the Pre-Elderly group (45–59 years), which accounts for 39%. Additionally, a notable 14% are identified as High-Risk Elderly due to either advanced age or the presence of existing comorbidities.

Knowledge on Elderlies Cardiometabolic Risk Factors

Table 2. Knowledge Score Pre and Post Intervention

Category	Pre Test		Post Test	
	Amount (n=57)	(%)	Amount (n=57)	(%)
Good	19	33	33	4
Average	33	58	58	75
Poor	5	9	9	21
Total	57	100	57	100

The community health program in Awiligar helped older people understand health risks better. Before the program, many did not know much about the dangers of high blood pressure and diabetes. About 58% had average knowledge, and nearly 10% knew very little. After the program, more people understood these health risks. The number of people with good knowledge increased from 33% to 58%, and those with average knowledge reached 75%.

Elderly Risk Factors

Table 3. Risk Factors

Variable	Standard	Category	Frequency (n=57)	Percentage (%)
Cardiovascular Risk Factors				
Hypertension	130-139 / 80-89 mmHg	Stage 1	11	19.3
	≥ 140/90 mmHg	Stage 2	46	80.7
Total			**57**	**100**
Metabolic Indicator				
Blood Sugar (fasting)	100–125 mg/dL	PreDiabetic	28	49.12
	≥126 mg/dL	Diabetic	22	38.6
	< 100 mg/dL	Normal	7	12.28
Total			**57**	**100**
Uric Acid				
	Male: 3.4 - 7.0 mg/dL Female: 2.4 - 6.0 mg/dL	Normal	16	28.07
	Male: > 7.0 mg/dL Female: >2.4-6.0 mg/dL	Hiperuricemia	41	71.93
Total			**57**	**100**
Total Cholesterol	Normal – borderline : < 200- 239 mg/dL	Normal	32	56.14
	≥ 240 mg/dL	Dislipidemia	25	43.86
Total			**57**	**100**
Kidney Health (Urine Analysis)				
Proteinuria		Positive	44	77.19
		Negative	13	22.81
Total			**57**	**100**
Hematuria		Positive	15	26.32
		Negative	42	73.68
Total			**57**	**100**
Leucosite		Positive	19	33.33
		Negative	38	66.67
Total			**57**	**100**

The cardiovascular assessment identified a critical public health concern: 80.7% of the table presented with Stage 2 Hypertension, while 19.3% were in Stage 1. This overwhelming prevalence of advanced hypertension indicates that the majority of the elderly in this community are experiencing cardiovascular stress that has exceeded the threshold for high-risk complications. Metabolic indicators further illustrate the complex health burden within this population. Only 12.28% of participants maintained a normal fasting blood sugar level, whereas 38.6% were categorized as diabetic and 49.12% as pre-diabetic. When cross-referenced with the 71.93% prevalence of hyperuricemia and 43.86% of dyslipidaemia, the data suggest a community with highly clustered metabolic syndrome. These figures significantly exceed national averages for rural elderly populations, likely due to a combination of dietary habits and the absence of routine primary care monitoring. By comparing these findings to Ministry of Health (Kemenkes) standards, it is evident that nearly 90% of the target group requires immediate clinical follow-up for metabolic regulation. The most significant clinical finding of this activity was the high incidence of renal distress markers. Urinalysis revealed that 77.19% of participants were positive for Proteinuria, a hallmark indicator of hypertensive nephropathy and glomerular damage. Furthermore, the presence of Hematuria (26.32%) and Leukocytes (33.33%) suggests a high secondary burden of urinary tract inflammation and potential chronic kidney disease (CKD).

Figure 1

Figure 2

Figure 3

Figure 1, 2 and 3. The activities of the community service

2. Discussion

Correlation of Cardio-Renal Risk and Implications for Quality of Life

Screening results indicate that the elderly population in Awiligar bears a substantial burden of Non-Communicable Disease (NCD) risk. The primary finding is a prevalence of hypertension reaching 100%, with 80.70% at Stage 2, and a prevalence of positive proteinuria at 77.19%. The correlation between high-grade hypertension and proteinuria is a significant clinical finding, confirming that uncontrolled high blood pressure has resulted in target organ damage to the kidneys, known as hypertensive nephropathy (De Bhailis & Kalra, 2022; Kader et al., 2026; Wu et al., 2021). Proteinuria serves as a strong indicator of early kidney damage or the presence of Chronic Kidney Disease (CKD). If left untreated, this condition will progress to a progressive decline in kidney function, ultimately necessitating kidney replacement therapy such as hemodialysis. CKD has a profound impact on the Quality of Life (QoL) of the elderly (D'Arrigo et al., 2025; Fatima & Hasan, 2022; Sihombing JP et al., 2021). Older adults with CKD often experience physical disturbances, increased stress and anxiety due to lifestyle changes and medication, as well as social and economic burdens (Ma et al., 2023; Wang et al., 2025). Previous studies have also described that elderly individuals with uncontrolled hypertension have a poorer quality of life both physically and mentally compared to groups with normal blood pressure (Butt et al., 2022; Nagy et al., 2023). Therefore, the high rate of proteinuria in Awiligar is not only a medical issue but also a predictor of substantial QoL decline in the future.

From a community-based perspective, the clustered prevalence of Stage 2 Hypertension (80.7%), Diabetes/Pre-diabetes (87.7%), and Hyperuricemia (71.9%) indicates that the elderly population in Awiligar is experiencing a syndemic environment. This high concentration of metabolic risk factors is likely influenced by localized lifestyle factors, such as traditional high-sodium diets and limited access to specialized geriatric care (Heo et al., 2024; Nissa & Sari, 2022) . In contrast to urban hospital populations, this community relies on a fragile support network comprising family and local Kaders. Consequently, the success of the intervention was attributed to its capacity to engage with the community in their own environment, thereby eliminating the geographical and psychological barriers that typically deter the elderly in Bandung Regency from seeking early diagnostic screenings.

Double Risk of Metabolic Syndrome

The findings of hyperuricemia (71.93%) and diabetes risk (nearly 88% in prediabetes/diabetes) highlight an increased risk of kidney stones and chronic kidney damage. Such comorbid conditions are consistent with the findings of metabolic syndrome screenings in various regions of Indonesia, where the prevalence

of hypertension and diabetes among the elderly often exceeds 70% (Mailani et al., 2023; Mashuri et al., 2022; Sudharsanan & Geldsetzer, 2019). This double burden renders the elderly in Awiligar highly vulnerable to cardiovascular events, such as stroke and heart disease, which can lead to disability and dependence, further exacerbating their Quality of Life (QoL).

The primary aim of this initiative was not solely the collection of data but the establishment of a sustainable clinical pathway. Consequently, the immediate subsequent action involved the formal referral of high-risk participants those exhibiting this double risks to the Puskesmas Cibeunying. These individuals have been incorporated into the Chronic Disease Management Program (Prolannis), ensuring they receive continuous monitoring and ACE-inhibitor/ARB therapy, which are the gold standards for renal protection (Marwati et al., 2022; Mubarak et al., 2024; PudjiAstuti et al., 2025). To ensure long-term sustainability, the data generated from this initiative has been disseminated to local health workers (Kaders) to serve as a baseline for future Posbindu activities (Javadi et al., 2025; Kadar et al., 2023; Pazos & Ferreira, 2022; Srinivas, 2021; Wang et al., 2025). This approach ensures that the short screening evolves into a continuous, community-led surveillance system for hypertensive nephropathy.

Risk of Urinary Tract Infection (UTI)

The prevalence of positive leukocytes (33.33%) indicates a high risk or presence of Urinary Tract Infection (UTI). UTIs in the elderly, particularly those with comorbidities such as diabetes and kidney problems, can lead to sepsis and accelerate the progression of acute kidney function decline, which also negatively impacts physical health and Quality of Life (QoL) (Hussain & Barnwal, 2025). These screening findings underscore an urgent need for advanced health interventions in Awiligar. Strategies should prioritize aggressive blood pressure control, blood sugar management, and prompt referral for elderly patients with proteinuria. Without these interventions, the risk of end-stage CKD complications and severe QoL decline will continue to increase (Patel et al., 2023; Prastika et al., 2021; Yulianti et al., 2023). Secondly, it is imperative that strategies prioritize the differential diagnosis of urinary tract infections (UTIs) during routine screenings (Afsharipoor et al., 2025; Chauhan et al., 2025; Tynan et al., 2026). Theoretically, untreated infections may expedite the decline of the Glomerular Filtration Rate (GFR) by inducing systemic inflammation (Little et al., 2025; Trenkmann et al., 2025). Educational efforts should emphasize the importance of hydration and hygiene, particularly for the 87.72% of participants with hyperglycemia, as glycosuria (sugar in the urine) creates a conducive environment for pathogen proliferation.

D. Conclusion

Cardio-renal screening conducted on 57 elderly individuals in Awiligar, Bandung Regency, reveals a substantial health risk associated with chronic non-communicable diseases and renal complications within this demographic. The findings indicate that all participants (100%) are classified within the prehypertension or hypertension categories, with a significant proportion (80.70%) reaching Stage 2 Hypertension. This condition is closely linked to elevated metabolic risk factors, including a high prevalence of Dyslipidemia (43.86%) and a substantial risk of Diabetes, with 94.74% of participants exhibiting PreDiabetes or Diabetes. Pertaining to renal health, Urine Analysis results demonstrate concerning abnormalities: Positive Proteinuria is present in 77.19% of participants, and Positive Hematuria is observed in 26.32% of participants. The high incidence of Proteinuria serves as a critical indicator of early kidney damage, likely attributable to uncontrolled Hypertension. Collectively, these results underscore a significant disease burden and highlight the urgent necessity for medical interventions and health education aimed at blood pressure regulation and kidney function maintenance among the elderly population in the Awiligar region.

E. Acknowledgment

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F. Author Contribution Statement

TS led the program, coordinating preparations with stakeholders, developing intervention plans, and ensuring their implementation according to the established timetable and objectives. TS was also responsible for data analysis, particularly all cardiometabolic indicators. WP served as the primary person in charge of the activity, overseeing the knowledge objectives and analyzing the results. WP was also responsible for preparing the final report. All authors contributed to the program design, field implementation, and drafting of the article.

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