

Risk Factors That Influence the Incidence of Hypertension in Coastal Communities in the Working Area of the South Wangi-Wangi Community Health Center in 2025

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Abstract

Hypertension is a non-communicable disease that is a global health problem and contributes significantly to morbidity and mortality. Coastal communities have a higher risk of developing hypertension due to unhealthy lifestyles and consumption habits. This study aims to determine the risk factors that influence the incidence of hypertension in coastal communities in the working area of the South Wangi-Wangi Community Health Center in 2025. This type of research is an analytical observational study with a case-control study design. The population in this study was the coastal community in the working area of the South Wangi-Wangi Community Health Center with a sample of 132 respondents (66 cases and 66 controls) using the Purposive Sampling technique. The statistical tests used were Chi-Square and Odds Ratio. The results of the study showed that family history (p-value=0.042, OR=2.303, CI 95%:1.093-4.851), salt consumption (p-value=0.000, OR=4.329, CI 95%:2.083-8.999), physical activity (p-value=0.013, OR=2.597, CI 95%:1.272-5.301), smoking (p-value=0.831, OR=0.834, CI 95%:0.361-1.925), and obesity (p-value=0.048, OR=2.191, CI 95%:1.067-4.499). Based on the research results, it can be concluded that family history, salt consumption, physical activity and obesity are risk factors for hypertension in coastal communities in the South Wangi-Wangi Community Health Center working area in 2025, while smoking is not a risk factor for hypertension in coastal communities in the South Wangi-Wangi Community Health Center working area in 2025.

Keywords: Family History; Hypertension; Obesity; Physical Activity; Salt Consumption; Smoke

1. Introduction

Non-communicable diseases cause high mortality rates each year and can affect individuals of all ages in various countries worldwide. One of the most prevalent non-communicable diseases in Indonesia is hypertension [1]. This condition indicates that hypertension is a serious health problem and requires special attention in prevention and control efforts [2]. Hypertension is a condition characterized by elevated systolic blood pressure >140 mmHg and diastolic blood pressure >90 mmHg. Hypertension is a chronic condition characterized by increased blood pressure on the walls of the arteries. This condition causes the heart to work harder to circulate blood throughout the body through the blood vessels, which can damage blood vessels and even cause degenerative diseases such as coronary heart disease, stroke, and kidney failure, which can even lead to death [3].

The WHO Global Report on Hypertension in 2022 recorded that approximately 600 million people worldwide will have hypertension by 2023, with approximately 33% of the population experiencing hypertension [4]. In 2024, an estimated 1.4 billion adults aged 30-79 worldwide will have hypertension, and by 2025, this number is expected to reach 1.5 billion. Furthermore, an estimated 9.4 million people die annually from hypertension and its complications [5].

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The Indonesian Ministry of Health reported that the prevalence of hypertension in Indonesia in 2022 was 32.7%. In 2023, 30.8% of Indonesians had hypertension [6]. This figure is expected to reach 36% by 2024 (Trianaputri & Rantung, 2025). Data on hypertension cases in Southeast Sulawesi recorded 526,515 cases in 2021, dropping to 516,321 in 2022. Then, in 2023, the number increased to 568,601 cases, and then decreased again to 440,919 cases in 2024 (Southeast Sulawesi Provincial Health Office, 2025).

According to data from the Wakatobi Regency Health Office, hypertension consistently ranks among the top 10 most common diseases in Wakatobi Regency. In 2021, the number of cases was 3,291 (2.90%). In 2022, there were 3,030 (2.62%), in 2023, 4,252 (3.61%), and in 2024, there were 3,636 (3.06%). In 2022, the highest number of hypertension cases was at the Wangi-Wangi Selatan Community Health Center and the lowest at the Hoga Community Health Center (Wakatobi Regency Health Office, in the Wakatobi Regency Statistics Agency, 2025). According to data from the Wangi-Wangi Selatan Community Health Center (Puskesmas) in Wakatobi Regency, hypertension cases increased from 734 cases (3.54%) in 2020 to 833 cases (3.89%) in 2021, decreasing in 2022 to 414 cases (1.91%), then increasing to 666 cases (3.02%) in 2023. In 2024, cases decreased to 285 cases (1.27%), but from January to October 2025, the number increased again to 586 cases (2.62%) [9].

Hypertension is known as the silent disease because it often occurs without any symptoms, so sufferers are unaware they have it [10]. Symptoms of hypertension are difficult to recognize because they lack specific symptoms. Easily observable symptoms include dizziness, restlessness, flushing, ringing in the ears, shortness of breath, fatigue, and blurred vision [11]. The WHO states that hypertension is a serious medical condition that significantly increases the risk of heart, brain, kidney, and other diseases [12]. Hypertension control efforts must be developed through risk factor control and disease management programs. These services can be implemented through integrated post (Posbindu) for NCDs, integrated services at community health centers (Puskesmas), and advanced health facilities [13].

Hypertension is a non-communicable disease that requires special attention, especially in coastal areas. Three-quarters of Indonesia's territory is covered by ocean, resulting in approximately 60% of the Indonesian population living along the coast. Coastal areas are more prone to hypertension because coastal communities tend to consume high levels of sodium and cholesterol-containing foods. In addition to poor dietary habits, coastal communities also have poor behaviors, knowledge, and lifestyles, such as smoking, obesity, lack of exercise, and alcohol consumption, which can lead to hypertension [14]. The prevalence of hypertension is closely linked to influencing factors. These include age, gender, race, family history, genetic makeup, and others, while modifiable risk factors include obesity, excessive salt intake, inactivity or lack of exercise, a high-fat diet, tobacco use, and alcohol consumption [1].

Based on the above background, hypertension remains a major health problem globally and in Indonesia. The prevalence of hypertension at the South Wangi-Wangi Community Health Center is also still increasing, influenced by changes in community lifestyles, such as salt consumption, lack of physical activity, smoking, and other unhealthy habits. Therefore, the authors are interested in conducting a study entitled "Risk Factors Influencing the Incidence of Hypertension in Coastal Communities in the South Wangi-Wangi Community Health Center Work Area in 2025."

2. Material and methods

This research is an analytical observational study with a case-control study design. It aims to determine the risk factors influencing the incidence of hypertension in coastal communities within the South Wangi-Wangi Community Health Center (Puskesmas) working area in 2025. The study was conducted from January to February 2026. The population comprised all coastal communities within the South Wangi-Wangi Community Health Center working area, South Wangi-Wangi District. The sample size was 132 respondents, comprising 66 cases and 66 controls. The sampling technique used was non-random purposive sampling. Data were analyzed using univariate and bivariate methods. Univariate analysis was used to generate the distribution and percentage of each variable, and bivariate analysis was used to compare the case and control groups regarding risk factors using the chi-square statistical test at a 95% confidence interval (CI).

3. Results and discussion

3.1. Univariate Analysis

Table 1 Characteristics of Respondents in Coastal Communities in the South Wangi-Wangi Community Health Center Work Area in 2025 (n=132)

Respondent Characteristics	(n)	(%)
Gender		
Male	28	21.2
Female	104	78.8
Age		
25-34 years	22	16.7
35-44 years	14	10.6
45-54 years	49	37.1
55-64 years	38	28.8
≥65 years	9	6.8
Last Education		
No School	21	15.9
Elementary School	36	27.3
Junior High School	28	21.2
High School	42	31.8
College	5	3.8
Occupatio		
No Working	8	6.1
Housewife	77	58.3
Farmer	9	6.8
Fisherman	26	19.7
Self-Employed	12	9.1

Source: Primary Data, 2026

Based on table 1 above, out of 132 respondents (100.0%), the most common gender is female, namely 104 respondents (78.8%) and the least common gender is male, namely 28 respondents (21.2%). The most common age of respondents is 45-54 years old, as many as 49 respondents (37.1%) and the lowest age is ≥65 years old, as many as 9 respondents (6.8%). While the most recent education of respondents is high school as many as 42 respondents (31.8%) and the lowest is college as many as 5 respondents (3.8%). And the most common occupation of respondents is housewife as many as 77 respondents (58.3%) and the lowest is unemployed as many as 8 respondents (6.1%).

3.2. Bivariate Analysis

Table 2 Risk Factors of Family History with Hypertension Incidence in Coastal Communities in the Work Area of the South Wangi-Wangi Community Health Center in 2025

Family History	Hypertension Incident				Total		p-value	OR (95%CI)
	Case		Control					
	n	%	n	%	n	%	0.042	2.303 (1.093-4.851)
Yes	28	42.4	16	24.2	44	33.3		
No	38	57.6	50	75.8	88	66.7		
Total	66	100.0	66	100.0	132	100.0		

Source: Primary Data, 2026

Based on table 2, the case group had the most respondents who did not have a family history, namely 38 respondents (57.6%), while the fewest had a family history, namely 28 respondents (42.4%). In the control group, the most respondents did not have a family history, namely 50 respondents (75.8%), while the fewest had a family history, namely 16 respondents (24.2%). Based on the results of the chi-square test, a *p*-value of 0.042 was obtained, indicating that family history influenced the incidence of hypertension in coastal communities in the working area of the South Wangi-Wangi Community Health Center in 2025. The Odds Ratio value was 2.303 with a 95% Confidence Interval (CI) (1.093-4.851), which means that respondents who had a family history were at risk of suffering from hypertension by 2.3 times greater than respondents who did not have a family history.

Table 3 Risk Factors of Salt Consumption with Hypertension Incidence in Coastal Communities in the Work Area of the South Wangi-Wangi Community Health Center in 2025

Salt Consumption	Hypertension Incident				Total		p-value	OR (95%CI)
	Case		Control					
	n	%	n	%	n	%	0.000	4.329 (2.083-8.999)
High Risk	42	63.6	19	28.8	61	46.2		
Low Risk	24	36.4	47	71.2	71	53.8		
Total	66	100.0	66	100.0	132	100.0		

Source: Primary Data, 2026

Based on table 3, the most cases had high-risk salt consumption of 42 respondents (63.6%) and the least low-risk of 24 respondents (36.4%). In the control group, the most respondents had low-risk salt consumption of 47 respondents (71.2%) and the least high-risk of 19 respondents (28.8%). Based on the results of the chi-square test, a *p*-value of 0.000 was obtained, indicating that salt consumption affects the incidence of hypertension in coastal communities in the working area of the South Wangi-Wangi Community Health Center in 2025. The Odds Ratio value was 4.329 with a 95% Confidence Interval (CI) (2.083-8.999) which means that respondents with high-risk salt consumption had a 4.3 times greater chance of suffering from hypertension compared to respondents with low-risk salt consumption.

Table 4 Risk Factors of Physical Activity with Hypertension Incidence in Coastal Communities in the Work Area of the South Wangi-Wangi Community Health Center in 2025

Physical Activity	Hypertension Incident				Total		<i>p-value</i>	OR (95%CI)
	Case		Control					
	n	%	n	%	n	%		
Low	35	53.0	20	30.3	55	41.7	0.013	2.597 (1.272-5.301)
Moderate	31	47.0	46	69.7	77	58.3		
Total	66	100.0	66	100.0	132	100.0		

Source: Primary Data, 2026

Based on table 4, in the case group, the most respondents had low physical activity, as many as 35 respondents (53.0%) and the least moderate physical activity, as many as 31 respondents (47.0%). In the control group, the most respondents had moderate physical activity, as many as 46 respondents (69.7%) and the least low physical activity, as many as 20 respondents (30.3%). Based on the results of the chi-square test, a p-value of 0.013 was obtained, indicating that physical activity affects the incidence of hypertension in coastal communities in the working area of the South Wangi-Wangi Community Health Center in 2025. The Odd Ratio value was 2.597 with a 95% Confidence Interval (CI) (1.272-5.301), which means that respondents who have low physical activity are at risk of suffering from hypertension by 2.5 times greater than respondents who have moderate physical activity.

Table 5 Risk Factors of Smoking with Hypertension Incidence in Coastal Communities in the Work Area of the South Wangi-Wangi Community Health Center in 2025

Smoke	Hypertension Incident				Total		p-value	OR (95%CI)
	Case		Control					
	n	%	n	%	n	%	0.831	0.834 (0.361-1.925)
Smoke	13	19.7	15	22.7	28	21.2		
Do not smoke	53	80.3	51	77.3	104	78.8		
Total	66	100.0	66	100.0	132	100.0		

Source: Primary Data, 2026

Based on table 5, in the case group, the most respondents did not smoke, as many as 53 respondents (80.3%) and the least who smoked were 13 respondents (19.7%). In the control group, the most respondents did not smoke, as many as 51 respondents (77.3%) and the least who smoked were 15 respondents (22.7%). Based on the results of the chi-square test, a p-value of 0.831 was obtained, indicating that smoking did not affect the incidence of hypertension in coastal communities in the working area of the South Wangi-Wangi Community Health Center in 2025. The Odd Ratio value was 0.834 with a 95% Confidence Interval (CI) of 0.361-1.925.

Table 6 Risk Factors for Obesity with Hypertension Incidence in Coastal Communities in the Work Area of the South Wangi-Wangi Community Health Center in 2025

Obesitas	Hypertension Incident				Total		p-value	OR (95%CI)
	Case		Control					
	n	%	n	%	n	%	0.048	2.191 (1.067-4.499)
Obesity	31	47.0	19	28.8	50	37.9		
Not Obese	35	53.0	47	71.2	82	62.1		
Total	66	100.0	66	100.0	132	100.0		

Source: Primary Data, 2026

Based on table 6, in the case group, the most respondents were not obese, as many as 35 respondents (53.0%) and the least obese were 31 respondents (47.0%). In the control group, the most respondents were not obese, as many as 47 respondents (71.2%) and the least obese were 19 respondents (28.8%). Based on the results of the chi-square test, a p-value of 0.048 was obtained, indicating that obesity affects the incidence of hypertension in coastal communities in the working area of the South Wangi-Wangi Community Health Center in 2025. The Odd Ratio value was 2.191 with a 95% Confidence Interval (CI) (1.067-4.499), which means that obese respondents were at risk of suffering from hypertension by 2.1 times greater than non-obese respondents.

3.2.1. Risk Factors of Family History and Hypertension in Coastal Communities in the Work Area of the South Wangi-Wangi Community Health Center in 2025

Family history is a record or information about the health conditions of previous family members that can influence a person's risk of developing certain diseases. As an unmodifiable risk factor, family history is a major determinant of an individual's susceptibility to hypertension. Respondents with a history of hypertension, whether from parents, grandparents, or other relatives, tend to be at higher risk of developing hypertension [15]. The results of this study

indicate that family history is a risk factor for hypertension in coastal communities in the South Wangi-Wangi Community Health Center (Puskesmas) work area in 2025. Respondents with a family history were 2.3 times more likely to develop hypertension than those without a family history. Individuals with parents with hypertension were at greater risk of developing hypertension than those without a family history. However, this does not mean that all individuals with a family history of hypertension will develop hypertension, as hypertension is influenced by various factors. Individuals without a family history remain at risk of developing hypertension if exposed to other risk factors [16]. This is because symmetric genes in the body signal the aldosterone synthase gene, resulting in ectopic aldosterone production, mutations in the endothelial sodium channel gene, and increased aldosterone activity, suppressed plasma renin activity, and hypokalemia. Increased aldosterone can trigger increased fluid retention, leading to increased blood pressure [17]. This is in line with the theory that if one parent suffers from hypertension, there is a 25% chance of inheriting the condition through genetics. However, if both parents suffer from hypertension, the likelihood of someone developing hypertension increases to 60% based on family history [18].

This study aligns with research conducted by Ayukhaliza & Ismah, 2023 [19], which showed a p-value of 0.000 and an OR of 5.066. This means that respondents with a family history are 5.0 times more likely to develop hypertension than those without. This study is also in line with research conducted by Qorina et al., 2023 [20] which shows that there is a relationship between family history and the incidence of hypertension with a p-value of 0.011 and an OR value of 3.407 is obtained, which means that respondents who have a family history are at risk of developing hypertension by 3.4 times compared to those who do not have a family history.

3.2.2. Risk Factors Linked to Salt Consumption and Hypertension in Coastal Communities in the South Wangi-Wangi Community Health Center Work Area in 2025

Salt consumption is a modifiable risk factor for hypertension, but lack of awareness contributes to poor food choices. It is known that the recommended daily sodium intake for adults is <2 grams, equivalent to 5-6 grams of NaCl, or approximately 1 teaspoon [21]. The study showed that salt consumption was a risk factor for hypertension in coastal communities in the South Wangi-Wangi Community Health Center work area in 2025. Respondents with high salt consumption were 4.3 times more likely to develop hypertension than those with low salt consumption. Sodium absorbed into the blood vessels from high salt consumption causes water retention, increasing blood volume. This leads to increased blood pressure. High sodium intake will cause excessive secretion of natriuretic hormone, which indirectly increases blood pressure [22]. Therefore, the WHO recommends limiting salt consumption to less than 5 grams per day as an effort to prevent hypertension and cardiovascular disease [23]. In the study, most respondents had a habit of consuming more than one teaspoon of salt per day when cooking. They also frequently consumed high-salt foods such as salted fish, salted eggs, pickles, and ready-to-eat foods, including instant spices and flavorings. High sodium intake, whether from table salt or processed foods, can cause fluid imbalances in the body because sodium plays a role in water retention. This can increase blood volume, ultimately impacting blood pressure [22].

This study is in line with the study conducted by Mulyasari et al., 2023 [24] which obtained a p-value = 0.000 with an OR value = 5.458 (2.498-11.928), so it can be interpreted that salt consumption is a risk factor for hypertension and those who consume excess salt are at risk of 5.458 times greater to experience hypertension compared to those who consume sufficient salt. This study is also in line with the study by Tanggela et al., 2022 [25] which shows there is a relationship between salt consumption behavior and the incidence of hypertension with a p-value = 0.047 and an OR value = 2.406 (1.086-5.332) which means that respondents who consume high salt are at risk of facing hypertension by 2.406 times compared to respondents who consume normal salt.

3.2.3. Risk Factors of Physical Activity and Hypertension in Coastal Communities in the South Wangi-Wangi Community Health Center Work Area in 2025

Physical activity is a significant factor in blood pressure stability. Research results indicate that physical activity is a risk factor for hypertension in coastal communities in the South Wangi-Wangi Community Health Center work area in 2025. Respondents with low physical activity had a 2.5-fold greater risk of developing hypertension compared to respondents with moderate physical activity. Low physical activity can lead to hypertension because the body becomes less active in maintaining heart function and blood vessel elasticity. When a person rarely engages in physical activity, blood vessels tend to stiffen, impeding blood flow and increasing peripheral resistance. As a result, the heart must pump blood harder to meet the body's needs. Furthermore, physical inactivity can increase sympathetic nerve activity, triggering the release of the hormones adrenaline and noradrenaline. These hormones cause an increased heart rate and narrowing of blood vessels (vasoconstriction), resulting in increased blood pressure [26]. Respondents with hypertension engaged in lower levels of physical activity due to a lack of free time for exercise. When they did have free time, they typically engaged in moderate- to vigorous-intensity physical activity only two to three days a week for ten to thirty minutes per day. Furthermore, most respondents walked, but only for about 10-20 minutes and not daily, thus not providing optimal

benefits in controlling blood pressure [27]. This research supports the theory that inactive individuals tend to have higher heart rates, causing the heart muscle to work harder with each contraction. The harder the heart muscle works to pump blood, the greater the burden of hypertension on the artery walls [26].

This research aligns with research conducted by Malo et al., 2024 [28], which showed a relationship between physical activity and the incidence of hypertension with a p-value of 0.026 and an OR of 2.183. This means that individuals with low levels of physical activity are 2.1 times more likely to develop hypertension than those with vigorous levels of physical activity. This study is also in line with research conducted Tanggela et al., 2022 [25] which showed that there was a relationship between physical activity and the incidence of hypertension, with a p value of 0.026 and an OR value of 2.749 (1.205-6.268) which means that respondents who have poor physical activity are at risk of experiencing hypertension 2.749 times compared to respondents who have good physical activity behavior.

3.2.4. Risk Factors of Smoking and Hypertension in Coastal Communities in the Work Area of the South Wangi-Wangi Community Health Center in 2025

Smoking is a modifiable risk factor for high blood pressure. Long-term effects of smoking include blood vessel damage, endothelial dysfunction, increased inflammatory chemicals, and high blood pressure [29]. The results of this study indicate that smoking did not affect the incidence of hypertension in coastal communities in the work area of the South Wangi-Wangi Community Health Center in 2025. Therefore, the researchers can conclude that smoking is not a risk factor for hypertension in coastal communities in the work area of the South Wangi-Wangi Community Health Center in 2025. The lack of an effect was due to the unequal distribution of respondents between smokers and nonsmokers. It was also influenced by the characteristics of the respondents, who were predominantly women who did not smoke, although they were still exposed to cigarette smoke daily from their surroundings. Furthermore, the cigarettes they smoked were filtered cigarettes, which have a filter at the tip that functions to reduce some of the harmful substances in inhaled cigarette smoke. However, even using filtered cigarettes doesn't mean they're safe [25]. Therefore, the results of this study indicate that the effects of smoking haven't yet become significant, not that smoking isn't harmful to health. The increase in blood pressure caused by nicotine occurs immediately after the first puff. Nicotine is absorbed by the tiny blood vessels in the lungs and circulates into the bloodstream. The brain reacts to nicotine by signaling the adrenal glands to release epinephrine (adrenaline). This hormone constricts blood vessels and forces the heart to work harder due to the increased pressure [30].

This study is in line with the study conducted by Mulyasari et al., 2023 [24] which showed a p-value = 0.761 which means that there is no relationship between smoking status and the incidence of hypertension at the age of 35-59 years in the working area of the Kebumen I Community Health Center. This study is also in line with the study conducted by [31] which obtained a p-value of 0.901 which means smoking is not a risk factor for hypertension with an OR value of 0.901 (0.368-2.205). In contrast to the study conducted by Nubatonis *et al.*, 2024 [32] which showed the results of the chi-square analysis of the relationship between smoking habits and the incidence of hypertension $p = 0.001$ and $OR = 4.231$ (1.851-9.669). This means that respondents who are smokers are at risk 4.231 times compared to respondents who do not smoke.

3.2.5. Obesity Risk Factors for Hypertension in Coastal Communities in the South Wangi-Wangi Community Health Center Work Area in 2025

Obesity is defined as a body weight exceeding a body mass index (BMI) of 25, which increases the risk of developing hypertension. The greater the body mass, the greater the need for blood to supply oxygen and nutrients to body tissues [33]. The study showed that obesity was a risk factor for hypertension in coastal communities in the South Wangi-Wangi Community Health Center work area in 2025. Obese respondents had a 2.1-fold greater risk of developing hypertension compared to non-obese respondents. Obesity increases the risk of hypertension because the accumulation of body fat can lead to increased sympathetic nervous system activity, insulin resistance, and activation of the renin-angiotensin-aldosterone system (RAAS), which plays a role in blood vessel constriction and fluid retention. These conditions make the heart work harder, resulting in increased blood pressure. Furthermore, obesity also causes impaired blood vessel function due to chronic inflammation and fat accumulation in the abdominal area [34]. Many of the respondents were elderly, contributing to obesity, which is then linked to hypertension. With age, metabolism declines and physical activity decreases, resulting in an imbalance between energy intake and energy expenditure. This condition leads to fat accumulation in the body, leading to obesity. In the elderly, obesity can increase the workload of the heart and cause narrowing and stiffening of blood vessels [35].

This study aligns with research conducted by Herdiani et al., 2021 [36], which found a p-value of 0.000 and an OR of 6.906 (2.565-18.595), indicating that obesity increases the risk of hypertension by 6.906 times compared to non-obese individuals. This study is also in line with the study conducted by Mayarni et al., 2020 [37] which showed that there was

a relationship between obesity and the incidence of hypertension in the community in Air Tiris village, Kampar Health Center UPTD Working Area with a p value = 0.004 and an OR value = 3.676, which means that respondents who are obese have a 3.676 times greater risk of triggering hypertension than those who are not obese.

4. Conclusion

Based on the results of the study, it can be concluded that family history, salt consumption, physical activity, and obesity are risk factors for hypertension, while smoking is not. These findings indicate that hereditary factors and lifestyle, especially high salt consumption, low physical activity, and obesity, play a role in the development of hypertension in coastal communities in the working area of the South Wangi-Wangi Community Health Center (Puskesmas) in 2025. From the results of this study, the community is expected to adopt a healthy lifestyle by reducing salt consumption, increasing physical activity, maintaining ideal body weight, and having regular blood pressure checks. Future researchers are advised to examine other risk factors that have not been studied to obtain a more comprehensive picture of the factors associated with hypertension.

Compliance with ethical standards

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Disclosure of conflict of interest

All authors involved in this scientific article have no conflicts of interest.

Statement of informed consent

All respondents involved in this study have expressed their consent to be interviewed and to provide information as needed for the research.

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