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# Predictable risk factors for pre-hypertension among adults using neuman systems model

## Abstract

**Purpose:** Guided by Neuman Systems Model, the study was to ascertain the likelihood intrapersonal and extra-personal risk factors for pre-hypertensive event in adulthood.

**Design:** A cross-sectional study included a convenience sample of 150 adults with pre-HTN in health district of Pissy.

**Methods**: Data were collected by using the WHO STEPS, Spiritual Well-being Scale, Perceived Stress Scale, and blood pressure measurement. Multiple Logistic Regressions and Structural Equation Modeling techniques were used to analyze data.

**Findings:** Among the 150 participants, 41% had low and 59% had high pre-HTN. The analysis revealed income < $500 per month, elevated waist-to-hip ratio in women, obesity, and being widowed predicted pre-HTN SBP/DBP event. Physical inactivity in workplace and current smoke's cigarette predicted pre-HTN SBP event. In the Spiritual/Religious Well-being Scale, *failure in the belief that God is concerned about personal problems,* OR=4.65 p<.01; *not feeling most fulfilled when in close communion with God*, OR=.33, p<.05; *failure in relation with God contributes to personal sense of well-being*, OR=6.34, p<.018 and OR=4.32, p<.006, predicted pre-HTN SBP/DBP events. In the Perceived Stress Scale, *feeling nervous and stressed in the last month*, OR=.43, p=.028 predicted pre-HTN SBP. The path analysis unveiled 10% of the variance in pre-HTN event was explained by the socio cultural factors; 4.3% by the psychological; 6.5% of the variance in pre-HTN SBP and 8.0% in pre-HTN DBP accounted for religious well-being factors, while 8.4% in pre-HTN SBP event was justified by existential well-being factors. Lastly, 22.7% of the variance in pre-HTN systolic/diastolic event accounted for the developmental factors.

**Conclusion:** This study finding constitutes a basis for further research interventions tailoring prevention to reduce pre-hypertensive among adults in West Africa, Burkina Faso.

**Clinical relevance:** A nursing model as a Neuman Systems Model provides a holistic assessment of likelihood risk factors for pre-hypertensive event among adults. The model can be used in community and clinical setting not only to assess risk factors and but also to guide quasi-experimental study for prevention as intervention to reduce modifiable diseases.

**Keywords:** prevalence, risk factors, pre-hypertension, adults, West Africa

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## Pre-hypertension among adults in West Africa

Pre-hypertension is a precursor of hypertension and subsequently a major cardiovascular diseases and is clinically stratified in two subcategories of abnormal blood pressure: (a) a low subcategory with a blood pressure (BP) of 120-129/80-84 mmHg and (b) a high subcategory with a BP of 130-139/85-89 mmHg.[1] Pre-hypertension has been neglected by the healthcare systems and providers across the developed and developing countries. However, many studies have demonstrated that adults with pre-hypertension have a greater risk for stroke, heart failure, and coronary heart diseases as compared to adults with normotensive BP.[2–4] In West African countries, trends of pre hypertension and hypertension are rising among the adults along with untold deaths of consequences. For instance, in Burkina Faso stroke and coronary heart diseases represented 3.36% and 2.79% of total causes of deaths respectively among the top 50 causes of death.[5,6] According to the World Health Organization (2012), stroke was the second cause of death 146.02 deaths per 100, 000 populations, while coronary heart diseases were the third cause of death representing 120.30 per 100,000 population in Burkina Faso. In Nigeria, a neighborhoods country, the prevalence of hypertension among adults fluctuated from 2.1% to 47.2% in a sample of 400 participants,[7] whereas in Ghana the prevalence of pre-hypertension and hypertension was 30.7% and 42.4%, respectively in a sample of 6,000 participants.[8] In a sample of 1,431 participants aged 18 years or older, the study older. [9] uncovered that 40% were pre-hypertensive. Prevalence and risk factors are preventable with educational approaches. In recent years, studies have assessed intrapersonal factors such as age, sex, waist circumference, body mass index, triglycerides, and cholesterol levels as risk profiles for pre-hypertension in adults.[9–11] Furthermore, extra personal factors such as smoking, alcohol consumption, physical inactivity, and high sodium diets are also attributed to increased risk profiles.[11,12] Knowledge of intrapersonal and extra personal risk factors for pre-hypertension can then be used to shift the effects of foremost risks associated with the disease. These factors are also measurable upon investigation and might be responsive to early intervention. Identifying the intrapersonal and extra personal risk profiles is an essential precondition for selecting effective prevention measures and decreasing the major cardiovascular diseases. However, in West African countries, none study guided by a Neuman Systems Model has assessed the intrapersonal and extra personal risk factors for pre-hypertension, especially among adults in Burkina Faso. Guided by Neuman Systems Theoretical Framework (Figure 2).[13] Intrapersonal

(i.e., physiological, psychological, developmental, and spiritual variables) and extra personal (i.e., , socio cultural variable) risk factors can affect the stability of adult system's health.[13] Thus, the aim of this study was ascertain the correlated and predictive intrapersonal and extra personal risk factors for pre-HTN among adults in urban health districts.

## Guiding theoretical framework: neuman systems model

### Origin of the neuman systems model

The Neuman Systems Model (NSM) was developed in 1970 by Betty Neuman and was first published in Nursing Research Journal in 1972.[14] The philosophical and theoretical underpinnings are based on the general systems theory,[15] the wholeness of life,[16] the field theory[17] and the typology of prevention as interventions.[18] In addition, the model was undergirded by the theory of stress and adaptation,[19] and the theory of stress and coping.[20] Neuman (1970) provided a wholistic perspective for nursing assessment and directions for actions to stabilize a person health.

### The worldview of neuman systems model

Neuman's model is based on the philosophy that emphasizes the wholism in human beings. In this perspective of wholistim and nursing caring, Neuman added spirituality to the model as an innate component of the human being that interrelates with all the other variables of the human system.[21] Wholism unlike holism is, applied to the human being as a multipartite but not a bipartite (body and mind or soul) even tripartite (body, mind, and soul or spirit). All parts act interactively and iteratively in the process of stabilizing the core energy of the human system. In this study, the researcher espoused the philosophical assumption of the wholism that is relevant scaffolding before proceeding with the exploration of spiritual/religious stressors among adults with pre-hypertension.

### Application of the pre-hypertension through neuman systems model

Although the Neuman System Model has been used broadly by nurse researchers in USA, no study has integrated its use with the intrapersonal and extra personal risk factors for pre-hypertensive event among adults. As depicted in Figure 2, the conceptual framework based on the NSM identified the clients as adults as well as research participants. According to this model, internal and external stressors continuously interact on the lines of defenses and resistances in the adult system.[13,21,22] If the normal line of defense (NLD) is disrupted because of internal and external risk stressors, then the negative effect in the physiological variable is slightly elevated blood pressure (SEBP) with parameters as described in the pre-hypertensive state (i.e., BP, 120-139/80-89 mmHg). The internal and external risk stressors are powerful factors that disrupt the adult system through the NLD. As a result, a complete disruption of the NLD affects the first line of resistance that may explain the high level of blood pressure (i.e., BP≥140 mmHg/90 mmHg) in the adult system. However, possible collapse of the second and the third lines of resistance can jeopardize the stability of the whole adult system if early nursing interventions were not initiated. Prominent failure in the basic structural energy of the adult system represents the level of stroke, myocardial infarction, heart failure, or coronary heart diseases. If a medical and nursing emergencies' interventions are not initially instituted in the adult system to strengthen the lines of defenses and resistances, then the basic structural energy source's fails; and death likely occurs. Timely assessment of the adult system involves blood pressure monitoring and interpersonal and intrapersonal risk factors for pre-hypertensive event are required to restore and maintain the health of adult system.

In this study, the components of blood pressure, 120 to 139mmHg (systolic) and 80 to 89mmHg (diastolic) in the physiological variable is the centerpiece for the estimation of pre-hypertensive prevalence. A stressor becomes an intrapersonal or extra personal risk when it negatively affects the blood pressure in the adult system.[21,22] Proposed that a risk stressor can be any environmental factor which may potentially affect the stability of the client system. Risk factors can be grouped in three categories within the adult system: (a) intrapersonal risk factors occurring within the system, (b) extra personal risk factors from outside of the system and influencing the system, and (c) interpersonal risk factors from the interaction between two systems. The intrapersonal and extra personal risk factors are particularly germane to this study. The intrapersonal risk factors for pre-hypertension can be accessed from the physiological, developmental, spiritual, and psychological variables, while the extra personal risk factors emerge from socio cultural variables.

## Methods

### Study participants

A cross-sectional design type descriptive was used and adult participants were recruited from the health district of Pissy in Ouagadougou. The population of Pissy health district was 638,234 inhabitants including 165,303 women and 148,070 men.[23] The accessible adult participants were the portion of the target population who met the following inclusion criteria: Any adults from diverse ethnicities and having a BP between 120-139/80-89 mmHg based on the JNC-7 definition of pre-hypertension, aged of 18 to 60 years, were able to read and write in French or English with a minimum primary school education and resided in the health district of Pissy. Exclusion criteria were set up at BP greater or lesser than 120-139/80-89mmHg, taking anti-hypertensive and anti-diabetes mellitus medications, and having history of stroke, myocardial infarction, angina, and other chronic diseases. Travelers, hospitalized, or adults with impaired cognitive abilities such as inability to communicate verbally were excluded. A convenience sampling technique was used to select the population sample and the Cochran's sample size formula $N = Z^2_{1-\alpha/2}(1-P)P/\varepsilon^2$ was used to obtain 150 adults.[24]

### Data collection

Participant recruitment approval was secured from the Azusa Pacific University Institutional Review Board (IRB) (Azusa, California, USA) and the National Health Ethics and Human Right Committee of Regional Health Department of Center in Burkina Faso. The investigation took place in the urban health district of Pissy. Data were collected between July10th and August 23rd 2013 using a WHO STEP questionnaire, Spiritual/Religious Well-being Scales, and Perceived Stress Scale in health district of Pissy. Interviews, blood pressure, waist and hip circumferences, height, and weight measurements were conducted in the district health centers, while lipids blood test such as total cholesterol, low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglycerides were performed in laboratories of the health district. Adult participants were asked to sit quietly for 15 minutes before their

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SBP and DBP measurements, using a standardized sphygmomanometer and cuffs of appropriate sizes. Participants were advised to avoid cigarette smoking, alcohol, caffeinated beverages, and exercise for at least 30 minutes before their BP measurement. Measurements were taken twice if readings vary by 10mmHg. The Korotkoff phase one (appearance) and phase fifth (disappearance) were recorded for the SBP and DBP, respectively. Physical measurements such as weight, height, waist, and hip circumference were recorded. Body weight was measured in light clothing using an adult weight scale placed on a firm, level surface and the height measurement was also recorded without shoes using a wall-mounted stadiometer Seca 217. The WHO's classification of body mass index was used to determine the normal weight (BMI≥18.5 –24.9 kg/m$^2$), overweight (BMI≥25–29.9 kg/m$^2$), and obesity (BMI≥30 kg/m$^2$). A waist–hip ratio above 0.90 for males or above 0.85 for females based on WHO STEPS was defined as an abdominal obesity.

### Data analysis

Data were analyzed using a software package for statistical analysis (SPSS) version 21.0. Descriptive statistics were used to present the basics features of the variables while inferential statistics were used to corroborate the correlations and predictability of pre-hypertensive SBP/DBP event from developmental, socio-cultural, psychological, and spiritual variables. Pearson Product-Moment correlation was used to determine the relationship among high pre-hypertension, intrapersonal, and extra personal risk factors' variables. In addition, multiple logistic regressions type forward stepwise was performed to determine the best predictors of pre-hypertensive SBP/DBP events in the adults. A Linear Structural Equation Modeling with multiple logistic regressions and path diagrams were also used to demonstrate the model fit and the causal modeling between the five interacting variables and the pre-HTN SBP/DBP event.

## Results

### Sample characteristics

A sample population of 150 adults with pre-hypertension was involved in this study. Sixty-five percent (n=98) were adult females whereas 35% (n=52) were adult males. The age range was 25 to 58 years with a mean of 41.08 years and SD=8.10 years. The lifestyle behavior including diets, physical activities in workplace, alcohol drinking, and cigarette smoking was presented in Table 1. The body mass index (BMI) was computed and the results showed that 38% of participants were overweight and 19% were obese compared with 41% of those who had a normal weight. Only, 1.3% of them were underweight and severely obese respectively (Figure 1).

### Associated risk factors for high pre-hypertensive SBP/DBP event

Among the 150 participated adults with pre-hypertensions, 41% (n=62) of them had a low pre-hypertension (120-129/80- 84mmHg) compared to 59% who had high pre-HTN (13-139/85-89mmHg) in terms of SBP and DBP respectively. Bivariate correlation was used to test the strength of relationship between probable risk factors and high pre hypertension (130-139mmHg/ 85-89mmHg) among young adults. Table 2 shows that seven out of the 105 correlations were statistically significant and were greater or equal to .20. Three correlations from developmental variables: Weight, r (88)=.200, p=.015; WC in men, r (88)=.201, p=.021; and BMI with obesity, r (88)=.269, p<.001; were moderately and positively correlated with high pre-HTN event (130-139 mmHg/ 85-89 mmHg) compared to two socio cultural variables: the household income, r (88)=-.204, p=0.012 and physical inactivity in workplace, r (88)=-.217, p<.008 which were moderately and negatively correlated with high pre-HTN occurrence. In addition, two spiritual variables: failure in *relation with God contributes to a sense of well-being*, r (88)=-.243, p=.003, and *failure in belief that God is concerned about personal problems*, r (88)=-.236, p=.004 were also moderately and negative correlated with high pre-HTN event. In summary, 4% of the variability of the high pre-hypertension in adult is significantly shared by the variability in weight, waist circumference in men, physical inactivity in workplace, or household income, while 7% of the variability of pre-hypertension is significantly shared by the variability in obesity. Only, 5% of the variability in pre-hypertension in adult is significantly shared by the variability in failure of relationship with God that contributes to a sense of well-being or failure in belief that God is concerned about personal problems respectively.

**Table 1** Demographic Characteristics of Female and Male Adults with Pre-hypertension in the Health District of Pissy, Burkina Faso, (n = 150)

| Demographic Variables | Frequency | Proportion |
|---|---|---|
| Marital Status | | |
| Never Married | 20 | 13 |
| Currently Married | 113 | 75 |
| Divorced | 2 | 1 |
| Widowed | 2 | 1 |
| Cohabitating | 13 | 10 |
| Household Income per Month | | |
| High income > $1000 | 12 | 8 |
| Middle income $500 to $1000 | 55 | 37 |
| Low income<$500 | 83 | 55 |
| Current Cigarette Smoker | | |
| Yes | 18 | 12 |
| No | 132 | 88 |
| Diets with Vegetable | | |
| Yes | 134 | 89 |
| No | 16 | 11 |
| Physical Activity by Walking/Bicycle | | |
| Yes | 84 | 56 |
| No | 66 | 44 |

### Intrapersonal risk factors for pre-hypertensive SBP/DBP events

Multiple logistic regressions and path analysis were conducted to provide estimates for the model's parameters, to predict the pre-HTN SBP/DBP events from the direct effects of the developmental, socio cultural, psychological, and spiritual variables.

 

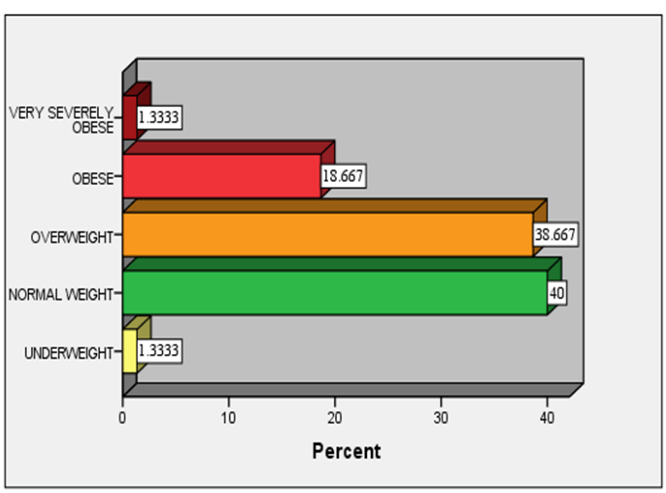


**Figure 1** Distribution of Body Mass Index of 150 Male and Female Adults with Pre-hypertension in the Health District of Pissiy, Burkina Faso.

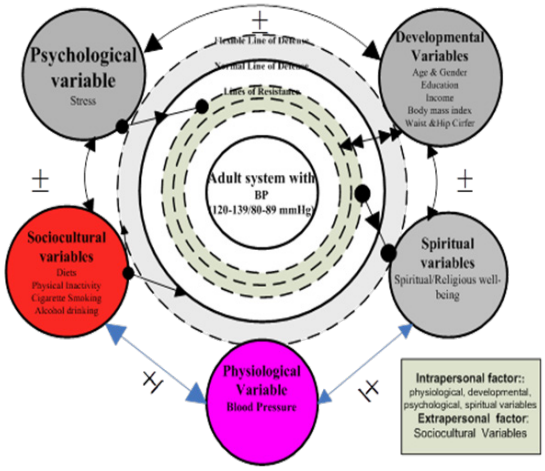


**Figure 2** Conceptual frame work for assessment of risk factors for pre-hypertension in adults in urban health district of Burkina Faso. Adapted from the Neuman system model by B Neuman, 1995, Boston. MA.

## Developmental risk factors and pre-hypertension

Household incomes <$500 per month, OR=.642, 95% CI [.13; 2.97], elevated Waist-to-Hip ratio in women, OR=.243, 95% CI [.069; .857], and BMI with obesity, OR=.132, 95% CI [0.04; 0.43]. Were predictors of SBP events. Four variables were predictors of DBP event: Household incomes <$ 500 per month, OR=.642, 95% CI [.23; 4.76], elevated Waist-to-Hip ratio in women, OR=.257, 95% CI [.07; .88], and BMI with obesity, O=.132, 95% CI [.26; .09], and being widowed OR=.330, 95% CI [.13; .79] (Table 3 and 4). Using the maximum likelihood estimation in LISREL 9.10,[25] the measurement model provided an acceptable fit to the data $\chi^2(33, N = 150) = 353.038, p = .000)$. The causal pathway analysis hypothesizes that the increase in overweight (β=.01), obesity (β=.05), and WHR in women (β=.18) and the decrease of household income < $500.00 per month (β= .06), is associated with the increase of pre-HTN SBP event in adults.

## Spiritual well-being risk factors and pre-hypertension

Religious Well-being Scale's 10 items were analyzed and the results showed that the item failure in *belief that God is concerned about personal problem,* was significant predictor on the incidence of pre-hypertensive SBP event (Wald=6.341, OR=4.65, p<.012), and DBP event (Wald=5.506, OR=4.16, p<.019) in adults, while, the item, *Not feeling most fulfilled when in close communion with God,* was significant predictor on the event of pre-hypertensive DBP (Wald=3.618, OR=.33, p<.05). The model explained 6.5% of the variance in pre-hypertensive SBP event and 8.0% of the variance in pre-hypertensive DBP incident (Table 5). In addition, by analyzing the existential well-being scale's items and the predictability of pre-hypertensive event, failure in *relationship with God contributes to personal sense of well-being,* was a significant predictor on the incidence of pre-hypertensive SBP event (Wald=5.597, OR= 6.34, p<.018) and DBP event (Wald=7.462, OR=4.32, p< .006) (Table 6). The model explained 8.4% of the variance in pre-hypertensive SBP event, (Nagelkerke's $R^2$ = .084,-2Log LL=186.68, $\chi^2(1, N = 150) = 9.26, p = .002$ ), and 5.7% of the variance in pre-hypertensive DBP incident (Nagelkerke's $R^2$ =0.057,-2Log LL=188.89, $\chi^2(1, N = 150) = 6.28, p = .012$ ). The causal pathway analysis hypothesizes that the decrease in *belief that God is concerned about my problems*, is associated with the increase of pre-hypertensive SBP and DBP event in adults (β=-.63 and β=-.45); while the decrease of *I feel most fulfilled when I'm close communion with God,* is associate with the increase of pre-hypertensive DBP event. In addition, the decrease in *my relation with God contributes to my sense of well-being,* is also associated with the increase of pre-hypertensive SBP (β=-.36) and DBP (β=-.36) events in adults.

## erceived stress risk factors and pre-hypertensive SBP/DBP event

Perceived Stress Scale's items were also performed to determine the predictability of pre-hypertensive SBP and DBP event. The results showed that feeling nervous and stressed in the last month, was significant predictor on the pre-hypertensive SBP event (Wald=4.82, OR=.43, p=.028) but not significant predictor on pre-hypertensive DBP event (Wald=3.10, OR=.47, p=.07). The model explained 4.3% of the variance in pre-hypertensive SBP event (Nagelkerke's $R^2$ =0.043, -2Log LL=198.52, $\chi^2(1, N = 150) = 4.88, p = .027$ ) (Table 7). The causal pathway analysis results indicated that the increase in *feeling nervous and stressed,* holding the remaining variables is associated with the increase of pre-hypertensive SBP (β=.54) and DBP (β=.17) events in adults.

## Physiological risk factors (total cholesterol, triglycerides, LDL-C, HDL-C) and pre-hypertensive SBP/DBP event

Findings show that total cholesterol, triglycerides, *LDL-C, HDL-C of participants* predict pre-hypertensive SBP and DBP event but not significant, p>.05.

## Extrapersonal risk factors for pre-hypertensive SBP/DBP events

**Socio cultural risk factors (diets, physical inactivity, alcohol drinking, cigarette smoking) and pre-hypertensive SBP/DBP event:** Socio cultural risk factors were analyzed and the results indicated that moderate physical inactivity in workplace (Wald=7.50,

OR=2.98, p=.006) and cigarette current smoking (Wald=3.94, OR=.34, p=.047) were significant predictors on the pre-hypertensive SBP event. The model explained 10% of the variance in pre-hypertensive SBP event, (Nagelkerke's $R^2$ =.099, -2Log LL=191.92, $R^2\chi^2(2, N = 150) = 11.43, p = .003$). The model theorizes that the decrease in *physical activity in workplace* (β=-.76), is associated with the increase of pre-hypertensive SBP while the increase in smoking cigarette currently (β=.02), is correlated with the increase of pre-hypertensive SBP event in adults.

**Table 2** Correlations between Risk Factors from Socio cultural, Developmental, Physiological, Psychological, Spiritual Determinants and High Pre-Hypertension (130-139/8-89mmHg) (n = 88).

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| High Pre-HTN (130-139/85-89 mmHg) | 1 | | | | | | | | | | | | | | |
| PA (Walking/ Bicycle) | 0.117 | 1 | | | | | | | | | | | | | |
| Moderate PA/ workplace | -.217** | 0.05 | 1 | | | | | | | | | | | | |
| Weight | .200* | 0.04 | 0.13 | 1 | | | | | | | | | | | |
| WC | 0.133 | -0.03 | 0.04 | .589** | 1 | | | | | | | | | | |
| WC, Men | .201* | -0.07 | 0.04 | .582** | .686** | 1 | | | | | | | | | |
| God is concerned about Problems | -.236** | -0.01 | 0.05 | 0.032 | 0.012 | 0.091 | 1 | | | | | | | | |
| Relation -God contributes SWB | -.243** | -0.1 | -0.03 | -0.035 | -0.108 | -0.033 | .186* | 1 | | | | | | | |
| I feel good about my future | -0.138 | -0.1 | 0.11 | 0.059 | 0 | -0.021 | 0.159 | .191* | 1 | | | | | | |
| Feeling nervous and stressed | -0.116 | -0.01 | 0.1 | 0.063 | 0.058 | 0.049 | -0.001 | 0.058 | 0.064 | 1 | | | | | |
| Feeling that things were going your way. | -0.095 | -0.01 | 0.05 | 0.085 | 0.063 | 0.063 | -0.016 | -0.112 | -0.045 | -0.01 | 1 | | | | |
| Failure to cope with other things | 0.027 | 0.07 | 0.1 | -0.153 | 0.002 | -0.03 | -0.041 | 0.086 | .213** | -0.02 | 0.15 | 1 | | | |
| BMI, underweight | -0.062 | -0.07 | -.24** | -.657** | -.407** | -.437** | -0.01 | 0.01 | -0.01 | 0.05 | -.17* | 0.06 | 1 | | |
| BMI, obesity | .269** | 0.08 | 0.033 | .633** | .439** | .543** | -0.109 | -0.101 | -0.02 | -0.05 | 0.05 | 0.08 | -.41** | 1 | |
| Household Middle income ($ 500 to $ 1000) | -.204* | -0.03 | 0.126 | 0.09 | .196* | 0.117 | 0.006 | -0.006 | 0.12 | 0.02 | -0.04 | 0.01 | -0.03 | -0.01 | 1 |

*p < .05; **p < .01; BMI, body mass index, WC, Waist Circumference; PA, physical activity.

**Table 3** Stepwise Multiple Logistic Regression Analysis Summary of the Development Variables in Predicting Pre-hypertensive SBP Event (n = 150)

| | | | | | Lower | Upper |
|---|---|---|---|---|---|---|
| Household Income < $500 | -2.443 | 8.482** | 0.014 | 0.642 | 0.139 | 2.971 |
| Household Income > $ 1,000 | -1.499 | 3.426 | 0.064 | 0.223 | 0.046 | 1.092 |
| Waist-to-Hip Ratio in Women | -1.414 | 4.845* | 0.028 | 0.243 | 0.069 | 0.857 |
| BMI (lbs/inch) Obesity | -2.023 | 11.20*** | 0.001 | 0.132 | 0.04 | 0.433 |
| Constant | 3.025 | 10.074** | 0.002 | 20.59 | | |

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Table Continued

| | | | | | Lower | Upper |
|---|---|---|---|---|---|---|
| -2 Log Likehood | 176.79 | | | | | |
| Model Chi-square (df = 4)p | 24.84 | | | | | |
| P | 0% | | | | | |
| Overall Rate of correct classification | 69% | | | | | |

*p < .05, **p < .01, ***p < .001, $b^s$ Unstandardized logistic regression coefficients

**Table 4** Stepwise Multiple Logistic Regression Analysis Summary of the Development Variables for Predicting Pre-Hypertensive DBP Event (n = 150)

| | | | | | lower | Upper |
|---|---|---|---|---|---|---|
| Household Income < $500 | -1.505 | 14.52*** | 0.001 | 0.642 | 0.233 | 4.76 |
| Household Income > $ 1,000 | -1.499 | 3.704 | 0.054 | 0.222 | 0.048 | 1.028 |
| Waist-to-Hip Ratio in Women | -1.359 | 4.620* | 0.032 | 0.257 | 0.074 | 0.887 |
| BMI (lbs/Inch) Obesity | -1.338 | 6.364** | 0.012 | 0.132 | 0.262 | 0.093 |
| Being Widow | -1.109 | 6.185** | 0.013 | 0.33 | 0.138 | 0.791 |
| Constant | 2.447 | 8.321** | 0.004 | 11.9 | | |
| -2 Log Likehood | 173.51 | | | | | |
| Model Chi-square (df = 5) | 27.36 | | | | | |
| p | 0 | | | | | |
| Overall Rate of correct classification | 68.50% | | | | | |

*p < .05, **p < .01, ***p < .001, $b^s$ Unstandardized logistic regression coefficients

**Table 5** Stepwise Multiple Logistic Regression Analysis Summary of the Religious Well-being Variables for Predicting Pre-Hypertensive SBP and DBP Events

| Predictor variables | $b^s$ | Wald | p | OR | $b^s$ | Wald | p | OR |
|---|---|---|---|---|---|---|---|---|
| I believe God is concerned about my problems | 1.54 | 6.34** | 0.012 | 4.65 | 1.42 | 5.50** | 0.019 | 4.16 |
| I feel most fulfilled when I'm Close communion with God | | | | | -1.1 | 3.62* | 0.05 | 0.33 |
| Constant | | | | | 0.81 | 0.014 | 0.9 | |
| -2 Log Likelihood | 191.5 | | | | 189.1 | | | |
| Model Chi-square (df = 1) | 7.26 | | | | 8.94 | | | |
| p | 0.007 | | | | 0.011 | | | |
| Overall Rate of correct classification | 64% | | | | 62% | | | |

*p < .05, **p < .01, ***p < .001, $b^s$ Unstandardized logistic regression coefficients

**Table 6** Stepwise Multiple Logistic Regression Analysis Summary of the Spiritual Well-being Variables for Predicting Pre-Hypertensive SBP and DBP Events

| Predictor variables | b | Wald | p | OR | b | Wald | p | OR |
|---|---|---|---|---|---|---|---|---|
| My relation with God contributes to my sense of well-being | 1.84 | 7.46** | 0.006 | 6.34 | 1.46 | 5.59** | 0.018 | 4.32 |
| Constant | -1.29 | 3.97* | 0.046 | 0.27 | -0.91 | 2.39 | 0.12 | |
| -2 Log Likelihood | 186.7 | | | | 188.9 | | | |
| Model Chi-Square (df=1) | 9.26 | | | | 6.28 | | | |
| p | 0.002 | | | | 0.012 | | | |
| Overall Rate of correct classification | 65% | | | | 64.1 | | | |

*p< .05, **p< .01, ***p< .001, $b^s$ Unstandardized logistic regression coefficients

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**Table 7** Stepwise Multiple Logistic Regression Analysis Summaries of the Perceived Stressed Variables for Predicting Pre-Hypertensive SBP and DBP Events

| Predictor variables | b | Wald | p | OR | b | Wald | p | OR |
|---|---|---|---|---|---|---|---|---|
| Feeling nervous and stressed | -0.83 | 4.82* | 0.028 | 0.43 | -0.74 | 3.1 | 0.076 | 0.47 |
| Constant | 0.57 | 8.42 | 0.004 | 0.27 | 0.37 | 5.16 | 0.023 | 1.45 |
| -2 Log Likelihood | 198.5 | | | | 195.8 | | | |
| Model Chi-square (df = 1) | 4.48 | | | | 6.83 | | | |
| p | 0.027 | | | | 0.74 | | | |
| Overall Rate of correct classification | 65% | | | | 61% | | | |

*p< .05, $b^s$ Unstandardized logistic regression coefficient

## Discussion

The findings show that prevalence of pre-HTN was disproportionally different in the sample of 150 adults. The prevalence of low pre-HTN was slightly higher in men than women, while the prevalence of high pre-HTN was higher in women than men. High pre-HTN was predominant compared to low pre-HTN among the adults. Women were more likely to have higher pre-hypertension than men in this study compared to the traditional research findings' assertion that the prevalence of pre-hypertension is commonly higher in men than women.[2,26] The overall prevalence was comparable with current study findings in Ghana, Nigeria, Egypt, and in USA.[9,27–29] In this study, intrapersonal and extra personal risk factors including household income < $500.00 per month, obesity, overweight, waist-to-hip ratio in women, being widowed, physical inactivity in workplace, cigarette current smoke, were significantly associated with the pre-HTN event, p<.05. These findings were consistent with previous published study findings showing that. Findings also revealed a new domain of risk factor for pre-HTN event in adults who have issues with believing in God such as in the following existential well-being subscale's items*: relation with God contributes to a sense of well-being* was strongly associated with the pre-HTN event. The finding is consistent with the study findings of Swinton and Mowat (2006). However, in religious well-being scale, the item; *failure in belief that God is concerned about personal problems* was associated with pre-HTN SBP and DBP events. The item, not feeling most fulfilled when I'm close communion with God was also associated with Pre-HTN SBP event. Psychological stress such as a *feeling nervous and stressed in last month* was associated with Pre-HTN SBP event. The finding is consistent with the assertion that spiritual and physical (cardiovascular disease) is interconnected, unique, and holistic[22] and spirituality intertwines with religion in adulthood and therefore, becomes a vital pathway factor that influences people health outcomes and coping. Lipid blood test analysis has been found to be correlated with pre-HTN.[12] However, our findings showed that there was a substantial increased risk for pre-HTN incident among the participants. Total cholesterol, LDL-C, and TG, were predictors for pre-HTN SBP/DBP incident but not significant. Risk factors for pre-hypertension SBP/DBP incident were also explained by the use of path diagram analysis which confirmed the model significance. These findings have implication for tailoring prevention as intervention to reduce the risk factors for pre-hypertension in adults.[30–33]

## Limitations of the study

The first major limitation of this study was the use of the non-probability sampling technique, convenience sampling which did not generate representativeness in the population. The second limitation is the self-reported data related to the dietary patterns data from socio cultural variables used in the analysis. It might not be accurate to draw keen conclusion. Lastly, the findings cannot be generalized and applied at the national level, but can provide a partial view of the prevalence of pre-hypertension and the risk factors for pre-hypertensive SBP and DBP event in West African county, Burkina Faso.

## Implications

The use of Neuman Systems Model in nursing research is a holistic benchmark in which a conceptual framework or model can be portrayed to evaluate the prediction of intrapersonal and extra personal risk factors for pre-hypertension in adult. Identifying and determining these predictable risk factors will guide public health nurses not only to set up a primary prevention as intervention for the reduction of these risk factors for pre-hypertensive event, but also a decrease of the major cardiovascular diseases correlated with. The nursing research may contribute to nationally or internationally a significant assessment for preventable diseases such as pre-hypertension, hypertension and their complications. The outcomes of this study may serve for enhancing health policy makers' decisions to reinforce strategies for prevention of the occurrence of pre-hypertension among adults. The use of NSM asa holistic model in nursing research centered on cardiovascular diseases presents a unique characteristic to provide rationale for the pre-HTN event in adults with appropriate statistical methods. Adults with pre-hypertension need particular follow-up and early prevention as an intervention to reduce the risks. Providing holistic assessment of the adult system, nurses advocate the seriousness of pre-hypertensive event, also act as community advocates to raise the awareness of pre-hypertensive event and its complications among the adults in communities. Nurses may involve in large praxis to improve the prevention, lifestyle changes, and management of pre-hypertension in adulthood.

## Conclusion

Guided by Neuman Systems Model, this study highlighted intrapersonal and extra personal risk factors that are associated with the pre-hypertensive SBP and DBP event among adults in West African country, Burkina Faso. The prevalence of pre-hypertension

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remains evident and increase annually among adults. Using Neuman System Model which describes five interacting variables in adult system (developmental, psychological, socio cultural, physiological, and spiritual/religious well-being variables) has allowed to identify and evaluate the predictable risk factors for pre-hypertensive SBP and DBP events. Through this study findings, there is a need to increase and reinforce knowledge, awareness, and early interventions. These interventions will focus on lifestyle and dietary changes, physical activity, spiritual well-being, and stress management in order to maintain a healthy and stable blood pressure. The findings may also converge to future research study as a quasi-experimental study to evaluate the effectiveness of nursing interventions on reduction of pre-hypertensive event from different ethnics in West Africa in order to fully provide appropriate pre-hypertensive management policy and strategies to reduce the major risk factors for pre-hypertensive event.

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## Conflicts of interest

Authors declare that there is no conflicts of interest.

## References

1. Winegarden CR. From "Prehypertension" to Hypertension? Additional evidence. *Annals of epidemiology*. 2005;15(9):720–725.
2. Greenlund KJ, Croft JB, Mensah GA. Prevalence of heart disease and stroke risk factors in persons with prehypertension in the united states, 1999-2000. *Archives of Internal Medicine*. 2004;164(19):2113–2118.
3. Liszka HA, Mainous AG, King DE, et al. Prehypertension and cardiovascular morbidity. *Annals of Family Medicine*. 2005;3(4):294–299.
4. Qureshi AI, Suri MF, Kirmani JF, et al. Is prehypertension a risk factor for cardiovascular diseases? *Stroke*. 2005;36(9):1859–1863.
5. World Health Organization. *Global health risks: mortality and burden of disease attributable to selected major risks*. Geneva, Switzerland: 2009.
6. World Health Organization. *World health statistics 2010*. 2010.
7. Akinlua JT, Meakin R, Umar AM, et al. Current Prevalence Pattern of Hypertension in Nigeria: A Systematic Review. *PLoS ONE*. 2015;10(10):e0140021.
8. Gebreselassie KZ, Padyab M. Epidemiology of Hypertension Stages in Two Countries in Sub-Sahara Africa: Factors Associated with Hypertension Stages. *International Journal of Hypertension*. 2015;2015:959256.
9. Agyemang, Charles, Owusu-Dabo, E. Prehypertension in the Ashanti region of Ghana, West Africa: An opportunity for early prevention of clinical hypertension. *Public Health*. 2008;122(1):19–24.
10. Ferguson TS, Younger NO, Tulloch-Reid MK, et al. Prevalence of prehypertension and its relationship to risk factors for cardiovascular disease in Jamaica: Analysis from a cross-sectional survey. *BMC Cardiovascular Disorders*. 2008;8:20.
11. Njelekela MA, Mpembeni R, Muhihi A, et al. Gender-related differences in the prevalence of cardiovascular disease risk factors and their correlates in urban Tanzania. *BMC Cardiovascular Disorders*. 2009;9:30.
12. BeLue R, Okoror TA, Iwelunmor J, et al. An overview of cardiovascular risk factor burden in sub-Saharan African countries: a socio-cultural perspective. *Globalization and Health*. 2009;22;5:10.
13. Neuman B Fawcett J. Neuman system model. 5 edn. Boston: Pearson; 2011.
14. Neuman BM, Young RJ. A model for teaching total person approach to patient problems. *Nursing Research*. 1972;21(3):264–269.
15. Von Bertalanffy L. General system theory: foundations, development, applications. 1968.
16. De Chardin PT. The phenomenon of man. London: Collins; 1955.
17. Edelson M. Sociotherapy and psychotherapy. Books on Demand; 1970.
18. Caplan G. Principles of preventive psychiatry. Basic Books; 1964.
19. Selye H. The psychology and pathology of exposure to stress. Montreal ACTA; 1950.
20. Lazarus RS, Folkman S. Stress, Appraisal, and Coping. New York: Springer; 1984.
21. Neuman B. The Neuman Systems Model. 3 edn. San Mateo, CA: Appleton & Lange. 1995.
22. Neuman B. The Neuman Systems Model. 2edn. Norwalk, CT: Appleton & Lange. 1989.
23. Health-Office-Burkina-Faso [OH-BF]. *Annual Statiistics*. 2008. 2009
24. Cochran WG. Sampling Techniques. 3 edn. New York: John Wiley & Sons; 1977.
25. Jöreskog KG, Sörbom D. LISREL 9: new statistical features: Scientific Software International. 2012.
26. Janghorbani M, Amini M, Gouya MM, et al. Nationwide survey of prevalence and risk factors of prehypertension and hypertension in Iranian adults. *Journal of Hypertension*. 2008;26(3):419–426.
27. El-Din, A M Sarry, Erfan, et al. Prevalence of pre-hypertension and hypertension in a sample of Egyptian adults and its relation to obesity. *Australian Journal of Basic & Applied Sciences*. 2012;6(13):481.
28. Gupta AK, Johnson WD. Prediabetes and prehypertension in disease free obese adults correlate with an exacerbated systemic proinflammatory milieu. *Journal of Inflammation*. 2010;7:36.
29. Isezuo SA, Sabir AA, Ohwovorilole AE, et al. Prevalence, associated factors and relationship between prehypertension and hypertension: a study of two ethnic African populations in Northern Nigeria. *J Hum Hypertens*. 2011;25(4):224–230.
30. Al-Maqbali AA, Temple-Smith M, Ferler J, et al. Prevalence and determinants of pre-hypertension among Omani Adults Attending non-communicable disease screening program in primary care setting in Sohar City. *Oman Medical Journal*. 2013;28(5):316–323.
31. Nie NH, Bent DH, Hull CH. SPSS: statistical package for the social sciences: McGraw-Hill; 1970.
32. Lee M, Saver JL, Chang B, et al. Presence of baseline prehypertension and risk of incident stroke: a meta-analysis. *American Academy of Neurology*. 2011;77(14):1330–1337.