Table 3. Factors associated with blood pressure status from univariate and multivariate multinomial logistic regressions (Clusters = 869, Strata = 30, *df* = 839).

Variables	Complex Sample Univariate Multinomial Logistic Regression (Crude Relative Risk Ratio)			Complex Sample Multivariate Multinomial Logistic Regression (Adjusted Relative Risk Ratio)		
	Pre-HPT RRR (95% CI)	HPT Stage 1 RRR (95% CI)	HPT Stage 2 RRR (95% CI)	Pre-HPT ARRR (95% CI)	HPT Stage 1 ARRR (95% CI)	HPT Stage 2 ARRR (95% CI)
Age Group						
18–29 years	1	1	1	1	1	1
30–39 years	1.52 (1.33–1.73)**	2.20 (1.78–2.72)**	3.84 (2.63–5.61)**	1.41 (1.19–1.66)**	2.05 (1.6–2.63)**	4.00 (2.65–6.04)**
40–49 years	2.25 (1.95–2.59)**	4.79 (3.88–5.90)**	10.57 (7.3–15.32)**	2.20 (1.83–2.64)**	4.45 (3.46–5.73)**	11.19 (7.40–16.93)**
50–59 years	3.06 (2.57–3.64)**	9.42 (7.51–11.82)**	23.75 (16.43–34.33)**	2.90 (2.32–3.63)**	8.33 (6.22–11.16)**	22.86 (14.71–35.54)**
≥60 years	4.60 (3.73–5.66)**	19.13 (15.03–24.36)**	66.05 (45.13–96.68)**	4.46 (3.37–5.9)**	18.03 (12.93–25.14)**	62.63 (37.72–103.99)**
Locality						
Urban	1	1	1	1	1	1
Rural	1.24 (1.11–1.38)**	1.42 (1.22–1.65)**	1.72 (1.43–2.07)**	1.10 (0.97–1.25)	1.22 (1.01–1.47)*	1.28 (1.01–1.62)*
Gender						
Male	2.32 (2.11–2.54)**	2.06 (1.81–2.34)**	1.56 (1.31–1.85)**	2.74 (2.41–3.12)**	3.24 (2.73–3.84)**	3.01 (2.36–3.83)**
Female	1	1	1	1	1	1
Ethnicity						
Malay	1.19 (1.03–1.38)*	1.17 (0.96–1.42)	1.54 (1.16–2.04)*	1.21 (1.02–1.44)*	1.21 (0.96–1.52)	1.64 (1.17–2.29)*
Chinese	1	1	1	1	1	1
Indian	1.19 (0.95–1.51)	1.05 (0.78–1.42)	0.99 (0.64–1.55)	1.04 (0.81–1.34)	0.84 (0.6–1.17)	0.79 (0.47–1.32)
Other Bumis	1.10 (0.89–1.36)	1.03 (0.78–1.37)	1.41 (0.97–2.05)*	1.1 (0.85–1.41)	1.1 (0.78–1.55)	1.46 (0.92–2.32)
Others	1.43 (1.15–1.78)*	0.99 (0.72–1.35)	0.77 (0.48–1.21)	1.37 (1.06–1.77)*	1.38 (0.94–2.01)	1.22 (0.71–2.1)
Education						
Non-formal	2.95 (2.17–4.01)**	4.46 (3.08–6.46)**	10.7 (7.02–16.31)**	1.95 (1.39–2.72)**	1.79 (1.17–2.73)*	3.03 (1.77–5.19)**
Primary	2.01 (1.72–2.37)**	3.79 (3.07–4.69)**	5.06 (3.74–6.84)**	1.33 (1.1–1.63)*	1.60 (1.24–2.06)**	1.66 (1.13–2.43)*
Secondary	1.13 (1.01–1.27)*	1.50 (1.26–1.8)**	1.39 (1.06–1.81)*	0.94 (0.81–1.08)	1.04 (0.85–1.28)	0.84 (0.62–1.13)
Tertiary	1	1	1	1	1	1
Others	1.23 (0.86–1.76)	1.56 (0.83–2.91)	1.2 (0.38–3.81)	1.02 (0.68–1.52)	1.30 (0.63–2.68)	0.99 (0.21–4.67)
Marital Status						
Never Married	1	1	1	1	1	1
Married	1.56 (1.4–1.74)**	2.60 (2.17–3.1)**	3.48 (2.66–4.56)**	0.97 (0.84–1.12)	0.81 (0.65–1.01)	0.61 (0.44–0.85)*
Widowed/Divorced	2.14 (1.66–2.76)**	5.84 (4.29–7.95)**	11.04 (7.74–15.74)**	1.12 (0.83–1.5)	1.13 (0.78–1.64)	0.77 (0.5–1.19)
Income						
Low	1.18 (0.99–1.39)	1.65 (1.32–2.06)**	2.50 (1.73–3.62)**	1.09 (0.91–1.31)	1.46 (1.11–1.92)*	2.15 (1.36–3.4)*
Middle	0.99 (0.83–1.19)	1.06 (0.82–1.35)	1.46 (0.99–2.15)	0.98 (0.81–1.17)	1.04 (0.78–1.39)	1.53 (0.96–2.44)
High	1	1	1	1	1	1
Current Smoker						
Yes	1.48 (1.33–1.65)**	1.16 (0.98–1.37)	0.89 (0.72–1.11)			
No	1	1	1			
Drinking Status[a]						
Non-Drinker	1	1	1			
Ex Drinker	0.77 (0.49–1.23)	0.78 (0.44–1.38)	1.07 (0.39–2.96)			
Current Drinker	0.92 (0.76–1.12)	0.9 (0.69–1.16)	0.71 (0.47–1.06)			
Vegetable Intake[a]						
Adequate	1	1	1			
Inadequate	0.97 (0.82–1.14)	1.06 (0.86–1.31)	0.9 (0.69–1.19)			
Fruit Intake[a]						
Adequate	1	1	1			
Inadequate	0.86 (0.72–1.02)	0.99 (0.79–1.24)	1.05 (0.78–1.41)			

(*Continued*)

Table 3. (Continued)

Variables	Complex Sample Univariate Multinomial Logistic Regression (Crude Relative Risk Ratio)			Complex Sample Multivariate Multinomial Logistic Regression (Adjusted Relative Risk Ratio)		
	Pre-HPT RRR (95% CI)	HPT Stage 1 RRR (95% CI)	HPT Stage 2 RRR (95% CI)	Pre-HPT ARRR (95% CI)	HPT Stage 1 ARRR (95% CI)	HPT Stage 2 ARRR (95% CI)
Physical Activity						
Inactive	0.76 (0.68–0.84)**	0.86 (0.74–0.99)*	1.06 (0.89–1.27)			
Active	1	1	1			
Diabetes Mellitus						
Yes	1.44 (1.23–1.69)**	2.71 (2.29–3.21)**	2.77 (2.23–3.43)**	1.04 (0.89–1.23)0.607	1.47 (1.22–1.78)**	1.2 (0.94–1.51)
No	1	1	1	1	1	1
Hypercholesterolemia						
Yes	1.25 (1.13–1.38)**	2.09 (1.83–2.4)**	3.24 (2.71–3.87)**	1.03 (0.92–1.15)0.65	1.34 (1.14–1.56)**	1.82 (1.48–2.25)**
No	1	1	1	1	1	1
BMI Status						
Normal/Underweight	1	1	1	1	1	1
Overweight	2.08 (1.85–2.34)**	3.21 (2.74–3.75)**	3.79 (3.07–4.68)**	1.97 (1.74–2.22)**	2.86 (2.41–3.4)**	3.44 (2.74–4.32)**
Obese	2.84 (2.41–3.35)**	6.92 (5.74–8.35)**	9.46 (7.3–12.26)**	3.43 (2.89–4.07)**	9.01 (7.29–11.15)**	13.72 (10.18–18.49)**

The Complex Sample Enter method was used for variable selection. Multicollinearity and interaction were unlikely. Overall fit of the model for each binary logit was checked accordingly: correctly weighted classified table (first binary models, 68%; second binary model,79%; third binary model, 89%), Weighted Area under ROC curve (first binary models, 0.72; second binary model, 0.84; third binary model, 0.72). Models were considered fit based on the classification table and area under the curve. A regression diagnostic was performed, and no influential outliers affected the overall model. Hence, no observations were removed from the model. Final model was adjusted to behavioral variables.

[a]p >0.25 in the univariable analysis;

*p <0.05;

**p <0.001.

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Previous studies have shown that increasing age is associated with higher odds for all stages of hypertension [16,19,25], which was consistent in this study. Similarly, a study conducted among high-income residents found that those in older age groups had more than a 2-fold chance of developing Stage 1 or 2 hypertension and a 34% greater chance of developing prehypertension regardless of other co-existing cardiovascular risk factors [26]. Possible explanations could be that stiffening arteries are associated with the aging process, the lack of physical activity common among the elderly, and a higher sensitivity to salt resulting in increased blood pressure [27–29].

Our study found that those in rural areas were more likely to have more severe hypertension. Similarly, a study from South Africa showed that those living in rural areas were twice as likely to have Stage 2 hypertension compared to urbanites, and a study in China found that rural dwellers had a 3–9 times higher chance of having clinical hypertension [19,30]. In addition, findings from a study in Mexico concluded that rural residents had 5 times higher odds of having uncontrolled hypertension and a 70% lower likelihood of having been treated for hypertension [31]. One possible explanation that might influence this result is that people living in urban areas may be more likely to be treated and have better access to health care [32]. Moreover, studies performed by Wang et. *al.* [30] and Ho *et. al* [33] found that urbanites were up to 20% more aware of their high blood pressure status compared to those living in rural areas.

As in our study, men have been found to be more often affected in comparison to women. Chiu *et al.* [34] reported that males had 70% higher odds of progression from a normal blood