Background

As the primary contributor to cardiovascular disease (CVD), hypertension (or high blood pressure) is the leading cause of morbidity and mortality worldwide [1, 2]. Globally, hypertension, which is defined as systolic blood pressure (SBP) ≥

and Central (N&C); 2) Coast and North Eastern (C&NE); 3) Eastern (E); 4) Nyanza and Western (N&W),

Table 2 Participants' physiological and biological measurements by sex

Indicator	Both	Female	Male	*P* value
Body mass index				
Normal	60.1	52.1	68.1	0.000
Underweight	11.9	9.6	14.3	
Overweight	18.9	24.7	13.2	
Obese	9.0	13.7	4.4	
Harmful use of alcohol	14.4	3.5	25.9	0.000
Insufficient physical activity	7.8	7.5	8.0	0.753
Current tobacco use	13.4	4.1	23.2	0.000
High salt consumption	89.7	89.2	90.2	0.387
High Fat intake	39.7	35.7	43.9	0.002
N	4485	2694	1791	

gender, body mass index, behavioral risk factors (alcohol and tobacco use). The overall age-standardized prevalence of hypertension was estimated at 24.5% [95%CI: 22.6–26.6]. Only 15.5% [95%CI: 12.4–18.9] were aware of their condition, 26.9% [95%CI: 17.3–36.4] of the respondents who were aware of their hypertensive status were on treatment for raised blood pressure in the last 2 weeks and 51.7% [95%CI: 33.5–69.9] among those on treatment had their blood pressure controlled.

Hypertension prevalence increased with increasing wealth status; individuals from the richest households had higher hypertension 29.0% [95%CI: 24.6–33.5] compared with those from the poorest households 19.4% [95%CI: 15.4–23.5] and this was statistically significant. Similarly, hypertension prevalence increased with higher BMI; overweight and obese individuals had significantly higher hypertension rates 30.7% [95%CI: 26.2–35.3] and

42.2% [95%CI: 32.1–52.4] respectively compared to underweight individuals 17.0% [95%CI: 12.3–21.8].

Hypertension awareness was significantly higher among individuals in the richest wealth quintile (24.8%) compared to individuals from middle wealth quintile (10.8%), among females (22.7%) compared to males (9.1%) and among the overweight (23.0%) and obese (25.6%) individuals compared to the normal weight individuals (10.8%).

Hypertension treatment was higher among underweight individuals (66.3%) compared to overweight (28.6%) and obese individuals (22.0%), among individuals not consuming harmful amounts of alcohol (30%) compared to those consuming harmful amounts of alcohol (10.5%) and among individuals not currently using tobacco (30.9%) compared to current tobacco users (11.9%).

Blood pressure control was high among the poorest households (81.7%) compared to the richest households (40.2%), among normal weight individuals (65.1%) compared to overweight (37.1%) and obese individuals (18.9%), among those not consuming harmful amounts of alcohol (53.6%) compared to those consuming harmful amounts of alcohol (2.5%) and among non-current tobacco users (50.5%) compared to current tobacco users (16.9%).

The factors associated with hypertension are summarized in Table 4. An increasing positive and significant association of being hypertensive was observed with increasing age and BMI. Respondents older than 50 years

of alcohol were 1.54 times more likely to be hypertensive in the overall model however, this effect was mainly from the male model.

Table 5

reported for neighboring countries such as Uganda (26.4%) [28] and Tanzania (26%) [29], and much lower than the prevalence reported for Malawi (33%) [30].

Like other studies conducted in similar settings [14, 31–33

study ruling out any causal association. Dietary salt intake, fat intake and physical activity measures were based on self-reported information, which is subject to bias and can lead to incorrect estimates. A key limitation is the missed opportunity of the current study to collect medication use data that could explain the treatment levels.

Conclusions

This is the first national survey on hypertension to be conducted highlighting hypertension as a major health problem in Kenya. This survey is important and gives a national picture of the hypertension situation which has been lacking to guide policies and interventions. The study results show a high hypertension prevalence coupled with low awareness and treatment. The high level of undiagnosed hypertension coupled with low levels of treatment can result in adverse cardiovascular outcomes that are costly to treat and this can potentially overburden the already over-stretched health care system. These results support an urgent need to develop new strategies, policies and programs that will promote prevention, increase screening, as well as expand access and adherence to effective treatment. Results from this national study are important as they highlight lower awareness of hypertension among males. This sex differences underscore the need for integrated programs that address men's needs for information and services relating to hypertension prevention and treatment.

Also, given that this study is embedded in the first national NCD risk factor survey in Kenya, there should be concerted efforts to have regular population data surveys for NCD risk factors so that trend data can better inform and update the policies, programs and interventions.

Abbre iations

CVD: Cardiovascular disease; DBP: Diastolic blood pressure; KEMRI: Kenya Medical Research Institute; NCD: Non-communicable diseases; SBP: Systolic blood pressure; SSA: Sub-Saharan Africa

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