RESEARCH ARTICLE

Knowledge of cardiovascular risk factors among caretakers of outpatients attending a tertiary cardiovascular center in Tanzania: a cross-sectional survey

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Abstract

Background: Health literacy on cardiovascular diseases (CVDs) plays an effective role in preventing or delaying the disease onset as well as in impacting the efficacy of their management. In view of the projected low health literacy in Tanzania, we conducted this cross-sectional survey to assess for CVD risk knowledge and its associated factors among patient escorts.

Methods: A total of 1063 caretakers were consecutively enrolled in this cross-sectional study. An adopted questionnaire consisting of 22 statements assessing various CVD risk behaviors was utilized for assessment of knowledge. Logistic regression analyses were performed to assess for factors associated with poor knowledge of CVD risks.

Results: The mean age was 40.5 years and women predominated (55.7%). Over two-thirds had a body mass index (BMI) ≥ 25 kg/m², 18.5% were alcohol drinkers, 3.2% were current smokers, and 47% were physically inactive. The mean score was 78.2 and 80.0% had good knowledge of CVD risks. About 16.3% believed CVDs are diseases of affluence, 17.4% thought CVDs are not preventable, and 56.7% had a perception that CVDs are curable. Low education (OR 2.6, 95% CI 1.9–3.7, p < 0.001), lack of health insurance (OR 1.5, 95% CI 1.1–2.3, p = 0.03), and negative family history of CVD death (OR 2.2, 95% CI 1.4–3.5, p < 0.001), were independently associated with poor CVD knowledge.

Conclusions: In conclusion, despite of a good level of CVD knowledge established in this study, a disparity between individual’s knowledge and self-care practices is apparent.

Keywords: Cardiovascular disease knowledge, Health literacy, Health knowledge, Awareness, CVD risk knowledge, Tanzania

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**Background**

As the pervasive struggle against infectious diseases continue, sub-Saharan Africa (SSA) is facing a rapid epidemiological transition characterized by an increasing predominance of chronic diseases particularly those affecting the cardiovascular system [1]. Although the ever-present communicable diseases remain the leading contributors to disease burden in the SSA region, non-communicable diseases (NCDs) are escalating at an alarming pace and it is projected that coming 2030 they will become the leading cause of morbidity and mortality [2, 3]. Nevertheless, low-middle income countries (SSA region inclusive) are currently witnessing a disturbingly disproportionate share of global NCDs deaths (i.e. > 75%) [4]. Owing to urbanization and sedentary life-style adoption, several NCD risk factors (i.e. smoking, heavy drinking, unhealthy diets, physical inactivity and overweight) are increasingly widespread in SSA communities and are postulated to be the drivers of the rapidly growing CVD burden in the region [4–6].

By virtue of their chronic nature, CVDs are of long duration and generally slow in progression necessitating life-long care inevitably with continuous expenditure [3, 5]. Nonetheless, these conditions are largely preventable through life-style modification to curb the exposure to the established risk factors [1–3]. It is evident that health literacy of CVD risk factors plays a considerably effective role in preventing or delaying the onset of disease as well as in impacting the efficacy of their management [7–10]. Likewise, persons with low functional health literacy have been associated with diminished use of the health system, less likelihood of engaging in health-promoting behaviors and poorer overall health outcomes [7–10].

Whilst SSA region is having one of the lowest adult literacy rates (65%) [11] in the world, just about a third of the Tanzanian population is estimated to have adequate health literacy [12]. Several studies have addressed the growing burden and pattern of CVD risk factors; however, there is dearth of information regarding public knowledge of CVD risk factors in SSA region particularly Tanzania. In this cross-sectional survey, we sought to assess the CVD risk knowledge and its associated factors among companions of outpatients attending a tertiary-level cardiovascular hospital in Tanzania. Such estimation of the baseline knowledge regarding CVD risks has potential public health relevance particularly in the development of targeted educational programs which are pivotal amidst the rapidly rising crisis.

**Methods**

**Recruitment process and definition of terms**

A cross-sectional survey was conducted between December 2019 and February 2020 at Jakaya Kikwete Cardiac Institute (a tertiary care public teaching hospital) in Dar es Salaam, Tanzania. A consecutive sampling method was utilized to recruit consented individuals who escorted known patients with CVD for a scheduled clinic visit. A structured questionnaire bearing questions pertaining to sociodemographic and clinical characteristics, measurement of key vitals (blood pressure, blood sugar, height, weight and waist circumference), and standard questions for assessing CVD risk knowledge was utilized. Physical activity was assessed using the Physical Activity Vital Sign (PAVS) scale [13]; with scores of 0 min/week denoting inactivity, 1 - < 150 min/week signifying under-activity and ≥ 150 min/week indicating physical activity. We defined underweight as BMI < 18.5 kg/m², normal: BMI 18.5–24.9 kg/m², overweight: BMI 25.0–29.9 kg/m² and obese: BMI ≥30.0 kg/m² [14]. Individuals who smoked at least 1 cigarette in the past 6 months were regarded as current smokers, those who last smoked over 6 months or self-reported quitting smoking were considered past smokers and those who never smoked were regarded as non-smokers. Alcohol drinking was defined as at least a once consumption every week. Hypertension was defined as SBP ≥140 mmHg or DBP ≥90 mmHg, or use of blood pressure lowering agents [15]. Diabetes was diagnosed using a random blood glucose (RBG) ≥11.1 mmol/L and/or fasting blood glucose (FBG) ≥7 mmol/L or use of glucose-lowering agents [16]. An adopted questionnaire consisting of 22 statements assessing various CVD risk behaviors was utilized for assessment of knowledge [17]. A percentage score for each participant was computed by dividing the sum of correct responses divided by the total number of questions (i.e. 22) multiplied by 100. A score of < 50% was classified as low; 50–69% moderate and ≥ 70% good knowledge [18, 19].

**Statistical analysis**

All statistical analyses were performed by STATA v11.0 software. Summaries of continuous variables are presented as means (± SD) and categorical variables are presented as frequencies (percentages). Categorical and continuous variables were compared using the Pearson Chi square test and student’s T-test respectively. Bivariate analyses were performed to assess for factors associated with poor knowledge of CVD risks. Factors included in this analysis were age, sex, education level, marital status, employment status, residence, possession of health insurance, BMI, self-perceived health status, medical check-up history, self-reported knowledge of CVDs, family history of CVD, family history of CVD-related death, physical activity, smoking status, alcohol use, dietary habits, hypertension and diabetes history. Wald Chi-Square tests was used to assess for the interaction terms, with a $p < 0.05$ cut-off used as criteria for
inclusion in multivariate analysis. Variables maintained in the multivariate model underwent stepwise and backward selection procedures. Odd ratios with 95% confidence intervals and p-values are reported. Statistical significance was set at p < 0.05 and all tests were two tailed.

Results
Study population
A total of 1063 individuals who escorted outpatients with established diagnosis of CVD were consecutively enrolled in this study. Table 1 displays the sociodemographic and clinical characteristics of the study participants. Their mean age was 40.5 years and there was a female predominance (55.7%). Majority (59%) of participants had at least secondary school education and 79.4% had a regular income generating activity. Over 85% of participants resided in urban areas and just over a third were health insured. Regarding participants’ relationship to the patient: 13.4% were spouses, 62.2% were children, 15.2% were siblings, 3.6% were parents and 5.6% were friends. Over two-thirds (66.8%) of participants had a BMI ≥ 25, 18.5% were alcohol drinkers, 3.2% were current smokers, 17.8% reported a regular healthy eating, and 47% were physically inactive. Nearly one-fifth (19.2%) of participants had a personal history of hypertension and 4.1% were known to have diabetes mellitus.

Knowledge and attitude regarding CVD risk factors
While 583 (54.9%) of participants had never had a general health check-up before, 41.3% had a perception of being in good health while 34.4% reported to have knowledge of CVD risk factors. Table 2 summarizes responses to the 22 questions used to assess knowledge about CVD risk factors. The mean CVD knowledge score was 78.2% with a range of 31.8–100%. A total of 847 (79.7%) participants had good knowledge, 204 (19.2%) had moderate knowledge, and 12 (1.1%) had low knowledge of CVD risk factors. About 16.3% believed CVD are diseases of rich people and 42.4% were unaware that they are the leading cause of mortality globally. Additionally, 17.4% thought CVD are not preventable, 67.4% believed one may know that they have CVD based on symptoms alone and 56.7% had a perception that CVD are curable. Smoking was recognized by 77% as a CVD risk, physical inactivity by 95.6%, excessive alcohol drinking by 90.1%, overweight by 90.1%, high-salt diet by 85.9%, and elevated cholesterol by 92.9% of participants. Furthermore, while just 38.6% were aware that men have a higher risk of CVD compared to women, 65.6% acknowledged positive CVD family history as a risk, whereas 89.5 and 72.4% knew that hypertension and diabetes respectively are risk factors for CVD.

Factors associated with knowledge of CVD risk factors
Table 3 displays findings of chi-square analyses of various characteristics by CVD knowledge status (i.e. score < 70% vs score ≥ 70%). Participants with low education had a higher likelihood of having poor knowledge of CVD risks compared to individuals with at least secondary education (30.8% vs 12.9%, p < 0.001). Moreover, individuals who possessed a health insurance displayed higher rates of good CVD knowledge compared to their uninsured counterparts (89.4% vs 75.2%, p < 0.001). Likewise, non-smokers showed a higher chance of having a good CVD knowledge compared to current smokers (80.4% vs 58.8%, p < 0.01). Furthermore, physically inactive participants had inferior likelihood of having good CVD knowledge compared to their physically active counterparts (77.0% vs 82.1%, p = 0.04). Additionally, participants with unhealthy eating pattern displayed a higher chance of having poor knowledge compared regular healthy dieters (22.3% vs 16.7%, p = 0.03). Participants with a positive family history of CVD death displayed a superior CVD risks knowledge compared to ones without a CVD-related death in the family, (88.5% vs 77.4%, p < 0.001).

A total of seventeen potential characteristics associated with knowledge of CVD risks were featured in logistic regression analysis. Table 4. During bivariate analyses seven out of the seventeen factors showed significant associations (i.e. p < 0.05) and were subsequently included in the multivariate regression model to control for confounders. At the end of multivariate regression analysis, three factors remained independently associated with poor CVD risks knowledge. These included: low education level (OR 2.6, 95%CI 1.9–3.7, p < 0.001), lack of health insurance (OR 1.5, 95%CI 1.1–2.3, p = 0.03), and negative family history of CVD death (OR 2.2, 95%CI 1.4–3.5, p < 0.001).

Discussion
As the NCD epidemic continues to accelerate amidst the ongoing infectious diseases battle, health-care systems in SSA are increasingly regarding CVDs in particular and NCDs in general as a top public health priority [20]. To curb this distressing trend, health literacy has a prominent significance in prevention of CVD both at the primary and secondary levels [7–10]. Sorensen K et al. [21] defined health literacy as the “individual’s knowledge, motivation, and competences to access, understand, appraise, and apply health information in order to make judgements and take decisions in everyday life concerning health care, disease prevention, and health promotion to maintain or improve quality of life during the life course”. Inspite of its evidence-based [7–10] benefits in NCDs prevention, variably low rates of health literacy have been documented around the globe making public
Table 1 Characteristics of participants in survey assessing knowledge of CVD risk factors (N = 1063)

| Characteristic                        | Proportion (%) |
|---------------------------------------|----------------|
| **Age** (Mean, SD)                    |                |
| Mean                                  | 40.5 (13.0)    |
| Range                                 | 18–77          |
| **Age group**                         |                |
| 18–34                                 | 379 (35.7%)    |
| 35–54                                 | 525 (49.3%)    |
| ≥ 55                                  | 159 (15.0%)    |
| **Sex**                               |                |
| Male                                  | 471 (44.3%)    |
| Female                                | 592 (55.7%)    |
| **Education**                         |                |
| No Formal                             | 22 (02.1%)     |
| Primary                               | 404 (38.0%)    |
| Secondary                             | 385 (36.2%)    |
| University                            | 252 (23.7%)    |
| **Marital status**                    |                |
| Single                                | 279 (26.3%)    |
| Married                               | 711 (66.9%)    |
| Divorced                              | 26 (02.5%)     |
| Widowed                               | 47 (04.4%)     |
| **Occupation**                        |                |
| Jobless                                | 112 (10.5%)    |
| Student                               | 54 (05.1%)     |
| Self-employed                         | 640 (60.2%)    |
| Employed                              | 204 (19.2%)    |
| Retired                               | 53 (05.0%)     |
| **Residence**                         |                |
| Urban                                 | 907 (85.3%)    |
| Rural                                 | 156 (14.7%)    |
| **Region of Residence**               |                |
| Dar es Salaam                         | 752 (70.7%)    |
| Other regions                         | 311 (29.3%)    |
| **Relationship to Patient**           |                |
| Spouse                                | 142 (13.4%)    |
| Child                                 | 661 (62.2%)    |
| Sibling                               | 162 (15.2%)    |
| Parent                                | 38 (03.6%)     |
| Friend                                | 60 (05.6%)     |
| **Health insured**                    |                |
| Yes                                   | 358 (33.7%)    |
| No                                    | 705 (66.3%)    |
| **Perceived health status**           |                |
| Good                                  | 439 (41.3%)    |
| Average                               | 577 (54.3%)    |

(Continued)

| Characteristic                        | Proportion (%) |
|---------------------------------------|----------------|
| **Bad**                               | 47 (04.4%)     |
| **When last check-up**                |                |
| Never                                 | 583 (54.9%)    |
| Within a Year                         | 399 (37.5%)    |
| Over a Year                           | 81 (07.6%)     |
| **Personal Disease History (% Yes)**  |                |
| CVD/Hypertension                      | 204 (19.2%)    |
| Diabetes                              | 43 (04.1%)     |
| Chronic kidney disease                | 12 (01.1%)     |
| HIV/AIDS                              | 26 (02.5%)     |
| Cancer                                | 6 (0.6%)       |
| Chronic pulmonary disease             | 19 (01.8%)     |
| Chronic back pain                     | 83 (07.8%)     |
| **Knowledge of CVD risk factors**     |                |
| (self-reported)                       |                |
| Yes                                   | 366 (34.4%)    |
| No                                    | 697 (65.6%)    |
| **Family history of CVD**             |                |
| Yes                                   | 389 (36.6%)    |
| No                                    | 661 (62.2%)    |
| Don’t know                            | 13 (01.2%)     |
| **CVD death in the family**           |                |
| Yes                                   | 218 (20.5%)    |
| No                                    | 799 (75.2%)    |
| Don’t know                            | 46 (04.3%)     |
| **Smoking status**                    |                |
| Current                               | 34 (03.2%)     |
| Past                                  | 43 (04.0%)     |
| Never                                 | 986 (92.8%)    |
| **Alcohol intake**                    |                |
| Yes                                   | 197 (18.5%)    |
| No                                    | 866 (81.5%)    |
| **Perceived healthy eating**          |                |
| Irregularly                           | 874 (82.2%)    |
| Regularly                             | 189 (17.8%)    |
| **≥ 30 min Exercise** (days/week)    |                |
| 0 days                                | 500 (47.0%)    |
| 1–3 days                              | 300 (28.2%)    |
| 4–6 days                              | 80 (07.6%)     |
| 7 days                                | 183 (17.2%)    |
| **Body Mass Index** (mean, SD)        |                |
| Underweight                           | 32 (03.0%)     |
| Normal                                | 321 (30.2%)    |
health measures particularly the development and implementation of targeted educational programs challenging or ineffective.

With about four-fifths of participants having an overall adequate knowledge regarding CVD risk factors, this present study demonstrated a modest level of health literacy in an urban setting of SSA. Our rates of CVD literacy echoes findings of previous studies from South Africa [17], Iran [22] and Malaysia [23] which produced knowledge rates of 75.3, 78.7 and 81% respectively. Contrary to our findings, regional studies from Nigeria [24] (44%) and Cameroon [25] (47.5%) revealed considerably low rates of CVD literacy. This observed variability in literacy rates between cited studies could be explained by the education-level differences among study participants and diversity of tools used for knowledge assessment. With regards to knowledge of specific risk behaviors, over nine-tenth of participants in this study recognized excess body weight, physical inactivity, and excess alcohol intake as risks, while more than three-quarters acknowledged smoking, unhealthy diet, hypertension and diabetes as attributable risks.

**Table 1** Characteristics of participants in survey assessing knowledge of CVD risk factors (N = 1063) (Continued)

| Characteristic                        | Proportion (%) |
|---------------------------------------|----------------|
| Overweight                           | 358 (33.7%)    |
| Obese                                | 352 (33.1%)    |
| Waist circumference (mean [cm], SD)   |                |
| Men ≥94 cm                            | 207 (44.0%)    |
| Women ≥280 cm                         | 528 (89.2%)    |
| Blood Pressure (mean, SD)             |                |
| Systolic Blood Pressure               | 128.5 (20.2)   |
| Diastolic Blood Pressure              | 83.0 (13.5)    |
| Blood Pressure Range                  |                |
| < 140/90                              | 754 (70.9%)    |
| ≥ 140/90                              | 309 (29.1%)    |
| Blood Sugar Range                     |                |
| FBG < 7.0/RBG < 11.1                  | 1029 (96.8%)   |
| FBG ≥ 7.0/RBG ≥ 11.1                  | 34 (0.3%)      |

**Table 2** Responses of the Cardiovascular Disease Knowledge Questionnaire used in this study (N = 1063)

| Item | Question                                      | Correct response | % answered correctly |
|------|-----------------------------------------------|------------------|----------------------|
| Q1   | Cardiovascular diseases (CVD) are diseases of rich people | No               | 890 (83.7%)         |
| Q2   | Smoking does not increase a risk of CVD       | No               | 818 (77.0%)         |
| Q3   | Consuming a lot of vegetables and fruits increases the risk of CVD | No               | 1006 (94.4%)       |
| Q4   | Consumption of too much salt is a risk to CVD | Yes              | 913 (85.9%)         |
| Q5   | Having excess body weight increases ones risk of CVD | Yes             | 958 (90.1%)        |
| Q6   | A family history of CVD increases ones risk of acquiring CVD | Yes             | 697 (65.6%)        |
| Q7   | Generally, regular consumption of red meat is healthier than white meat | No               | 864 (81.3%)        |
| Q8   | Cardiovascular diseases are curable upon completion of described dose. | No               | 460 (43.3%)        |
| Q9   | Diabetes increases ones risk of CVD           | Yes              | 770 (72.4%)         |
| Q10  | Men are at higher risk of CVDs compared to women | Yes            | 410 (38.6%)        |
| Q11  | Excessive alcohol drinking is dangerous to cardiovascular health | Yes            | 958 (90.1%)        |
| Q12  | CVDs are the leading cause of deaths globally | Yes             | 612 (57.6%)        |
| Q13  | A person may know that he/she has CVD based on signs and symptoms alone | No             | 347 (32.6%)        |
| Q14  | A person with CVD may infect a close person   | No               | 1006 (94.4%)       |
| Q15  | High blood pressure is a risk factor of CVD   | Yes              | 951 (89.5%)        |
| Q16  | Animal fat is healthier than plant oil        | No               | 892 (83.9%)        |
| Q17  | Old age is a risk factor for CVD              | Yes              | 850 (80.0%)        |
| Q18  | Stress increases ones risk of acquiring CVD   | Yes              | 1000 (94.1%)       |
| Q19  | Exercising regularly is harmful to cardiovascular health | No             | 1016 (95.6%)       |
| Q20  | High cholesterol in blood prevents one from CVD | No             | 988 (92.9%)        |
| Q21  | CVD are not preventable                      | No               | 878 (82.6%)        |
| Q22  | Doing health check-ups frequently is harmful  | No               | 1004 (94.5%)       |

Mean score (SD), Range 78.2% (10.9), 31.8–100%
A wide variation of knowledge rates regarding individual risk factors is observed in the literature. For instance, smoking [17, 23–33] has been recognized as a CVD risk by 36.2–93.2% of participants, excess alcohol intake by 40.7% [29–65% [31], unhealthy diet [23–26, 28–31, 33] by 2.8–88%, physical inactivity [17, 23–31, 33] by 1.2–96%, excess body weight [23–31, 33] by 1.6–100%, hypertension [23–31, 33] by 6.2–94% and diabetes [17, 23–31] by 5.3–92.4%. Astonishingly, despite of a predominant blood-relationship between study participants and the escorted patients, just over one-third of participants realized they are living in a family with a positive CVD history and less than two-thirds were aware that it increases ones risk of CVD. In unison to our findings, studies by Awad et al. 26 (62.6%), George et al. 27 (68%), and Shafiq et al. 28 (60%) revealed similar rates of recognition of family history as an attributable risk of CVD. Nonetheless, in a couple of other studies [25, 29, 30] majority (> 50%) of

### Table 3 Bivariate analyses of potential associated factors for CVD risk knowledge (N = 1063)

| Characteristic                              | n    | Score < 70       | Score ≥ 70     | p-value |
|---------------------------------------------|------|-----------------|----------------|---------|
| Age > 40                                    | 502  | 96 (19.1%)      | 406 (80.9%)    | 0.46    |
| Age ≤ 40                                    | 561  | 117 (20.9%)     | 444 (79.1%)    |         |
| Female                                      | 592  | 121 (20.4%)     | 471 (79.6%)    |         |
| Male                                        | 471  | 92 (19.5%)      | 379 (80.5%)    | 0.72    |
| ≤ Primary education                         | 426  | 131 (30.8%)     | 295 (69.2%)    |         |
| ≥ Secondary education                       | 637  | 82 (12.9%)      | 555 (87.1%)    | < 0.001 |
| Single                                      | 279  | 65 (23.3%)      | 214 (76.7%)    |         |
| Ever married                                | 784  | 148 (18.9%)     | 636 (81.1%)    | 0.12    |
| No regular income                           | 219  | 52 (23.7%)      | 167 (76.3%)    |         |
| Regular income generating activity          | 844  | 164 (19.4%)     | 680 (80.6%)    | 0.16    |
| Rural                                       | 156  | 39 (25.0%)      | 117 (75.0%)    |         |
| Urban                                       | 907  | 174 (19.2%)     | 733 (80.8%)    | 0.09    |
| Uninsured                                   | 705  | 175 (24.8%)     | 530 (75.2%)    |         |
| Health insurance                            | 358  | 38 (10.6%)      | 320 (89.4%)    | < 0.001 |
| BMI ≥ 25                                    | 710  | 133 (18.7%)     | 577 (81.3%)    |         |
| BMI < 25                                    | 353  | 80 (22.7%)      | 273 (77.3%)    | 0.12    |
| Perception on self-health ≤ average         | 624  | 119 (19.1%)     | 505 (80.9%)    |         |
| Perceive to be in good health               | 439  | 94 (21.4%)      | 345 (78.6%)    | 0.36    |
| Never had health check-up                   | 583  | 118 (20.2%)     | 465 (79.8%)    |         |
| Ever had a check-up                         | 480  | 98 (20.4%)      | 382 (79.6%)    | 0.94    |
| No knowledge of CVD risks (self-reported)   | 697  | 171 (24.5%)     | 526 (75.5%)    | < 0.001 |
| Knowledgeable on CVD risks                  | 366  | 45 (12.3%)      | 321 (87.7%)    |         |
| No history of CVD death in family           | 845  | 191 (22.6%)     | 654 (77.4%)    | < 0.001 |
| Positive history of CVD death               | 218  | 25 (11.5%)      | 193 (88.5%)    | < 0.001 |
| No regular exercise                         | 500  | 115 (23.0%)     | 385 (77.0%)    |         |
| Exercises ≥ 1 day/week                      | 563  | 101 (17.9%)     | 462 (82.1%)    | 0.04    |
| irregular diet (< 5 days/week)              | 691  | 154 (22.3%)     | 537 (77.7%)    |         |
| Regular healthy diet (≥ 5 days/week)        | 372  | 62 (16.7%)      | 310 (83.3%)    | 0.03    |
| Current smokers                             | 34   | 14 (41.2%)      | 20 (58.8%)     |         |
| Non-smokers                                 | 1029 | 202 (19.6%)     | 827 (80.4%)    | < 0.01  |
| Current alcohol drinkers                    | 197  | 40 (20.3%)      | 157 (79.7%)    |         |
| Non-drinkers                                | 866  | 176 (20.3%)     | 690 (79.7%)    | 1.0     |
| Positive personal history of CVD            | 204  | 35 (17.2%)      | 169 (82.8%)    |         |
| Negative personal history of CVD            | 859  | 181 (21.1%)     | 678 (78.9%)    | 0.21    |
| Known to have diabetes                      | 43   | 10 (23.3%)      | 33 (76.7%)     |         |
| Negative diabetes history                   | 1020 | 206 (20.2%)     | 814 (79.8%)    | 0.62    |
participants were unaware of the increased risk of acquiring CVD in the presence of a positive family history. Irrespective of a predominant positive family history of CVD and acknowledgement of the importance of regular check-ups by large majority of participants, over a half of study subjects have never had a basic check-up their entire lives. Notwithstanding the relatively good CVD risk knowledge, risk behaviors were disproportionately high among participants of this present study. For instance, although excess body weight was recognized as a risk by over 90% of participants just one-third had a healthy weight. Similar pattern was observed with nearly 96% recognizing physical inactivity as a risk and yet just about a half of participants were physically active. Furthermore, certain risk factors (i.e. overweight, hypertension, and diabetes) revealed comparatively similar rates of knowledge to participants free from such risks. Nevertheless, current smokers, physically inactive and unhealthy eaters displayed inferior knowledge rates compared to their counterparts with healthy behaviors respectively.

Conclusions

Despite a fairly good level of knowledge regarding CVD risk factors established in this study, a vivid disconnection between individual’s knowledge and self-care practices (i.e. CVD risk behaviors) is apparent. These findings reflect alarming public health concerns and underscore the urgent need to establish and implement wide-spread and effective educational initiatives aiming at mitigating the community’s practices towards cardiovascular risk factors.

Table 4 Logistic Regression Analysis of Factors Associated with Poor knowledge of CVD risks

| Variable                        | Age > 40 | Age ≤ 40 | p-value |
|---------------------------------|----------|----------|---------|
| Female                          | 0.9      | 0.6-1.2  | 0.3     |
| Age ≥ 65 years                  | 1.2      | 0.9-1.6  | 0.2     |
| Education level                 | 0.7      | 1.4      | 0.14    |
| Marital status                  | 0.8      | 0.6-1.1  | 0.2     |
| Income status                   | 0.8      | 0.5-1.2  | 0.3     |
| Occupation                      | 2.3      | 1.6-3.3  | < 0.001 |
| BMI ≥ 25                        | 1.5      | 1.1-2.1  | < 0.01  |
| Perceived health                | 1.0      | 0.8-1.4  | 0.9     |
| Weight status                   | 1.0      | 0.7-1.4  | 0.9     |
| Healthy diet                    | 2.3      | 1.4-3.5  | < 0.001 |
| Exercise status                 | 1.8      | 1.1-3.1  | < 0.01  |
| Smokers                         | 1.2      | 0.7-2.0  | 0.03    |
| Alcohol consumption             | 1.5      | 1.1-2.1  | 0.03    |
| Hypertension                    | 1.7      | 1.2-2.5  | < 0.01  |
| Diabetic status                 | 0.8      | 0.4-1.7  | 0.6     |

Abbreviations

BMI: Body mass index; CVDs: Cardiovascular diseases; DBP: Diastolic blood pressure; FBG: Fasting blood glucose; NCDs: Non-communicable diseases; RBG: Random blood glucose; SBP: Systolic blood pressure; SSA: Sub-Saharan Africa

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Authors’ contributions

PP and MJ conceived the study. NM, MK, ZM, NRH, HJS, UWM, HA, and RH recruited participants and conducted all the interviews while HM, SB, JM, HLK, EC, and ZJ performed all necessary measurements and physical examinations. NM performed data entry and PP did the analysis. The corresponding author (PP) wrote the first draft of the manuscript, and other authors contributed to and approved it. All authors assume responsibility for the accuracy and integrity of the analysis. All authors made the decision to submit the manuscript for publication. The author(s) read and approved the final manuscript.

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Availability of data and materials

The final version of data set supporting the findings of this paper is submitted together with this manuscript to the editorial committee. All the raw data is included in this manuscript. There are no ethics restrictions preventing the sharing of the raw data.

Ethics approval and consent to participate

Participants gave written informed consent to participate in the study. The study protocol was approved by the local ethics committees (Jakaya Kikwete Cardiac Institute) and was conducted in accordance with the Declaration of Helsinki.

Consent for publication

Not applicable.
Competing interests
The authors declare that they have no competing interests.

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