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Public health concerns, risk perception and information sources in Cameroon

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Abstract: This study presents a descriptive account of ratings based on psychometric variables of perceived twenty-five health risk factors, their information sources and the confidence in the information sources among Cameroonians nationwide. Health risk factors such as HIV/AIDS, natural disasters, terrorism, unprotected sex, unemployment, alcohol consumption, street crime, cigarette smoking, poverty, malaria, cholera and motorcycle accidents were among the greatest perceived health risk factors by the population. On the other hand, female genital mutilation and natural health products were ranked the lowest posing health risk factors among Cameroonians. Also, women perceived more health risks than men, with large differences in the perceived risks of unemployment and chronic diseases. Respondents across the regions younger than forty years old reported greater concerns over health risk factors than those over forty years old. Media organisations, health and professional groups were reported as the main sources of information as well as greater confidence in information obtained from health personnel compared with other information sources among the population. The results obtained from this study showed public concern over several health risk factors, and policies directed towards the effective communication and management strategies of health risks within the communities aimed at the development of health prevention/promotion programmes of the nation should be encouraged.



Tinyami Erick Tandii

ABOUT THE AUTHORS

We are a team of researchers from the Korea University Graduate School of Public Health who work on multifaceted research issues within and outside Korea striving for a better understanding of some public health issues affecting our communities. Throughout our research, we identified and discussed some common attributes of concerns to the public regarding health related issues and sort out proposals that could help in shaping the ways policies formulators could better interpret and implement some vital issues pertaining to the population healthy living. Our study sample the opinion of Cameroonians on how they perceived health risks and taking into consideration that population health is an integral approach on the reflection on how different factors and forces shape individual's health, it's thus important for health researchers and social reforms policymakers to redirect suitable indicators that will benefit the population and their environment by involving both the public and experts views.

PUBLIC INTEREST STATEMENT

Sampling public perception regarding health risks may cut across different factors ranging from; if the risk in question evokes feelings of dread, if the issue is well understood, whether it involve uncertainty, if it is a subject of personal control, or familiarity and media courage. Considering that, public perception on health risks could aid in shaping the way experts assess and direct decisions regarding health risk factors, it is of importance to closely examine their views. This study was designed to investigate the degree of public perception associated with various health risk factors, their information sources and the confidence on the sources of information to Cameroonians nationwide. The results are aimed towards contributing to a better understanding of perceived health risk factors and health status profile of Cameroonians, which could allow for the development or re-enforcement of health prevention/promotion programs of the nation.

Subjects: Health & Society; Health Conditions; Public Health Policy and Practice

Keywords: public health risk; psychometric variables; risk perception; information sources; Cameroon

1. Introduction

Public concerns and perceptions about health risks and the environment are important parameters to consider in public health with respect to management and policy implementation. Such perceptions of risk may vary across geographic regions, age, gender, income and education (Krewski et al., 2006; Lemyre, Lee, Mercier, Bouchard, & Krewski, 2006). Factors influencing the way the public view and perceive health risks may vary and include media coverage, if the risk in question evokes feelings of dread, if the issue is well understood, whether the issue involves a lot of uncertainty, if it is subject to personal control, or if it is familiar (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978; Krewski et al., 2006; Shepherd, Jepson, Watterson, & Evans, 2011). Programmes targeting the public may influence the way the society perceives risks and may result in differences between perceived and actual risks that are not easily eliminated from the actuarial determinant of risks due to the programmes that have distributed information to the general population. Previous studies demonstrated that public concerns and perceptions regarding health risks have qualitative importance and have showed a wide range of differences from the actuarial risk of potential hazards based on dread or controllability (Sjoberg, 2002; Slovic, 1987). However, to better understand and appreciate the differences in how the public and experts assess health risks resulting in morbidity and mortality, researchers and policy formulators interested in population health risk management may have to consider how the public view and value risks in its communities, and assessments should consider sensitivity of the public as well as actual harms (Lupton, 1995).

In the 1990s, the term “risk society” was first used by Beck (1992), who viewed risk as a product of late modernity in which human progress and development has led to more progressive hazards that threaten human health and the ecosystem at large. He based his arguments on risk with particular emphasis on external hazards and dangers to the public. Beck (1992) believed that modern society has changed principally from a society characterised solely by social that is based on income to a society in which the major threats are environmental hazards that transcend traditional inequalities. He further looked at the responses of the scientific community and the public to risk and suggested that, “social reality without scientific rationale is blind”, and “scientific rationale without social rationale is empty.”

The public commonly accepts that hazards and dangers exist, but they are not viewed equally, as public concerns of risks cannot be completely attributed to irrationality or ignorance (Beck, 1992). However, risk has generally been viewed and discussed as a “paradigm of rational choices” and will be baseless if it is considered independently from a community’s culture (Shepherd et al., 2011). Several factors associated with hazards, such as “dread factors”, have been shown to be the most determinant factors among others that influence risk perception, including the perceptions of the lack of control over a situation, the catastrophic potential of hazards, the undefined character of hazard, and the number of people potentially affected (Zhang & Fan, 2013).

Taking into consideration that population health is an integral approach in the reflection of how different factors and forces shape an individual’s health, it is therefore a major topic in health research and social reform policy to redirect suitable indicators of risk that will benefit both the population and their environment (Kindig & Stoddart, 2003). Distancing itself from previous perspectives that focused on biology and the physical environment, a broader approach for the evaluation of population health research has gained more momentum in the 1990s and 2000s by including individual factors involving lifestyle and social forces as well as the physical features of the environment as health determinants (Krewski et al., 2005). This recent change in approach and the public education of risk issues, which has led to a growing attention focused on both the environmental and social consequences of health risks, may have accounted for this change in the focus of

population health. Inspired by previous studies (Kim, Kim, Song, Cho, & Choi, 2014; Krewski et al., 2006; Lemyre et al., 2006; Slovic, 1996), a principal components analysis approach was used to examine the underlining health risk perception of people in Cameroon. This approach is believed to be more informative about how people view and perceive health risks. This is the first attempted study to document perceived potential health risk factors to both individuals and public, their information sources and confidence in the information sources nationwide.

The following objectives of this study were established: to document the differences in public perception of selected health risk factors, to investigate the psychological factors related to the acceptability of health risk factors and to identify suitable information sources and confidence in the information sources regarding health risk factors to Cameroonians nationwide.

2. Methodology

2.1. Research area and subjects

In order to develop effective health prevention programs and health risk communication strategies, it is essential to have information about differences in opinion among Cameroonians. This was a national population-based cross-sectional survey conducted using a self-administered questionnaire designed to sample public perceptions of different health risk factors. Based on the 2010 national population census BUCREP (2010), proportional quota sampling was used to ensure that respondents were demographically representative of the general population, with quotas based on gender and region. Cameroonian adults of both sexes aged ≥ 20 years who continuously lived in the country for at least 2 years were included in the survey. The validity of the questionnaire content was ensured by systematic review of the survey questions by the research and academic staff of the Graduate School of Public Health, Korea University and some public health experts in Cameroon (ethical committee).

Prior to the implementation of the questionnaire, a pre-test was performed amongst some 100 volunteer subjects living in Cameroon who were not included in the final data, and obtained a Cronbach's alpha coefficient of 0.8276. Adjustment were made and a total of 25 health risk factors were retained for the study, sorted based on national profile and experts choices deemed as important to the general public.

An initial sample size of 1,000 inhabitants was set as a representation for the study spread proportional across the nation based on regions and gender. A total of 3,452 individuals were physically approached to participate in the survey on a voluntary bases, of which 1,082 consented and participated in the survey. Of the 1,082 samples collected, 15 had missing values and were excluded from the final analysis of the surveyed data leading to 1,067 samples that were used for the study. Generally, the final sampled data were near equal proportions of females 52.2% and males 47.8% compared to the official 2010 national population census of 50.6% females and 49.4% males. Of the 19,406,100, inhabitants that lived in the country in 2010, based on regions, were distributed as follows: 5.2% in the Adamawa, 18.2% in the Centre, 4.1% in the East, 17.9% in the Extreme North, 14.8% in the Littoral, 10.5% in the North, 9.3% in the Northwest, 9.2% in the West, 3.5% in the South and 7.3% in the Southwest; the sampled population was distributed as follows: 5.1% in the Adamawa, 18.8% in the Centre, 5.1% in the East, 18.0% in the Extreme North, 14.1% in the Littoral, 9.8% in the North, 8.9% in the Northwest, 7.7% in the West, 2.9% in the South and 9.5% in the Southwest.

2.2. Sample collection and procedure

Prior to administering the questionnaire, the interviewer explained the purpose of the study to all respondents and emphasized the participant's anonymity, as the interviewer did not collect names prior to obtaining their signed consent to participate. The questionnaire was conducted nationwide from the 17th of June to the 30th of August 2015, and was available in both French and English, which are the official languages of the nation, based on the respondent's preference.

The principal investigator first identified (with the assistance of some regional collaborators), recruited and trained 10 research assistants, one from each region, who assisted in the sample collection. Public places were the main sources of contact with the population and included weekly marketplaces, bus terminals, churches/mosque, universities, public office entrances, etc. The questionnaire was conducted on a one-to-one basis to ensure that only a single participant from a family was included in the survey. An average time of 30 min was used to complete the questionnaire.

2.3. Survey content and methods

The questionnaire consisted of 18 questions divided into 3 sections. The first section collected demographic data, including gender, age, education, income, region and duration of residency. The second section collected information on the psychological paradigm variables suggested by Slovic and the Sandman Outrage Management Index (Sandman, 1993; Slovic, 1987), which consisted of the following questions: For perceived risk, “How much do you think each risk factor is risky to you?” For personal knowledge, “How much do you know about the effects of each risk factor?” For risk known to science, “Do you think the scientific facts and relevant information have been sufficiently studied and well-known?” For controllability, “What is the extent to which the risk from each risk factor can be managed (i.e., avoided or prevented)?” For seriousness of the risk to future generations, “How much do you think the risks that are caused by these risk factors would affect your descendants?” For outrage, “What is the extent of your social hostility and outrage when accidents occur due to each risk factor?” Lastly, for government accountability, “What is the extent of the accountability of the government when diseases and accidents occur due to each risk factor?” Participants were asked to provide their responses to risk factors based on a 7-point Likert scale from 1 (very low health risk) to 7 (very high health risk).

The third section of the questionnaire was comprised of two questions. Question 1, was based on information sources; “Indicate what level of information regarding health risk factors you receive from each of the following information sources: administrative (government) agencies, professional groups (such as universities), media organizations, health personnel, environmental and public interest groups, and friends/relatives.” Question 2 was related to the level of confidence in the information received from particular sources; “To what extent do you trust or have confidence in the information you receive from the different information sources regarding health risks?” They were asked to rate their information based on a seven-point Likert scale of; 1 = receiving very little/no information or very little/no confidence, and 7 = receiving very high information or having very high confidence. Each point was rated based on the question and factor concern.

2.4. Data analysis

Descriptive statistical analyses were performed to illustrate the levels of risks perceived as “high health risks” according to the mean score ratings with regards to gender, age, education, income and region of location. The health risk factors of the various indicators were ranked in descending order according to the mean score differences. The percentage survey weights were used to ensure that the sample was representative of the Cameroonian population in the analysis based on the study sample size. Factor analysis was used to reduce the dimensions of common attributes among the risk factors into simpler dimensions using principal component analysis with varimax rotation. An independent *t*-test was performed to examine the group differences for each hazard according to the mean score values of perceived risks based on gender. ANOVA was performed to compare the perceptions of different issues based on age, education, income and geographic location. Differences were considered significant at $p < 0.05$. The design effects due to the stratified random sampling in this study were examined and were found to be close to 1 (ranging from 0.98 to 1.00), indicating that the analysis of the data using simple random sample variances would result in a conventional inference of the data using SPSS (22.0) statistical software.

3. Ethics statement

Prior to the implementation of this study, an Ethical and Administrative approvals were obtained from both the National Ethics Committee for Human Health Research (No. 2015/05/587/CE/CNERSH/

SP) and the Ministry of Public Health (No. D30-412/L/MINSANTE/SG/DROS/DTLC) of Cameroon and a written informed consent was collected from each participant.

4. Results

4.1. Characteristics of research subjects

A total of 3,452, individuals were contacted to participate in the survey, and 1,082 consented and took part in the survey. Of the 1,082 samples collected, 15 had missing values and were excluded from the final analysis, resulting in 1,067 samples that were retained for the study. Of these, 557 (52.2%) were females and 510 (47.8%) males, with a mean age of 37.2 ± 10.3 years (mean \pm SD). The majority of the participants (408, 38.2%) had an education level \geq university, and 183 (17.2%) participants had an education level \leq primary education. The Centre and the Extreme North Regions were the most represented according to the proportion quota, with 200 (18.6%) and 194 (18.2%) samples, respectively. A majority of the subjects, 443 (44.3%), had monthly earned incomes of \leq \$100 USD, as shown in Table 1.

4.2. General perceived health risk factors to Cameroonians

HIV/AIDS was perceived as posing the greatest personal health risk factor to the population, with a mean score of 6.58 ± 1.12 . By combining the psychometric variables to determine the overall mean scores, terrorism was perceived as the greatest health risk factor to the nation, with a mean score of 5.82 ± 0.51 . Natural disasters, unprotected sex, unemployment, alcohol consumption, cigarette smoking, poverty, malaria, and cholera were also among the leading perceived health risk factors to the population. Female genital mutilation and natural health products were the lowest perceived risk factors to the population (Table 2). Additionally, respondents reported having a substantial knowledge of risk factors and worried more about the consequences to the future generation compared to other psychometric variables. The tendency of an individual's perception of management and government actions as a result of health risks were scored the lowest compared to other actions (Mean \pm SD, 3.40 ± 1.49) and (4.38 ± 1.88), respectively (Table 2).

4.3. Perceived health risk differences based on gender

Generally, in this study, women (5.32 ± 0.66) perceived these health risk factors as having higher risks compared with the men (5.09 ± 0.68). The largest mean score difference between genders was for unemployment, with a difference of 0.51. However, other large differences in the values of the perceived risk were observed between genders for chronic diseases, high-voltage power lines, and natural health products. With the exceptions of alcohol consumption, tap water consumption, motorcycle accidents, cigarette smoking, female genital mutilation and high-voltage power lines, all the other factors had statistically significant differences ($p < 0.05$) in perceived risk by gender, as shown in Table 3.

4.4. Perceived health risk differences based on age groups

The largest mean score difference of 0.85 between the age groups was for the perceived risk of high-voltage power lines. However, respondents within the 40–49 years age group rated risk factors slightly higher than respondents in other age groups, with an overall mean of 5.23 ± 0.69 . Other larger mean differences were observed for vaccine accidents, terrorism, female genital mutilation and motorcycle accidents. The group ≥ 50 years tended to score risk factors lower than other age groups, with the exception of high-voltage power lines, vaccine accidents, female genital mutilation, tap water consumption, alcohol consumption and climate change. There were no statistically significant differences in the health risk factors among the different age groups (Table 4).

4.5. Perceived health risk differences based on education

The greatest mean score difference across education levels, 0.18, was reported for poverty and unprotected sex. This difference could be due to individual knowledge and exposure that may have accounted for a better appreciation of the health risk factors that were important in his or her life. This could explain why in this study, the mean score differences among those with less than a

Table 1. Socio-demographic characteristics of all participants (N = 1,067)

Variables	N (%)
<i>Gender</i>	
Women	557 (52.2)
Men	510 (47.8)
<i>Age (years) mean ± SD</i>	
20–29	274 (25.7)
30–39	368 (34.5)
40–49	277 (26.0)
≥50	148 (13.87)
<i>Education</i>	
≤Primary school	183 (17.2)
Secondary school	270 (25.3)
High school	206 (19.3)
≥University	408 (38.2)
<i>Regions</i>	
AD	54 (5.1)
CE	200 (18.7)
ES	55 (5.2)
EN	194 (18.2)
LT	150 (14.1)
NO	105 (9.8)
NW	95 (8.9)
WE	82 (7.7)
SU	31 (2.9)
SW	101 (9.5)
<i>Income (\$USD) (monthly)</i>	
100	473 (44.3)
101–499	218 (20.4)
500–999	266 (24.9)
≥1,000	110 (10.3)

Notes: AD (Adamawa), CE (Centre), ES (East), EN (Extreme North), LT (Littoral), NO (North), NW (North West), WE (West), SU (South), SW (South West).

university education were slightly higher than those with at least a university education. Larger mean score differences were also observed for the perceived risks of alcohol consumption, polio and unemployment. No significant differences were determined for perceived risks based on education level (Table 5).

4.6. Perceived health risk differences based on regional location

Mean scores of perceived health risk factors based on the ten geographical regions are shown on Table 6. The greatest mean score difference of 1.09 was observed for the perceived health risk of chronic diseases across the different regions of the nation. The respondents in the Extreme North Region were significantly more likely to perceive health risk factors as more risky than other regions of the nation, followed by the Northwest Region. All perceived health risk factors were statistically significant at ($p < 0.05$) among the different regions of the nation.

Table 2. Mean scores (SD) for general selected health risk perception in Cameroon (N = 1,067)

Risk factors	Personal risk mean (SD)	Overall mean (SD)	Personal knowledge mean (SD)	Risk known to science mean (SD)	Controllability mean (SD)	Seriousness to future generation mean (SD)	Outrage mean (SD)	Accountability of the government mean (SD)
HIV/AIDS	6.58 (1.12)	5.51 (0.78)	5.99 (1.11)	6.31 (1.06)	4.03 (1.85)	5.58 (1.21)	5.77 (1.21)	4.32 (1.86)
Natural disaster (flood, landslide, etc.)	6.50 (0.88)	5.30 (0.71)	6.47 (0.98)	6.19 (0.87)	3.26 (1.80)	5.67 (1.11)	5.25 (1.52)	3.80 (2.02)
Terrorism	6.34 (1.17)	5.82 (0.51)	6.69 (0.76)	6.39 (0.82)	3.15 (1.38)	6.73 (0.64)	6.07 (1.51)	5.39 (1.50)
Unprotected sex	6.29 (1.13)	5.50 (0.69)	6.20 (0.87)	6.24 (1.03)	3.01 (1.46)	5.85 (1.37)	5.69 (1.29)	5.26 (1.97)
Unemployment	6.25 (0.82)	5.51 (0.66)	6.47 (0.76)	6.27 (1.42)	3.18 (1.24)	5.91 (1.87)	5.72 (1.08)	4.77 (1.55)
Drinking alcohol	6.21 (1.22)	5.36 (0.78)	5.83 (1.05)	5.92 (1.44)	3.78 (1.69)	5.31 (1.85)	5.73 (1.00)	4.75 (2.01)
Street crime	6.21 (0.83)	5.07 (0.53)	6.37 (0.94)	5.16 (1.04)	2.89 (1.49)	6.16 (0.93)	5.28 (1.29)	3.42 (1.72)
Cigarette smoking	6.17 (0.72)	5.41 (0.65)	6.08 (0.89)	6.11 (1.06)	3.72 (1.84)	6.35 (0.72)	5.44 (1.82)	4.02 (2.03)
Poverty	6.08 (0.92)	5.29 (0.61)	6.58 (0.69)	5.94 (1.39)	3.28 (1.52)	5.84 (0.83)	5.64 (1.47)	3.67 (2.03)
Malaria	6.05 (1.24)	5.44 (0.57)	6.51 (0.94)	6.37 (0.94)	3.17 (1.29)	6.07 (1.22)	5.62 (1.40)	4.31 (1.58)
Cholera	6.02 (0.94)	5.30 (0.61)	6.51 (0.96)	5.25 (1.26)	3.47 (1.77)	6.32 (0.84)	5.65 (1.47)	3.92 (1.92)
Motorcycle accident	5.90 (0.89)	5.15 (0.69)	6.35 (0.83)	5.54 (1.74)	3.17 (1.31)	5.89 (1.17)	5.63 (1.39)	3.59 (2.11)
Medical malpractice	5.88 (1.23)	4.83 (0.65)	4.46 (1.85)	5.60 (1.04)	3.36 (1.47)	5.29 (1.52)	5.36 (1.49)	3.88 (2.04)
Tap water	5.78 (1.04)	4.92 (0.56)	5.70 (1.08)	5.48 (1.08)	2.96 (1.46)	5.59 (1.29)	5.18 (1.35)	3.72 (2.13)
Climate change	5.65 (1.57)	5.31 (0.63)	5.76 (1.41)	5.95 (1.23)	3.01 (1.24)	6.15 (1.13)	5.73 (1.03)	4.90 (2.11)
Car accident	5.61 (1.15)	5.27 (0.61)	6.22 (1.04)	5.96 (1.15)	3.42 (1.60)	6.13 (0.90)	5.46 (1.65)	4.08 (1.77)
Influenza	5.59 (1.30)	5.23 (0.91)	5.68 (1.44)	5.65 (1.66)	4.01 (1.24)	5.29 (1.84)	5.33 (1.81)	5.08 (1.71)
High voltage power lines	5.57 (1.04)	4.76 (0.73)	4.58 (1.19)	4.69 (1.64)	3.68 (1.32)	5.64 (1.23)	5.39 (1.71)	3.73 (1.99)
Polio	5.56 (1.26)	5.24 (0.72)	5.72 (1.35)	6.32 (0.97)	2.94 (1.29)	5.16 (2.07)	5.52 (1.43)	5.46 (1.87)
Vaccines accident	5.55 (1.39)	5.26 (0.68)	5.50 (1.34)	6.06 (1.31)	3.53 (1.60)	5.40 (1.13)	5.76 (1.12)	5.04 (1.97)
Air pollution	5.26 (1.41)	5.14 (0.60)	5.32 (1.74)	5.33 (1.25)	3.66 (1.57)	6.14 (1.07)	5.44 (1.69)	4.82 (1.69)

(Continued)

Table 2. (Continued)

Risk factors	Personal risk mean (SD)	Overall mean (SD)	Personal knowledge mean (SD)	Risk known to science mean (SD)	Controllability mean (SD)	Seriousness to future generation mean (SD)	Outrage mean (SD)	Accountability of the government mean (SD)
Chronic diseases (diabetes, cancer, etc.)	5.13 (1.41)	5.23 (0.91)	5.25 (1.48)	5.71 (0.96)	5.09 (1.60)	6.32 (0.99)	5.22 (2.17)	3.93 (1.73)
Measles	5.06 (1.90)	4.96 (0.71)	5.01 (1.56)	5.43 (2.44)	3.12 (1.38)	5.40 (1.90)	5.24 (1.60)	5.44 (1.68)
Female genital mutilation	4.90 (1.50)	4.75 (0.82)	5.50 (1.80)	5.63 (1.55)	3.08 (1.49)	4.95 (1.60)	5.19 (1.43)	4.03 (2.21)
Natural (traditional) health product	4.70 (1.43)	4.79 (0.72)	5.86 (1.44)	5.20 (1.50)	3.07 (1.33)	5.30 (1.45)	5.23 (1.62)	4.14 (1.80)
Total mean (SD)	5.79 (1.18)	5.21 (0.68)	5.86 (1.17)	5.79 (1.27)	3.40 (1.49)	5.78 (1.28)	5.52 (1.46)	4.38 (1.88)

Notes: Mean ± standard deviation.

Independent variable: Personal risk (ranked in descending order); Dependent variables: Psychometric variables (Personal knowledge, Risk known to science, Controllability, Seriousness to future generation, Outrage and Accountability of the government); Overall Mean (SD); the combination of the psychometric variables.

Table 3. Mean scores (SD) differences of health risk based on gender among Cameroonians (N = 1,067)

Risk factors	Perceived risk score		Mean differences	p-value*
	Female mean (SD)	Male mean (SD)		
Unemployment	5.75 (0.80)	5.24 (0.65)	0.51	<0.001
Chronic diseases (diabetes, cancer, etc.)	5.47 (0.97)	4.97 (0.76)	0.50	<0.001
High voltage power lines	4.97 (0.77)	4.53 (0.62)	0.44	<0.001
Natural (traditional) health product	4.97 (0.74)	4.60 (0.65)	0.37	<0.001
Influenza	5.40 (0.92)	5.04 (0.85)	0.36	0.023
Vaccines accident	5.41 (0.67)	5.10 (0.64)	0.31	<0.001
Poverty	5.43 (0.61)	5.13 (0.57)	0.30	<0.001
Unprotected sex	5.63 (0.68)	5.35 (0.67)	0.28	0.044
Drinking alcohol	5.49 (0.77)	5.22 (0.77)	0.27	0.581
Natural disaster (flood, landslide, etc.)	5.42 (0.71)	5.17 (0.68)	0.25	0.602
HIV/AIDS	5.62 (0.66)	5.38 (0.64)	0.24	0.073
Female genital mutilation	4.87 (0.81)	4.63 (0.82)	0.24	0.567
Motorcycle accident	5.25 (0.63)	5.04 (0.73)	0.21	0.433
Cigarette smoking	5.51 (0.63)	5.31 (0.66)	0.20	0.468
Medical malpractice	4.92 (0.63)	4.73 (0.65)	0.19	0.002
Measles	5.05 (0.57)	4.86 (0.82)	0.19	<0.001
Air pollution	5.23 (0.57)	5.05 (0.62)	0.18	0.035
Polio	5.31 (0.67)	5.16 (0.76)	0.15	0.016
Climate change	5.38 (0.56)	5.24 (0.70)	0.14	<0.001
Malaria	5.50 (0.51)	5.36 (0.61)	0.14	<0.001
Car accident	5.33 (0.54)	5.20 (0.67)	0.13	<0.001
Street crime	5.11 (0.50)	5.02 (0.56)	0.09	<0.001
Terrorism	5.84 (0.45)	5.79 (0.56)	0.05	<0.001
Cholera	5.31 (0.56)	5.28 (0.66)	0.03	<0.001
Tap water	4.92 (0.53)	4.92 (0.58)	0.00	0.118
Total Mean (SD)	5.32 (0.66)	5.09 (0.68)	0.23	0.247

*By t-test. Mean ± standard deviation (SD).

4.7. Perceived health risk differences based on income

Table 7, illustrates the perceived mean score differences of health risk based on the different income levels among the sampled population. The risk factor influenza had the highest perceived risk mean score difference of 0.14 among the different income levels. Other factors with significant mean score differences were cholera, medical malpractice, polio, and natural disasters. Additionally, it was observed that individuals with lower monthly incomes also tended to perceive health risk factors (\leq \$100 USD, 5.24 ± 0.68) as higher risks than those with higher income (\geq \$ 1,000 USD, 5.20 ± 0.71). Based on income variation, the differences in the perceived risks of poverty and measles were statistically significant ($p < 0.05$).

4.8. Ranking of 25 health risk factors with respect to knowledge and dread based on gender

Using factor analysis to reduce the dimensions that affect personal psychological characteristics with regards to health risk perception, two factors, “knowledge” and “dread”, were extracted and

Table 4. Mean scores (SD) differences of health risk based on age groups among Cameroonians (1,067)

Risk factors	Age group (years)				Mean differences	p-value*
	20–29 Mean (SD)	30–39 Mean (SD)	40–49 Mean (SD)	≥50 Mean (SD)		
High voltage power lines	4.78 (0.73)	4.82 (0.74)	4.63 (0.69)	5.48 (0.69)	0.85	0.103
Vaccines accident	5.25 (0.66)	5.26 (0.66)	5.22 (0.68)	5.86 (0.45)	0.64	0.921
Terrorism	5.84 (0.49)	5.79 (0.51)	5.87 (0.45)	5.29 (0.62)	0.58	0.552
Female genital mutilation	4.78 (0.78)	4.75 (0.86)	4.66 (0.87)	5.23 (0.62)	0.57	0.647
Motorcycle accident	5.14 (0.67)	5.16 (0.64)	5.13 (0.63)	4.67 (0.87)	0.49	0.970
Tap water	4.90 (0.57)	4.92 (0.56)	4.93 (0.53)	5.33 (0.80)	0.43	0.322
Measles	4.92 (0.64)	4.96 (0.63)	4.92 (0.62)	4.63 (0.70)	0.33	0.540
Car accident	5.26 (0.63)	5.26 (0.60)	5.23 (0.63)	4.93 (0.62)	0.33	0.815
Cholera	5.30 (0.63)	5.32 (0.57)	5.31 (0.62)	5.02 (0.49)	0.30	0.648
Drinking alcohol	5.35 (0.80)	5.38 (0.76)	5.35 (0.78)	5.12 (0.62)	0.26	0.860
Influenza	5.22 (0.91)	5.20 (0.90)	5.32 (0.84)	5.45 (0.75)	0.25	0.516
Air pollution	5.12 (0.63)	5.15 (0.60)	5.05 (0.55)	4.90 (0.53)	0.25	0.128
Climate change	5.33 (0.62)	5.33 (0.65)	5.25 (0.57)	5.49 (0.83)	0.24	0.220
Unemployment	5.48 (0.80)	5.52 (0.78)	5.50 (0.79)	5.28 (0.57)	0.22	0.796
Unprotected sex	5.50 (0.67)	5.50 (0.69)	5.44 (0.75)	5.28 (0.77)	0.22	0.912
Cigarette smoking	5.43 (0.68)	5.41 (0.63)	5.39 (0.65)	5.21 (0.74)	0.22	0.971
HIV/AIDS	5.53 (0.65)	5.49 (0.68)	5.50 (0.67)	5.29 (0.87)	0.21	0.571
Poverty	5.29 (0.62)	5.31 (0.59)	5.20 (0.59)	5.40 (0.56)	0.20	0.421
Polio	5.25 (0.72)	5.21 (0.71)	5.20 (0.76)	5.07 (0.54)	0.18	0.599
Street crime	5.08 (0.54)	5.06 (0.53)	5.03 (0.47)	5.20 (0.59)	0.17	0.480
Natural (traditional) health product	4.79 (0.74)	4.82 (0.68)	4.67 (0.79)	4.79 (0.62)	0.15	0.324
Medical malpractice	4.82 (0.65)	4.81 (0.67)	4.79 (0.63)	4.69 (0.79)	0.13	0.588
Natural disaster (flood, landslide, eruption)	5.30 (0.71)	5.34 (0.67)	5.30 (0.76)	5.22 (0.68)	0.12	0.453
Malaria	5.41 (0.58)	5.47 (0.55)	5.41 (0.55)	5.39 (0.65)	0.08	0.576
Chronic diseases (diabetes, cancer, etc.)	5.27 (0.93)	5.22 (0.93)	5.19 (0.84)	5.19 (0.85)	0.08	0.946
Total mean (SD)	5.21 (0.68)	5.22 (0.67)	5.23 (0.69)	4.69 (0.79)	0.54	0.595

*By ANOVA. Mean ± standard deviation.

used to analyse and rank the 25 risk factors for each gender. Factors were extracted using principal component analysis with varimax rotation. Based on the analysis of the results, for both women and men, “risk known to science”, “personal knowledge” and “controllability” were considered as the first factors, and “outrage”, “seriousness of the risk to future generations” and “accountability of the government” were the second factors. The first factors were collectively named “Knowledge”, and

Table 5. Mean scores (SD) differences of health risk based on education level among Cameroonians (N = 1,067)

Risk factor	Education				Mean differences	p-value*
	≤Primary school mean (SD)	Secondary mean (SD)	High School mean (SD)	≥University mean (SD)		
Poverty	5.15 (0.69)	5.30 (0.63)	5.33 (0.60)	5.27 (0.61)	0.18	0.356
Unprotected sex	5.65 (0.66)	5.53 (0.68)	5.48 (0.68)	5.47 (0.71)	0.17	0.341
Drinking alcohol	5.43 (0.73)	5.45 (0.70)	5.29 (0.80)	5.31 (0.82)	0.16	0.151
Polio	5.36 (0.71)	5.27 (0.72)	5.24 (0.69)	5.20 (0.74)	0.16	0.478
Unemployment	5.41 (0.77)	5.56 (0.75)	5.49 (0.81)	5.51 (0.79)	0.15	0.641
Vaccines accident	5.35 (0.65)	5.33 (0.65)	5.20 (0.66)	5.25 (0.70)	0.15	0.167
Cigarette smoking	5.54 (0.63)	5.41 (0.64)	5.40 (0.63)	5.40 (0.67)	0.14	0.708
High voltage power lines	4.84 (0.70)	4.81 (0.74)	4.70 (0.78)	4.74 (0.72)	0.14	0.477
Climate change	5.40 (0.68)	5.33 (0.60)	5.31 (0.65)	5.27 (0.65)	0.13	0.242
Street crime	5.00 (0.59)	5.12 (0.52)	5.04 (0.58)	5.07 (0.51)	0.12	0.436
Car accident	5.37 (0.63)	5.28 (0.57)	5.25 (0.62)	5.25 (0.63)	0.12	0.715
Chronic diseases (diabetes, cancer)	5.26 (0.93)	5.31 (0.89)	5.19 (0.94)	5.19 (0.92)	0.12	0.518
Air pollution	5.10 (0.64)	5.12 (0.61)	5.21 (0.61)	5.14 (0.60)	0.11	0.480
Measles	5.03 (0.63)	4.98 (0.63)	4.96 (0.63)	4.94 (0.83)	0.09	0.902
Natural (traditional) health products	4.85 (0.65)	4.81 (0.73)	4.76 (0.74)	4.78 (0.73)	0.09	0.890
Motorcycle accident	5.11 (0.75)	5.15 (0.65)	5.19 (0.77)	5.15 (0.67)	0.08	0.772
Medical malpractice	4.88 (0.54)	4.85 (0.63)	4.83 (0.67)	4.80 (0.67)	0.08	0.798
Influenza	5.20 (0.99)	5.24 (0.91)	5.26 (0.90)	5.24 (0.90)	0.06	0.902
Malaria infection	5.42 (0.59)	5.47 (0.54)	5.43 (0.62)	5.42 (0.55)	0.05	0.884
Cholera	5.23 (0.57)	5.34 (0.63)	5.26 (0.64)	5.28 (0.61)	0.05	0.461
Natural disaster (flood, landslide, eruption)	5.28 (0.69)	5.31 (0.68)	5.30 (0.74)	5.32 (0.69)	0.04	0.408
Tap water	4.95 (0.53)	4.93 (0.47)	4.92 (0.58)	4.93 (0.58)	0.03	0.824
HIV/AIDS	5.50 (0.68)	5.54 (0.64)	5.47 (0.67)	5.51 (0.69)	0.03	0.815
Female genital mutilation	4.78 (0.84)	4.75 (0.83)	4.76 (0.83)	4.76 (0.79)	0.03	0.966
Terrorism	5.83 (0.42)	5.82 (0.48)	5.84 (0.53)	5.81 (0.50)	0.03	0.937
Total Mean (SD)	5.24 (0.68)	5.21 (0.66)	5.20 (0.67)	5.81 (0.66)	0.61	0.611

*By ANOVA.

the second factors were collectively named “Dread”. The threshold value for the varimax rotation method was 0.40 for the factor loadings with eigenvalues, and the variances for women were higher than for the men, as shown in Table 8.

Table 6. Mean scores (SD) differences of health risk based on regions among Cameroonians (N = 1,067)

Risk factors**	Regions***										Mean differences	p-value*
	AD Mean (SD)	CE Mean (SD)	ES Mean (SD)	EN Mean (SD)	LT Mean (SD)	NO Mean (SD)	NW Mean (SD)	WE Mean (SD)	SU Mean (SD)	SW Mean (SD)		
1	4.74 (0.59)	5.18 (0.84)	5.45 (0.85)	5.72 (0.91)	5.22 (0.86)	5.21 (1.08)	5.32 (0.93)	5.38 (1.04)	4.63 (0.54)	4.98 (0.74)	1.09	<0.001
2	4.53 (0.62)	4.76 (0.81)	4.79 (0.87)	5.18 (0.66)	4.67 (0.66)	4.79 (0.65)	4.90 (0.71)	4.85 (0.65)	4.19 (0.64)	4.71 (0.61)	0.99	<0.001
3	5.03 (0.82)	5.24 (0.81)	5.16 (0.95)	5.58 (0.88)	5.14 (0.95)	5.14 (0.98)	5.32 (0.93)	5.12 (1.02)	4.62 (0.68)	5.37 (0.77)	0.96	<0.001
4	5.20 (0.79)	5.18 (0.67)	5.14 (0.60)	5.61(0.61)	5.27 (0.68)	5.12 (0.72)	5.23 (0.76)	5.28 (0.56)	4.68 (0.60)	5.32 (0.88)	0.93	<0.001
5	5.65 (0.69)	5.58 (0.83)	5.14 (1.02)	5.93 (0.82)	5.24 (0.77)	5.50 (0.61)	5.58 (0.77)	5.16 (0.87)	5.21 (0.08)	5.70 (0.26)	0.79	<0.001
6	4.52 (0.94)	4.85 (0.87)	4.79 (0.68)	5.20 (0.70)	4.67 (0.75)	4.52 (0.82)	4.81(0.82)	4.63 (0.75)	4.43 (0.76)	4.70 (0.85)	0.77	<0.001
7	5.36 (0.68)	5.45 (0.68)	5.39 (0.61)	5.70 (0.59)	5.36 (0.62)	5.32 (0.58)	5.42 (0.65)	5.31(0.57)	4.97 (0.56)	5.50 (0.73)	0.73	<0.001
8	5.39 (0.62)	5.45 (0.64)	5.54 (0.59)	5.76 (0.63)	5.51(0.73)	5.42 (0.75)	5.51 (0.71)	5.59 (0.72)	5.11 (0.43)	5.44 (0.71)	0.65	0.001
9	4.92 (0.63)	5.15 (0.68)	5.15 (0.59)	5.46 (0.67)	5.05 (0.66)	5.17 (0.86)	5.18 (0.62)	5.02 (0.62)	4.81 (0.70)	5.26 (0.72)	0.65	<0.001
10	5.05 (0.60)	5.32 (0.61)	5.33 (0.68)	5.57 (0.51)	5.23 (0.58)	5.24 (0.65)	5.35 (0.66)	5.28 (0.62)	4.95 (0.46)	5.21 (0.45)	0.62	<0.001
11	5.15 (0.75)	5.35 (0.79)	5.11 (0.76)	5.70 (0.63)	5.10 (0.70)	5.24 (0.52)	5.35 (0.66)	5.22 (0.65)	5.08 (0.55)	5.39 (0.71)	0.62	<0.001
12	4.59 (0.55)	4.82 (0.78)	4.76 (0.86)	5.06 (0.71)	4.54 (0.75)	4.77 (0.77)	4.86 (0.71)	4.83 (0.72)	4.45 (0.65)	4.62 (0.52)	0.61	<0.001
13	4.78 (0.72)	4.98 (0.59)	4.93 (0.62)	5.16 (0.59)	5.01 (0.57)	4.89 (0.65)	4.96 (1.00)	5.05 (0.64)	4.55 (0.51)	4.90 (0.68)	0.61	0.002
14	4.85 (0.59)	4.87 (0.55)	4.83 (0.60)	5.07 (0.56)	4.90 (0.56)	4.86 (0.47)	4.98 (0.54)	4.85 (0.54)	4.59 (0.45)	5.10 (0.61)	0.51	<0.001
15	5.22 (0.80)	5.53 (0.82)	5.38 (0.71)	5.64 (0.76)	5.25 (0.75)	5.17 (0.76)	5.38 (0.76)	5.20 (0.65)	4.76 (0.76)	5.42 (0.77)	0.47	<0.001
16	5.02 (0.64)	5.29 (0.69)	5.24 (0.71)	5.58 (0.58)	5.23 (0.64)	5.14 (0.72)	5.36 (0.63)	5.29 (0.69)	4.76 (0.65)	5.13 (0.69)	0.44	<0.001
17	5.38 (0.62)	5.44 (0.63)	5.47 (0.64)	5.75 (0.69)	5.48 (0.67)	5.45 (0.67)	5.59 (0.70)	5.51 (0.74)	5.32 (0.40)	5.51 (0.59)	0.43	0.005
18	5.18 (0.73)	5.30 (0.72)	5.29 (0.55)	5.57 (0.48)	5.31 (0.59)	5.21 (0.60)	5.28 (0.62)	5.36 (0.50)	5.18 (0.50)	5.36 (0.75)	0.39	0.003
19	5.47 (0.60)	5.32 (0.66)	5.08 (0.61)	5.47 (0.57)	5.22 (0.66)	5.20 (0.47)	5.26 (0.57)	5.16 (0.49)	5.28 (0.66)	5.50 (0.67)	0.39	<0.001
20	5.28 (0.61)	5.35 (0.62)	5.22 (0.61)	5.48 (0.63)	5.15 (0.58)	5.08 (0.54)	5.29 (0.60)	5.12 (0.44)	5.10 (0.64)	5.43 (0.67)	0.38	<0.001
21	5.35 (0.54)	5.44 (0.58)	5.22 (0.67)	5.67 (0.49)	5.32 (0.57)	5.45 (0.52)	5.45 (0.57)	5.38 (0.48)	5.37 (0.52)	5.59 (0.57)	0.35	<0.001
22	4.69 (0.70)	4.94 (0.75)	4.94 (0.55)	5.02 (0.63)	4.76 (0.56)	4.71 (0.55)	4.81 (0.64)	4.84 (0.56)	4.72 (0.53)	4.74 (0.75)	0.33	0.001
23	5.00 (0.60)	5.07 (0.51)	5.01 (0.40)	5.25 (0.47)	5.01 (0.55)	5.08 (0.52)	5.07 (0.52)	5.01 (0.57)	4.97 (0.63)	5.10 (0.56)	0.28	0.040
24	5.80 (0.62)	5.86 (0.49)	5.68 (0.43)	5.86 (0.45)	5.77 (0.57)	5.77 (0.38)	5.82 (0.48)	5.72 (0.55)	5.82 (0.57)	5.95 (0.55)	0.27	0.029
25	5.08 (0.64)	5.19 (0.69)	5.07 (0.66)	5.33 (0.48)	5.05 (0.54)	5.14 (0.53)	5.19 (0.60)	5.05 (0.56)	5.05 (0.70)	5.10 (0.56)	0.14	0.013
Total Mean(SD)	5.09 (0.67)	5.24 (0.69)	5.16 (0.67)	5.49 (0.63)	5.14 (0.66)	5.14 (0.65)	5.25 (0.69)	5.17 (0.65)	4.90 (0.57)	5.24 (0.66)	0.59	0.011

*By ANOVA.

**1- Chronic diseases (diabetes, cancer, etc.), 2-Natural (Traditional) health product, 3-Influenza, 4- Polio, 5- Unemployment, 6- Female genital mutilation, 7-Cigarette smoking, 8- Unprotected sex, 9- Motorcycle accident, 10- Poverty, 11- Natural disaster (flood, landslide, eruption), 12- High voltage power lines, 13- Measles, 14- Tap water, 15- Drinking alcohol, 16- Vaccines accident, 17- HIV/AIDS, 18- Climate change, 19- Cholera, 20- Car accident, 21- Malaria, 22- Medical malpractices, 23- Street crime, 24- Terrorism, 25- Air pollution. Mean ± standard deviation.

***AD (Adamawa), CE (Centre), ES (East), EN (Extreme North), LT (Littoral), NO (North), NW (North West), WE (West), SU (South), SW (South West).

Table 7. Mean (SD) scores differences of health risks based on income (1,067)

Risk factor	Monthly income (\$ USD)				Mean differences	p-value*
	≤100 Mean (SD)	101–499 Mean (SD)	500–999 Mean (SD)	≥1,000 Mean (SD)		
Influenza	5.19 (0.91)	5.23 (0.94)	5.23 (0.90)	5.33 (0.86)	0.14	0.629
Cholera	5.37 (0.56)	5.27 (0.62)	5.29 (0.63)	5.24 (0.59)	0.13	0.183
Medical malpractice	4.82 (0.67)	4.91 (0.61)	4.80 (0.66)	4.79 (0.65)	0.12	0.132
Polio	5.31 (0.71)	5.29 (0.70)	5.19 (0.74)	5.20 (0.69)	0.12	0.105
Natural disaster (flood, landslide, eruption)	5.32 (0.69)	5.23 (0.74)	5.33 (0.69)	5.25 (0.69)	0.10	0.225
Unemployment	5.55 (0.73)	5.46 (0.78)	5.51 (0.81)	5.54 (0.77)	0.09	0.633
Poverty	5.26 (0.59)	5.30 (0.59)	5.31 (0.60)	5.22 (0.71)	0.09	0.039
High voltage power lines	4.77 (0.71)	4.72 (0.72)	4.77 (0.75)	4.81 (0.75)	0.09	0.693
Vaccines accident	5.31 (0.64)	5.23 (0.70)	5.25 (0.68)	5.26 (0.69)	0.08	0.562
Climate change	5.36 (0.64)	5.35 (0.57)	5.28 (0.65)	5.28 (0.68)	0.08	0.335
Street crime	5.05 (0.54)	5.09 (0.51)	5.07 (0.53)	5.01 (0.57)	0.08	0.547
HIV/AIDS	5.51 (0.63)	5.55 (0.66)	5.49 (0.68)	5.47 (0.64)	0.08	0.632
Chronic diseases (diabetes, cancer, etc.)	5.18 (0.94)	5.26 (0.87)	5.24 (0.91)	5.25 (0.95)	0.08	0.733
Unprotected sex	5.49 (0.70)	5.53 (0.69)	5.49 (0.68)	5.46 (0.73)	0.07	0.805
Drinking alcohol	5.33 (0.84)	5.34 (0.80)	5.37 (0.75)	5.40 (0.75)	0.07	0.859
Car accident	5.28 (0.59)	5.28 (0.61)	5.24 (0.62)	5.31 (0.60)	0.07	0.625
Measles	5.01 (0.64)	4.96 (0.59)	4.94 (0.63)	4.94 (1.22)	0.07	0.005
Motorcycle accident	5.14 (0.70)	5.13 (0.66)	5.15 (0.72)	5.19 (0.65)	0.06	0.892
Cigarette smoking	5.42 (0.63)	5.45 (0.66)	5.39 (0.66)	5.45 (0.63)	0.06	0.615
Malaria infection	5.48 (0.57)	5.42 (0.58)	5.42 (0.56)	5.45 (0.56)	0.06	0.547
Natural (traditional) health product	4.83 (0.72)	4.77 (0.71)	4.78 (0.72)	4.81 (0.75)	0.06	0.811
Female genital mutilation	4.75 (0.86)	4.77 (0.82)	4.75 (0.81)	4.72 (0.83)	0.05	0.954
Air pollution	5.13 (0.62)	5.17 (0.60)	5.14 (0.58)	5.14 (0.65)	0.04	0.866
Tap water	4.91 (0.55)	4.91 (0.54)	4.94 (0.55)	4.91 (0.64)	0.03	0.866
Terrorism	5.83 (0.53)	5.83 (0.50)	5.80 (0.51)	5.83 (0.48)	0.03	0.767
Total mean (SD)	5.24 (0.68)	5.22 (0.67)	5.21 (0.68)	5.20 (0.71)	0.04	0.606

Mean ± standard deviation.

*By ANOVA.

For the analyses based on knowledge, women and men ranked natural disasters (flood, landslide, eruption, etc.) and terrorism as the highest risk factors, respectively. With regards to dread, terrorism was ranked the highest risk factor for both men and women (Table 9). This was analysed based on the knowledge and dread the various gender had with respect to each health risk factor and were ranked in descending order based on the individual's perception.

Table 8. Factor analysis of psychometric paradigms* based on gender

Variables ^{a,b}	Women		Men		Factor name
	Factor 1	Factor 2	Factor 1	Factor 2	
Risk known to science	0.838	-0.047	0.814	-0.088	Knowledge ^b
Personal knowledge	0.835	0.148	0.722	0.063	
Controllability	0.671	0.462	0.685	0.349	
Outrage	-0.137	0.811	-0.224	0.803	Dread ^c
Seriousness to future generation	0.325	0.784	0.167	0.702	
Accountability of government	0.568	0.658	0.485	0.641	

*Varimax method: By considering variables greater than 0.40 as the threshold value of factor loadings.

^aDependent variables: 1: negative score to 7: positive score.

^bEigen value (women: 2.404, men: 2.002), variance (%; women: 65.096, men: 55.434).

^cEigen value (women: 1.213, men: 1.004), variance (%; women: 32.556, men: 27.729).

4.9. Risk cognition map of the 25 risk factors based on gender

To develop a risk cognition map that showed the location of the 25 risk factors based on knowledge and dread, their positions were marked on a two-dimensional space with the Y-axis representing knowledge and the X-axis representing dread by examining the factor loading of each risk factor. The results showed that the perceived risks of unemployment, natural disasters, HIV/AIDS, cigarette smoking, poverty, unprotected sex, motorcycle accidents, alcohol consumption, car accidents, malaria and terrorism were located in quadrant I, the quadrant in which knowledge and dread were high for both men and women. Additionally, for both men and women, the perceived risks of measles and natural health products were located in quadrant II, in which knowledge was high and dread was low. In quadrant III, the perceived risks of female genital mutilation, medical malpractice, high-voltage power lines, polio, street crime, vaccine accident and tap water were located, and both knowledge and dread were low. The perceived risks of influenza and climate change were located in quadrant IV, in which knowledge was low and dread was high. However, the perceived risks of air pollution, chronic disease and cholera were located in different quadrants based on gender, as shown in Figure 1.

4.10. Sources of information and confidence in information sources of health risks

The results regarding information sources and confidence are found in Table 10. Most respondents indicated receiving a large quantity of information from media organizations (6.19 ± 1.06) and health personnel (4.93 ± 2.22), while very little information was received from environmental/public interest groups (3.02 ± 1.75) and friends/relatives (2.70 ± 1.80). Additionally, the respondents indicated that they had a higher degree of confidence in health personnel as sources of information (6.52 ± 0.89) than any other sources of information. Although media organizations represented the source of largest quantity of information, participants had a slightly lower degree of confidence regarding the information provided about health risk factors. The environmental/public interest groups and friends/relatives were rated with equally low degrees of confidence as information sources.

5. Discussion

This large-scale national survey was the first attempt to investigate the degree of public perception associated with the selected health risk factors, information sources and the confidence in these sources of information by Cameroonians nationwide.

Participants in this study scored most of the selected risk factors as having high health risks to the population. HIV/AIDS was scored as the risk factor that posed the greatest personal health risk to the public. This may be due to the continuous sensitization of the public regarding the virus, as well as the frequent information that is available within the communities about deaths in suspected AIDS cases or individuals who died because of the disease, which may have triggered some degree of fear among the population. Cameroon is one of the nations in Sub-Saharan Africa experiencing

Table 9. The ranking of 25 health risk factors based on knowledge and dread using gender

Ranking	Knowledge*		Dread**	
	Women	Men	Women	Men
1	Natural disaster (flood, landslide, eruption),	Terrorism	Terrorism	Terrorism
2	HIV/AIDS	Malaria infection	Unemployment	HIV/AIDS
3	Cholera	HIV/AIDS	Unprotected sex	Malaria
4	Terrorism	Natural disaster (flood, landslide, etc.),	HIV/AIDS	Unprotected sex
5	Drinking alcohol	Cigarette smoking	Cigarette smoking	Cigarette smoking
6	Cigarette smoking	Cholera	Malaria	Cholera
7	Car accident	Unprotected sex	Drinking alcohol	Climate change
8	Malaria infection	Poverty	Chronic diseases (diabetes, cancer, etc.)	Unemployment
9	Street crime	Car accident	Poverty	Drinking alcohol
10	Poverty	Unemployment	Natural disaster (flood, landslide, etc.)	Car accident
11	Motorcycle accident	Drinking alcohol	Vaccines accident	Natural disaster (flood, landslide)
12	Unprotected sex	Polio	Influenza	Polio
13	Polio	Motorcycle accident	Climate change	Poverty
14	Unemployment	Climate change	Car accident	Vaccines accident
15	Climate change	Street crime	Polio	Air pollution
16	Chronic diseases (diabetes, cancer etc.)	Vaccines accident	Cholera	Influenza
17	Influenza	Influenza	Motorcycle accident	Motorcycle accident
18	Tap water	Medical malpractice	Air pollution	Street crime
19	Vaccines accident	Tap water	Street crime	Chronic diseases (diabetes, cancer)
20	Air pollution	Female genital mutilation	Measles	Tap water
21	Female genital mutilation	Air pollution	High voltage power lines	Measles
22	Measles	Chronic diseases (diabetes, cancer)	Natural (traditional) health product	Medical malpractice
23	Natural (traditional) health products	Measles	Medical malpractice	Female genital mutilation
24	Medical malpractice	High voltage power lines	Tap water	Natural (traditional) health product
25	High voltage power lines	Natural (traditional) health product	Female genital mutilation	High voltage power lines

*Knowledge, 1: knowledgeable; 25 unknowledgeable.

**Dread, 1: high dread; 25: low dread.

the effects of HIV/AIDS and has yet to recover from the disease, as its prevalence remains at approximately 5.5% nationally (Mbanya, Sama, & Tchounwou, 2008). Additionally, natural disaster was scored to be of equally high health risk to the population. The information on and impacts of the constant flooding and landslides observed within the country with reported loss of life, displacement and damage to properties may have accounted for the rating. Although the damages incurred may have been blamed on natural disasters, poor town planning and human activities in risky zones may

Figure 1. Risk cognitive map of 25 health risk factors based on gender.

Notes: \diamond Women, \circ Men; ND (Natural disaster), HA (HIV/AIDS), C (Cholera), T (Terrorism), DA (Drinking alcohol), CS (Cigarette smoking), CA (Car accident), MI (Malaria infection), SC (Street crime), P (poverty), MA (Motorcycle accident), US (Unprotected sex), Pv (Polio), U (Unemployment), CD (Chronic diseases), I (Influenza), TW (Tap water), VA (Vaccine accident), AP (Air pollution), FGM (Female genital mutilation), M (Measles), NHP (Natural (traditional) health product), MP (medical malpractice), HPL (High voltage power lines), CC (Climate change).

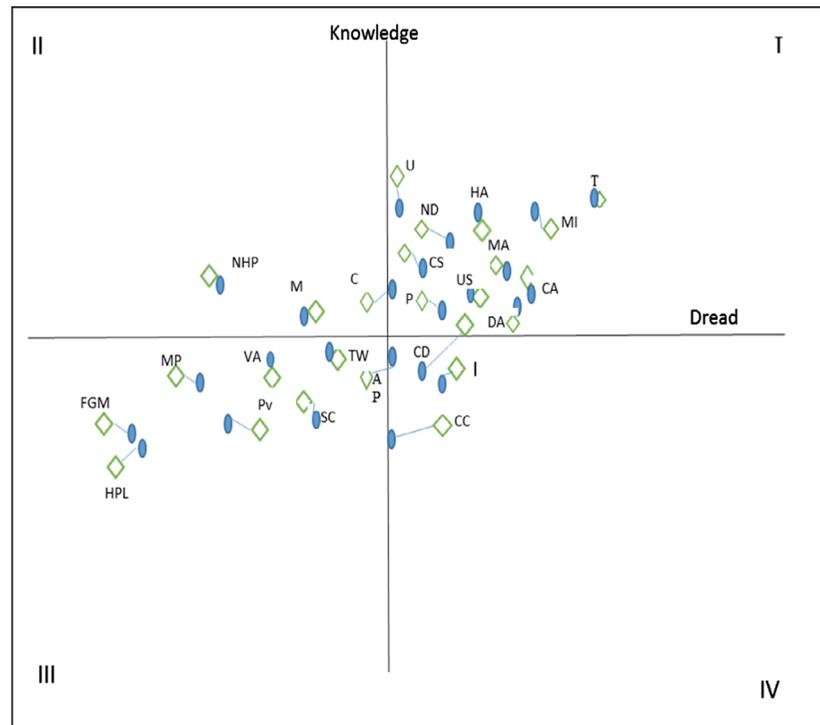


Table 10. Perceived health risks information sources and confidence in information sources (N = 1,067)

Source of information	Mean (SD)	Confidence in information Sources	Mean (SD)
Media organizations	6.19 (1.06)	Health personnel	6.52 (0.89)
Health personnel	4.93 (2.22)	Media organizations	4.98 (2.21)
Professional groups, such as university	4.68 (2.24)	Professional groups, such as university	4.37 (1.35)
Administrative (government) agencies	3.39 (1.78)	Friends and relatives	3.18 (2.19)
Environmental and public interest groups	3.02 (1.75)	Administrative (government) agencies	3.17 (1.76)
Friends and relatives	2.70 (1.80)	Environmental and public interest groups	2.37 (1.62)

Note: Mean \pm standard deviation.

have also accounted for the occurrences. Hence, the government and stakeholders may want to consider careful town planning and the education of the population on potential natural disaster risk sites.

After combining the psychometric variables to generate overall mean score values for the risk factors, terrorism was scored as posing the greatest health risk to the population. This high perception may be due to the recent attacks on the national territory by the Islamic sect Boko Haram, which have accounted for dozens of deaths and thousands wounded and displaced, especially within the Northern regions of the country. Terrorism is not new, but the method in which it is performed has changed over time. Since the terrorist attack in the US on 11 September 2001, there have been many documented terrorist events. Slovic (2002), postulated that new ways to launch attacks, including the use of commercial airlines, weapons of mass destruction, and chemical and biological threats to

our environment, are different methods that have all led to a new paradigm of conflict worldwide. In Cameroon, suicide terrorism has been the most frequently practiced method of killing large numbers of people that is used by the Islamic sect; this has resulted in the loss of lives and the destruction of property, which in turn has increased the fear of terrorism among many people within the national territory.

Additionally, socio-behavioural factors and some environmental factors, especially those that have been frequently projected by the media, were equally scored to be high health risks to the population; these included HIV/AIDS, unemployment, unprotected sex, malaria, cigarette smoking, alcohol and climate change. Previous studies have identified media outlets as sources of reminders to the population that help with the easy identification of certain health issues within or around their environment, a phenomenon that many have termed heuristic mechanisms (Combs & Slovic, 1979; Krewski et al., 2006; Tversky & Kahneman, 1973). One of the flaws of this phenomenon is that it may lead to the population perceiving a higher health risk than the true actuarial degree of occurrence. Therefore, it is important to consider the influence of media outlets when conducting public perception studies, especially during an epidemic or for health events that are widely communicated to society. This may have been the case for the perceived risk of terrorism, which was rated as the overall highest health risk factor in Cameroon even though this may not reflect the actual facts on the ground.

In order to assess the relationship between risk factor perception and demographic variables, gender, age, education and region of location are of importance. In accordance with previous studies (Krewski et al., 2006; Lemyre et al., 2006), women perceived higher health risks than did men. Some researchers (Flynn, Slovic, & Mertz, 1994; Gustafson, 1998) have argued that existing differences in the traditional power relationship between men and women may be at the centre of their differences in health risk perception. However, others have postulated that women tend to be more careful about health and safety concerns in most of their activities (Davidson & Freudenburg, 1996; Gustafson, 1998). The differences between men and women in health risk perception are still largely unclear; however, some studies have attributed these differences to the level of education or biological differences (Dosman, Adamowicz, & Hrudey, 2001; Slovic, 1995). In this study, women perceived a significantly higher health risk than men for several factors, with large differences observed for chronic diseases, high-voltage power lines, natural health products and influenza. The large differences in the perception of chronic diseases between genders may be due to the “traditional” concept of men not frequently having health checks. Men often claim to have stronger immune systems than women and depend largely on self-medication or traditional herbs for their treatments, seeking modern medicine only at advanced stages of infections. The government may want to consider implementing some policies that will educate and change/modify some of the traditional/cultural beliefs and practices that are or may be health threats to the nation.

Differences in education level and age may influence the ways in which health risk factors are perceived. While age differences are suggested to have an influence on how health risks are perceived, the differences may be due to the increasing contacts with a risk and exposures changing over time. A certain situation may permit a more comprehensive appraisal of a risk factor in an older person than their younger counterparts (Dosman et al., 2001). This is incongruent with this study, as the older (≥ 50 years) participants generally scored health risk factors lower than did the younger age groups. Some studies have argued that individuals with less education (Krewski et al., 2006; Lemyre et al., 2006) score health risk perceptions higher; this suggestion is in accordance with this study, as subjects with lower education levels tended to perceive higher risks for health risk factors than those with higher education levels. Despite these differences, there is a need for further study to improve our understanding of the influence and relationship between age and education in health risk perception, as there were no significant differences among age groups and education regarding the perceived risks in this study.

Reflecting that the perception of health risk factors may vary depending on geographical location, large differences in mean score of perceived risk were observed in this study based on the region where the respondent resided. However, these differences across regions may be due to a number of factors, including the proximity to the risk factor, the nature and type of the sources of information, and the socio-political climate of the region (Dosman et al., 2001; Krewski et al., 2006). The large disparities between perceived risks in the northern regions and other regions of the nation may have been a result of the large differences between socioeconomic activities in these regions. This resulted in northern respondents scoring health risk factors with higher perceived risk than their southern region counterparts who have access to more socioeconomic amenities. For example, a study performed in 2015 on human resources for health in Cameroon revealed that the northern regions had fewer health personnel per capita than other regions of the nation, thus leading to large disparities in disease and health outcomes (Tandi et al., 2015). A lack of improved socioeconomic activities also implies low-income earnings within the region, which may account for the perceived health risk ratings and differences across different wages (Li, Feigelman, & Stanton, 2000).

The way the public perceives and interprets health risk factors may be based on their individual daily experiences. One of the reasons that risk perception by the public may differ from experts' views is not based on their lack of scientific knowledge regarding risk factors but rather that they perceive risks based on their personal appraisal of social rationality, which may be of little concern to experts or the government. Actions to bring the public's and experts' views with regards to health risk perception into better alignment may aid in the proper identification of risk, eventually leading to the development of suitable policies and programs for the promotion of health risk prevention to the nation.

6. Limitations

This study focused largely on descriptive accounts of how different health risk factors were scored by the public. It also based its findings only on twenty-five specific health risk factors; therefore, future studies require a broader sampling of factors. Also, survey weights were measured based only on regional and gender percentages with the targeted sampled size, although this was an initial study on such a topic in the nation, a more larger population sample size should be implemented in future studies. There was the dearth of information regarding some indicators (age, education and income) both nationally and regionally, which made it difficult to compare actuarial data with the study data. Cultural differences in health beliefs and practices across the different regions, which may have affected an individual's views and perceptions, were not considered in the study but may have influenced the results. Although there is a dearth of information, data presented in this study were based on the official national population census of 2010 categorized by gender and region, and the proportional quota of sampling was considered to be a "representative" sample of the entire nation; therefore there is little evidence that the sample used was not demographically balanced.

7. Conclusion

Generally, the risk factors presented in this study were scored as posing a potential "high health risk" to the population. Experts and managers interested in population health may want to consider taking measures that will carefully address these issues to effectively communicate and control the consequences that may result from the continuity of risk factors or accidents within the country. Although this study was limited to Cameroon, the results of this study could stand as a guide to address public perception of health risk factors in developing nations, such as those of Sub-Saharan Africa, as there is little information in this area of research. Because terrorism was expressed as beyond individual control and the overall highest perceived risk factor, the government may want to carefully interpret these results and take inclusive measures to educate the population on suitable ways to manage the situation to prevent other related health effects that may come from terrorism as well as from other risk factors presented in this study.

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Competing interests

The authors declare no competing interest.

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