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# Improving Stroke Prevention in the French West Indies

## Limits to Lay Knowledge of Risk Factors

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**Background and Purpose**—We sought to evaluate lay knowledge and understanding of cardiovascular diseases in the French West Indies.

**Methods**—In 2007, a cross-sectional study of 1005 randomly selected men and women (54% age 25 to 74 years from Guadeloupe and stratified by sex, age, and region was established to ascertain the population's knowledge and awareness of chronic diseases. Questions were asked about the respondent's knowledge of cardiovascular risk factors as well as their opinions and beliefs about measures to prevent these diseases.

**Results**—Knowledge about stroke prevention in this sample was lower than for heart disease, with 69% of women and 65% of men reporting that precautions can be taken to avoid a stroke versus 84% and 77%, respectively, for heart disease. "Avoid stress" was the most commonly cited stroke prevention measure, with 35% of women and 27% of men reporting it. The first spontaneous item cited for heart disease prevention was "physical exercise or sport," reported by 47% of women and 45% of men. We hypothesize that knowledge of stroke and stroke risk factors is poor in Guadeloupe or that it reflects culturally adapted health promotion messages from doctors.

**Conclusions**—Knowledge and awareness were found to be lower for stroke than for heart diseases. Changes in health promotion strategies are required in the French West Indies to improve the population's overall awareness of these diseases and to narrow the gap between knowledge and practice. (*Stroke*. 2010;41:00-00.)

**Key Words:** stroke prevention and ■ control ■ heart diseases ■ social environment

Stroke is the second most common cause of death worldwide after ischemic heart disease,<sup>1</sup> with the burden of stroke mortality falling unequally on low- and middle-income countries.<sup>2</sup> Stroke is also a disease with a higher incidence among black populations.<sup>3,4</sup> In France, cardiovascular diseases are the second most common cause of death (age-adjusted 29% of deaths), with stroke accounting for 6.6%.<sup>5</sup> Stroke is the leading cause of disability in France, with the stroke-related disability prevalence estimated at 398 per 100 000 inhabitants.<sup>6</sup> The age-adjusted incidence rate of stroke is 122.5 per 100 000 for men and 75.9 per 100 000 for women in France.<sup>7</sup> However, in Martinique, 1 of the French Départements d'Outre Mer located in the Caribbean archipelago, corresponding stroke incidence rates are considerably higher, at 170 per 100 000 for men and 159 per 100 000 for women.<sup>8</sup> In Guadeloupe, mortality from diseases of the circulatory system represented 30% of all deaths in 2003 and 32% of all deaths in mainland France.<sup>9</sup> Among the risk factors for stroke and ischemic heart disease, both obesity and hypertension have a high prevalence in the French West Indies (FWI, comprising Guadeloupe, Guyane, and Martinique).

10–12 Thus, reducing the prevalence of risk factors linked to stroke and heart disease in these French territories is of strong public health interest.

Understanding lay perceptions of these diseases and their risk factors is an important step in determining the optimal effectiveness of a public health campaign. Knowledge of risk factors is also likely to influence the patient's initial contact and compliance with primary care. Studies have shown differing levels of awareness or knowledge of the main risk factors in populations worldwide, with hypertension, smoking, and diet, as well as nonestablished risk factors, being the most commonly cited.<sup>13–15</sup> It is worth debating whether campaigns to increase public awareness and information passed on by practitioners should be based purely on biomedical evidence or to what extent messages may need to be adapted to specific sociocultural settings.

Little information is available on the awareness and knowledge of heart disease, stroke, and their risk factors in the FWI. One objective of the Connaissances sur la santé, croyances, et pratiques en terme de prévention cardiovasculaire dans la population Guadeloupéenne (CONSANT) project was to

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establish the level of awareness and knowledge of cardiovascular diseases and their risk factors in Guadeloupe. Guadeloupe has a culturally heterogeneous population consisting of black residents descended from slaves, a substantial minority of second- and third-generation Indo-Asians, and white Europeans, mostly from continental France.<sup>10</sup> The aim of this study was to understand the level of knowledge about the prevention of cardiovascular diseases within the CONSANT sample. We aimed to answer the following research questions: Do respondents know that stroke and heart disease can be prevented? What are the commonly cited methods of prevention for heart disease and stroke? Answers to these questions will provide information enabling better-adapted public health campaigns as well as primary care guidelines.

## Methods

CONSANT is a cross-sectional study with a stratified sample of men and women age 25 to 74 years who were selected according to age and sex quotas based on the most recent census data from the French statistical office (Institut national de la statistique et des études économiques [INSEE], 1999). The sampling method used a simple cross-sectional design. Sampling points were selected at random from the telephone book within geographically delineated districts. The first household surveyed was the neighboring household to the 1 selected from the telephone book. The random route method was then used to select subsequent households. This method is often used in developing countries, where ambiguous information/addresses are commonly found; therefore, the person conducting the survey calls at every *n*th household by following a random route.<sup>16</sup> Within the households, a random-number grid (Kish) was used to select 1 eligible household member to be surveyed. Individuals were ineligible to participate if they were not between the ages of 25 and 74 years and not normally resident on mainland Guadeloupe. A total of 1274 households were contacted and 1005 surveys were completed, giving a response rate of 79%. Data collection and entry were performed throughout 2007. Each subject gave informed consent to participate in the study, and all data were anonymized.

During interviews at the respondent's home, questionnaires administered by trained researchers were used to collect information on health behaviors, health status, socioeconomic environment, and access to health care. Questions were asked about the respondent's knowledge of cardiovascular and cerebrovascular disease risk factors as well as their opinions and beliefs about measures to prevent these chronic diseases. These questions were based on a set of queries developed for the international MONICA project, which had already been used in France between 1995 and 1997<sup>17</sup> (all questions cited herein were translated from French): "In your opinion, are there precautions to be taken to avoid heart disease, such as a myocardial infarction." If the respondent answered "yes," their spontaneous, open-ended responses to what precautions can be taken to avoid heart disease were noted by the interviewer and subsequently categorized into 20 potential risk factors. The same questions were asked for stroke.

At the same visit, anthropometric measurements were taken and blood pressure was measured with a validated automated device (Omron M5-1). Blood pressure was measured at minutes 5, 6, and 7 of rest with the subject in a sitting position with a cuff adapted to arm size. The participants were given their results with a brief explanation and, when relevant, the nurse provided health promotion information. The data were then anonymized and sent for entry into the database. Hypertension was defined as a mean systolic blood pressure  $\geq 140$  mm Hg and/or a mean diastolic blood pressure  $\geq 90$  mm Hg at the first visit, or if the subject was currently receiving antihypertensive treatment.

Body mass index was calculated as weight divided by height squared ( $\text{kg}/\text{m}^2$ ). Data from the questionnaire were used to establish tobacco and alcohol consumption, occupational status, level of educational attainment, and physical activity level. Respondents were defined as being smokers if they reported currently smoking

**Table 1. Characteristics of Men and Women in the CONSANT Sample**

Characteristics	Men (n=465)	Women (n=540)
Age groups, n, y (%)		
25–34	123 (26.5)	141 (26.1)
35–44	120 (25.8)	135 (25.0)
45–54	90 (19.4)	99 (18.3)
55–64	58 (12.5)	66 (12.2)
65–74	74 (15.9)	99 (18.3)
Occupational categories, n (%)		
Executives and intermediates		
Agricultural or independent occupation	23 (5.0)	33 (6.2)
Manual and nonmanual workers	80 (17.3)	28 (5.2)
Retired	155 (33.5)	181 (33.9)
Other inactive	59 (12.7)	77 (14.4)
146 (31.5)	215 (40.3)	
Education level, n, y (%)		
$\leq 6$	125 (27.2)	155 (29.4)
7–11	212 (46.2)	201 (38.1)
$\geq 12$	122 (26.6)	171 (32.5)
Married or cohabiting, n (%)		
260 (56.2)	249 (47.1)	
Smokers, n (%)		
111 (23.9)	40 (7.4)	
Units of alcohol consumption $\geq 4/\text{wk}$ , n (%)		
15 (3.2)	3 (0.6)	
Physical activity level $< 1$ h/wk, n (%)		
317 (70.1)	435 (81.6)	
Body mass index, mean $\pm$ SD, $\text{kg}/\text{m}^2$ , n		
25.4 $\pm$ 4.3 (458)	27.8 $\pm$ 5.8 (531)	
Units of alcohol consumed per week, mean $\pm$ SD, n		
4.7 $\pm$ 14.4 (458)	0.9 $\pm$ 3.4 (534)	
Blood pressure, mean $\pm$ SD, mm Hg, n		
Systolic		
128.4 $\pm$ 17.9 (459)	120.7 $\pm$ 19.4 (535)	
Diastolic		
79.3 $\pm$ 12.2 (459)	77.7 $\pm$ 11.8 (535)	

cigarettes, cigarillos, cigars, or a pipe on a regular basis. Alcohol consumption (beer, cider, wine, or liquor) was quantified in glasses per day and converted into units, and heavy drinkers were defined as those consuming  $\geq 4$  units per day. Data on physical activity were extracted from a question on participation in sporting activity, whereby a sedentary lifestyle was defined as having  $< 60$  minutes of sporting activity per week. Occupational status was extracted according to the standard "professions et catégories socioprofessionnelles" defined by the French statistical office (INSEE).<sup>18,19</sup> The respondents were grouped into 5 categories: executives and intermediates, manual and nonmanual workers, agricultural and independent occupations, retired, and other inactive. Educational attainment was grouped into 3 categories:  $< 6$  years, 7 to 11 years, and  $\geq 12$  years of formal education.

## Statistical Analyses

Categorical variables were compared by the  $\chi^2$  test. Multivariate analyses were conducted by logistic regression. All analyses were performed with the statistical package Stata SE 9.2 for Windows (Stata Corp, College Station, Tex).

## Results

The general characteristics of the population are presented in Table 1. Knowledge about prevention was higher for heart disease than for stroke, with 84% of women reporting that

**Table 2. Percent Response to Whether Precautions Can Be Taken to Prevent Stroke or Heart Disease and Cited Risk Factors by Level of Education**

	Education Level				<i>P</i>	<i>P*</i>
	Low	Middle	High	Percent of Total		
<b>Women</b>						
Precautions can be taken to prevent heart disease						
Yes	74	86	91	84	0.003	<0.001
No	18	8	6	10		
Nonresponse	8	6	3	5		
Precautions can be taken to prevent stroke						
Yes	59	72	73	69	0.101	
No	28	17	19	21		
Nonresponse	12	11	8	10		
Can name >1 risk factor for heart disease	70	86	89	83	<0.001	<0.001
Can name >1 risk factor for stroke	55	70	68	65	0.009	
<b>Men</b>						
Precautions can be taken to prevent heart disease						
Yes	69	79	83	77	0.142	<0.001
No	20	14	12	15		
Nonresponse	11	7	5	8		
Precautions can be taken to prevent stroke						
Yes	58	63	76	65	0.083	
No	28	25	19	25		
Nonresponse	14	11	5	10		
Can name >1 risk factor for heart disease	64	78	80	75	0.006	<0.001
Can name >1 risk factor for stroke	52	58	70	60	0.010	

\*Adjusted *P* value.

precautions can be taken to avoid heart disease versus 69% for stroke ( $P<0.001$ ), and the respective values for men were 77% and 65% ( $P<0.001$ ). The proportion of respondents who said that no precautions can be taken to prevent stroke was higher than for heart disease: 21% of women and 25% of men for stroke versus 10% of women and 15% of men for heart disease ( $P<0.001$ ). No response was also high regarding stroke prevention, with 10% of men and women choosing not to respond to the question versus 5% of women and 8% of men for heart disease. Among women, knowledge of prevention of heart disease increased positively with education level, but this was not observed for knowledge of prevention of stroke (Table 2). In men, there was no association between knowledge of prevention of heart disease or stroke and education level. In terms of age, knowledge of heart disease prevention remained stable across the age groups for both sexes, except for respondents age 65 to 74 years, in whom such knowledge dropped slightly. The results varied somewhat across the age groups for stroke prevention, with the lowest levels of awareness for respondents in the oldest (65 to 74 years) age group (data not shown). Whether respondents could cite 1 or more risk factors revealed similar trends, with a total of 83% of women citing 1 or more risk factors for heart disease versus 65% for stroke ( $P<0.001$ ) and 75% of men citing 1 or more risk factors for heart disease versus 60% for stroke ( $P<0.001$ ). In women and men reporting 1 or more risk factor, this was significantly and positively associated with education level.

The response rate for each spontaneous answer about whether there are precautions to be taken to avoid heart disease or stroke is listed in rank order for women and men by education level in Tables 3 and 4. For heart disease, the first 8 answers were the same for both sexes, with the highest proportion of women and men (47% and 45%, respectively) reporting “physical exercise or sport activity” as the first precaution to be taken. This was followed in order by “eat less fat” (42% of women and 32% of men), “drink less alcohol” (26% and 29%, respectively), and “do not smoke” (24% and 28%, respectively). For stroke, the top 3 answers were the same for both sexes, with the rank order according to response rate varying for women and men thereafter. “Avoid stress” was the highest-rated response, with 35% of women and 27% of men reporting this as a preventive measure to be taken to avoid stroke. It was closely followed by “avoid arguments,” with a response rate of 31% of women and 26% of men, and then “physical exercise and sport activity,” with a response rate of 23% and 22% for women and men, respectively. “Sleeping well” ranked fourth among women, 17% of whom reported this as a precaution to be taken, whereas it ranked sixth for men (11%), who reported “not smoking” (16% of men and 14% of women) and “drinking less alcohol” (15% of men and 16% of women) as being more important. In both women and men, citing “physical exercise and sport,” “not smoking,” “watching your weight,” and “watching your cholesterol” as methods of heart

**Table 3. Rank Order of Spontaneously Cited Precautions to Be Taken to Avoid Heart Disease by Men and Women, by Education Level**

Rank Order of Spontaneous Answers	Percent by Education Level					P	Percent With Hypertension (n=200)
	Low	Medium	High	Total			
Women (n=540)							
1 Physical exercise or sport activity	10	18	22	47		†	39†
2 Eat less fat	29	47	48	42		‡	40
3 Drink less alcohol	22	28	27	26			27
4 Do not smoke	15	26	33	24		†	22
5 Avoid stress	22	26	25	24			28
6 Eat more fresh fruit and vegetables	18	25	26	23			23
7 Eat less salt	21	19	17	19			24*
8 Watch your weight	10	18	22	17		†	17
9 Avoid arguments	15	17	15	16			22†
10 Sleep well	10	14	18	14			13
11 Watch your cholesterol	11	10	19	14		†	13
12 Diet to lose weight	7	11	15	11			10
13 Be followed by your doctor	7	9	14	10			10
14 Watch your blood pressure	8	5	12	8			9
15 Other	8	10	6	8			12†
16 Diet for diabetes or to avoid sugar	4	6	9	7			9
17 Watch your blood glucose levels	6	4	7	7			7
18 Use more oils and margarines	4	6	8	6			4
19 Other type of diet	1	4	4	3			2
20 Smoke less	2	3	2	2			2
Men (n=465)							
1 Physical exercise or sport activity	25	50	56	45		‡	43
2 Eat less fat	27	31	39	32			29
3 Drink less alcohol	29	29	30	29			28
4 Do not smoke	22	24	39	28		†	28
5 Avoid stress	17	16	25	19			20
6 Eat more fresh fruit and vegetables	12	17	22	17			18
7 Eat less salt	15	14	12	14			17
8 Watch your weight	12	9	24	14		†	13
9 Sleep well	12	9	20	13		*	11
10 Avoid arguments	10	12	18	13			11
11 Other	10	12	9	11			7
12 Be followed by your doctor	7	10	10	9			9
13 Watch your cholesterol	6	7	16	9		†	10
14 Watch your blood pressure	6	7	12	9			7
15 Diet to lose weight	5	7	10	8			9
16 Use more oils and margarines	5	6	9	6			5
17 Watch your blood glucose levels	2	5	9	6		*	7
18 Diet for diabetes or to avoid sugar	2	6	5	5			7
19 Smoke less	2	3	5	3			2
20 Other type of diet	2	1	5	2			3

\* $P<0.05$ ; † $P<0.01$ ; ‡ $P<0.001$ .

disease prevention were all significantly and positively associated with education level. A similar trend was observed for items cited to prevent stroke in men and women: “physical exercise or sport,” “watching your blood pressure,” and “watching your cholesterol” were positively associated with education level.

Of note is the significant change in the prevalence of some of the spontaneous responses to the questions on heart disease and stroke when the respondent was defined as hypertensive (last columns in Tables 3 and 4). Multivariate analyses were performed for the items when a significant difference ( $P<0.05$ ) was observed between the overall sample and

**Table 4. Rank Order of Spontaneously Cited Precautions to Be Taken to Avoid Stroke by Men and Women, by Education Level**

Rank Order of Spontaneous Answers	Percent by Education Level				<i>P</i>	Percent With Hypertension (n=200)
	Low	Medium	High	Total		
<b>Women (n=540)</b>						
1 Avoid stress (5)	27	38	37	35		32
2 Avoid arguments (9)	26	37	29	31	*	28
3 Physical exercise or sport activity (1)	11	21	33	22	‡	22
4 Sleep well (10)	11	19	19	17		16
5 Drink less alcohol (3)	12	17	19	16		17
6 Eat less fat (2)	17	15	16	16		18
7 Eat less salt (7)	14	19	11	15		20*
8 Do not smoke (4)	13	13	17	14		16
9 Watch your blood pressure (14)	6	14	15	12	*	12
10 Eat more fresh fruit and vegetables (6)	10	7	15	11		13
11 Watch your weight (8)	7	11	12	10		11
12 Watch your cholesterol (11)	6	6	13	8	*	7
13 Be followed by your doctor (13)	7	6	11	8		11
14 Other (15)	5	9	8	8		11*
15 Watch your blood glucose levels (17)	4	2	8	4	*	7*
16 Diet for diabetes or to avoid sugar (16)	4	3	6	4		8†
17 Other type of diet (19)	4	4	4	4		4
18 Use more oils and margarines (18)	4	2	4	3		4
19 Diet to lose weight (12)	3	5	6	3		5
20 Smoke less (20)	3	1	2	2		2
<b>Men (n=465)</b>						
1 Avoid stress (5)	23	24	34	27		22
2 Avoid arguments (10)	26	25	30	26		18†
3 Physical exercise or sport activity (1)	15	21	34	23	†	26
4 Do not smoke (4)	13	13	23	16	*	16
5 Drink less alcohol (3)	17	11	19	15		22†
6 Sleep well (9)	11	6	19	11	†	10
7 Eat less fat (2)	10	9	15	11		9
8 Watch your blood pressure (14)	13	5	13	9	†	14†
9 Watch your weight (8)	10	6	14	9	*	9
10 Eat less salt (7)	10	8	7	9		11
11 Other (11)	7	9	10	9		4*
12 Be followed by your doctor (12)	8	6	11	8		10
13 Eat more fresh fruit and vegetables (6)	4	9	11	8		11
14 Watch your cholesterol (13)	6	5	12	7	*	7
15 Diet to lose weight (15)	4	1	6	5		4
16 Watch your blood glucose levels (17)	3	3	6	4		3
17 Diet for diabetes or to avoid sugar (18)	5	2	5	4		4
18 Other type of diet (20)	2	4	4	5		5
19 Use more oils and margarines (16)	2	3	2	3		3
20 Smoke less (19)	2	2	3	2		1

\**P*<0.05; †*P*<0.01; ‡*P*<0.001.

Numbers in parentheses refer to the rank order of the same item cited as a precaution for heart disease in Table 3.

hypertensive respondents in the bivariate analyses to control for confounding with age and education (Table 5). For heart disease prevention, hypertensive women were 80% (95% CI, 1.1 to 3.0) more likely to say that eating less salt and twice as likely (odds ratio [OR]=2.0; 95% CI, 1.2 to 3.5) to say that avoiding arguments were measures of heart disease preven-

tion compared with nonhypertensive women. No differences were observed between hypertensive and nonhypertensive men for prevention measures cited for heart disease. For stroke prevention, hypertensive men were less likely to say that avoiding arguments could help prevent stroke (OR=0.5; 95% CI, 0.3 to 0.9) but were more likely to say that drinking

**Table 5. Association Between Being Hypertensive and Items Cited as Preventive Measures for Heart Disease or Stroke, Adjusted for Age and Education Level: Logistic Regression Analysis**

Heart Disease	OR	95% CI	P
<b>Women</b>			
Physical exercise or sport activity	0.83	0.54–1.26	0.381
Eat less salt	1.81	1.10–2.99	0.020
Avoid arguments	2.02	1.18–3.47	0.011
<b>Stroke</b>			
<b>Women</b>			
Eat less salt	1.87	1.07–3.25	0.027
Watch your blood glucose levels	2.92	1.15–7.39	0.024
Diet for diabetes or to avoid sugar	3.46	1.32–9.08	0.012
<b>Men</b>			
Avoid arguments	0.52	0.31–0.86	0.012
Drink less alcohol	2.25	1.29–3.96	0.005
Watch your blood pressure	2.66	1.29–5.47	0.080

less alcohol (OR=2.3; 95% CI, 1.3 to 4.0) and watching your blood pressure (OR=2.7; 95% CI, 1.3 to 5.5) were measures of stroke prevention compared with other men. Hypertensive women were more likely to cite eating less salt (OR=1.9; 95% CI, 1.1 to 3.3), watching your blood glucose levels (OR=2.9; 95% CI, 1.2 to 7.4), and having a special diet for diabetes or to avoid sugar (OR=3.5; 95% CI, 1.3 to 9.1) were ways to prevent stroke compared with nonhypertensive women.

### Discussion

So far as we know, this is the first time that knowledge and awareness of these chronic diseases has been studied in the FWI. The main finding from this study is that knowledge and awareness about measures to prevent stroke are poorer than for heart disease in Guadeloupe. The results are alarming in a region where there is a high incidence of stroke, showing that only 12% of women and 9% of men cited hypertension as a risk factor for stroke compared with 20% of men and women in mainland France.<sup>6</sup>

There are some limitations to this study, which relied on the respondent's understanding and response to questions soliciting their opinions and knowledge. The nonresponse rate for the question on measures to prevent stroke was 10%, which may reflect a problem in the wording or interpretation of the question, or it may reflect the respondent's lack of knowledge on the subject. Although no difference was observed between respondents and nonrespondents in terms of age, education level, or marital status, male nonrespondents were more likely to be in the inactive/unemployed occupation category (44%) than were male respondents (30%,  $P=0.01$ ). This suggests that among men who did not respond to whether there are preventive measures to be taken against stroke, they were more likely to have a low socioeconomic status versus those who did respond. This difference was not observed among women. A nurse, trained specifically to administer the questionnaire, was present to answer any queries. As with all epidemiologic studies, error or bias may have been introduced through sample selection. In this

**Table 6. Comparison of Stroke Knowledge Based on International Literature**

	Percent
Yes, there are precautions to be taken to prevent stroke	
Kelly-Irving et al ( <i>vide infra</i> ; 2010), Guadeloupe (CONSANT)	67
Can name $\geq 1$ risk factor for stroke	
Kelly-Irving et al ( <i>vide infra</i> ; 2010), Guadeloupe (CONSANT)	62
Müller-Nordhorn et al <sup>13</sup> (2006), Germany	68
Pontes-Neto et al <sup>14</sup> (2007), Brazil	82
Yoon et al <sup>15</sup> (2001), Australia	88
Neau et al <sup>6</sup> (2009), France	89

case, sampling was done with age and sex quotas to obtain a sample representative of the general population rather than by randomly selecting individuals within stratified groups. This means that the chance of being selected was not equal and that certain individuals may have been more likely to participate, with no information on those who declined or were unavailable. Interobserver variability may also have been introduced by the trained nurses conducting the survey. We do not have information on agreement or disagreement among the survey staff about their interpretation of spontaneous answers.

Knowledge and awareness of risk factors for stroke in the FWI are different from those found in other countries (Table 6), with the most important established risk factors being lower on the list of commonly cited items. Our study showed that 31% of women and 35% of men did not know about measures to prevent stroke or did not respond to the question, and an alarming 35% of women and 40% of men could not name 1 or more risk factor for stroke. In a study among a sample of the French mainland population from Poitou-Charentes, Neau et al<sup>6</sup> found that 10.5% of the respondents could not name a single stroke risk factor. A Brazilian study of stroke awareness reported that 18.5% of respondents could not name any stroke risk factors,<sup>14</sup> and results from Australia showed that 12% of respondents did not know of any stroke risk factors. Therefore, knowledge about stroke and how to prevent it is worse in the FWI. In our study, the most commonly cited measures to prevent stroke were avoiding stress (31%) and arguments (29%), with only 12% of women and 9% of men citing lowering blood pressure. In a study performed among 28 090 German respondents, 37% of men and 47% of women cited hypertension as a risk factor for stroke.<sup>13</sup> Pontes-Neto et al<sup>14</sup> reported that the most-cited risk factor was smoking (50%), followed by poor eating habits (36%) and hypertension (30%). An Australian study of stroke awareness showed that smoking was the most commonly cited risk factor (39%), followed by stress (34%), poor diet (32%), and hypertension (30%). In mainland France, the most commonly cited risk factor was also smoking (48%), followed by alcohol consumption (38%) and high cholesterol values (30%).<sup>6</sup> Similarly, a lower level of knowledge of measures to prevent heart disease was observed in Guadeloupe (84% of women and 77% of men) compared with mainland France (89% of women and 88% of men), especially among men.<sup>17</sup> The top 3 spontaneously cited measures

to prevent heart disease were the same, with respondents in mainland France listing them in the following order: “eat less fat,” “physical exercise and sport,” and “drink less alcohol.” The rate at which respondents from mainland France cited these items was much higher compared with respondents in Guadeloupe. “Physical exercise and sport” was cited among 63% of mainland French respondents compared with 47% in Guadeloupe, “eat less fat” was cited among 69% of mainland French versus 37% of Guadeloupians, and “drink less alcohol” was cited by 53% of mainland French respondents versus 28% of Guadeloupien respondents. Knowledge of risk factors for stroke and heart disease was significantly associated with the level of education in both men and women, with certain items, such as being physically active and watching cholesterol levels, being significantly and positively linked with education level. This association was also observed by Müller-Nordhorn et al<sup>13</sup> and suggests that a certain amount of knowledge and awareness about heart disease and stroke is linked to socioeconomic status.

The most commonly cited spontaneous responses given for stroke prevention do not reflect the established risk factors associated with cerebrovascular disease but highlight the importance of better relationships, fewer interpersonal conflicts, and lower levels of stress. The spontaneous responses for heart disease prevention, however, were more grounded in biomedical recommendations. Two main hypotheses are postulated to explain this difference. First, it is linked to the lay understanding of stroke in Guadeloupe, where stressful living conditions could be associated with stroke. Second, medical professionals may have adapted their health promotion message to concerns that they have about the Guadeloupien population regarding stress. Support for the first hypothesis can be seen in the differences between hypertensive and nonhypertensive respondents about measures of prevention of stroke and heart disease. For example, hypertensive men and women were more likely to cite “biomedical” measures of stroke prevention, such as eating less salt, watching glucose levels, and watching blood pressure, compared with nonhypertensives. These differences between hypertensives and the general population may indicate the influence of contact with the health services, whereby such respondents would be likely to receive advice on ways to prevent diseases caused by hypertension. This situation suggests that people who are not in regular contact with the health services are less aware of these diseases and how they can be prevented. If this is the case, then a broad health education campaign to inform the general population about stroke and heart disease prevention would be of great public health interest.

However, there is also some support for the alternative hypothesis among our findings. Hypertensive women were more likely to say that avoiding arguments is an important measure to prevent heart disease compared with nonhypertensives. This supports the idea that medical advice consists of both biomedical recommendations and knowledge of the specific social context and lay perceptions of health and the body. Medical practitioners living and working in Guadeloupe are likely to have incorporated these sociocultural manifestations of illness in parallel to typical biomedical explanations. Indeed, from an epidemiologic point of view,

psychological stress has been linked to the development of cardiovascular risk factors such as hypertension and atherosclerosis.<sup>20–22</sup> Self-perceived stress, as well as stress-related measures like sense of coherence, have also been associated with stroke.<sup>23,24</sup> Within this population, psychosocial factors such as stress could contribute to the risk of morbidity and mortality from heart disease or stroke. Indeed, strong socioeconomic inequalities, alongside strained social and professional relationships, create a tense social atmosphere in the FWI. This tension also permeates the household, where familial relationships are affected by rivalry between the sexes where multiple sexual partners are commonplace. Such conflicts put a strain on heterosexual relationships and marriage partners. This is concordant with a high frequency of medical consultation for depression and other mental health symptoms reported in the region.<sup>25</sup> From a lay perspective, the circulation and flow of bodily fluids are the basis of good health. In Guadeloupe, Benoit<sup>26</sup> highlighted a lay taxonomy of sickness and disease structured around notions of “hot” versus “cold,” “dry” versus “wet,” and “blocked” versus “flowing” “humors,” such as blood, lymph, and water. The brain and head are perceived as organs vital to this humeral flow. Any emotional or physical trauma, increase in anxiety level, or stress is likely to impede the natural circulation within the body. Thus, the brain is the seat of psychological and emotional concerns wherein obstacles to flow will remain “blocked” in case of stress. Avoiding arguments may therefore be a recommendation consistent with both lay and medical explanations of disease.

### Summary

The overall awareness of stroke and heart disease in Guadeloupe is poor compared with other countries. The hypothesis that there is an association between overall levels of anxiety and stress within a society and an increased prevalence of cardiovascular risk factors such as hypertension deserves further exploration. It is worth envisioning a research project on medical discourse and how the latter may be constructed from national and international health promotion campaigns as well as the sociocultural context at a local level. Given the high incidence of stroke<sup>8</sup> and high prevalence of hypertension<sup>11,12</sup> in the FWI compared with mainland France, it is of strong public health interest to improve lay knowledge of these diseases. Health promotion campaigns to improve knowledge of risk factors for chronic diseases in Guadeloupe may benefit from being targeted specifically at stroke prevention.

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## Disclosures

None.

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