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Research Data Related to this Submission

There are no linked research data sets for this submission. The following reason is given:

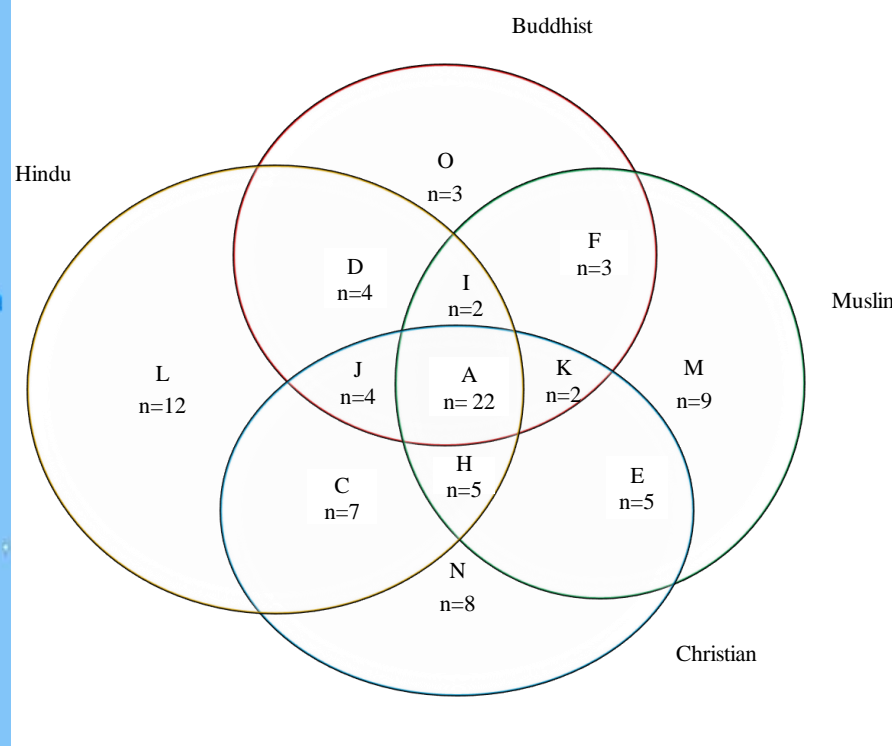
No data was used for the research described in the article



A comparative ethno-religious study of traditional herbal medicines used to manage cardiovascular diseases:

100 plant species belonging to 46 families and 19 polyherbal formulations used against CVDs.

Fruit (42.8%) was the most used plant parts and juice (27.8%) was the most frequently reported method of preparation of herbal remedies



A comparative ethno-religious study of traditionally used medicinal plants used to manage cardiovascular diseases

Abstract

Cardiovascular diseases (CVDs) remain the leading cause of death globally. Notoriously, the multicultural island of Mauritius has also not been spared from the burden of CVDs. In 2017, 32.3% of all deaths resulted from CVDs solely. Despite the availability of conventional medicine, Mauritians have a deep-rooted interest in the use of traditional herbal medicines (THMs) for the management of diseases. Nonetheless, there is currently a dearth of study that specifically addresses the extent of use of THMs among cardiovascular patients. In addition, cultural similarities/differences in the use TMs in cardiovascular patients among different religious groups have also not been undertaken. This study endeavours to document for the first time THMs employed against CVDs as well as to highlight cultural similarities/differences in their use among different religious groups in Mauritius. A nationally representative sample (n=384) involving cardiovascular patients was recruited to take part in a face to face interview using a semi-structured questionnaire. Four quantitative indexes, (frequency index (FI), informant consensus factor (ICF), cultural importance index (CII), and Jaccard similarity index (JSI)) were calculated. Pearson Chi-Squared test was performed to measure the relationship between demographic characteristics and use of TMs. One hundred plant species belonging to 46 families and 19 polyherbal formulations (PHF) were reported to be used against CVDs. Fruit (42.8%) was the most used plant parts and juice (27.8%) was the most frequently reported method of preparation of herbal remedies. Based on the FI, *Citrus limon* scored the highest value (FI=9.1). Hypertensive disease category was the most cited ailment category with the highest informant consensus factor (ICF=0.65). The CII showed that *Ocimum tenuiflorum*, *Camellia sinensis*, *Murraya koenigi*, and *Citrus limon* were the culturally most important plants among Hindu, Muslim, Christian, and Buddhist respectively. The highest similarity of plants usage was between the Hindu and Muslim community with a JSI of 90.9. A total of eight animal species distributed over seven families were documented against CVDs. Fish (46.4%) was reported as the most utilised animal remedy (*Thunnini* FI=28.6). This study showed that TMs largely based on food plants and animal products are extensively used by the different religious communities of Mauritius as a form of health-care. It is anticipated that this preliminary documentation of therapies used in CVDs management will open new avenues for research and stimulate further pharmacological investigations to discover useful bioactive constituents to alleviate sufferings.

Keywords: Ethno-religious; Hypertensive; traditional medicines; food plants; Mauritius.

List of abbreviations: AA: Arrhythmia; AFR: Acute rheumatic fever; ARs: Animal remedies; BP: Blood pressure; CHD: Coronary heart disease ; CII: Cultural importance index; CII_B: Cultural importance index among Buddhist; CII_C: Cultural importance index among Christian; CII_H: Cultural importance index among Hindu; CII_M: Cultural importance index among Muslim; CVD(s): Cardiovascular disease(s); FI: Frequency index; H: Hypertensive disease; HA: Heart attack; ICF: Informant consensus factor; ID: Identification number; IHD: Ischaemic heart disease; IPNI: International Plant Name Index; IUCN: International Union for Conservation of Nature; JSI: Jaccard similarity index; MP(s): Medicinal plant(s); MMS: Mauritius Meteorological Services ; NF-kB: Nuclear factor kappa B; PHD: Pulmonary heart disease; PHF: Polyherbal formulations; RHD: Rheumatic heart disease; TCM: Traditional Chinese medicine; TM(s): Traditional medicine(s); VCAM-1: Vascular cell adhesion molecule-; VHD: Valvular heart disease; WHO: World Health Organisation

Introduction

Cardiovascular diseases (CVDs) are the leading cause of mortality worldwide. An estimated 17.9 million people died from CVDs in 2016, representing, 31% of all global deaths. Of these deaths, 85% are due to heart attack and stroke (WHO, 2019). Enthrallingly, the Mauritian population also has not been spared from the devastating scourge of CVDs. In fact, in 2017, CVD was the principal cause of death over the island and resulted in 3206 deaths, out of which, 1850 were due to heart diseases followed by cerebrovascular and hypertensive diseases with 809 and 505 deaths respectively (Health Statistics Report, 2017).

Interestingly, a plethora of conventional drug therapies are available which provide a wide array of therapeutic benefits to cardiovascular patients (Li, 2011; cited Zheng *et al.* 2013). Patients suffering from myocardial infarction have recourse to low-dose diuretic-based therapy to prevent this disease (Chen *et al.* 2005), the risk of sudden cardiac death can be reduced by 31% with the help of β -blockers (Al-Gobari *et al.* 2013), and for the prevention of thromboembolic events, anti-platelet treatment remains the mainstay (Geerts *et al.* 2008).

Nonetheless, despite the success of conventional medicines in appeasing the suffering of cardiovascular patients further to improving the quality of life of sufferers, they are not devoid of unwanted side-effects (Toyoshima *et al.* 1997; cited Zheng *et al.* 2013). Consequently, in an attempt to identify novel avenues to manage CVDs, interest in traditional medicines (TMs) has been rejuvenated. Furthermore, there is a strong perception that TMs are safe and present fewer side-effects compared to conventional drugs. The use of TMs is still anchored among different cultures of the world. Indeed, a previous bulletin from the WHO depicted that up to 80 % of the emerging world's population still rely on TMs for curative purposes (WHO, 2013). In addition, more than 2000 plants have been recorded to be used in different traditional systems of medicine (Arya and Gupta, 2011; cited Suroowan and Mahomoodally, 2015) among which include *Panax notoginseng*, *Salvia miltiorrhiza*, *Astragalus membranaceus*, *Crataegus monogyna*, and *Allium sativum* which are providing comprehensive relief to cardiovascular patients (Winston, 2012). Though, TMs have promising medicinal potential, the risk of herb-drug interaction when taken concomitantly with conventional drugs exists (Tachjian *et al.* 2010).

Mauritius is a tropical island of volcanic origin situated in the Indian Ocean with a population of around 1.27 million people. Mauritius is multicultural whereby people of different religions namely Hinduism (49%), Christianity (32%), Islam (17%), and Buddhism (0.4%) cohabit the island (World Population Review, 2019). Moreover, Mauritius is endowed with a rich floral biodiversity and harbours an array of medicinal plants (Mauritius Wildlife Federation, 2012). The

1 use of TMs has formed part of the first line approach employed by local inhabitants to obtain relief
2 from a wide range of maladies since centuries ago. Interestingly, this practice is ongoing as reported
3 by a number of previous local publications (Mootoosamy and Mahomoodally, 2013; Suroowan and
4 Mahomoodally, 2015). Given the burden that CVDs pose over the island and the fact that no study
5 has yet documented the TMs employed against CVDs exclusively, this study was designed to
6 provide a repertoire and safeguard such information for the first time. In addition, it is important to
7 study the similarities and differences in the use of plant and animal species against CVDs among
8 different religious groups. Consequently, this study also endeavours to generate ethno-religious data
9 for the use of TMs in the prophylaxis and management of CVDs that could subsequently stimulate
10 further research.
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21 **Methodology**

22 **Study area**

23 The tropical island of Mauritius is positioned in the Indian Ocean, some 2,000 kms off the
24 Eastern coast of Africa and 890 kms to the East of Madagascar covering a total land area of 1865
25 km² (Mauritius Ports Authority, 2019). The island is faced with two seasons throughout the year
26 namely; summer which starts from November to April and winter which lasts from June to
27 September whereby October and May are the transition months (MMS, 2019).
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35 The Mauritian population is estimated at 1.27 million today with 49.38% males and 50.62%
36 females. The people of Mauritius are multicultural with Hinduism being the largest religion (49%)
37 followed by Christianity (32%), Islam (17%), and Buddhism (0.4%). Moreover, Mauritians are
38 multi-lingual whereby languages such as Creole, Hindi, Bhojpuri, French, and English are
39 commonly used for communication (World Population Review, 2019).
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44 Given its volcanic origin, the island possesses rich and fertile lands onto which prevails a
45 diverse flora. Indeed, the island has been endorsed by the International Union for Conservation of
46 Nature (IUCN) as a centre for plant diversity (Ministry of Environment and Sustainable
47 Development of Mauritius, 2010). The flora holds its origin from the Mascarenes, as a result of the
48 variation in topography and given the geographical isolation of the Mascarene Islands, a plethora of
49 endemic species occurred in Mauritius (Gurib-Fakim and Brendler, 2004). A total number of 711
50 plant species are reported to inhabit the island out of which 246 are endemic. On the other hand, 30
51 land birds, 17 native reptiles, and 1700 marine species also reside within the island among other
52 animal species (Ministry of Environment and Sustainable Development of Mauritius, 2010). During
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the recent years, a large extent of land clearing, invasion by alien species and land pollution has been witnessed over the island. These factors predispose the local 89% of the flora to a major threat of extinction. Hence endemic plants are protected, preserved, and regulated by the Mauritian government at legally defined areas on the mainland; National Parks and Nature Reserves (Ministry of Environment and Sustainable Development of Mauritius, 2010).

Data collection

The present research was approved by the Department of Health Sciences, University of Mauritius, Mauritius. Information was sought from informants above 20 years based on the assumption that the mature population hold greater knowledge on traditional medicine (TM). According to WHO, the cardiovascular population represents 28.4% of the whole population (WHO, 2018). Based on the population size, the sample size for the cardiovascular population was estimated according to the formula proposed by Rashid *et al.* (2011): $n = (Z\alpha)^2 \times [P (1 - P)] / d^2$; where, $n = (Z\alpha)^2 \times [P (1 - P)] / d^2$ where: n = estimated sample size, $Z\alpha$ at 5% level of significance = 1.96, d = level of precision; estimated to be 0.05, and P = the cardiovascular population which is 28.4% of the whole population. Hence, the sample size = $(1.96^2) \times [0.284 (0.716)] / (0.05)^2 = 312$ people. Following field work, 384 cardiovascular patients were interviewed and only 320 who were traditional users were included in the final study.

Data was gathered mainly through face to face interviews using a semi-structured questionnaire. Field trips were conducted in both rural and urban areas namely; Goodlands, Petit Raffray, Flacq, Poudre d'Or, Pamplémousse, Grand-Baie, Calebasse, Port Louis, and Vacoas during the academic year 2016-2017. Prior to the start of the interview, respondents signed a consent form after reading an information sheet which summarised the aim of the project, consent of participants, confidentiality information, and contact details of researcher, where signature could not be obtained verbal agreement was requested. The interview was conducted in the local vernacular language (Mauritian Creole). Each interview lasted between 10-15 minutes. People's home, health centres, Chinese shops, and ashrams were visited to meet respondents.

During field trips, participants were requested to show the plants they used as remedies if they had them cultivated or around their vicinity. Samples of the plants and/or pictures of the plants were taken for better plant identification with the help of a local botanist. The International Plant Name Index was used to identify the scientific names of the plant species (IPNI, 2012).

A locally published book was used to cross-check the data (local/scientific names) obtained during the survey (Gurib-Fakim and Brendler, 2004). The Plant List (www.plantlist.org),

1 International Plant Name index (www.ipni.org), (IPNI) and Kew Botanical Garden Plant name
2 databases were used to confirm both the scientific names of plants and the author names (Heinrich
3 and Verpoorte, 2014; Rivera *et al.* 2014). Our local repository database was revised whereby
4 botanical samples were given a collection number for future reference as proposed by Verpoorte
5 (2008).
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9 This research has been geared to endorse the involvement of the natives who have conserved
10 indigenous TM knowledge and also targets to safeguard the community biodiversity and intellectual
11 property rights. Moreover, participants were ensured that this investigation does not hold any
12 commercial purpose and aims exclusively at information documentation, conservation, and
13 transmission of traditional knowledge concerning use of TM for cardiovascular diseases (CVDs).
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18 **Questionnaire design**

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20 A semi-structured questionnaire was designed to meet the objectives of the project and
21 comprised of both close and open-ended questions. Altogether 26 questions were included and
22 divided into four sections; A, B, C, and D. Section A sought to generate demographic details and
23 included gender, age, religion, residence, highest level of education, occupation, monthly household
24 income, and current cardiovascular status. Section B of the questionnaire consisted of information
25 about the plant remedies used to manage CVDs: reasons for preference, source of medicinal plant
26 (MP), MP counselling, local name of the plant, part consumed, method of preparation, route of
27 administration, dosage, frequency of intake, duration of treatment, any possible side effects,
28 improvement in health status, effectiveness of phytotherapy, and use of other botanical remedies or
29 additives. Section C was based on animal remedy used to manage CVDs: reasons for preference,
30 local name of the animal, form used, part consumed, method of preparation, dosage, route of
31 administration, frequency of intake, duration of treatment, safety of animal remedies (ARs), and
32 effectiveness of zootherapy. Finally, section D was based on use of other traditional remedies for
33 CVDs management: Yoga, acupuncture, massage, prayer, deep breathing exercises, and others.
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47 Based on the data obtained from the participants, all the reported ailments were classified
48 into seven categories and the categories were ischaemic heart disease, cerebrovascular disease,
49 hypertensive disease, pulmonary heart disease, valvular heart disease, arrhythmia, and heart attack
50 (WHO, 2016).
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54 **Quantitative indexes**

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56 The data obtained about medicinal plants and animal species was analysed using different
57 quantitative indexes.
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Frequency index

The frequency index (FI) was used to compare the relative importance of each plant species over the island. As stated by Mahwasane *et al.* (2013), FI is a statistical expression of the percentage frequency of citation for a particular botanical species by participants. FI was calculated based on the following formula (Madikizela *et al.* 2012): $FI = FC/N \times 100$; where, FC is the number of participants who mentioned the use of the species and N is the total number of participants. A high FI value was obtained when there were many participants who cited a specific plant and low when there were few reports.

Informant consensus factor

To analyse the data obtained on the use of animals and plants, the informant consensus factor (ICF) was used to assess the homogeneity of the information. All citations were placed into illness categories for which the plant or animal was reported to be used. ICF was determined by using the following formula: $ICF = (N_{ur} - N_t) / (N_{ur} - 1)$; where, N_{ur} is the number of citations for a particular disease category and N_t is the number of species used for this disease category. Low ICF values are obtained (close to 0 value) if plants/animals are chosen randomly or if participants do not interchange information about their use and values are high (close to 1 value) if there is a well-defined selection criterion in the community and/or if there is an exchange of information between the participants. The medicinal flora or fauna that are assumed to be effectual in treating a particular illness will have higher ICF values (Cakilcioglu *et al.* 2011).

Cultural Importance Index

Culturally important medicinal species are identified by the cultural importance index (CII). The most culturally important plant/animal species in each religious group was determined by using the following CII formula: where, NC is the sum of different ailments categories (of each i species), UR is the total number of use reports per species, and N is the total number of participants in each religious group. The CII is the sum of the proportion of participants that state each of the use-categories for a given species. The maximal index value equals the total number of different use-categories (NC), which would occur if all participants in a religious group would state the use of a species in all use-categories (Leto *et al.* 2013). In this case, the maximal value of CII would be 2.00 (Srithi *et al.* 2012). This index was used to determine the cultural importance of each plant/animal

species and to check to what level each plant/animal species is present in the memory of the participants of each religious group (Leto *et al.* 2013).

$$CII = \sum_{u=u_i}^{u_{NC}} \sum_{i=i_1}^{i_n} \frac{UR_{ui}}{N}$$

Jaccard Similarity Index

According to Güzel *et al.* (2015), the Jaccard similarity index (JSI) was used to determine the degree of similarity of medicinal flora usage among the different religious groups. The JSI is calculated using the formula: $JSI = C \times 100 / A + B - C$; where, A is the number of plant taxa stated by religious group A, B is the number of plant taxa stated by the religious group B, and C is the number of plant taxa stated by both A and B. The JSI values ranged from 40.0 to 90.0, where a value less than 40.0 indicates a low similarity between two religions and a value greater than 90.0 indicates a high similarity between two religions.

Data analysis

All data presented in this study were tabulated and analysed using Microsoft Word 2007, Microsoft Excel 2007, and the Statistical Package for Social Science (SPSS) version 20.0. Pearson Chi-Squared test was performed to determine any association between demographic variables and use of TMs. A *p*-value of less than 0.05 indicated a strong association and was considered to be statistically significant. Traditional data were gathered from different databases such as Science Direct, Pubmed Central, ResearchGate, and SpringerLink amongst others.

Results and Discussion

Demographic data of the participants

Out of 384 Mauritian adults interviewed, 320 (128 males and 192 females) claimed to be using traditional medicine (TM) (Table 4.1). Similar finding was reported by Ishola *et al.* (2014) where majority of the TM users were female as they are generally more health conscious and more involved in dealing with all kinds of health problems within the family and they are typically responsible for preparation of traditional remedies at home.

Ethnographic investigations revealed that the age group 60 years and above (N=162) provided more information about TM use followed by the age group 50-59 (N=109). From this it can be deduced that old people have a deep rooted knowledge in TM and put that knowledge into practice as opposed to the younger generation. Some possible reasons for the youth to neglect the use of TM could be due to lack of TM knowledge, a belief on conventional drugs as being more

effective, and the free availability of allopathic medicine by public hospitals. This finding is in line with the work of Barner *et al.* (2010) where TM use is dominated by the old population.

Moreover, the results revealed that most of the participants using TM belonged to the Hindu community (N=84) and this could be due to their considerable knowledge of Ayurvedic medicine. The number of users interviewed for each religious group was almost equal: 84, 83, 77, and 76 for the Hindu, Muslim, Christian, and Buddhist religious groups respectively in order to make a better comparison of medicinal flora and fauna use among the four religious groups.

Furthermore, the results revealed that rural people (N=212) made greater use of TM which could be due to a number of reasons such as; enough land available in rural regions for herbal cultivation and livestock farming, poverty running in many rural areas and inability of residents to purchase some expensive allopathic drugs, and the belief that TM formed part of their cultural heritage among others. This hypothesis correlated the work of Cakilcioglu *et al.* (2011) where rural inhabitants were found to be the most preponderant users of TM for nourishment and medical purposes.

This study showed that many of the participants had a primary level of education (N=146). This finding corroborated with the work of Gakuya *et al.* (2013) where elder people with low level of education hold greater knowledge regarding medicinal plants' use and those with high education level believe more in the effectiveness of conventional drugs.

Moreover, the results revealed that the majority of the participants were retired (N=122). Retired people usually have more free time compared to working people and can dedicate some of their time to look for TM and get engaged in preparation of remedies.

It was also observed that people with a monthly household income of \leq Rs 10 000 (N=117) were the most common users of TM and this finding could be explained by the fact that people belonging to low economic background prefer cheap TM for healing properties so as to save maximum of their limited income for other purposes. Interestingly, Tag *et al.* (2012) stated that a large number of poor people still depend on natural remedies to manage several types of illnesses.

Hypertensive disease (N=219) was the most commonly reported cardiovascular disorder among the participants followed by arrhythmia (N=59), ischaemic heart disease (N=40), heart attack (N=31), cerebrovascular disease (N=30), valvular heart disease (N=3), and pulmonary heart disease (N=2).

Associations between demographic factors and use of TM were assessed using Pearson Chi-Squared test where $p < 0.05$ were considered statistically significant. A significant association ($p < 0.05$) was found between majority of the demographic variables such as gender, age, residence, highest level of education, occupation and monthly household income (Rs), current cardiovascular

status, and use of TM. However, no significant association ($p>0.05$) emerged between religion and use of TM.

Table 1: Associations between demographic characteristics and use of traditional medicines

Variable	Categories	Users ^a (N=320)	Non-users ^b (N=64)	Total (N=384)	Pearson χ^2 test (p-value)
Gender	Male	128 (74.9)	43 (25.1)	171 (44.5)	<0.05
	Female	192 (90.1)	21 (9.9)	213 (55.5)	
Age (years)	20-29	2 (25.0)	6 (75.0)	8 (2.1)	<0.05
	30-39	8 (25.8)	23 (74.2)	31 (8.1)	
	40-49	39 (67.2)	19 (32.8)	58 (15.1)	
	50-59	109 (92.4)	9 (7.6)	118 (30.7)	
	≥ 60	162 (95.9)	7 (4.1)	169 (44.0)	
Religion	Hindu	84 (82.4)	18 (17.6)	102 (26.6)	>0.05
	Muslim	83 (84.7)	15 (15.3)	98 (25.5)	
	Christian	77 (80.2)	19 (19.8)	96 (25.0)	
	Buddhist	76 (86.4)	12 (13.6)	88 (22.9)	
Residence	Rural	212 (91.4)	20 (8.6)	232 (60.4)	<0.05
	Urban	108 (71.1)	44 (28.9)	152 (39.6)	
Highest level of education	No formal education	36 (78.3)	10 (21.7)	46 (12.0)	<0.05
	Primary education	146 (91.8)	13 (8.2)	159 (41.4)	
	Secondary education	134 (87.6)	19 (12.4)	153 (39.8)	
	Tertiary education	4 (15.4)	22 (84.6)	26 (6.8)	
Occupation	Unemployed	4 (44.4)	5 (55.6)	9 (2.3)	<0.05
	Housewife	110 (94.0)	7 (6.0)	117 (30.5)	
	Government officer	6 (20.0)	24 (80.0)	30 (7.8)	
	Non-government officer	78 (77.2)	23 (22.8)	101(26.3)	
	Retired	122 (96.1)	5 (3.9)	127 (33.1)	
Monthly household income (Rs)*	≤ 10 000	117 (95.1)	6 (4.9)	123 (32.0)	<0.05
	10 001- 20 000	82 (85.4)	14 (14.6)	96 (25.0)	
	20 001- 30 000	70 (87.5)	10 (12.5)	80 (20.8)	
	30 001- 40 000	35 (62.5)	21 (37.5)	56 (14.6)	
	≥ 40 000	16 (55.2)	13 (44.8)	29 (7.6)	
Cardiovascular issues	Yes	320 (83.3)	64 (16.7)	384 (100.0)	0 (0.0)
	No	0 (0.0)	0 (0.0)	0 (0.0)	
Current cardiovascular status	Ischaemic heart disease	27 (67.5)	13 (32.5)	40 (10.4)	<0.05
	Cerebrovascular disease	28 (93.3)	2 (6.7)	30 (7.8)	
	Hypertensive disease	215 (98.2)	4 (1.8)	219 (57.0)	
	Arrhythmia	28 (47.5)	31 (52.5)	59 (15.4)	
	Heart attack	19 (61.3)	12 (38.7)	31 (8.1)	
	Pulmonary heart disease	1 (50.0)	1 (50.0)	2 (0.5)	
	Valvular heart disease	2 (66.7)	1 (33.3)	3 (0.8)	

*1 €=Rs 37.5; ^aParticipants using traditional medicines (%); ^bParticipants not using traditional medicines (%)

Reasons behind preference to use medicinal plants

As summarised in Table 2, the most frequently quoted reasons behind preference to use MPs were to maintain overall health (100.0%). This motivation is normally considered a priority in a person's life as it determines the quality of life someone will be leading ahead and the easy availability (96.6%) of MPs locally. Moreover, many informants were of the idea that MPs are free from side effects (95.9%) and hence they were encouraged to make longer use of these plants. Furthermore, the results revealed that MPs were cheaper (59.1%) than allopathic drugs and therefore they were widely used. Some people reported use of MPs as a result of family tradition (30.3%) where the belief of medicinal plant (MP) as being a good choice for managing ailments has passed from generation to generation and is still in practice. The presumption that MPs were more effective (28.4%) were claimed by a few participants when questioned about their preference to use.

Table 2: Assessment of different reasons behind preference to use medicinal plants

	N	%
Maintain overall health	320	100
Easily available locally	309	96.6
Free from side effects	307	95.9
Low cost	189	59.1
Family tradition	97	30.3
More effective	91	28.4

N: Number of respondents; %: Percentage of respondents

Source of advice to use medicinal plants

As depicted in Table 3, majority of informants claimed to start using MPs following advice from family (97.5%) and friends (85.9%) as individuals are generally more closely attached to their families or friends who care for them and help them without expecting to gain something in return and act in their best interest in a selfless way. Moreover, it was observed that many participants followed the advice of the media (46.6%) and this can be explained by the fact that people are easily influenced by the media because the way they portray certain things finally end up convincing people. A few reported to be using MPs after being advised by health care professionals (5.6%), books (1.6%), and educators (0.6%).

Table 3: Source of advice to use medicinal plants

	N	%
Family	312	97.5
Educators	2	0.6
Friends	275	85.9
Books	5	1.6
Media	149	46.6
Health care professionals	18	5.6

Medicinal plants used to manage cardiovascular diseases

The ethnobotanical use of 100 plant species belonging to 46 families used to manage cardiovascular diseases (CVDs) was reported by 320 informants. The information obtained on medicinal plants from the four religions namely Hindu, Muslim, Christian, and Buddhist was arranged in alphabetical order according to their family names along with their therapeutic uses (Table 4).

Table 4. Medicinal plants used against cardiovascular diseases in Mauritius

Family	Scientific name of plant (ID)	Local name of plant	Disease	Part of plant used	Method of preparation and administration	FI	C11 _H	C11 _M	C11 _C	C11 _B
Actinidiaceae	<i>Actinidia deliciosa</i> (A.Chev.) C.F.Liang & A.R.Ferguson (KM2017002)	Kiwi	H	Fr	Prepare juice with the fruit, water, 1 tsp of sugar, and drink 1 cup thrice a week for 1 month.	0.063	0.000	0.012	0.013	0.000
			H	Fr	Eat 1 raw kiwi thrice a week until cured.					
Agaricaceae	<i>Agaricus bisporus</i> (J.E.Lange)Imbach(KM2017004)	Mushroom	IHD	Cap	Cook canned mushroom and eat 1 spoon twice a week until cured.	0.313	0.012	0.000	0.000	0.000
Amaryllidaceae	<i>Allium cepa</i> L. (KM2017005)	Onion	IHD	B	Eat 4 to 5 raw onion roundels once daily for 1 week.	0.938	0.012	0.000	0.026	0.000
			AA	B	Prepare a decoction with the bulb in water and drink 1 cup once daily for 1 week.					
			AA	B	Prepare juice with the bulb, mix 1 tsp of the juice to 1 tsp of honey and drink once daily for 1 week.					
	<i>Allium sativum</i> L. (KM2017006)	Garlic	H	B	Prepare garlic paste, add 1 tsp of the paste to 1 bowl of soup and drink thrice a week for 2 months.	1.9	0.012	0.012	0.013	0.039
			H	B	Prepare garlic paste, add 1 tsp of the paste to salad dressings and eat once daily until cured.					
			VHD	B	Prepare garlic paste, add half tsp of honey to the paste and eat 1 spoon once daily until cured.					
			IHD	B	Eat 2 raw garlic cloves once daily for 1 week.					

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			Stroke	B	Prepare juice with the bulb and drink 1 spoon once daily for 2 weeks.					
			Stroke	B	Eat 2-3 raw garlic cloves once daily for 1 week.					
Anacardiaceae	<i>Mangifera indica</i> L. (KM2017057)	Mango	H	L	Prepare a decoction of leaves in water and drink 1 cup when hypertensive.	1.25	0.012	0.012	0.013	0.013
			H	Fr	Unripe mangoes are dried and made into pickles and 2 tsp are eaten once daily for 1 month.					
			H	Fr	Eat 1 raw ripe mango once daily for 1 week.					
			H	Fr	Prepare juice with ripe mangoes, water, and drink 1 glass thrice a week for 1 month.					
	<i>Spondias dulcis</i> G.Forst. (KM2017090)	Frucytère	H	Fr	Prepare juice with ripe fruit, water, and drink 1 cup twice a week for 2 months.	0.063	0.012	0.012	0.000	0.000
			H	Fr	Unripe frucytère are dried and made into pickles and 1 spoon is eaten once daily for 2 weeks.					
	<i>Anacardium occidentale</i> L. (KM2017008)	Cashew	IHD	Se	Eat a handful of dry cashew once daily for 1 week.	0.063	0.012	0.012	0.000	0.000
			IHD	Se	Eat half cup of dry cashew twice a week for 1 month.					
Annonaceae	<i>Annona muricata</i> L. (KM2017010)	Carossol	H	L	Prepare an infusion of the leaves in water and drink 1 cup twice a week until cured.	0.063	0.000	0.012	0.013	0.000
			H	L	Prepare an infusion of the leaves in water and drink 1 cup thrice a week until cured.					

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Apiaceae	<i>Annona reticulata</i> L. (KM2017011)	Custard apple	H	Fr	Prepare juice with half ripe fruit, 1 cup of milk, 2 tsp of lime juice, and drink 1 glass twice a week for 14 days.	0.063	0.012	0.012	0.000	0.000
			H	Fr	Eat half raw ripe fruit twice a week for 2 months.					
	<i>Apium graveolens</i> L. (KM2017012)	Celery	H	L	Prepare a decoction with the leaves in water and drink 1 cup twice per week until cured.	0.938	0.012	0.024	0.000	0.000
			H	L	Prepare a decoction of the leaves in water and drink 1 cup thrice per week for 1 month.					
			H	L	Prepare salad with 1 stalk celery and eat once daily until cured.					
	<i>Daucus carota</i> L. (KM2017045)	Carrot	H	R	Prepare juice with carrot root, water, and drink 1 glass twice per week for 14 days.	1.6	0.012	0.012	0.013	0.026
			H	R	Prepare mixed salad with 2 carrots and eat once daily until cured.					
			Stroke	R	Eat 1 raw carrot twice daily for 1 week.					
			Stroke	R	Prepare carrot soup and drink 1 small bowl twice a week for 1 month.					
			Stroke	R	Prepare juice with carrot, water, and drink 1 glass thrice per week until cured.					
	<i>Petroselinum crispum</i> (Mill.) Nyman (KM2017073)	Parsley	HA	L	Add 1 spoon of raw chopped leaves to salad dressings and eat once daily for 2 weeks.	0.063	0.012	0.012	0.000	0.000
			H	L	Prepare an infusion of chopped leaves in water and drink 1 cup twice a week until cured.					

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		<i>Coriandrum sativum</i> L. (KM2017038)	Coriander	H	Se	Infuse 2 tsp of coriander seed powder to 1 cup of water and drink when hypertensive.	0.063	0.012	0.000	0.000	0.013
				AA	Se	Add 2 tsp of coriander seed powder to 1 tsp of honey and have this mixture once daily after dinner for 10 days.					
	Apocynaceae	<i>Carissa carandas</i> L. (KM 2017026)	Coeur de moiselle	H	Fr	Eat 2-3 raw slightly unripe fruit when hypertensive.	0.313	0.012	0.000	0.000	0.000
	Arecaceae	<i>Phoenix dactylifera</i> L. (KM2017075)	Date	H	Fr	Eat 1 dry date twice daily in the morning on an empty stomach until cured.	0.938	0.012	0.012	0.013	0.000
				H	Fr	Eat 1 dry date once daily for 2 weeks.					
				Stroke	Fr	Eat 1 dry date thrice daily for 1 week.					
		<i>Cocos nucifera</i> L. (KM2017036)	Coconut	H	Fr	Drink 1 glass of raw fresh coconut water twice a week for 1 month.	0.938	0.012	0.000	0.026	0.000
				H	Fr	Drink 1 glass of raw fresh coconut water in the morning on an empty stomach thrice a week for 2 months.					
				H	Fr	Eat raw fresh coconut cream and drink the water twice a week for 3 months.					
	Asteraceae	<i>Cynara cardunculus</i> L. (KM2017044)	Artichoke	H	L	Prepare a decoction of the leaves in water and drink 1 cup twice per day for 1 week.	0.063	0.000	0.000	0.026	0.000
				H	L	Prepare juice with the leaves, water, and drink 1 cup thrice per week until cured.					
		<i>Tagetes erecta</i> L. (KM2017093)	Marigold	Stroke	Fl	Prepare an infusion of the flower in water and drink 1 cup once daily for 1 month.	0.313	0.012	0.000	0.000	0.000
	Brassicaceae	<i>Brassica oleracea</i> L. (KM2017021)	Broccoli	IHD	Fl	Prepare broccoli soup and drink 1 bowl thrice per week until cured.	0.063	0.012	0.012	0.000	0.000

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			IHD	Fl	Cook broccoli and eat 5 to 6 florets once a week until cured.					
	<i>Brassica nigra</i> (L.) Andrz. (KM2017020)	Mustard	HA	Se	Mustard seeds are pickled with mustard oil and 1 tsp is eaten twice daily until cured.	0.313	0.000	0.012	0.000	0.000
	<i>Nasturtium officinale</i> R.Br (KM2017066)	Watercress	H	L	Soak the leaves in water for few hours and eat 1 bowl thrice per week until cured.	0.313	0.000	0.012	0.000	0.000
Bromeliaceae	<i>Ananas comosus</i> (L.) Merr. (KM2017009)	Pineapple	H	Fr	Prepare juice with the fruit, water, and drink 1 cup twice per week until cured.	1.6	0.012	0.024	0.013	0.013
			HA	Fr	Eat half raw fruit thrice a week for 2 months.					
			Stroke	Fr	Eat half raw fruit once daily for 1 week.					
			Stroke	Fr	Prepare juice with the fruit, water, 1 tsp sugar, and drink 1 cup twice per week until cured.					
			Stroke	Fr	Prepare pineapple milkshake with pineapple and banana fruit slices, milk, sugar, and drink 1 glass once per week for 1 month.					
Cactaceae	<i>Hylocereus undatus</i> (Haw.) Britton & Rose (KM2017049)	Pitaya	H	Fr	Eat 1 raw pitaya twice monthly until cured.	0.313	0.012	0.000	0.000	0.000
Caricaceae	<i>Carica papaya</i> L. (KM2017025)	Papaya	H	Fr	Eat half raw ripe fruit in morning on empty stomach thrice per week until cured.	0.938	0.012	0.012	0.000	0.013
			Stroke	Fr	Prepare juice with ripe fruit, water, and drink 1 glass twice per week for 2 months.					
			Stroke	Fr	Eat half raw ripe fruit in morning on empty stomach thrice per week until cured.					
Chenopodiaceae	<i>Spinacia oleracea</i> L.(KM2017089)	Spinach	H	L	Prepare juice with the leaves, 2 tsp of honey, water, and drink 1 glass once daily for 1 week.	1.9	0.024	0.012	0.013	0.026

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			PHD	L	Prepare mixed salad with 8-10 spinach leaves and eat once daily until cured.					
			IHD	L	Prepare mixed salad with 10 spinach leaves eat thrice a week until cured.					
			Stroke	L	Prepare juice with spinach leaves, 2 tsp of honey, water, and drink 1 cup twice a week for 1 month.					
			Stroke	L	Prepare soup with spinach leaves and drink 1 cup once daily until cured.					
			Stroke	L	Eat 10 spinach leaves in the form of cooked vegetable thrice a week until cured.					
	<i>Beta vulgaris</i> L. (KM2017019)	Beetroot	H	R	Prepare juice with the root, water, and drink 1 glass twice a week for 1 month.	0.063	0.000	0.012	0.013	0.000
			H	R	Grate 1 raw beetroot and eat thrice a week until cured.					
Cucurbitaceae	<i>Momordica charantia</i> L. (KM2017060)	Bittergourd	IHD	Fr	Prepare a mixture of juice with bitter gourd, tomato, and cucumber fruits and drink 1 spoon once daily in the morning for 1 week.	0.063	0.000	0.012	0.000	0.013
			H	Fr	Prepare a mixture of juice with bitter gourd, amla, and java plum fruits and drink 1 cup twice per week for 2 months.					
	<i>Lagenaria siceraria</i> (Molina) Standl. (KM2017051)	Calebasse	H	L	Prepare a decoction with the leaves in water and drink 1 cup twice per week for 3 months.	0.063	0.000	0.012	0.000	0.013
			H	L	Prepare a decoction with the leaves in water and drink 1 cup thrice per week for 2 months.					
	<i>Luffa aegyptiaca</i> Mill. (KM2017055)	Patole	H	L	Crush and press 4 leaves to obtain a juice and drink twice per week until cured.	0.313	0.012	0.000	0.000	0.000

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	<i>Citrullus lanatus</i> (Thunb.) Mansf. (KM2017029)	Watermelon	H	Fr	Eat 1 slice of raw fruit in morning on empty stomach once daily for 1 week.	0.063	0.012	0.000	0.013	0.000
			H	Fr	Prepare pure fruit juice and drink 1 cup twice a week for 1 month.					
	<i>Cucurbita maxima</i> Duchesne (KM2017041)	Pumpkin	H	Fr	Cook pumpkin fruit as a vegetable and eat 2 spoons twice a week until cured.	0.063	0.000	0.012	0.000	0.013
			H	Fr	Prepare juice with the fruit, water, and drink 1 cup once daily for 3 days.					
	<i>Cucumis sativus</i> L. (KM2017040)	Cucumber	H	Fr	Prepare juice with the fruit, water, and drink 1 glass when hypertensive.	0.938	0.012	0.000	0.026	0.000
			H	Fr	Prepare juice with the fruit, half tsp of honey, water, and drink 1 glass thrice a week for 2 months.					
			H	Fr	Prepare juice with the fruit, water, and drink 1 glass once a week for 1 month.					
	<i>Luffa acutangula</i> (L.) Roxb. (KM2017054)	Ridge gourd	Stroke	Fr+pe	Blend cooked luffa to obtain chutney and eat 1 tsp once daily until cured.	0.313	0.012	0.000	0.000	0.000
	<i>Sechium edule</i> (Jacq.) Sw. (KM2017088)	Chouchou	H	Fr	Cook chouchou fruit as a vegetable and eat 2 spoons twice per week until cured.	0.313	0.000	0.000	0.013	0.000
Cycadaceae	<i>Cycas revoluta</i> Thunb. (KM2017043)	Sago	H	Se	Prepare a decoction of the seeds in water and drink half cup when hypertensive.	0.313	0.012	0.000	0.000	0.000
Euphorbiaceae	<i>Manihot esculenta</i> Crantz (KM2017058)	Manioc	H	L	Prepare an infusion of the leaves in water and drink 1 cup twice per week until cured.	0.063	0.012	0.000	0.013	0.000
			H	L	Prepare an infusion of the leaves in water and drink 1 cup once per week until cured.					
Fabaceae	<i>Tamarindus indica</i> L. (KM2017094)	Tamarin	H	Fr	Dried and made into pickles and 1 tsp eaten thrice a week for 3 months.	0.938	0.012	0.000	0.026	0.000

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			H	Fr	Eat 1 raw fresh tamarind pod once daily for 1 week.					
			H	Fr	Prepare juice with tamarind fruit, water, 1 tsp of sugar, 3-4 ice cubes, and drink 1 glass thrice a week for 2 months.					
		<i>Phaseolus vulgaris</i> L. (KM2017074)	Haricot vert	H	Po	Prepare a decoction of the pods in water and drink 1 cup twice for 1 day.	0.313	0.000	0.012	0.000 0.000
		<i>Trigonella foenum-graecum</i> L. (KM2017096)	Fenugreek	IHD	Se	Soak 1 tsp of seeds in ½ cup water overnight and eat them along with the water the next morning on an empty stomach once daily for 3 months.	0.313	0.000	0.000	0.013 0.000
Iridaceae		<i>Crocus sativus</i> L. (KM2017039)	Saffron	H	Fl	Prepare an infusion of saffron strands in water, add 1 tsp of honey, and lemon juice and drink 1 cup twice a week for 3 months.	0.063	0.012	0.000	0.013 0.000
				H	Fl	Prepare an infusion of saffron strands in water, add 1 tsp of honey, and drink 1 cup twice a week for 6 months.				
Juglandaceae		<i>Juglans</i> L. (KM2017050)	Walnut	HA	Se	Blend 1 cup of dry walnut seeds with 2 cups of water, 3 dates, 1 tsp of honey then strain the mixture and drink 1 cup thrice a week for 3 months.	0.313	0.000	0.000	0.013 0.000
Lamiaceae		<i>Ocimum tenuiflorum</i> L. (KM2017068)	Tulsi	H	L	Crush and press the leaves to obtain the juice and drink 2 tsp twice per week for 1 month.	3.4	0.131	0.000	0.000 0.000
				H	L	Crush and press 3 leaves to obtain the juice and add 2 tsp of honey and drink twice per week until cured.				

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			H	L	Crush and press 4 leaves to extract the juice, add half tsp of honey, 1 tsp of basil juice, and drink twice daily for 2 weeks.					
			H	L	Prepare a decoction of the leaves in water and drink 1 glass once a week for 1 month.					
			H	L	Prepare a decoction of the leaves in water and drink 1 cup twice a week until cured.					
			H	L	Prepare a decoction of the leaves in water and drink 1 cup thrice a week until cured.					
			H	L	Eat 3 raw leaves when hypertensive.					
			H	L	Prepare a decoction of the leaves in water and drink 1 cup twice a week until cured.					
			H	L	Prepare a decoction of the leaves in water and drink 1 cup daily for 1 week.					
			H	L	Eat 5 raw leaves when hypertensive.					
			H	L	Prepare a decoction of the leaves in water and drink 1 cup twice a week for 2 months.					
	<i>Thymus vulgaris</i> L. (KM2017095)	Thyme	IHD	L	Prepare an infusion of chopped leaves in water, add 1 tsp of lemon juice and drink 1 cup thrice a week until cured.	0.313	0.000	0.012	0.000	0.000
	<i>Mentha piperita</i> L.(KM2017059)	Mint	AA	L	Prepare a decoction with the leaves in water and drink 1 cup once daily for 1 week.	0.063	0.000	0.000	0.013	0.013
			H	L	Prepare a decoction with the leaves in water and drink 1 cup thrice a week until cured.					

Lauracea	<i>Cinnamomum verum</i> J.Presl (KM2017028)	Cinnamon	AA	Ba	Add 1 tsp of powdered cinnamon to 1 glass of warm water and drink once daily for 1 month.	0.063	0.000	0.000	0.000	0.026
			H	Ba	Prepare a decoction of the bark in water and drink 1 cup twice a week until cured.					
	<i>Persea americana</i> MILL. (KM2017072)	Avocado	AA	Fr	Prepare juice with the fruit, 1 tsp sugar, 1 cup milk, and drink 1 glass thrice a week for 2 months.	0.063	0.000	0.000	0.013	0.013
			H	Fr	Eat half raw fruit thrice a week for 1 month.					
	<i>Litsea glutinosa</i> (Lour.) C.B.Rob. (KM2017053)	Bois d'oiseau	H	L	Prepare a decoction of 7 to 8 leaves in water and drink 3 cups daily for 3 months.	0.313	0.000	0.012	0.000	0.000
Leguminosae	<i>Cicer arietinum</i> L. (KM2017027)	Chickpea	HA	Se	Boil 1 cup of dry chickpea seeds in water and eat thrice a week until cured.	0.063	0.000	0.000	0.013	0.013
			HA	Se	Prepare mixed salad with 1 cup of canned chickpea seeds and eat once daily for 1 week.					
Linaceae	<i>Linum usitatissimum</i> L. (KM2017052)	Flaxseeds	H	Se	Soak the seeds in a cup of water at night and drink it the next morning on an empty stomach. Drink thrice per week until cured.	0.313	0.000	0.000	0.013	0.000
Lythraceae	<i>Punica granatum</i> L. (KM2017082)	Pomegranate	H	Fr+Se	A medium-size raw pomegranate is eaten twice a week every morning on an empty stomach for 2 months.	0.063	0.000	0.000	0.013	0.013
			H	Fr+Se	Prepare juice with pomegranate, water, and drink 1 cup twice per week for 3 months.					
Malvaceae	<i>Hibiscus rosa-sinensis</i> L. (KM2017048)	Hibiscus	H	Fl	Prepare an infusion of the flower in water, add 1 tsp of honey, and drink 1 cup daily for 1 week.	0.063	0.012	0.012	0.000	0.000

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			H	Dry sepal	Prepare an infusion with tea bags in water and drink 1 cup once daily for 6 days.					
		<i>Abelmoschus esculentus</i> Moench (KM2017001)	Lalo	IHD	Fr	Cut the ends of 4 lalo, split the body with a knife, and soak in 1 cup of water overnight. Drink the water the next morning and repeat this once daily for 1 week.	0.313	0.000	0.012	0.000 0.000
	Meliaceae	<i>Azadirachta indica</i> A.Juss. (KM2017018)	Neem	AA	L	Prepare a decoction with the leaves in water and drink 1 glass once a week until cured.	0.063	0.012	0.012	0.000 0.000
				AA	L	Prepare a decoction with the leaves in water and drink 1 cup twice a week until cured.				
	Moraceae	<i>Artocarpus heterophyllus</i> Lam. (KM2017013)	Jack	H	Fr	Eat 3 to 4 raw ripe jackfruit bulbs once daily for 1 week.	0.938	0.012	0.012	0.013 0.000
				H	Fr	Cook unripe fruit as a vegetable and eat 4 spoons twice a week until cured.				
				H	Fr	Eat 2 raw ripe jackfruit bulbs once daily for 1 week.				
		<i>Morus alba</i> L. (KM2017063)	Mulberry	AA	L	Prepare a decoction of the leaves in water and drink 1 cup twice per week for 2 months.	0.063	0.000	0.000	0.000 0.026
				IHD	L	Prepare a decoction of the leaves in water and drink 1 cup daily for 1 week.				
		<i>Artocarpus altilis</i> (Pakinson ex F. A. Zorn) (KM2017014)	Breadfruit	H	L	Prepare a decoction with the leaves in water and drink 1 cup twice per week until cured.	0.938	0.012	0.000	0.013 0.013
				AA	L	Prepare a decoction with the leaves in water and drink 1 cup thrice per week for 2 months.				
				H	Fr	Eat half raw ripe breadfruit twice a week for 1 month.				

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Moringaceae	<i>Moringa oleifera</i> Lam. (KM2017062)	Brède mouroungue	H	L	Prepare a decoction of the leaves in water and drink 1 glass thrice a week until cured.	1.6	0.012	0.012	0.013	0.026
			H	St	Prepare a decoction of the stem in water and drink 1 cup twice a week until cured.					
			H	L	Crush and press the leaves to obtain a juice, mix the juice with milk, and drink 1 cup twice a week for 1 month.					
			H	L	Cook the leaves and eat 6 spoons thrice a week until cured.					
			H	L	Prepare a decoction of the leaves in water and drink 1 glass twice a week for 2 months.					
Musaceae	<i>Musa</i> L. (KM2017065)	Banana	H	Fr	Eat 2 small raw ripe bananas once daily until cured.	1.6	0.012	0.012	0.026	0.013
			H	Fr	Eat 1 raw ripe banana at breakfast once daily until cured.					
			H	Fr	Chop 1 raw ripe banana in pieces, mix with 2 spoons of plain yogurt, and eat thrice a week for 2 months.					
			AA	Fr	Mash 1 raw ripe banana slightly and mix with 1 bowl of oatmeal. Eat at breakfast thrice a week for 6 months.					
			IHD	Fr	Eat 1 raw ripe banana at breakfast daily until cured.					
Myrtaceae	<i>Psidium guajava</i> L. (KM2017081)	Guava	AA	Fr	Eat 1 raw ripe guava every morning on empty stomach for 10 days.	0.938	0.012	0.012	0.000	0.013
			H	L	Prepare a decoction with the leaves in water and drink 1 cup once daily until cured.					

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			AA	L	Prepare a decoction with the leaves in water and drink 1 cup thrice per week until cured.					
	<i>Syzygium cumini</i> L. Skeels (KM2017091)	Java plum	H	Fr	Sold as an ayurvedic juice. Drink 1 tsp twice daily for 6 months.	0.938	0.012	0.012	0.013	0.000
			H	Fr	Eat 5 to 10 raw java plum fruits when hypertensive.					
			H	Fr	Sold as an ayurvedic juice. Drink 1 spoon once daily until cured.					
	<i>Syzygium jambos</i> (L.) Alston (KM2017092)	Rose apple	HA	Fr	Eat 2-3 raw fruits once daily for 1 week.	0.313	0.000	0.012	0.000	0.000
Oleaceae	<i>Olea europaea</i> L. (KM2017069)	Olive	H	L	Prepare a decoction of the leaves in water and drink 1 cup once daily for 1 week.	1.6	0.012	0.024	0.013	0.013
			H	L	Prepare a decoction of the leaves in water and drink 1 cup thrice a week until cured.					
			H	Fr	Confit with olive fruits and eat 3 to 4 fruits once daily for 1 week.					
			H	Fr	Prepare a decoction of olive fruits in water and eat 2 fruits once daily for 3 weeks.					
			IHD	Fr	Add 2 tsp of olive oil to salad dressings and eat once daily until cured.					
Oxalidaceae	<i>Averrhoa bilimbi</i> L. (KM2017016)	Bilimbi	H	Fr	Dried and made into pickles and 1 spoon eaten thrice a week for 3 months.	0.938	0.012	0.000	0.000	0.026
			H	Fr	Eat 2 raw bilimbi fruit thrice a week until cured.					
			H	Fr	Eat 2 raw bilimbi fruit when hypertensive.					
	<i>Averrhoa carambola</i> L. (KM2017017)	Carambol	H	Fr	Eat 1 ripe raw starfruit once daily for 2 weeks.	0.313	0.012	0.000	0.000	0.000

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Passifloraceae	<i>Passiflora edulis</i> Sims (KM2017071)	Passion fruit	H	Fr+Se	Eat 1 raw passion fruit thrice a week for 1 month.	0.313	0.012	0.000	0.000	0.000
Phyllanthaceae	<i>Phyllanthus emblica</i> L. (KM2017076)	Amla	Stroke	Fr	Prepare juice with amla fruits, water, 1 tsp honey, and drink 1 cup thrice per week until cured.	1.3	0.012	0.012	0.013	0.013
			Stroke	Fr	Prepare juice with amla fruits, water, and drink 1 cup thrice per week for 2 months.					
			H	Fr	Eat 3 to 4 raw fruits when hypertensive.					
			H	Fr	Eat 10 raw fruits thrice a week until cured.					
Piperaceae	<i>Piper betle</i> L. (KM2017077)	Betel	AA	L	Prepare a decoction with the leaves in water and drink 1 glass twice a week until cured.	0.938	0.036	0.000	0.000	0.000
			AA	L	Prepare a decoction with the leaves in water and drink 1 glass thrice a week until cured.					
			AA	L	Prepare a decoction with the leaves in water and drink 1 cup twice a week for 1 month.					
Poaceae	<i>Avena sativa</i> L. (KM2017015)	Oatmeal	IHD	Gr	Soak the grains in 1 cup of water for a few hours and drink thrice a week until cured.	0.063	0.000	0.000	0.013	0.013
			H	Gr	Soak the grains in 1 cup of water overnight and drink in the morning on an empty stomach. Do this once daily for 1 week.					
	<i>Zea mays</i> L. (KM2017099)	Corn	IHD	Se	The corn is boiled in water and 1 medium size stalk eaten thrice a week for 1 month.	0.313	0.000	0.000	0.013	0.000
	<i>Oryza sativa</i> L. (KM2017070)	Brown rice	H	Gr	Cook brown rice and eat 1 plate 5 times per week until cured.	0.938	0.012	0.000	0.013	0.013
			H	Gr	Cook brown rice and eat 1 plate once daily for 3 weeks.					

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			IHD	Gr	Cook brown rice and eat 1 plate once daily for 6 months.					
Ranunculaceae	<i>Nigella sativa</i> L. (KM2017067)	Black seeds	H	Se	1 tsp of black seeds is powdered and swallowed with water thrice a week until cured.	0.063	0.000	0.024	0.000	0.000
			H	Se	Eat 1 tsp of raw black seeds mixed with honey until cured.					
Rosaceae	<i>Malus domestica</i> Baumg. (KM2017056)	Apple	Stroke	Fr	Prepare juice with the fruit, water, and half tsp sugar and drink 1 glass twice a week for 1 month.	1.3	0.012	0.012	0.013	0.013
			H	Fr	Prepare juice with the fruit, water, and drink 1 cup thrice a week for 3 months.					
			H	Fr	Eat 1 raw apple once daily until cured.					
			H	Fr	Eat 1 raw apple once daily for 1 week.					
	<i>Fragaria ananassa</i> Duchesne (KM2017047)	Strawberry	H	Fr	Prepare juice with the fruit, water, 1 tsp of sugar, 2 ice cubes, and drink 1 glass twice a week for 2 months.	0.938	0.000	0.012	0.013	0.013
			H	Fr	Eat 1 raw strawberry twice daily for 1 week.					
			HA	Fr	Prepare juice with the fruit, water, 1 tsp of sugar, and lemon juice and drink 1 glass thrice a week until cured.					
	<i>Prunus dulcis</i> (Mill.) Rchb. (KM2017079)	Almond	H	Se	Soak 6 seeds in water for few hours and eat once daily for 2 weeks.	2.5	0.012	0.024	0.026	0.026
			H	Se	Soak 7 seeds in half cup water and add 1 spoon of orange juice. Eat the seeds and drink the solution 5 times a week until cured.					

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			H	Se	Soak 5 seeds in water overnight and eat once daily in the morning on an empty stomach until cured.					
			H	Se	Soak 5 seeds in water for few hours and eat once daily for 1 week.					
			H	Se	Soak 5 seeds in milk, eat the seeds and drink the milk every night until cured.					
			HA	Se	Chop 8 soaked almonds in water, add to oatmeal and eat thrice a week for 1 month.					
			IHD	Se	Blend 1 cup of dry almond seeds with water, 1 tsp of honey then strain the mixture and drink 1 glass thrice a week for 1 month.					
			IHD	Se	Soak 8 seeds in water overnight and eat once daily in the morning on an empty stomach until cured.					
	<i>Prunus domestica</i> L. (KM2017078)	Plum	H	Fr	Eat 1 raw plum thrice a week for 1 month.	0.063	0.012	0.000	0.000	0.013
			H	Fr	Eat 1 raw plum once daily for 5 days.					
	<i>Pyrus</i> L. (KM2017083)	Pear	H	Fr	Prepare juice with the fruit, water and drink 1 cup when hypertensive.	0.938	0.012	0.012	0.013	0.000
			H	Fr	Prepare a mixed fruit salad with 1 sliced pear and eat once daily for 1 week.					
			H	Fr	Eat 1 raw fruit once daily for 3 days.					
	<i>Prunus persica</i> (L.) Batsch (KM2017080)	Peach	AA	Fr	Eat 1 raw peach once a week for 1 month.	0.313	0.012	0.000	0.000	0.000
	<i>Rosa</i> L. (KM2017084)	Rose	H	Pet	Prepare rose petal jam with rose petals, honey, sugar, and eat 1 tsp thrice a week until cured.	0.313	0.000	0.000	0.013	0.000

Rubiaceae	<i>Morinda citrifolia</i> L. (KM2017061)	Noni	H	Fr	Prepare juice with the fruit and drink 1 spoon once daily until cured.	1.3	0.012	0.012	0.013	0.013
			H	L	Prepare a decoction with the leaves in water and drink 1 cup twice per week until cured.					
			H	L	Prepare a decoction with the leaves in water and drink 1 glass twice per week for 1 month.					
			H	Fr	Sold as ayurvedic juice. Drink 1 spoon twice daily until cured.					
	<i>Coffea arabica</i> L. (KM2017037)	Green coffee	AA	Se	Prepare an infusion of green coffee powder in water, add 1 tsp of sugar, and drink 1 cup once daily for 1 week.	0.063	0.000	0.012	0.013	0.000
			H	Se	Prepare an infusion of green coffee powder in water and drink 1 cup once daily for 3 weeks.					
	<i>Uncaria tomentosa</i> DC. (KM2017097)	Cat's claw	AA	Brk	Prepare a decoction with the bark in water, add 1 tsp of lemon juice, 1 tsp of honey, and drink 1 cup thrice a week until cured.	0.313	0.000	0.000	0.013	0.000
Rutaceae	<i>Citrus limon</i> (L.) Burm.f. (KM2017031)	Lemon	H	Fr	Press the fruit to obtain the juice and drink 1 spoon twice a week until cured.	9.1	0.060	0.096	0.026	0.184
			H	Fr	Press the fruit to obtain the juice and drink 1 spoon when hypertensive.					
			H	Fr	Press the fruit to obtain the juice and drink 1 spoon once daily for 1 week.					
			H	Fr	Sold as an ayurvedic juice. Drink 1 spoon once daily until cured.					
			H	Fr	Sold as an ayurvedic juice. Drink 1 spoon twice daily for 3 months.					

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H	Fr	Sold as an ayurvedic juice. Drink 1 spoon twice daily until cured.
H	Fr	Sold as an ayurvedic juice. Drink 1 spoon twice daily for 2 weeks.
H	Fr	Sold as an ayurvedic juice. Drink 1 spoon twice daily for 1 month.
H	Fr	Press the fruit to obtain the juice and drink 1 spoon once daily for 1 week.
H	Fr	Press the fruit to obtain the juice, add 1 tsp of honey, water, and drink 1 glass once a month until cured.
H	Fr	Press the fruit to obtain the juice, add 1 tsp of sugar, water and drink 1 glass once a week for 3 months.
H	Fr	Press the fruit to obtain the juice, add water and drink 1 glass thrice a week until cured.
H	Fr	Press the fruit to obtain the juice and drink 1 spoon twice a week until cured.
H	Fr	Press the fruit to obtain the juice, add 1 tsp of honey, water and drink 1 cup twice a week for 3 weeks.
H	Fr	Press the fruit to obtain the juice, add 1 tsp of honey, water and drink 1 glass once a week for 3 months.
H	Fr	Press the fruit to obtain the juice, add water and drink 1 glass thrice a week until cured.
H	Fr+pe	Eat 1 raw slice when hypertensive.
H	Fr	Confit with lemon, garlic, orange peel, and consume 1 tsp once daily until cured.

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			H	Pe	Prepare a decoction of the peels in water and drink 1 cup twice a week for 3 months.					
			H	Fr	Press the fruit to obtain the juice in a litre of water and drink 1 spoon twice daily for 1 month.					
			H	Fr	Press the fruit to obtain the juice and drink 1 spoon when hypertensive.					
			H	Fr	Press the fruit to obtain the juice and drink 1 spoon once daily for 1 week.					
			H	Fr	Press the fruit to obtain the juice in a litre of water and drink 1 spoon thrice daily until cured.					
			H	Fr	Prepare a mixed fruit salad with 3-4 slices and eat once daily for 1 week.					
			H	Fr	Press half fruit and sprinkle the juice over curries when hypertensive.					
			H	Pe	Prepare mixed salad with half cup grated freezed lemon peels and eat once daily for 2 weeks.					
			H	Fr	Sold as an ayurvedic juice. Drink 1 spoon twice daily for 5 months.					
			AA	Fr	Press half a lemon fruit to obtain the juice, add 1 tsp of honey, water, and drink 1 glass once daily before bedtime until cured.					
			AA	Fr	Press the fruit to obtain the juice, add 1 tsp of honey, water, and drink 1 cup once daily for 1 month.					
	<i>Aegle marmelos</i> (L.) Corrêa (KM2017003)	Bael	HA	Fr	Prepare juice with fresh fruit, ½ tsp of ghee, water, and drink 1 glass twice a week for 2 months.	1.3	0.012	0.012	0.013	0.013

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			H	Fr	Prepare juice with fresh fruit, 1 tsp of honey, water, and drink 1 glass thrice a week until cured.					
			H	L	Prepare a decoction of the leaves in water and drink 1 cup twice a week until cured.					
			H	L	Prepare a decoction of the leaves in water and drink 1 cup thrice a week until cured.					
	<i>Citrus sinensis</i> Pers. (KM2017035)	Sweet Orange	H	Fr	Press the fruit to obtain the juice and drink 1 cup thrice a week until cured.	1.6	0.012	0.012	0.026	0.013
			H	Fr	Eat 1 raw fruit once daily for 1 week.					
			H	Fr	Press the fruit to obtain the juice and drink 1 cup twice a week until cured.					
			H	Fr	Prepare juice with the fruit and water and drink 1 cup once daily for 1 week.					
			H	Pe	Prepare mixed salad with half cup grated orange peels and eat once daily for 1 week.					
	<i>Citrus medica</i> L. (KM2017033)	Citron	H	Fr	Press the fruit to obtain the juice, add water, 1 tsp of honey, and drink 1 cup twice a week until cured.	1.3	0.012	0.012	0.013	0.013
			H	Fr	Press the fruit to obtain the juice, add 1 tsp of honey, and drink half cup once daily for 3 days.					
			H	Fr	Press the fruit to obtain the juice, add water, 1 tsp of sugar and drink 1 cup thrice a week for 2 months.					
			H	Fr	Press the fruit to obtain the juice and drink 1 spoon once daily for 2 weeks.					
	<i>Citrus aurantifolia</i> (Christm.) Swingle	Lime	H	L	Prepare a decoction with 4 leaves in water and drink 1 cup thrice per week until cured.	0.938	0.000	0.012	0.013	0.013

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(KM2017030)

H Fr Prepare juice with the fruit, add water, 1 tsp honey, and drink 1 cup twice per week until cured.

H L Prepare a decoction of the leaves in water, add 1 tsp of sugar, and drink 1 glass when hypertensive.

Citrus reticulata Blanco Mandarin H Fr Eat 1 raw fruit once daily for 1 week. 0.063 0.000 0.000 0.000 0.026
(KM2017034)

H Fr Prepare juice with the fruit and water and drink 1 cup once daily for 1 week.

Murraya koenigi (L.) Caripoulet H L Prepare an infusion with 5 leaves in water and drink 1 cup twice a week until cured. 4.4 0.024 0.048 0.065 0.039
Spreng (KM2017064)

H L Prepare an infusion with 4 leaves in water and drink 1 cup twice a week until cured.

H L Prepare a decoction of the leaves in water and drink half cup when hypertensive.

H L Prepare a decoction of the leaves in water and drink 1 cup once a week for 3 months.

H L Prepare a thick juice with 10-15 leaves, water, 1 tsp lime juice, and drink 1 spoon every morning on empty stomach until cured.

H L Prepare juice with the leaves, water, and drink 1 cup thrice a week for 3 months.

H L Prepare an infusion of the leaves in water and drink 1 cup twice per week until cured.

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			H	L	Blend cooked curry leaves to obtain chutney and eat 1 spoon at dinner once daily for 2 months.					
			H	L	Prepare a decoction of the leaves in water and drink 1 cup twice a week until cured.					
			H	L	Prepare an infusion of the leaves in water and drink 1 cup thrice per week for 1 month.					
			H	L	Prepare a decoction of the leaves in water and drink 1 cup once a week for 3 months.					
			H	L	Prepare a decoction of the leaves in water and drink 1 glass twice a week until cured.					
			H	L	Prepare an infusion of the leaves in water and drink 1 cup thrice per week for 1 month.					
			H	L	Prepare an infusion of the leaves in water and drink 1 cup twice per week until cured.					
	<i>Citrus maxima</i> (Burm.) Osbeck (KM2017032)	Grapefruit	VHD	Fr	Prepare juice with the fruit together with water and 1 tsp honey. Drink 1 cup once daily before dinner until cured.	0.063	0.000	0.012	0.013	0.000
			H	Fr	Eat 1 slice of raw fruit once daily for 1 week.					
Solanaceae	<i>Capsicum annuum</i> <i>Cayenne</i> L. (KM2017023)	Cayenne pepper	HA	Fr	Infuse 1 tsp of cayenne pepper powder and 1 tsp of lemon juice to 1 cup of hot water and drink once daily for 3 days.	0.063	0.012	0.012	0.000	0.000
			AA	Fr	Infuse half tsp of cayenne pepper powder to 1 cup of hot water and drink thrice a week until cured.					

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Theaceae	<i>Solanum melongena</i> L. (KM2017086)	Egg plant	HA	Fr	Cook as vegetable and eat 2 spoons once a week until cured.	0.063	0.012	0.012	0.000	0.000
			H	Fr	Prepare a decoction with sliced egg plant fruit in 1 litre of water and add juice from half lemon. Drink half cup once daily for 1 week.					
	<i>Solanum lycopersicum</i> L. (KM2017085)	Tomato	Stroke	Fr	Prepare juice with the fruit and water and drink half cup thrice a week for 1 month.	0.938	0.012	0.000	0.000	0.026
			H	Fr	Add 4 to 5 slices of raw tomato in sandwich and eat thrice a week for 2 months.					
			H	Fr	Prepare juice with the fruit, water, 1 tsp honey, and drink 1 cup twice per week for 2 months.					
	<i>Solanum tuberosum</i> L. (KM2017087)	Potato	H	St	Peel 1 raw potato and grind it to form a paste. Add 1 tsp of this paste in a glass of water and 1 tsp of lemon juice and drink thrice a week for 14 days.	0.313	0.000	0.012	0.000	0.000
	<i>Capsicum annuum</i> Group L. (KM2017024)	Bell pepper	H	Fr	Prepare a mixed salad with 1 chopped bell pepper and eat once daily for 2 weeks.	0.938	0.012	0.000	0.013	0.013
			H	Fr	Prepare a mixed salad with 1 chopped bell pepper and eat when hypertensive.					
			H	Fr	Add 4 to 5 slices of raw bell pepper in sandwich and eat thrice a week until cured.					
	<i>Camellia sinensis</i> L. Kuntze (KM2017022)	Green tea	H	Dry L	Prepare an infusion with the tea bags in water and drink 1 cup once daily for 2 months.	4.7	0.012	0.096	0.052	0.026
			H	Dry L	Prepare an infusion with the tea bags in water and drink 1 cup once daily for 6 months.					

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H	Dry L	Prepare an infusion with the tea bags in water and drink 1 cup twice daily for 1 week.
H	Dry L	Prepare an infusion with the tea bags in water and drink 1 cup thrice a week until cured.
H	Dry L	Prepare an infusion with the tea bags in water and drink 1 cup once daily for 3 weeks.
H	Dry L	Prepare an infusion with the tea bags in water and drink 1 cup thrice a week until cured.
H	Dry L	Prepare an infusion with the tea bags in water and drink 1 cup once daily until cured.
H	Dry L	Prepare an infusion with the tea bags in water and drink 1 cup once daily until cured.
H	Dry L	Prepare an infusion with the tea bags in water, add 1 tsp of sugar, drink 1 cup once daily for 6 days.
H	Dry L	Prepare an infusion with the tea bags in water and drink 1 cup thrice a week until cured.
HA	Dry L	Prepare an infusion with the tea bags in water, add 1 tsp of sugar, and drink 1 cup once daily for 6 days.
HA	Dry L	Prepare an infusion with the tea bags in water and drink 1 cup twice daily for 1 week.
Stroke	Dry L	Prepare an infusion with the tea bags in water, add 1 tsp of honey, and drink 1 cup once daily for 3 months.
Stroke	Dry L	Prepare an infusion with the tea bags in water and drink 1 cup thrice a week until cured.

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			Stroke	Dry L	Prepare an infusion with the tea bags in water and drink 1 cup once daily for 2 weeks.					
Vitaceae	<i>Vitis vinefera</i> L. (KM2017098)	Raisin	IHD	Se	Infuse 4-5 dry raisins in one glass of warm milk, add 2-3 threads of saffron, and drink once daily for 1 week.	2.5	0.012	0.036	0.026	0.026
			H	Se	Soak 10 to 15 dry raisins in water overnight and eat them the next morning on empty stomach. This is done daily for 1 week.					
			IHD	Se	Prepare a decoction of 20 to 25 dry raisins in a litre of water, let cool down, sip the water once daily, and chew the boiled raisins in between. This is done for 2 weeks.					
			IHD	Se	Soak half cup of dry raisins in water for 2 hours then add to oatmeal and eat thrice a week for 1 month.					
			H	Se	Prepare an infusion of dry raisins in water and drink 1 cup once daily for 2 days.					
			AA	Se	Soak a handful of dry raisins in water and eat once daily in the morning on an empty stomach for 1 week.					
		Grape	AA	Fr	Eat 1 cup of fresh raw grapes twice a week for 1 month.					
			HA	Fr	Prepare juice with fresh grapes and water. Drink thrice a week until cured.					
Xanthorrhoeaceae	<i>Aloe vera</i> (L.) Burm.f. (KM2017007)	Aloe vera	H	L	Sold as an ayurvedic juice. 10 ml taken twice daily after meal until cured.	1.9	0.012	0.012	0.026	0.026
			AA	L	Sold as an ayurvedic juice. 15 ml taken once daily after meal until cured.					

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			H	L	Fresh raw gel is removed from the leaf pulp and 2 tsp are eaten once daily in the morning for 1 week.					
			H	L	Fresh raw gel is removed from the leaf pulp and 1 tsp are eaten once daily in the morning for 1 week.					
			AA	L	Prepare juice with fresh gel and water and drink 1 cup twice per week until cured.					
			H	L	Prepare a paste with fresh aloe vera gel extract and eat 1 spoon twice daily for 1 week.					
Zingiberaceae	<i>Zingiber officinale</i> Roscoe (KM2017100)	Ginger	Stroke	R	Peel the root, grate, and squeeze to obtain a juice, add 1 tsp honey and drink 1 cup once a week for 1 month.	2.5	0.012	0.024	0.026	0.039
			Stroke	R	Ginger tea: remove the peel, prepare a decoction of ginger in water, add 1 tsp of honey and drink 1 cup twice a week for 3 months.					
			Stroke	R	Peel the root, grate, and squeeze to obtain a juice, add 1 tsp honey and 1 spoon lemon juice and drink 1 cup once a week for 2 months.					
			AA	R	Ginger tea: remove the peel and prepare a decoction of ginger in water and drink 1 cup once daily for 3 months.					
			AA	R	Ginger tea: remove the peel, prepare a decoction of ginger in water, add 1 tsp of honey, and lemon juice and drink 1 cup thrice a week until cured.					

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<i>Curcuma longa</i> L. (KM2017042)	Turmeric	IHD	R	Ginger tea: remove the peel and prepare a decoction of ginger in water and drink 1 cup four times per week for 3 months.					
		HA	R	Prepare ginger paste and add 1 tsp of the paste to curries daily until cured.					
		HA	R	Peel the root, grate and squeeze to obtain a juice, add 1 tsp honey, and drink 1 cup twice a week until cured.					
	Turmeric	Stroke	R	Add 2 tsp of fresh grated turmeric root juice to half tsp of honey and drink twice daily for 1 day.	1.9	0.024	0.012	0.026	0.013
		Stroke	R	Infusion of 1 tsp of turmeric powder to a glass of warm milk and drink once daily for 6 days.					
		IHD	R	Infuse 1 tsp of turmeric powder to a glass of warm milk then add 1 tsp of honey and drink twice daily for 1 week.					
		IHD	R	Infuse 2 tsp of turmeric powder in 1 cup of hot water then add 1 tsp honey, 1 tsp lemon juice, a pinch of black pepper, and drink once daily for 2 weeks.					
		IHD	R	Infusion of 1 tsp of turmeric powder to vegetable soup and drink thrice a week for 1 month.					
		HA	R	Prepare a decoction of 2 tsp fresh grated turmeric root in water, add 1 tsp of honey, and drink 1 cup once a week for 1 month.					

<i>Elettaria cardamomum</i> Maton (KM2017046)	Cardamom	H	Se	Infusion of 1 tsp of cardamom powder into 1 cup of warm black tea and drink once daily for 1 week.	0.938	0.012	0.012	0.013	0.000
		AA	Se	Infusion of 1 tsp of cardamom powder to a glass of warm water and drink thrice a week until cured.					
		H	Se	Chew a pod of raw cardamom seeds once daily after dinner for 3 days.					

Diseases: H, Hypertensive disease; AA, Arrhythmia; HA, Heart attack; VHD, Valvular heart disease; PHD, Pulmonary heart disease; IHD, Ischaemic heart disease. Parts of plant used: Fr, Fruit; L, Leaf; Se, Seed; St, Stem; B, Bulb; Ba, Bar; Brk, Bark; Po, Pod; Pe, Peel; R, Root; Pet, Petal; Gr, Grain; Fl, Flower. FI, Frequency index; CII_H, cultural importance index among the Hindu community; CII_M, cultural importance index among the Muslim community; CII_C, cultural importance index among the Christian community; and CII_B, cultural importance index among the Buddhist community. ID, Identification number. Tsp, teaspoon.

Source of medicinal plant

Majority of MPs used in the preparation of herbal remedies were purchased (59.1%) and a plausible reason to explain this data could be due to the low cost of medicinal flora (Figure 1). Many participants reported to have cultivated (42.5%) such plants in home gardens, in small areas surrounding the house, or in clay pots so that they were immediately available whenever required and a few were collected from the wild (1.6%). However, this result deviates from the work of Singh et al. (2012) where most of the MPs were gathered from the wild.

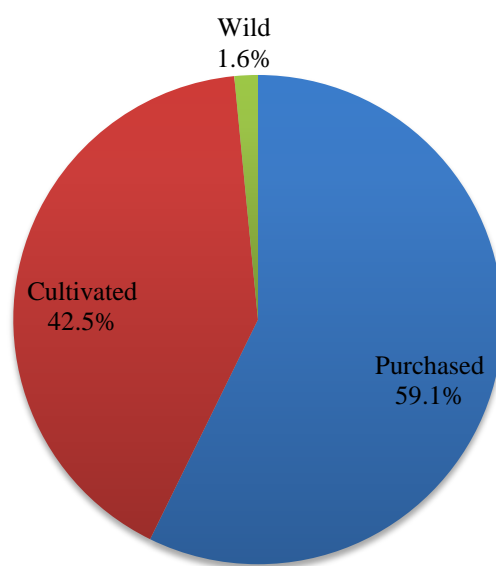


Figure 1: Source of medicinal plants

Parts of medicinal plants used in the preparation of herbal remedies

Figure 2 showed that the most used plant part for medicinal preparation was fruit (42.8%) and the least common parts employed were bark, pod, cap, sepal, and petal (0.3%). The reasons for the prevalence of fruits were possibly because of the high levels of bioactive substances mainly antioxidants which provide health benefits beyond basic nutrition and better taste and the easy accessibility of above ground fruits. However, this finding contradicts the report of a recent study conducted by Mahomoodally *et al.* (2016) whereby leaf was found to be the most frequently used part. Use of leaf was also high among the informants in the current study and this might be because of the greater abundance of leaves in comparison to other parts of plant, higher concentration of bioactive substances, and greater accessibility of above ground leaves (Tuttolomondo *et al.* 2007; Ghorbani, 2005; Ghimire *et al.* 2008).

It was seen that root made little contribution to the study because its removal would make the survival of the plant species difficult and eventually affect sustainability of native plants therefore it was not encouraged. The present result differs from the report of Cheikhyoussef *et al.* (2011) where roots were the commonly used in herbal preparations.

In order to achieve positive results with plant remedies, one should choose the proper part of the plant that contains the bioactive ingredients as in many plants different parts may contain totally different compounds which perform distinct functions in the human body (Alzweiri *et al.* 2011).

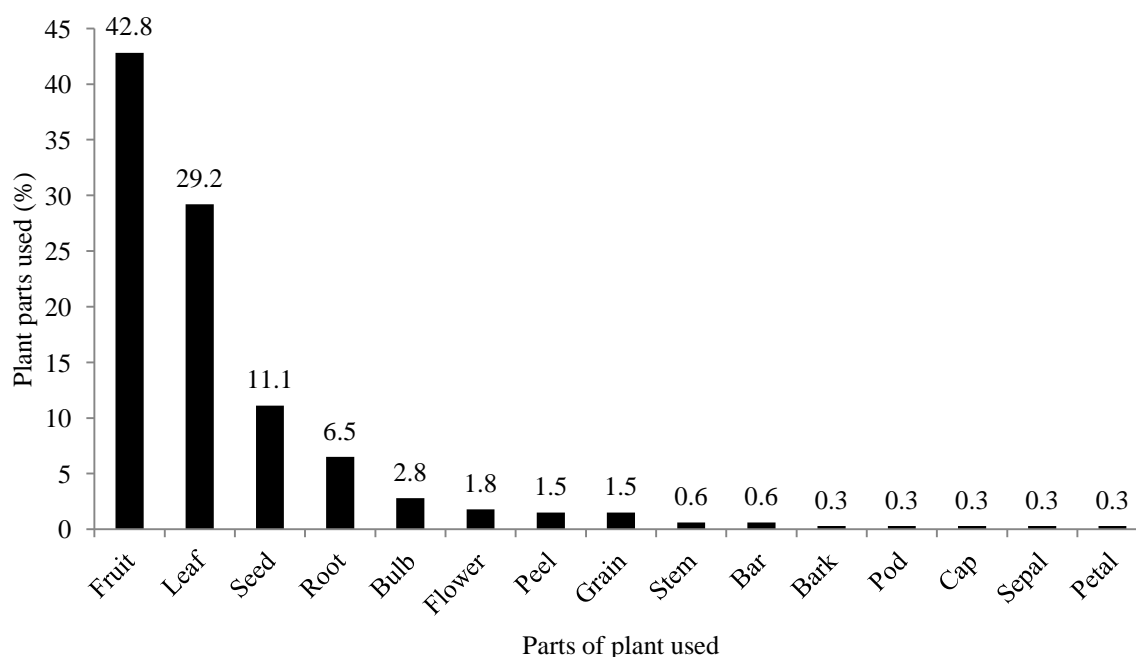


Figure 2: Plant parts used

Method of preparation of herbal remedies

As depicted in Figure 3, juice (27.8%) was the most preferred method of preparation of herbal remedies and the least opted modes of preparation were milkshake, jam, and oil (0.3%). In accordance with these results, Malla *et al.* (2015) in western Nepal also reported juice as being the most common mode of preparation. Juice is normally the desired one because it is tasty, refreshing, and is easily consumed in its liquid state. It provides a wider range of fruits or vegetables which allows the body to get more nutrients as well as to better absorb the nutritional substances (Greenfield, 2013).

Some participants believed in eating raw fruits and vegetables rather than preparing juice from them because they are richer in natural fibres which offer many health benefits (English, 2013).

Decoction was also a popular method of medicinal plant preparation where different parts of plants are boiled in water until the quantity of water is reduced to half of its actual volume. Zhang *et al.* (2005) reported that heating accelerates several biological reactions resulting in many active compounds, hence accounting for the efficacy of herbal remedies prepared by decoction.

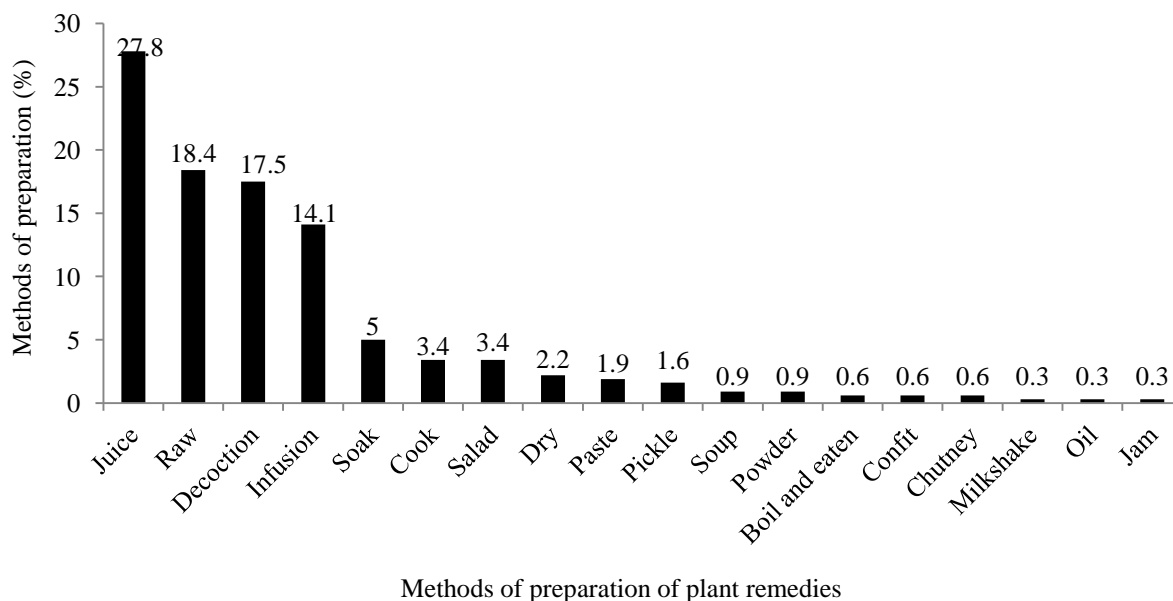


Figure 3: Method of preparation of herbal remedies

Use of polyherbal formulations to manage cardiovascular diseases

It was observed that a minority of the respondents (5.9%) made use of more than one botanical remedy to manage CVDs. The reasons behind use of polyherbal formulations (PHF) reported by the participants were:

- More effective than single MP because they contain multiple bioactive compounds that work together to provide better a result (57.9%)
- A highly desired therapeutic effect is achieved with a low dose of PHF and therefore:
 - It is available for use for a longer period of time (15.8%)
 - There is less chance of suffering from toxicity or adverse effects (26.3%)

Nonetheless, most of the informants (94.1%) claimed to use single plant which resembles the study of Boulogne *et al.* (2011) where majority of the diseases were managed with only one MP.

Use of additives

In the current investigation, majority of the respondents (58.4%) used additives in the preparation of herbal remedies. As shown in Figure 4, water (73.6%) was the most preferred additive compared to milk (3.5%). Some informants (12.8%) claimed to be using more than 1 additive.

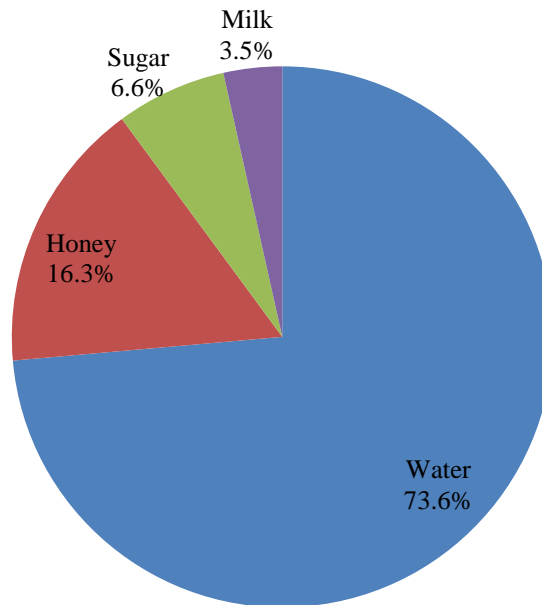


Figure 4: Types of additives used during preparation of plant remedies

The reasons behind use of additives reported by the participants were:

- To make the herbal remedies appetising thereby improving taste satisfaction (50.8%)
- To reduce sourness or bitterness of some remedies so that they can be consumed without any fuss (42.8%)
- To improve the nutritional value (2.1%)
- To facilitate preparation of the remedy (4.3%)

Individual taste preference dominated the use of additives in this study. Many participants find it hard to accept certain tastes as their tongues have not been adapted to those particular tastes and hence have to use additives to improve tolerance of some remedies. This is in line with the study of Grønhaug *et al.* (2008) where additives were reported to be used in preparation of remedies in order to ameliorate the tastes so as to ascertain patients' compliance.

Dose, administration and side effects of herbal medicine

The dose of medicine administered to the patient usually depends on sex (Grønhaug *et al.* 2008), age, health state and the duration of the illness (Togola *et al.* 2005). In the present study, severity of disease and duration of illness mainly influenced the dose of herbal medicines.

In the current study, all MPs were administered orally (100%) because it was the most easiest and comfortable route where it excluded complex and expensive accessories (Kpodar *et al.* 2015). This finding is in accord with that of Sadeghia and Mahmood (2014) where botanical remedies were mainly administered orally.

Table 5 showed that a minority of the informants (4.1%) reported presence of side-effects from over-consumption of botanical remedies. Herbal medicines are generally regarded as safe. Since there is a lack of standardisation of herbal drugs, individuals tend to overuse them whenever they did not encounter the desired effects and this led to unwanted side-effects.

Table 5: Side effects of botanical remedies reported by informants

Family name	Scientific name	Local name	Ailment	Side effects	Number of citations
Amaranthaceae	<i>Beta vulgaris</i>	Beetroot	Hypertension	Nausea	1
Amaryllidaceae	<i>Allium cepa</i>	Onion	Arrhythmia	Cough	1
	<i>Allium sativum</i>	Garlic	Stroke	Stomach burning	1
Anacardiaceae	<i>Mangifera indica</i>	Mango	Hypertension	Belly pain	1
	<i>Spondias dulcis</i>	Frucytere	Hypertension	Skin problem	1
Bromeliaceae	<i>Ananas comosus</i>	Pineapple	Stroke	Throat infection	1
Caricaceae	<i>Carica papaya</i>	Papaya	Stroke	High blood glucose level	1
Cucurbitaceae	<i>Momordica charantia</i>	Bittergourd	Ischaemic heart disease	Weakness	1
Rutaceae	<i>Citrus limon</i>	Lemon	Hypertension	Weakness	2
	<i>Murraya koenigi</i>	Caripoulet	Hypertension	Blurred vision	1
	<i>Citrus maxima</i>	Grapefruit	Valvular heart disease	Diarrhoea	1
Xanthorrhoeaceae	<i>Aloe vera</i>	Aloe vera	Hypertension	Diarrhoea	1

However, majority of the respondents (95.9%) stated that there were no side-effects following administration of plant remedies.

Improvement in health status and effectiveness of medicinal plants

Out of 320 users, 318 (99.4%) agreed that MPs improved their health status and therefore they extended the use of plant remedies until cured. Moreover, they would encourage other sufferers to use and benefit from the curative properties of these plants.

When questioned about the effectiveness of botanical remedies, it was found that (4.4%) of the users attributed the effect of the remedy as very good, (85.9%) as good, (9.1%) as quite good, and (0.6%) as bad. Individuals who were satisfied with the effectiveness of plant remedies were consistent with their use whereas those who rated MPs as bad discontinued their use and moved towards synthetic drugs.

Botanical families

As depicted in Figure 5, Cucurbitaceae and Rutaceae were the most represented families with the highest number of species (eight), followed by Rosaceae and Solanaceae with seven and five species respectively.

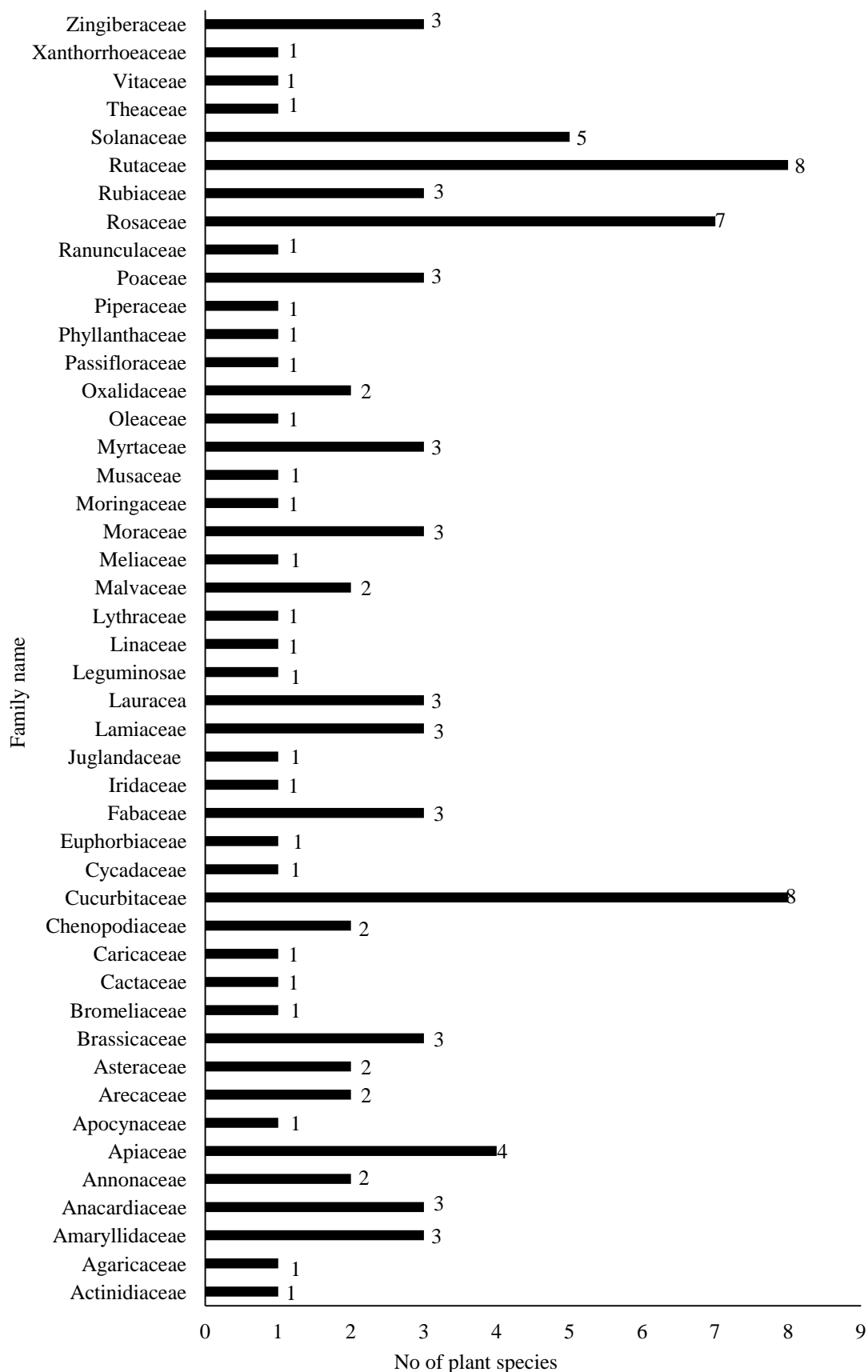


Figure 5: Representative botanical families

1 The Cucurbitaceae and Rutaceae families consist of 800 and 1700 plant species
2 respectively largely distributed in tropical regions of the world (Dhiman *et al.* 2012; Gurib-
3 Fakim, 2006). This large group of plant species has accounted for the predominance in the
4 number of species of the Cucurbitaceae and Rutaceae families in the current study.
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7 The most cited family was Rutaceae with 63 citations used against CVDs. High
8 citations of the Rutaceae family may be because of its wide range of distribution and the
9 presence of the active secondary metabolites namely alkaloids which are medicinally
10 valuable (Gurib-Fakim, 2006). However, Garcia *et al.* (2010) reported Asteraceae as the most
11 common cited family in their study.
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16 17 18 19 **Frequency index**

20 The highest frequency index (FI) value was scored by *Citrus limon* (9.1) showing its
21 significance in local phytotherapy (Table 4). It was followed by *Camellia sinensis* (4.7),
22 *Murraya koenigi* (4.4), and *Ocimum tenuiflorum* (3.4). They were widely used because of
23 their curing capacity and they were easily accessible and affordable in the study area. The
24 fact that these plants are largely used in the study area, it is important to carry out further
25 research to determine the presence of other bioactive components and their potential
26 beneficial roles. Interestingly, there has been previous record that frequently cited plant
27 species have been tested for their pharmacological activities. Garg *et al.* (2012) reported that
28 the ethanolic extract of *Murraya koenigi* leaf reduced blood lipids and facilitated flow of
29 blood in coronary arteries in vitro thereby promoting cardiovascular benefits.
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40 The lowest FI value was scored by *Agaricus bisporus*, *Carissa carandas*, *Tagetes*
41 *erecta*, *Brassica nigra*, *Nasturtium officinale*, *Hylocereus undatus*, *Luffa acutangula*, *Luffa*
42 *aegyptiaca*, *Sechium edule*, *Cycas revolute*, *Phaseolus vulgaris*, *Trigonella foenum- graecum*,
43 *Juglans*, *Thymus vulgaris*, *Litsea glutinosa*, *Linum usitatissimum*, *Abelmoschus esculentu*,
44 *Syzygium jambos*, *Averrhoa carambola*, *Passiflora edulis*, *Zea mays*, *Prunus persica*, *Rosa*,
45 *Uncaria tomentosa*, and *Solanum tuberosum* (0.313). This does not necessarily mean that
46 these plants do not hold any significance to the local population but it may imply that
47 traditional knowledge about their use is very poorly disseminated or possibly because they
48 are rare, most people are unaware of these species and their therapeutic values (Sharma *et al.*
49 2012).
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Informant consensus factor

Based on the informant consensus factor (ICF), (Table 6), it can be deduced that the level of respondents' agreement was highest for hypertensive disease (ICF=0.65). This high ICF value could be due to a large number of hypertensive patients in the study area and better contact established between them to manage this disease. Furthermore, a high ICF value for a specific illness category might demonstrate the efficacy of the plants in managing this ailment category (Cakilcioglu *et al.* 2011). Moreover, a high ICF indicates the possibility of holding essential active components in these plants and therefore there is a need to carry further phytopharmacological analysis of these plants (Kadir *et al.* 2012). On the other hand, the lowest agreement between the respondents was found in heart attack disease category with ICF value of 0.22. This could be due to a lack of communication among the informants with regard to the management of this disease category. Besides, analysis of illness categories was carried out in order to find out the most important plant species in each category. Valvular and pulmonary heart diseases were not included in the disease category because only one plant was cited under valvular heart disease and two plants were cited under pulmonary heart disease which eventually yielded an ICF value of zero.

Table 6: Illness categories and informant consensus factor for plants

Illness categories	No. of species (N)	Use categories (N)	ICF
Hypertensive disease	77	215	0.65
Arrhythmia	20	28	0.30
Cerebrovascular disease	14	28	0.52
Ischaemic heart disease	19	27	0.31
Heart attack	15	19	0.22

ICF: Informant consensus factor

Cultural Importance Index

The cultural importance index (CII) demonstrated that *Ocimum tenuiflorum* (0.131), *Camellia sinensis* (0.096), *Murraya koenigi* (0.065), and *Citrus limon* (0.184) are the most culturally important plant species among the Hindu, Muslim, Christian, and Buddhist religious groups, respectively in terms of their medicinal uses (Table 7). The high CII of these plants shows their significance in their specific culture because of their versatile remedial features. These species have been used since the time of our ancestors and there has been transmission of medicinal knowledge of these plants from one generation to the next within the distinct religious groups (Mahomoodally *et al.* 2016).

1 According to Tardío and Pardo-de-Santayana (2008), the CII is an effective tool for
2 highlighting those taxa with a high agreement for the culture of the study area and hence
3 recognises the knowledge shared among these people.
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5 Plants with low CII in a specific religious group indicate that little cultural importance
6 is given to them in TM in that specific community. According to Tuttolomondo *et al.* (2014)
7 plants with low CII value imply that the indigenous people had little faith upon the exclusive
8 use of the medicinal plant species in the management of certain ailments or indicate that
9 traditional knowledge about therapeutic uses of these plants is at risk of not being transmitted
10 thereby promoting cultural erosion. The use of medicinal flora is also affected by cultural and
11 religious preferences (Jusu and Sanchez, 2013).
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18 Some of the reported medicinal floras were found to play fundamental roles in
19 religious functions among the Hindus. *Ocimum tenuiflorum* is regarded as a holy plant in
20 Hindu belief. Every morning Hindu devotees water and pray to Tulsi plant by chanting a
21 prayer so as to keep the family members in good shape. Furthermore, the leaves of bael plant
22 were reported to play an important role during ‘Mahashivratri’ which is a Hindu festival
23 celebrated every year in honour of lord Shiva.
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Table 7: Culturally most important plant and animal species used against cardiovascular diseases

Religious groups	Hindu	Muslim	Christian	Buddhist
Plant species	<i>Ocimum tenuiflorum</i> (0.131)	<i>Camellia sinensis</i> (0.096)	<i>Murraya koenigi</i> (0.065)	<i>Citrus limon</i> (0.184)
	<i>Piper betle</i> (0.036)	<i>Vitis vinefera</i> (0.036)	<i>Allium cepa</i> (0.026)	<i>Allium sativum</i> (0.039)
	<i>Agaricus bisporus</i> (0.012)	<i>Apium graveolens</i> (0.024)	<i>Cocos nucifera</i> (0.026)	<i>Zingiber officinale</i> (0.039)
	<i>Spondias dulcis</i> (0.012)	<i>Ananas comosus</i> (0.024)	<i>Cynara cardunculus</i> (0.026)	<i>Daucus carota</i> (0.026)
	<i>Anacardium occidentale</i> (0.012)	<i>Olea europaea</i> (0.024)	<i>Cucumis sativus</i> (0.026)	<i>Spinacia oleracea</i> (0.026)
	<i>Annona reticulata</i> (0.012)	<i>Nigella sativa</i> (0.024)	<i>Tamarindus indica</i> (0.026)	<i>Cinnamomum verum</i> (0.026)
	<i>Petroselinum crispum</i> (0.012)	<i>Spondias dulcis</i> (0.012)	<i>Musa</i> (0.026)	<i>Morus alba</i> (0.026)
	<i>Carissa carandas</i> (0.012)	<i>Anacardium occidentale</i> (0.012)	<i>Prunus dulcis</i> (0.026)	<i>Moringa oleifera</i> (0.026)
	<i>Tagetes erecta</i> (0.012)	<i>Annona reticulata</i> (0.012)	<i>Citrus sinensis</i> (0.026)	<i>Averrhoa bilimbi</i> (0.026)
	<i>Brassica oleracea</i> (0.012)	<i>Petroselinum crispum</i> (0.012)	<i>Aloe vera</i> (0.026)	<i>Prunus dulcis</i> (0.026)
	<i>Hylocereus undatus</i> (0.012)	<i>Brassica oleracea</i> (0.012)	<i>Curcuma longa</i> (0.026)	<i>Citrus reticulata</i> (0.026)
	<i>Luffa aegyptiaca</i> (0.012)	<i>Brassica nigra</i> (0.012)	<i>Elettaria cardamomum</i> (0.026)	<i>Solanum lycopersicum</i> (0.026)
	<i>Luffa acutangula</i> (0.012)	<i>Nasturtium officinale</i> (0.012)	<i>Actinidia deliciosa</i> (0.013)	<i>Aloe vera</i> (0.026)
	<i>Cycas revoluta</i> (0.012)	<i>Phaseolus vulgaris</i> (0.012)	<i>Mangifera indica</i> (0.013)	<i>Mangifera indica</i> (0.013)
	<i>Hibiscus rosa-sinensis</i> (0.012)	<i>Thymus vulgaris</i> (0.012)	<i>Annona muricata</i> (0.013)	<i>Coriandrum sativum</i> (0.013)
	<i>Azadirachta indica</i> (0.012)	<i>Litsea glutinosa</i> (0.012)	<i>Phoenix dactylifera</i> (0.013)	<i>Carica papaya</i> (0.013)
	<i>Averrhoa carambola</i> (0.012)	<i>Hibiscus rosa-sinensis</i> (0.012)	<i>Beta vulgaris</i> (0.013)	<i>Momordica charantia</i> (0.013)
	<i>Passiflora edulis</i> (0.012)	<i>Abelmoschus esculentus</i> (0.012)	<i>Citrullus lanatus</i> (0.013)	<i>Lagenaria siceraria</i> (0.013)
	<i>Prunus persica</i> (0.012)	<i>Azadirachta indica</i> (0.012)	<i>Sechium edule</i> (0.013)	<i>Cucurbita maxima</i> (0.013)
	<i>Capsicum annuum Cayenne</i> (0.012)	<i>Syzygium jambos</i> (0.012)	<i>Manihot esculenta</i> (0.013)	<i>Mentha piperita</i> (0.013)
		<i>Capsicum annuum Cayenne</i> (0.012)	<i>Trigonella foenum-graecum</i> (0.013)	<i>Persea americana</i> (0.013)
	<i>Solanum melongena</i> (0.012)	<i>Solanum melongena</i> (0.012)	<i>Crocus sativus</i> (0.013)	<i>Cicer arietinum</i> (0.013)
		<i>Solanum tuberosum</i> (0.012)	<i>Juglans</i> (0.013)	<i>Punica granatum</i> (0.013)
			<i>Mentha piperita</i> (0.013)	<i>Artocarpus altilis</i> (0.013)

**Animal
species**

Bos taurus (0.25)

Salmo salar (0.333)

Brachyura (0.222)

Thunnini (0.444)

Apis mellifera (0.2)

Sardinella zunasi (0.2)

Caridea (0.2)

Persea americana (0.013)

Cicer arietinum (0.013)

Linum usitatissimum (0.013)

Punica granatum (0.013)

Artocarpus heterophyllus
(0.013)

Artocarpus altilis (0.013)

Syzygium cumini (0.013)

Phyllanthus emblica (0.013)

Avena sativa (0.013)

Zea mays (0.013)

Oryza sativa (0.013)

Malus domestica (0.013)

Fragaria ananassa (0.013)

Pyrus (0.013)

Rosa (0.013)

Morinda citrifolia (0.013)

Coffea arabica (0.013)

Uncaria tomentosa (0.013)

Aegle marmelos (0.013)

Citrus medica (0.013)

Citrus aurantifolia (0.013)

Citrus maxima (0.013)

Capsicum annuum Group
(0.013)

Elettaria cardamomum
(0.013)

Psidium guajava (0.013)

Phyllanthus emblica (0.013)

Avena sativa (0.013)

Oryza sativa (0.013)

Malus domestica (0.013)

Fragaria ananassa (0.013)

Prunus domestica (0.013)

Morinda citrifolia (0.013)

Aegle marmelos (0.013)

Citrus medica (0.013)

Citrus aurantifolia (0.013)

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Gallus domesticus (0.2)

Jaccard Similarity Index

In the present study, the highest number of medicinal plants were provided by the Hindu community (65), followed by Muslim (58), Christian (57), and Buddhist (44) community.

As illustrated in Table 8, the highest similarity of medicinal plants usage was found to be between the Muslim and Hindu community with Jaccard similarity index (JSI) value of 90.9. This indicates that there has been an exchange of traditional knowledge about medicinal uses of plants between these two communities for management of CVDs. Both the Hindu and Muslim groups are descendants of Indian indentured workers brought by the British to work on sugarcane, banana, tea, and coffee plantations. They originated from the same village in eastern Uttar Pradesh and western Bihar in northern India and shipped together to Mauritius (Hollup, 1996).

Moreover, many Indo Mauritians speak “Bhojpuri” language which is a combination of both Creole and Hindi languages. Furthermore, certain traditions are similar among the Hindu and Muslim community. For example, during marriage ceremonies, henna is used to adorn the brides’ hands in both religious groups (Mahomoodally *et al.* 2016).

Table 8: Jaccard similarity index for different religious groups.

	Hindu	Muslim	Christian	Buddhist
Hindu	-	90.9	53.8	36.4
Muslim	90.9	-	41.7	33.3
Christian	53.8	41.7	-	83.3
Buddhist	36.4	33.3	83.3	-

The lowest similarity of medicinal plants usage was found to be between the Muslim and Buddhist community with JSI value of 33.3. A possible reason for this might be because the Buddhist religious group have their own system of healing which differs from that of Muslim. Also, it was observed that the Buddhist community were quite reluctant to share their traditional knowledge with people of other religious groups (Mahomoodally *et al.* 2016). Furthermore, Chinese people often use Chinese herbs and some of them are unfamiliar to the Hindus, Muslims and Christians. Güzel *et al.* (2015) reported that anthropological studies should be conducted in depth in order to identify factors influencing ethno-medicinal similarities and differences among distinct cultural groups.

Ailment Categories

As depicted in Table 9, the reported ailments were classified into seven categories of cardiovascular diseases.

Table 9: The use of plant and animal-based remedies by illness categories

Illness categories	Plant species	Animal species
Hypertensive disease	<i>Actinidia deliciosa</i> , <i>Allium sativum</i> , <i>Mangifera indica</i> , <i>Spondias dulcis</i> , <i>Annona muricata</i> , <i>Annona reticulata</i> , <i>Apium graveolens</i> , <i>Daucus carota</i> , <i>Petroselinum crispum</i> , <i>Coriandrum sativum</i> , <i>Carissa carandas</i> , <i>Phoenix dactylifera</i> , <i>Cocos nucifera</i> , <i>Cynara cardunculus</i> , <i>Nasturtium officinale</i> , <i>Ananas comosus</i> , <i>Hylocereus undatus</i> , <i>Carica papaya</i> , <i>Spinacia oleracea</i> , <i>Beta vulgaris</i> , <i>Momordica charantia</i> , <i>Lagenaria siceraria</i> , <i>Luffa aegyptiaca</i> , <i>Citrullus lanatus</i> , <i>Cucurbita maxima</i> , <i>Cucumis sativus</i> , <i>Sechium edule</i> , <i>Cycas revoluta</i> , <i>Manihot esculenta</i> , <i>Tamarindus indica</i> , <i>Phaseolus vulgaris</i> , <i>Crocus sativus</i> , <i>Ocimum tenuiflorum</i> , <i>Mentha piperita</i> , <i>Cinnamomum verum</i> , <i>Persea americana</i> , <i>Litsea glutinosa</i> , <i>Linum usitatissimum</i> , <i>Punica granatum</i> , <i>Hibiscus rosa-sinensis</i> , <i>Artocarpus heterophyllus</i> , <i>Artocarpus altilis</i> , <i>Moringa oleifera</i> , <i>Musa</i> , <i>Psidium guajava</i> , <i>Syzygium cumini</i> , <i>Olea europaea</i> , <i>Averrhoa bilimbi</i> , <i>Averrhoa carambola</i> , <i>Passiflora edulis</i> , <i>Phyllanthus emblica</i> , <i>Oryza sativa</i> , <i>Nigella sativa</i> , <i>Malus domestica</i> , <i>Fragaria ananassa</i> , <i>Prunus dulcis</i> , <i>Prunus domestica</i> , <i>Pyrus</i> , <i>Rosa</i> , <i>Morinda citrifolia</i> , <i>Coffea arabica</i> , <i>Citrus limon</i> , <i>Aegle marmelos</i> , <i>Citrus sinensis</i> , <i>Citrus medica</i> , <i>Citrus aurantifolia</i> , <i>Citrus reticulata</i> , <i>Murraya koenigi</i> , <i>Citrus maxima</i> , <i>Solanum melongena</i> , <i>Solanum lycopersicum</i> , <i>Solanum tuberosum</i> , <i>Capsicum annuum</i> , <i>Camellia sinensis</i> , <i>Vitis vinefera</i> , <i>Aloe vera</i> and <i>Elettaria cardamomum</i>	<i>Apis mellifera</i> , <i>Bos taurus</i> , <i>Brachyura</i> , <i>Caridea</i> , <i>Gallus domesticus</i> and <i>Thunnini</i>
Arrhythmia	<i>Allium cepa</i> , <i>Coriandrum sativum</i> , <i>Mentha piperita</i> , <i>Cinnamomum verum</i> , <i>Persea americana</i> , <i>Azadirachta indica</i> , <i>Morus alba</i> , <i>Artocarpus altilis</i> , <i>Musa</i> , <i>Psidium guajava</i> , <i>Piper betle</i> , <i>Prunus persica</i> , <i>Coffea arabica</i> , <i>Uncaria tomentosa</i> , <i>Citrus limon</i> , <i>Capsicum annuum</i> , <i>Vitis vinefera</i> , <i>Aloe vera</i> , <i>Zingiber officinale</i> and <i>Elettaria cardamomum</i>	<i>Apis mellifera</i> , <i>Gallus domesticus</i> and <i>Salmo salar</i>
Cerebrovascular disease	<i>Allium sativum</i> , <i>Daucus carota</i> , <i>Phoenix dactylifera</i> , <i>Tagetes erecta</i> , <i>Ananas comosus</i> , <i>Carica papaya</i> , <i>Spinacia oleracea</i> , <i>Luffa acutangula</i> , <i>Phyllanthus emblica</i> , <i>Malus domestica</i> , <i>Solanum lycopersicum</i> , <i>Camellia sinensis</i> , <i>Zingiber officinale</i> and <i>Curcuma longa</i>	<i>Sardinella zunasi</i>
Ischaemic heart disease	<i>Agaricus bisporus</i> , <i>Allium cepa</i> , <i>Allium sativum</i> , <i>Anacardium occidentale</i> , <i>Brassica oleracea</i> , <i>Momordica charantia</i> , <i>Trigonella foenum-graecum</i> , <i>Thymus vulgaris</i> , <i>Abelmoschus esculentus</i> , <i>Morus alba</i> , <i>Musa</i> , <i>Olea europaea</i> , <i>Avena sativa</i> , <i>Zea mays</i> , <i>Oryza sativa</i> , <i>Prunus dulcis</i> , <i>Vitis vinefera</i> , <i>Zingiber officinale</i> and <i>Curcuma longa</i> .	<i>Bos taurus</i> , <i>Sardinella zunasi</i> , <i>Brachyura</i> , <i>Salmo salar</i> and <i>Thunnini</i>
Heart attack	<i>Petroselinum crispum</i> , <i>Brassica nigra</i> , <i>Ananas comosus</i> , <i>Juglans</i> , <i>Cicer arietinum</i> , <i>Syzygium jambos</i> , <i>Fragaria ananassa</i> , <i>Prunus dulcis</i> , <i>Aegle marmelos</i> , <i>Capsicum annuum</i> , <i>Solanum melongena</i> , <i>Camellia sinensis</i> , <i>Vitis vinefera</i> , <i>Zingiber officinale</i> and <i>Curcuma longa</i> .	<i>Apis mellifera</i> , <i>Caridea</i> and <i>Salmo salar</i>

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Valvular heart disease	<i>Allium sativum and Citrus maxima</i>
Pulmonary heart disease	<i>Spinacia oleracea</i>

1 The illness categories treated by the highest number of MPs were hypertensive disease with
2 77 reported plant species, followed by arrhythmia with 20 species, ischaemic heart disease
3 with 19 species, heart attack with 15 species, cerebrovascular disease with 14 species,
4 valvular heart disease with 2 species, and pulmonary heart disease with 1 species.
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6 This data indicates a high prevalence of hypertension among the participants in the study
7 area, hence the need to search for more anti-hypertensive herbs. The effectiveness exhibited
8 by some of the anti-hypertensive herbs in this study has earlier been reported in in-vivo
9 studies. For instance, seed extracts of celery was found to decrease blood pressure in
10 deoxycorticosterone acetate-induced hypertensive rats (Moghadam *et al.* 2013; cited Al Disi
11 *et al.* 2015). Furthermore, in a double-blind, placebo-controlled trial, obese hypertensive
12 patients who received 379 mg green tea extract for 84 days showed a significant reduction of
13 4 mmHg in both systolic and diastolic blood pressure (Bogdanski *et al.* 2012; cited Al Disi *et*
14 *al.* 2015). Additionally, long term administration of safranal, which is the main component of
15 *Crocus sativus* lowered systolic blood pressure in deoxycorticosterone acetate salt
16 hypertensive rats (Imenshahidi *et al.* 2015; cited Al Disi *et al.* 2015).
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18 Nevertheless, use of medicinal plants may differ among different groups of people in distinct
19 parts of the world. For instance, in Mauritius, *Trigonella foenum-graecum* was reported to be
20 used against hypercholesterolemia but in Iran it is employed against gynaecological issues
21 (Sadeghia and Mahmood, 2014). The results of this study showed that (37.0 %) of the MPs
22 reported by the informants were used to manage more than one type of illness. This finding
23 corresponds the previous result described by Gupta *et al.* (2013) where majority of medicinal
24 flora utilised by local people have several uses.
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Cross-cultural comparison of medicinal plants among the different religious groups

Despite the fact that the four religious groups in Mauritius differs from each other in terms of the worship style, rituals, and beliefs, it was found that that they possess common knowledge about most of reported therapeutic plants in the study area. As illustrated in Figure 6, 22 plant species were common to the 4 religious groups, whereas 10 plant species were common among the Hindu and Muslim groups only, 7 plant species were common among the Hindu and Christian groups only, 4 plant species were common among the Hindu and Buddhist groups only, 5 plants were common among the Muslim and Christian groups only, 3 plants were common among the Muslim and Buddhist groups only, 5 plants were common among the Christian and Buddhist groups only, 5 plant were common among the Hindu, Muslim, and Christian religious groups only, 2 plants were common among the Hindu, Muslim, and Buddhist groups only, 3 plants were common among the Hindu, Christian, and Buddhist groups only and 2 plants were common among the Muslim, Christian, and Buddhist groups only. 12 plant species were used by the Hindu religious group only, 9 plants were used by the Muslim group only, 8 plants were used by the Christian group only and 3 plants were used by the Buddhist group only.

It was surprising to see a high resemblance between the uses of same MP species among the four communities. Some possible reasons for this high correspondence might be due to (1) sharing of traditional knowledge through media such as via 'Radio Plus' which is a radio station in Mauritius where along with songs the anchor provides the listeners with some tips about how to manage various ailments naturally hence justifying the use of common plants among distinct communities or via newspapers for instance the 'Weekend Newspaper' which is available every Sundays where a section is dedicated to health whereby traditional information is provided to readers against illnesses thus explaining the commonly used flora among the different religious groups, (2) exchange of knowledge about use of medicinal plants through friends or acquaintances of different religious groups, and (3) people who reside near each other in certain regions use similar plant species which might be due to the presence of a few MPs in nearby herbal stores or wild which are in the reach of these people.

1 It was reported that the acceptance and use of certain medicinal flora by one religious
2 group influence other religious groups (Lingaraju *et al.* 2013). Also, plants are used by
3 different religious groups because of their potential pharmacological effectiveness (Masevhe
4 *et al.* 2015). Other reasons for the parallel use of plant species among different religious
5 groups are due to chance, same criteria for choosing plants, and cross-cultural exchange of
6 information on the efficacy of a plant (Heinrich *et al.* 1998).
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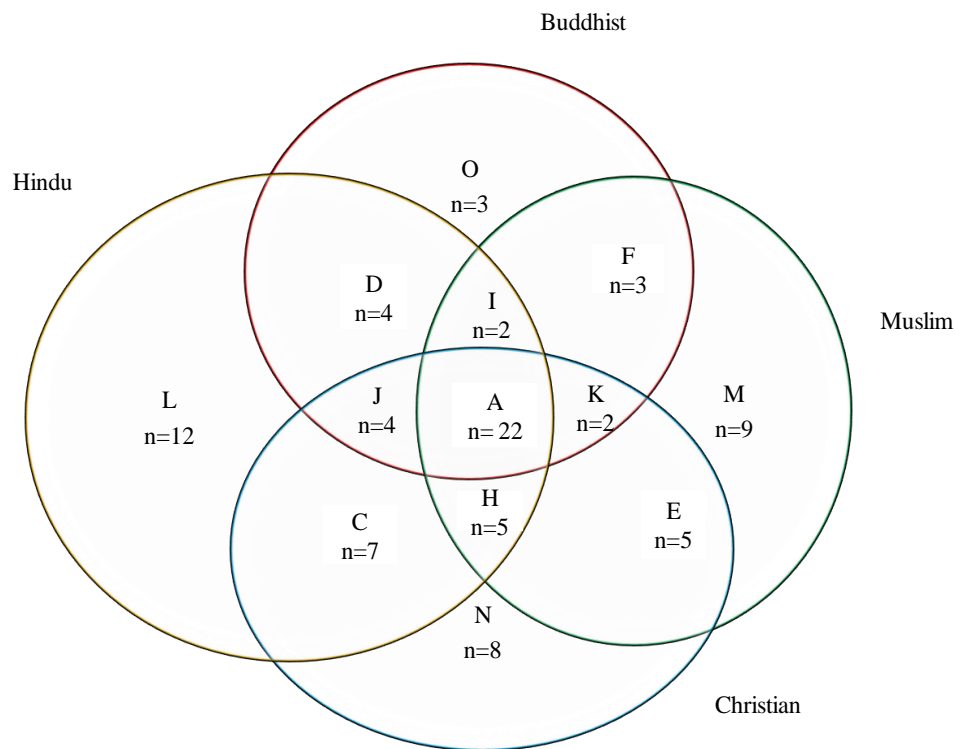


Figure 6: Overlap of plant species reported by the 4 religious groups of Mauritius

- A. Plant species common to all the 4 religious groups (*Allium sativum*, *Mangifera indica*, *Daucus carota*, *Ananas comosus*, *Spinacia oleracea*, *Moringa oleifera*, *Musa*, *Olea europaea*, *Phyllanthus emblica*, *Malus domestica*, *Prunus dulcis*, *Morinda citrifolia*, *Citrus limon*, *Aegle marmelos*, *Citrus sinensis*, *Citrus medica*, *Murraya koenigi*, *Camellia sinensis*, *Vitis vinefera*, *Aloe vera*, *Zingiber officinale*, and *Curcuma longa*)
- B. Plant species common to Hindu and Muslim groups only (*Spondias dulcis*, *Anacardium occidentale*, *Annona reticulata*, *Apium graveolens*, *Petroselinum crispum*, *Brassica oleracea*, *Hibiscus rosa-sinensis*, *Azadirachta indica*, *Solanum melongena*, and *Capsicum annum Cayenne*)
- C. Plant species common to Hindu and Christian groups only (*Allium cepa*, *Cocos nucifera*, *Citrullus lanatus*, *Cucumis sativus*, *Manihot esculenta*, *Tamarindus indica*, and *Crocus sativus*)
- D. Plant species common to Hindu and Buddhist groups only (*Coriandrum sativum*, *Prunus domestica*, *Averrhoa bilimbi*, and *Solanum lycopersicum*)
- E. Plant species common to Muslim and Christian groups only (*Actinidia deliciosa*, *Annona muricata*, *Coffea Arabica*, *Citrus maxima*, and *Beta vulgaris*)
- F. Plant species common to Muslim and Buddhist groups only (*Momordica charantia*, *Lagenaria siceraria*, and *Cucurbita maxima*)
- G. Plant species common to Christian and Buddhist groups only (*Mentha piperita*, *Cicer arietinum*, *Punica granatum*, *Avena sativa*, and *Persea Americana*)
- H. Plant species common to Hindu, Muslim, and Christian religious groups only (*Pyrus*, *Phoenix dactylifera*, *Artocarpus heterophyllus*, *Syzygium cumini*, and *Elettaria cardamomum*)
- I. Plant species common to Hindu, Muslim, and Buddhist groups only (*Carica papaya* and *Psidium guajava*)
- J. Plant species common to Hindu, Christian and Buddhist groups only (*Oryza sativa*, *Capsicum annum Group*, and *Artocarpus altilis*)
- K. Plant species common to Muslim, Christian and Buddhist groups only (*Citrus aurantifolia* and *Fragaria ananassa*)
- L. Plant species common to Hindu group only (*Agaricus bisporus*, *Carissa carandas*, *Tagetes erecta*, *Hylocereus undatus*, *Luffa aegyptiaca*, *Luffa acutangula*, *Cycas revoluta*, *Ocimum tenuiflorum*, *Averrhoa carambola*, *Passiflora edulis*, *Piper betle*, and *Prunus persica*)
- M. Plant species common to Muslim group only (*Brassica nigra*, *Nasturtium officinale*, *Phaseolus vulgaris*, *Thymus vulgaris*, *Litsea glutinosa*, *Abelmoschus esculentus*, *Syzygium jambos*, *Nigella sativa*, and *Solanum tuberosum*)
- N. Plant species common to Christian group only (*Cynara cardunculu*, *Sechium edule*, *Trigonella foenum-graecum*, *Juglans*, *Linum usitatissimum*, *Uncaria tomentosa*, *Rosa*, and *Zea mays*)
- O. Plant species common to Buddhist group only (*Citrus reticulata*, *Morus alba*, and *Cinnamomum verum*)

However, only a minority of the respondents (N=64; 16.7%) reported no use of medicinal plants for management of CVDs. The most frequently mentioned reason for not choosing MPs was never intended to use (85.9%) and the least cited one was less effective (14.1%).

Animal-based remedies to manage cardiovascular diseases

Out of 384 informants interviewed, only 28 (7.3%) reported to have used animal based remedies to manage CVDs.

Reasons behind preference to use animal remedies

Table 10 showed the different reasons behind the preference to use animal remedies (ARs). The use of medicinal fauna is a common practice worldwide. This is supported by the fact that ≥ 1500 and 584 animals are used as medicine in China and Latin America respectively (Alonso-Castro *et al.* 2011). Absence of side effects (100.0%) made ARs the first choice of use in the study area and therefore use of ARs was consistent. Easy accessibility (96.4%) and low cost (53.6%) of ARs were quoted by many informants. Many medicinal fauna were obtained in the wild, several were reared, and some were purchased in nearby supermarkets thus facilitating accessibility. Mauritius is bestowed with a rich variety of medicinal land and water animal species which are in plenitude and this is the reason why their prices were low. Only a minority (28.6%) stated that ARs were efficient when interviewed about their preference to use.

Table 10: Assessment of different reasons behind preference to use animal remedies

	N	%
Free from side effects	28	100
Easily available locally	27	96.4
Low cost	15	53.6
Efficient	4	28.6

N: Number of respondents

?: Percentage of respondents

As summarised in Table 11, a total of 8 different animal-based remedies distributed over 7 families were recorded against CVDs.

Table 11: Animal-based remedies used against cardiovascular diseases in Mauritius

Family	Scientific name of animal	Local name of animal	Disease	Part of animal used	Method of preparation and administration	FI	C11 _H	C11 _M	C11 _C	C11 _B
Apidae	<i>Apis mellifera</i>	Honey bee	AA	Honey	Add 1 tsp of fresh raw honey, 1 spoon of milk powder to 1 glass of warm water and drink once daily before bedtime for 2 weeks.	14.3	0.125	0.167	0.111	0.200
			H	Honey	Add 1 tsp of fresh raw honey to 1 glass of warm water and drink twice daily until cured.					
			H	Honey	Add 1 tsp of fresh raw honey to 1 glass of warm water and drink twice daily until cured.					
			HA	Honey	Add 1 tsp of fresh raw honey and 1/3 tsp of cinnamon powder to 1 glass of warm water and drink four times a week for 1 month.					
Bovidae	<i>Bos taurus</i>	Cow	H	Milk	Drink 1 glass of raw fresh cow's milk thrice a week until cured.	7.1	0.250	0.000	0.000	0.000
			IHD	Urine	Add ½ spoon of alum powder in half cup of raw fresh urine and drink twice a week for 3 months.					
Clupeidae	<i>Sardinella zunasi</i>	Sardine fish	IHD	Whole body	Cook fresh fish and eat 2 pieces once a week until cured.	7.1	0.000	0.000	0.111	0.200
			Stroke	Flesh	Prepare a fish salad with canned sardine, tomato, and onion slices and eat 3 spoons twice a week until cured.					
Crustacean	<i>Brachyura</i>	Crab	IHD	Whole body	Prepare fresh crab soup and drink 1 bowl once a week until cured.	10.7	0.125	0.000	0.222	0.000

			H	Whole body	Prepare fresh crab soup and drink 1 bowl once a week until cured.					
			H	Whole body	Prepare fresh crab soup and drink 1 bowl once a week until cured.					
		<i>Caridea</i>	Shrimp	HA	Abdomen	Cook frozen shrimp in 'rougaille' and eat 5-10 abdomen once a week.	7.1	0.000	0.167	0.000 0.200
			H	Abdomen+ Tail	Cook dry shrimp and eat 10-20 once a week.					
	Phasianidae	<i>Gallus domesticus</i>	Chicken	AA	Egg	Boil fresh egg and eat 1 egg twice a week for 15 days.	14.3	0.125	0.167	0.111 0.200
			H	Egg	Prepare a mixed salad with 2 fresh boiled eggs and 1 boiled potato and eat 3 spoons once a week for 1 month.					
			H	Thigh	Cook frozen chicken and eat 2 thighs once a week until cured.					
			H	Thigh	Cook frozen chicken and eat 1 thigh twice a week until cured.					
	Salmonidae	<i>Salmo salar</i>	Salmon fish	AA	Whole body	Cook frozen fish and eat 1 piece twice a week for 3 months.	10.7	0.125	0.333	0.000 0.000
			HA	Whole body	Cook frozen fish and eat 1 piece twice a week for 6 months.					
			IHD	Whole body	Cook fresh fish and eat 1 piece once a week until cured.					
	Scombridae	<i>Thunnini</i>	Tuna fish	IHD	Flesh	Cook fresh fish and eat 1 piece twice a week until cured.	28.6	0.250	0.167	0.444 0.200
			H	Flesh	Cook fresh fish and eat 1 piece twice a week until cured.					
			H	Flesh	Cook frozen fish and eat 1 piece thrice a week until cured.					
			IHD	Flesh	Cook frozen fish and eat 2 pieces once a week until cured.					
			H	Flesh	Cook frozen fish and eat 1 piece thrice a week until cured.					

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H	Flesh	Cook frozen fish and eat 1 piece twice a week until cured.
H	Flesh	Cook frozen fish and eat 1 piece twice a week until cured.
H	Flesh	Cook frozen fish and eat 2 pieces once a week until cured.

Diseases: H, Hypertensive disease; AA, Arrhythmia; HA, Heart attack; IHD, Ischaemic heart disease.FI, Frequency index; CII_H,cultural importance index among the Hindu community; CII_M,cultural importance index among the Muslim community; CII_C,cultural importance index among the Christian community; and CII_B, cultural importance index among the Buddhist community.

1 Fish was the most commonly used ARs (46.4%) compared to the least used species
2 honey bee (14.3%), chicken (14.3%), crab (10.7%), cow (7.1%), and shrimp (7.1%) (Table
3 4.24). This may be attributed to greater abundance and easy availability of fish in Mauritius.
4 Similar results were obtained from the work of Alves *et al.* (2007) where the most commonly
5 used animal species was found to be fish. Various parts of animal species were used and
6 among them, flesh (31.0%) was the most widely used part followed by whole body (24.1%),
7 honey (13.8%), egg, thigh, and abdomen (6.9%), and milk, urine, and tail (3.4%). It was
8 reported that flesh is a soft part and can be eaten easily hence it was the most preferred part
9 by many participants. Fresh form (53.6%) was the most preferred one. This is because fresh
10 form is richer in nutrients and bioactive compounds and performs better therapeutic actions.
11 However, preserved form was also reported by many people (46.4%) and they stated that
12 preserved ARs are easy to store, have a greater shelf life and can be used throughout the year.
13 The most common modes of preparation were cooked (57.1%), followed by raw (21.4%),
14 soup (10.7%), salad (7.1%), and boiled and eaten (3.6%). A possible reason for this might be
15 because cooking is the most appropriate method of preparing the animal remedy as certain
16 medicinal fauna cannot be eaten raw or cooking with the required ingredients makes the
17 remedy tastier for consumption. However, our finding deviates from the work of
18 Vijayakumar *et al.* (2015) where ARs were mainly taken as raw for management of illnesses.
19 All the ARs were taken orally (100%) because oral route is the easiest way of food
20 administration.
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22 The most frequently cited animal remedy was Tuna fish (F1=28.6). Interestingly,
23 Tuna which is a fatty fish been shown to contain high amount of omega-3 polyunsaturated
24 fatty acids which improve cardiac function by their anti-triglyceridemic, anti-hypertensive,
25 hemostatic, anti-arrhythmic, and anti-atherogenic effects (deLeiris *et al.* 2009; Saremi and
26 Arora, 2009; von Schacky 2008; Kromhout *et al.* 2012; Di Minno *et al.* 2010; cited Peter *et al.* 2013).
27 Tuna fish is affordable and is pleasant to the tongue therefore it was the most used
28 one by Mauritian participants. Based on the informant consensus factor, hypertensive disease
29 had the highest agreement among the informants (ICF=0.64) and the lowest agreement
30 between the informants was seen in ischaemic heart disease category with ICF value of 0.2. It
31 was observed that certain animal based remedies were used solely in a single religious group.
32 For example, cow's milk and urine was reported to be used against hypertension and
33 ischaemic heart disease respectively by the Hindu community only. This can be explained by
34 the fact that cow is considered a sacred animal and is held in high esteem by Hindus and
35 many Hindus raise cows and they believe that cow's products such as milk and urine will
36

1 help to manage certain ailments. Tuna fish and honey were common to all the 4 religious
2 groups, sardine fish and chicken thigh were common to Christian and Buddhist only, chicken
3 egg, and salmon fish were common to Hindu and Muslim only, crab was common to Hindu
4 and Christian only and shrimp was common to Muslim and Buddhist only. Furthermore it
5 was found that the Christian community were the leading users of animal based remedies.
6
7 Taking into account the safety of zootherapy, 78.6% of the zootherapy users claimed that it
8 was safe to use animals for managing illnesses, 7.1% stated that it was a quite safe practice,
9 and 14.3% reported that it was very safe. None mentioned that zootherapy was unsafe to use.
10 When the participants were questioned whether they found zootherapy effective as a
11 traditional therapy, 75.0% of them agreed, 17.9% strongly agreed, and 7.1% were not sure.
12 No one disagreed or strong disagreed with zootherapy effectiveness.
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15 From these data, it can deduced that safety and effectiveness are two major factors
16 that affect the use of zootherapy. If zootherapy would have caused harm to people or would
17 not have provided any positive results, it would have been discouraged and alternatives to
18 zootherapy would have been used.
19

20 Out of 384 people interviewed, 356 (92.7%) did not choose ARs for management of
21 CVDs. Majority (N=333; 93.5%) reported that the reason for not choosing ARs was because
22 they never intended to use them, some (N=16; 4.5%) claimed themselves as vegetarians, and
23 a few stated that they had unwanted-side effects (N=7; 2.0%) with some ARs.
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27 **Other traditional remedies to manage cardiovascular diseases**

28 Out of 384 informants interviewed, only 16 (4.2%) reported to have used other traditional
29 remedies to manage CVDs.
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32 As depicted in Table 12, deep breathing exercise was the most widely reported traditional
33 remedy (25.0%) and acupuncture (6.3%) were the least used one. Deep breathing exercise
34 was the most common practice because it is a very light, effective, easy, and cost free
35 activity. It can be performed in any sort of outfit and even busy people can get engaged in
36 this exercise at their workplace. Acupuncture was the least common practice because of its
37 high cost and lack of trained acupuncture professionals in Mauritius. Similar finding was
38 obtained from the work of Mahomoodally and Muthoorah (2014) which reported the use of
39 acupuncture as the least common traditional remedy to manage ailments among Mauritians.
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Table 12: Other traditional remedies used against cardiovascular diseases in Mauritius

Cardiovascular diseases	Traditional remedies	Method of use
H	Yoga	Perform yoga once daily for 20 to 25 minutes.
IHD	Yoga	Perform yoga twice a week for 40 minutes.
H	Massage	Body massage done once a week with massage oil for 2 months.
H	Massage	Foot massage done thrice a week with sweet almond oil mixed with avocado oil until cured.
AA	Prayer	Pray in early morning at 5.00 a.m by chanting a mantra 108 times once daily for 11 weeks.
H	Prayer	Pray in the morning by chanting 'Dhanvantari mantra' 21 times and offer betel leaves, genda flowers, fruits such as apples, oranges and bananas and rose water to God. Do this prayer once daily. This helps the patient feels positive and hopeful and lowers the blood pressure back to normal.
H	Deep breathing exercise	Do deep breathing exercise once daily in the morning for 10 minutes.
H	Deep breathing exercise	Do deep breathing exercise twice daily for 5 minutes.
H	Deep breathing exercise	Do deep breathing exercise once daily in the morning for 8 to 10 minutes.
AA	Deep breathing exercise	Do deep breathing exercise several times a day at work when free for a short time.
AA	Swimming	Swimming done once a week for 1 hour.
H	Swimming	Swimming done twice a week for 1 hour.
H	Jogging	Jogging done thrice a week for 45 minutes.
H	Jogging	Jogging done once daily for 1 hour.
HA	Jogging	Jogging done thrice a week for 30 minutes.
H	Acupuncture	Acupuncture done once a week for 1 month by a trained healthcare professional.

H, Hypertensive disease; IHD, Ischaemic heart disease; AA, Arrhythmia; HA, Heart attack

Relationship between knowledge and use of traditional medicine

Results revealed that majority of the informants (90.6%) reported that if more knowledge was available on TM more people would use it and a minority of people stated no (0.3%) or maybe (9.1%) and the only possible reason for this might be because they had a very poor knowledge concerning TM compared to those who stated yes and were unaware of the importance of TM in the management of various ailments.

Conclusion

To the best of knowledge, this cross-cultural study is the first attempt to document traditional medicines (TMs) used to manage cardiovascular diseases (CVDs) in Mauritius. The plethora of information obtained from the present survey shows the importance of plant and animal based remedies among people suffering from CVDs. The high prevalence of *Citrus limon* in the current study indicates its significance against circulatory disorders. Zootherapy was also found to play an important role in healing practices where fish (*Thunnini*) recorded high popularity among the local population due to the presence of omega-3 which has been proved to possess cardiovascular benefits. It is obvious that Mauritians still rely to a great extent on TMs which need to be protected and used judiciously from a sustainable perspective. Moreover, the comparative ethno-religious investigation conducted in this study area revealed the use of common medicinal plants and animal species among the four religious groups and also the use of certain species restricted to a particular religious group. As a conclusive note, the current study demonstrates the deep cultural heritage in terms of ethno-medicinal knowledge that the Mauritian population of different religious groups possess. However, of much concern is the gradual erosion of such valuable knowledge as the younger generation are not interested in sustaining and sharing the information to the upcoming generation. Therefore, it is anticipated that publication and dissemination of this rapidly disappearing valuable knowledge is of uttermost importance in order to protect our cultural heritage which has the potential to stimulate future research.

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