Research Article

Comparison of non communicable diseases and its risk factors prevalence between Tamil Nadu and Kerala

Arumugam P

Professor of Biostatistics, Department of Community Medicine, Sri Muthukumaran Medical College and RI, Chikkarayapuram, Mangadu, Chennai-600069 Tamil Nadu, INDIA.
Email: pitchaiarumugam47@gmail.com

Abstract

Background: Tamil Nadu (TN) and Kerala, the two states of Indian constituency are located in the Indian Peninsula and divided by Western Ghats. Both states are having similarities in custom and culture. Kerala and Tamil Nadu had achieved the goals of Health for All by 2000 AD well in advance by 1987 and 1991respectively. The IDSP-NCD Risk Factors Survey Phase-I revealed risk factors which were influencing the prevalence of NCD in both states. **Aim:** To compare the prevalence of NCD and its risk factors between two states**. Methodology:** The demographic characteristics, risk factors of NCD and prevalence of hypertension and diabetes data were selected from the IDSP Survey Phase-I results. The participants of Tamil Nadu and Kerala were 5105 and 4838 persons respectively. Appropriate test of significance was applied for comparison. **Results:** Mean ages of study subjects of Tamil Nadu and Kerala were 39.5±13.5years 41.6±13.8 years respectively. Prevalence of Diabetes in Tamil Nadu and Kerala were 4.5% and 9.2% respectively and hypertension prevalence were 3.0% and 6.9% respectively in both states. Risk factors prevalence (%) between the states was Smoking 29.0 and 30.3%, Smokeless tobacco 22.5 and 11.5, Alcohol 28 and 32.8, Physical activities 4.3 and 7.1, Obesity 22.5 and 27.1 and Coconut oil consumption was 3.1 and 87.2 respectively. **Discussion:** In Kerala age and literates were significantly greater than Tamil Nadu. Except tobacco usage; other risk factors were significantly greater than Tamil Nadu. Smoking was not significant and smokeless tobacco was significantly less in Kerala. The prevalence of HT and Diabetes were significantly more in Kerala than Tamil Nadu. **Conclusion*:*** High Prevalence of HT and Diabetes in Kerala compared to Tamil Nadu may be attributed to the high rate of consumption of Coconut oil (87.2%) and Alcohol (32.8%) in spite of having more physical activities (7.1%).
Keywords: NCD, HT, Diabetes, Behavioural Risk Factors (BRF), Prevalence, Coconut oil.

Address for Correspondence:
Dr. Arumugam P, Professor of Biostatistics, Department of Community Medicine, Sri Muthukumaran Medical College and RI, Chikkarayapuram, Mangadu, Chennai-600069 Tamil Nadu, INDIA.
Email: pitchaiarumugam47@gmail.com
Received Date: 08/12/2014 Accepted Date: 16/12/2014

Access this article online

Quick Response Code:

Website: www.statperson.com

DOI: 20 December 2014

INTRODUCTION

World Health Organization (WHO) declared "Attainment of level of health that will enable every individual to lead a socially and economically productive life" as Health for All by 2000 AD[1]. The key to achieve the goal was Primary Health Care and declared at Alma Atta, the Capital of Khaza Kasthan in 1978[2]. In response to the above declarations, India declared its Health Policy in 1983 with an emphasize of population stabilization in long run by achieving the Net Reproduction Rate (NRR) unity by 1996 in all states and by country in 2000 AD. Kerala, the first state in India achieved NRR unity in 1987 and declared as "Demographically developed state" and stepped in to Demographic transition. Next to Kerala, Tamil Nadu has got the status of "Demographically developed state" in 1991and started Demographic transition. The two states, Kerala attained the demographic transition in 1988 and Tamil Nadu in 2000 by attaining the Total Fertility Rate (TFR) 2.1 as replacement index of fertility[3].The two states are located

How to site this article: Arumugam P. Comparison of non communicable diseases and its risk factors prevalence between Tamil Nadu and Kerala. *International Journal of Recent Trends in Science and Technology* December 2014; 13(2): 398-403 http://www.statperson.com (accessed 20 December 2014).

in Indian Peninsula and bifurcated by Western Ghats. The custom culture and civilization are more or less equal with a little difference in food habit and oil consumption. The traditional name of Kerala is Malaiazham. (Malai means mountains and Azham means downs). The Ministry of Health and Family Welfare, Government of India initiated a decentralized, state based Integrated Disease Surveillance Project (IDSP) in the year 2004 to provide data on the risk factors of non-communicable disease surveillance planned periodic community based surveys of population aged 15-64. The first phase of the survey included seven states namely Andhra Pradesh, Kerala, Madhya Pradesh, Maharashtra, Mizoram, Tamil Nadu and Uttarakhand. The high prevalence of major risk factors viz. tobacco and alcohol consumption, inappropriate diet, physical inactivity, high blood pressure, high blood glucose and dyslipidemias are driving the epidemic of NCDs. The major (modifiable) Behavioural Risk Factors (BRF) identified in the World Health Report 2002 is tobacco use, harmful alcohol use, unhealthy diet (low fruit and vegetable consumption) and physical inactivity. The major biological risk factors identified are overweight and obesity, raised blood pressure, raised blood glucose and raised total cholesterol. Tobacco use is a known or probable cause of about 25 diseases. Consumption is linked to more than 60 disease conditions including liver cirrhosis, several cancers (liver, laryngeal, esophageal and oropharyngeal cancers), injuries and hemorrhagic strokes. Consumption of fruits and vegetables reduces the risk of NCDs, like cancers and cardiovascular diseases. Dietary patterns that include higher intakes of fruits and vegetables are associated with several health benefits, including a decreased risk for some types of cancer. Low consumption of fruit and vegetables has been identified as a risk factor in the development of a range of chronic diseases, including coronary heart disease, stroke and many forms of cancer. Research has indicated that the required intake of fruit for optimal health benefits is five daily servings of fruit and vegetable. Lack of physical activities leads to obesity, dyslipidemia (lower high-density lipoprotein levels), insulin resistance, diabetes mellitus and high blood pressure levels. Physical inactivity is a well established risk factor for coronary heart disease (CHD) and is associated with about a twofold increase in risk of CHD. The IDSP-NCD Risk Factors Survey Phase-I in India was carried out by National Institute of Medical Statistics as National Nodal Agency (NNA) with specific objectives 1. Assess the prevalence of NCD risk factors in different strata of population in the states; 2. Establish a baseline database of NCD risk factors needed to monitor trends in population health behavior and risk factors for chronic diseases over a period of time in the states; and 3. Provide evidence for evolving strategies and interventions for identified risk factors in the community to reduce the burden of Non- Communicable Diseases in the population. The results were published for individual states according to the objectives[4,5,6]. Among the seven states of phase-1, Kerala and Tamil Nadu, only two states were comparable states since they have achieved demographic transition as pioneer states in India. The two states are geographically, demographically and epidemiologically comparable states in respect of NCD risk factors[4,5,6].

AIM

To compare the prevalence of NCD risk factors between two states.

OBJECTIVES

1. To compare the demographic characteristics between the states.
2. To compare the NCD risk factors between the states.
3. To compare the NCD Prevalence between the states.

METHODOLOGY

The data regarding the risk factors of NCD were collected from the report published by the National Institute of Medical Statistics, (ICMR) New Delhi. The survey used uniform sample design and physical measurements to facilitate comparability across states. In view of the statement given in the report the two states data were collected for analysis. In each state namely Tamil Nadu and Kerala, 5105(male =2077 and female =3028) and4838 (male =1710 and female = 3128) the persons respectively selected were in the age group of 15-64 years. The individual demographic characters and risk factors were not available. The consolidated tables of risk factors and prevalence of NCD were available for all the seven states. Among them, the data pertaining to the study states viz. Tamil Nadu and Kerala were selected for analysis and interpretation as secondary source. The mean ages of the survey samples were computed from the published ten years gender wise age group tables and interpreted between the states by 'Z' test. The proportions of risk factors and prevalence were interpreted by 'Z' test of proportions. The p- values less than or equal to 0.05($P \leq 0.05$) were considered as statistically significant in two tailed tests.

RESULTS

The two states namely Tamil Nadu and Kerala were compared for similarity according to their Socio Economic and Demographic characteristics with India.

Table 1: Demographic profiles of Tamil Nadu and Kerala compared with India. (2007-08)

Indicators	Tamil Nadu	Kerala	India
Population (000)	65269	33535	1128521
Pop ratio Urban /000	781	351	385
Decadal GR	11.72	9.43	21.52
CBR/000 Pop	16.2	14.9	23.5
CDR/000 pop	6.4	6.5	7.5
Life expectancy (e_0) M/F	64.8/67.1	71.3 /76.3	62.3/63.9
TFR/woman	1.8	1.7	2.9
IMR/1000 LBs	37	15	57
MMR/100000 LBS	134	110	301
Sex Ratio /1000 males	987	1058	933
Age @ marriage (F)	21.8	22.9	20.2
Literacy rate (T)	73.5	90.9	64.8
BPL (%)	22.5	15.0	27.5

Source [5,6]

The above table -1 Compares the Demographic and Socio Economic profile of the study states with India. The decadal growth rate CBR, CDR, TFR, IMR, MMR and BPL were significantly lesser in both states than the country. The life expectancy (e_0^0), mean age at marriage, sex ratio and literacy rate were significantly greater in the study states than India.

Table 2: Gender and age group wise comparison between Tamil Nadu and Kerala (2007-08)

Age group	Proportions of Males			Proportions of Females			Proportions of Total		
	TN	Kerala	Significance	TN	Kerala	Significance	TN	Kerala	Significance
15-24	17.5	18.5	P>0.05	16.6	13.1	P<0.001	17.1	15.0	P<0.01
25-34	21.4	16.0	P<0.001	27.6	22.8	P<0.001	25.1	20.4	P<0.001
35-44	21.2	19.2	P>0.05	20.9	21.5	P>0.05	21.0	20.7	P>0.05
45-54	17.9	18.2	P>0.05	19.9	21.8	P>0.05	19.1	20.5	P>0.05
55-64	21.8	27.9	P<0.001	14.9	20.7	P<0.001	17.9	23.3	P<0.001
Mean ± SD	40.4 ± 14.1	42.1 ± 14.7	P<0.001	38.9 ± 13.1	41.4 ± 13.3	P<0.001	39.5 ± 13.5	41.6 ± 13.8	P<0.001

Among the males, the proportions of age brackets such as 15-24, 35-44 and 45-54 were not statistically significant (P>0.05). The age group 25-34 males proportion of Tamil Nadu (21.4%) was significantly (P<0.001) greater than Kerala (16.0%). But the males in the 55-64 age group of Tamil Nadu (21.8%) was significantly (P<0.001) lesser than Kerala (27.9). In respect of females similar significant lesser proportions were observed in younger age groups like 15-24 and 25-34 of Kerala than Tamil Nadu But the middle ages groups like 35-44 and 45-54 in both states did not differed significantly (P>0.05).The elderly female study subjects in Kerala (20.7%) was significantly(P<0.001) more than Tamil Nadu (14.9%).Also, the gender wise proportions between the states were reflected in the total study subjects as younger ages of Tamil Nadu proportions were significantly (P<0.001) more than Kerala and in the middle ages such as 35-44 and 45-54 age brackets of both states were not significantly differed (P>0.05). The older age group of total Kerala subjects (23.3%) was significantly (P<0.001) greater than Tamil Nadu (17.9%). The males' mean age of Kerala 42.1 ± 14.7 years was significantly (P<0.001) greater than 40.4 ± 14.1 years of Tamil Nadu. Similarly the females and total subjects mean ages were significantly greater in respect of Kerala subjects (P<0.001). Finally in of respect age distribution of study subjects, the Tamil Nadu younger populations were more and equal in Middle Ages than Kerala. The elderly populations of Kerala were more than Tamil Nadu and the same was echoed in the mean ages between the two states.

Table 3: Comparison of Socio Economic characteristics of study subjects between TN and Kerala:

Indicators	Proportions of Males			Proportions of Females			Proportions of Total		
	TN	Kerala	Signi	TN	Kerala	Signi	TN	Kerala	Signi
Literacy rate	78.2	94.8	P<0.001	59.1	86.8	P<0.001	66.8	89.4	P<0.001
Never Married	21.9	27.1	P<0.001	9.6	10.4	P>0.05	14.6	16.3	P<0.05
Currently Married	76.0	72.2	P<0.01	76.3	80.1	P<0.001	76.2	77.3	P>0.05
Widowed/ Separated	2.1	0.7	P<0.001	14.1	9.5	P<0.001	9.2	6.4	P<0.001
n	**2077**	**1710**		**3028**	**3128**		**5105**	**4838**	

The literacy rates of males, females and total study subjects were significantly greater in Kerala than Tamil Nadu (P<0.001). Never married females between the two states was not statistically significant (P>0.05).The male and female never married proportions were significantly greater in Kerala than Tamil Nadu (P<0.001). Currently married males were more in Tamil Nadu and females were more in Kerala. But Total currently married proportions of the study subjects were equal in both states (P>0.05). Widow/separated males, females and total subjects were significantly more in Tamil Nadu than Kerala (P<0.001).

Table 4: Gender wise NCD risk factors comparison between Tamil Nadu and Kerala: (2007-08)

Risk Factors	Proportions of Males			Proportions of Females			Proportions of Total		
	TN	Keral	Signi.	TN	Kerala	Signi.	TN	Kerala	Signi.
Smoking	27.4	27.2	P>0.05	0.0	0.2	P<0.05	13.7	13.2	P>0.05
Exposed to smoking	17.1	25.0	P<0.001	6.0	22.2	P<0.001	10.7	23.0	P<0.05
Tobacco	13.6	7.0	P<0.01	8.4	3.4	P<0.001	11.0	5.4	P<0.001
Tot. Tobacco	35.5	28.7	P<0.001	8.1	3.2	P<0.001	21.8	15.5	P<0.001
Alcohol	29.5	35.9	P<0.001	0.1	0.1	P=1.00	14.7	17.4	P<0.001
Low Physic al activity	57.3	64.7	P<0.001	74.2	86.2	P<0.001	65.8	75.8	P<0.01
Med. Physical activity	35.8	22.1	P<0.001	24.2	12.5	P<0.001	30.0	17.5	P<0.001
High Physical activity	6.9	13.2	P<0.001	1.6	1.4	P>0.05	4.3	7.1	P<0.001
Raised BP	3.9	7.9	P<0.001	5.0	10.4	P<0.001	4.5	9.2	P<0.001
Raised blood sugar	3.4	6.5	P<0.001	2.6	5.3	P<0.001	3.0	5.9	P<0.001
Un healthy diet	98.2	82.5	P<0.001	99.6	91.9	P<0.001	98.9	87.4	P<0.001
WC ≥ 90cm (M)80(F)	18.5	24.2	P<0.001	31.2	59.9	P<0.001	24.8	42.7	P<0.001
Over Weight (I,II,III)	18.9	21.6	P<0.05	26.3	32.4	P<0.001	22.6	27.1	P<0.001

The smoking habit of the two states did not differed significantly (P>0.05) among the males and total. But in Tamil Nadu no female subjects had the habit of smoking and Kerala 0.2% of females were smokers. In respect of tobacco chewing, all categories of study subjects were significantly (P<0.001) greater in Tamil Nadu than Kerala and total tobacco consumption was also very highly significantly greater in Tamil Nadu than Kerala (P<0.001).The alcohol consumption was significantly (P<0.001) more among the males in Kerala than Tamil Nadu. Females of alcohol addicts in both states were equal (P=1.00). Low physical activity of Kerala in all subjects significantly (P<0.001) more in Kerala. The other risk factors namely low physical activity, raised blood pressure, raised blood sugar, waist circumference over weight and obesity were significantly (P<0.001) higher in Kerala than Tamil Nadu. The unhealthy diet was significantly (P<0.001) more in Tamil Nadu than Kerala.

Table 5: Percentage of oil consumption of Households of Tamil Nadu and Kerala (2007-08)

Type of oil	Tamil Nadu (%)	Kerala (%)	Significance
Coconut oil	3.1	87.2	P<0.001
Palm oil	11.5	9.9	P<0.05
Other oil	85.4	2.9	P<0.001
Total	**100.0**	**100.0**	

The coconut oil consumption in Kerala was (87.2%) very highly significant (P<0.001). The palm oil consumption in Kerala was significantly lesser than Tamil Nadu (P<0.05). The other oil consumption (85.4) in Tamil Nadu was very highly significantly higher than Kerala (P<0.001).

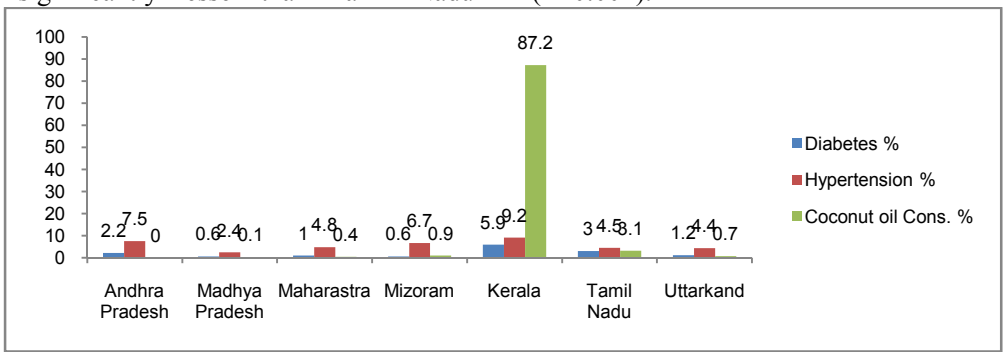

Figure 1: Percentage comparison of diabetes, hypertension and coconut oil consumption with in IDSP-Phase 1 states: (2007-2008)

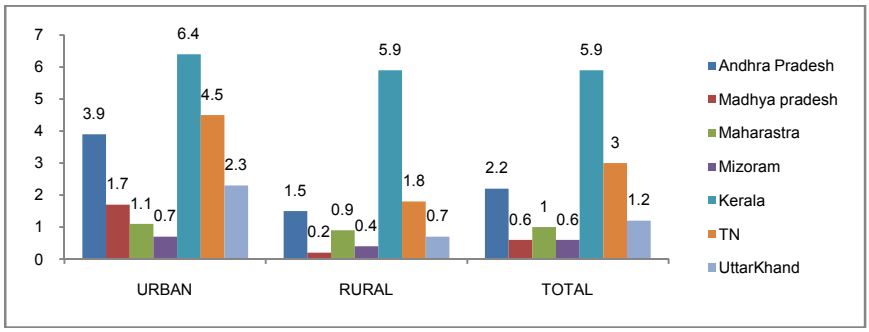

Figure 2: Percentage of respondents with Diabetic according to residences of phase-I states of India, (2007-08)

DISCUSSIONS

The demographic characteristics of the two states were either lesser or greater than India according to the favour of demographic transition. The BPL of Kerala was significantly greater than Tamil Nadu. But the study population of Kerala in gender wise and total were significantly elder than Tamil Nadu and the same was reflected in the higher expectation of life at birth of Kerala. Among the behavioural risk factors of NCD, except total tobacco and unhealthy diet consumption the other NCD risk factors such as alcohol, low physical activity, hypertension, waist circumference and overweight were very highly significantly ($p<0.001$) more in Kerala than Tamil Nadu. The total tobacco and unhealthy diet consumption were very highly significantly ($P<0.001$) more among the male, female and total persons of Tamil Nadu than Kerala. Despite of low tobacco and low unhealthy diet consumption the prevalence of hypertension (male =7.9%, female =10.4% and persons = 9.2%) and diabetes (male = 6.5%, Female =5.3% and persons= 5.9%) were high in Kerala. But by adding the passive smokers of Kerala, the tobacco consumers of Male, female and persons were 59.1%, 25.8% and 41.6% respectively. Similar community based study in Kerala revealed that tobacco consumptions of men women and total persons were 50.3%, 6.7% and 28.0% respectively[7]. The other behavioural risk factors namely alcohol and unhealthy diet consumption in Kerala among the study subjects were reported by Thangappan *et al* Alcohol Men (31.15) women (0.5%) and persons (15.4%) and diet (Men(42.9%) women(50.0%) and persons (47.0%). Tobacco use was associated with anthropometric measures and hypertension and alcohol intake was associated with overweight, abdominal obesity and hypertension[7]. Physical inactivity was associated with overweight, abdominal obesity and hypertension, but not associated with biochemical risk factors [7].Another similar community based study conducted with modification of age bracket as 30-74 years reported the behavioural risk factors as follows. The smoking habit of males and females as 40% and 0.4% and passive smokers of males and females were 62% and 43% respectively. Alcohol intake by males and females were 41% and 0.9% of current and past users of males10% respectively. The combined inactivity during work, leisure and travel of male and female were 23% and 22% respectively. The gender wise overweight and obesity reported among males and females were 17% and 33% respectively. The total unhealthy diet was reported as 87%[8]. In either of the above two studies the edible oil consumption of household was not studied. But the same was studied in IDSP-phase 1 survey. The coconut edible oil consumption in Kerala was 87.2%. Such a huge intake of coconut edible oil was not prevailing in any of the six states (Fig-1)[4]. The same of TN was only 3.1%. As stated by Thankappan *et al* Tobacco use, Alcohol intake and low physical activity were not associated with any of the biochemical risk factors[7]. Then what would be the risk factor of raised blood sugar in Kerala and titled as capital of diabetes. No community based surveys had substantiated that coconut and coconut oil better for health. Harsh Mahajan reported "In South India, a lot of people are vegetarian. But vegetarianism is no safeguard. In fact coconut oil leads to heart diseases."[9]. Suresh Vijayan informed "Increased consumption of dense – rich foods along with increasing sedentary life style has increased the incidence of diabetes and heart diseases" [10]. The saturated fat of coconut oil stood first rank among the different oils displayed in Kerala's Clinics and claimed that the prevalence of diabetes was 21% with a mean age of 34 years reduced from 65 years during the past six years[11]. The high prevalence of diabetes (5.9%) and hypertension (9.2%) in Kerala among the IDSP surveillance phase-1 states may be attributed to more (87.2%) number of households consuming saturated fat content coconut oils. According to Health Policy of India 2002, the BPL of Kerala was 12.7% and of this study also the BPL of Kerala was 15%[12]. NFHS-3 results revealed that prevalence of Diabetes increases from lower wealth quintiles to higher wealth quintiles of men and women [13].

According to Suresh Vijayan and NFHS-3, the diabetes may be called as wealthy peoples' disease with high consumption of saturated fat of coconut, coconut oil and virgin coconut oil and low physical activity of urban affluent community[10, 13].

CONCLUSION

The foregoing analysis and interpretations clearly elucidated that Kerala is not only the harbinger of demographic transition with low fertility and mortality comparable with developed countries, but also the harbinger of diabetes in India. The diabetes leads to the co morbidity of Retinopathy, Neuropathy and Nephropathy and related Cardio Vascular Diseases etc. But, under high morbidity situations the expectation of life at birth (e_0) is also high in Kerala may be attributed to more intakes of fruits and vegetables (13%) as well as fish by the urban affluent community. The prevalence of diabetes in urban areas was significantly greater than rural respondents in all phase -1 survey states (Fig-2) since the urban residents had low physical activities than their rural counter parts. The high morbidity prevalence with more e_0 echoed in NBD measure DALYs of health gap. The component YLL (years of life lost due to premature deaths) may be decreased by longevity with morbidity and YLD may be increased and tallied the DALYs. Diabetic mellitus is not a disease. But it is an infirmity of pancreases in secretes of insulin. The epidemic of diabetes may be controlled at the earliest by taking appropriate steps like mass screening surveys to identify the pre diabetic cases to postpone the incidence of diabetic mellitus and thus prevent the epidemic of diabetic some extent. Since, the diabetic may be an Acquired Insulin Deficiency Syndrome (AIDS of NCD).

ACKNOWLEDGEMENT

The author acknowledges and dedicates the research article to his Biostatistics Professor, Prof. Arvind Pandey, Director, National Institute of Medical Statistics (ICMR) and National Nodal Agency for IDSP- NCD Risk Factors Survey (2007-08) India Phase-1 States.

REFERENCES

1. Global Strategy for Health for All by the year 2000. World Health Organization, Geneva 1981. Health for All series No-3. P 11and 15.
2. International Conference on Primary Health Care, Alma Ata, USSR 6-12 September 1978.
3. Census of India 2001. Population projection for India and states 2001-2006 (Revised December 2006) P-6.
4. MOH and FW. GOI, Integrated Disease Surveillance Project (IDSP). Non Communicable Disease Risk Factors Survey. 2007-08. India- phase - 1 state.
5. Ibid- Tamil Nadu
6. Ibid 4. Kerala
7. Thankappan K R. *et al* Risk Factors Profile for Chronic NCD. Results of community based study in Kerala-India, Indian J Med Res 131, January 2010, PP 53- 63.
8. Sugathan T. N, Soman C.R, Sankara Narayanan K. Behavioural Risk Factors for NCD among adults in Kerala, India. Indian J Med Res 127, June 2008, PP 555-563.
9. Z_{EE} News "Coconut oil ups heart diseases risk, October 17, 2008.
10. Suresh Vijayan, Times of India, November 14, 2013.
11. Jothy, NDTV 31-10-2009.
12. NFHS-3 (2005-06) Vol-1. IIPS Mumbai, Pg 422.
13. National Health Policy 2002 (India)

Source of Support: None Declared
Conflict of Interest: None Declared