

# Determination of the causes of tendency toward red meat and meat products in the west of Iran

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**Background:** Although meat constitutes an important part of many consumers' diet, its consumption has become a quiet controversial issue. Several factors are effective on tendency to red meat consumption. The 2007's report of the world Cancer Research Fund makes the recommendation to limit the consumption of red meat to less than 500 g per week. The aim of this study is to determine meat and meat products consumption and causes of tendency to red meat among people of Khorramabad city, Iran. **Methods:** This cross-sectional study was carried out on 300 adults (178 women and 122 men; aged 19-70 years) of Khorramabad city, Iran. Red meat and processed meat intake (from a FFQ), demographic and causes of tendencies to red meat consumption (from a self-reported questionnaire) were evaluated. Statistical methods included independent t-test and one-way ANOVA. **Results:** Consumption of red meat and meat products was  $531.8 \pm 543.5$  g/w and  $132.5 \pm 251.1$  g/w, respectively. The most important factors of tendencies toward red meat consumption were delectability, palatability, accessibility, cultural and traditional beliefs, and lack of food diversity in Lorestan province, animal husbandry, nomadic life, and hospitality. Red meat consumption was more common among men and lower in the income levels of \$300. **Conclusions:** The results demonstrated that red meat consumption in adult people of the west of Iran was high. Since consumption of meat and meat products may create health concerns for people, it is necessary for policymakers to adopt effective strategies to advocate the use of fish and poultry.

**Key words:** Consumption, income, Iran, meat, tendency

## INTRODUCTION

What humans eat is influenced by many factors such as availability of foods, preferences, price, and value systems.<sup>[1]</sup>

Meat and meat products are important sources of a wide range of nutrients. However, meat is not a homogeneous food group and composition of meat varies widely by the meat category.<sup>[2]</sup>

Although meat constitutes an important part of many consumers' diet, its consumption has become a quiet controversial issue. Red meat and meat products have long been established as important dietary sources of protein and essential nutrients including iron, zinc and vitamin B12. Yet recent reports that their consumption may increase the risk of cardiovascular disease (CVD) and the colon cancer have led to a negative perception of the red and processed meat's role in health.<sup>[2-4]</sup> Moderate consumption of lean red meat as part of a balanced diet is unlikely to increase risk of CVD or colon cancer, but it may positively influence nutrient intakes and fatty acid profiles, thereby impacting positively on long-term health.<sup>[3]</sup>

The 2007's report of the world Cancer Research

Fund makes the recommendation to limit the consumption of red meat and to avoid processed meat intake. Based on this report, the French National Cancer Institute recommends to limit the intake of red meat to less than 500 g per week.<sup>[5,6]</sup> Higher red meat consumption is associated with a greater risk of metabolic syndrome.<sup>[7,8]</sup>

Many factors such as the income, ability of the meat sector to produce it, socio-economic status of consumers affect meat consumption. Also, other factors such as sex, age, religious, BMI, total energy expenditure have been studied.<sup>[3]</sup> Meat consumption as well as the consumer behavior and attitude toward meat have been visited as research subjects for many years.<sup>[9]</sup>

The prevalence of CVD is high in Iran. CVD is one of the most important causes of mortality in Iran and Lorestan province.<sup>[10,11]</sup> On the other hand, meat consumption in Khorramabad is different from that of other areas and may be influenced by the local culture and its habits.<sup>[12,13]</sup> The aim of this study is to determine red meat (beef, veal, and lamb) and meat products (sausage, calbas and hamburger) consumption among adult people in Khorramabad city and causes of their tendency to red meat consumption.

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## METHODS

In this cross-sectional study, the data were collected through personal interviews with adult people in Khorramabad city, Iran, from January to February 2011. Respondents were selected by using multi stage random cluster sampling. The clusters were health care centers of Khorramabad city. Of the total number of clusters (including 16 units), 10 health centers (3 in the north, 4 in the center, and 3 in the south of the city) were selected. The samples were selected to represent each region's population. Two questionnaires were administered. The first questionnaire was a preliminary demography and causes of tendencies questionnaire (DCTQ) which was constructed by the researchers through careful consideration of the existing literature and discussion with an expert panel (one social medicine specialist and two nutritionists). Then, the questionnaire was completed by 30 healthy individuals whose reliability was calculated by a test-retest over a two-week interval ( $r = 0.89$ ). The final validated and reliable DCTQ included 3 types of questions about "demography items", "the cuisine style of cooking", and "causes of tendencies to red meat consumption". The second questionnaire, which was taken from Azadbakht *et al.*<sup>[7]</sup> was a validated and reliable semi-quantitative FFQ including items related to red meat (beef, veal, lamb, minced mixed of beef and lamb) and meat products (sausage, calbas, and hamburger). Data were collected by trained nutrition experts during a personal interview with each participant. Data for the sample size were obtained from a pilot study in which one hundred (50 males and 50 females) healthy persons were engaged. This study was part of a larger study concerning red meat and white meat consumption in Khorramabad city. The sample size was estimated based on the mean estimation of red, chicken, and fish, and  $\alpha = 0.05$  and  $SD = 4.46$  (for red meat) in the pilot study. The largest sample size was related to red meat. In conclusion, the sample size was determined to be 305. Data from the pilot study was used in the final analyses.

All data from the FFQ were changed to g/week. Each question related to "causes of tendencies to red meat consumption" was measured on 5-point Likert (ordinal) scales ranging from "totally disagree" to "fully agree" with 0, 25, 50, 75, and 100 scores, respectively. Participants' verbal consent was obtained.

SPSS software version 19 was used for data analysis. Independent t- test was used to compare amount of consumption among males and females and one-way

ANOVA followed by Duncan post hoc test was used to compare the means of other indices. The significance level was set at 0.05.

## RESULTS

Response rates to the DCTQ and the FFQ were 98 and 88.5%, respectively. We had also some missing data for some items, so the number of cases in analyses for various items may be different. Most participants were females (59.3%). The mean and standard deviation of age was  $34.1 \pm 11.6$  years, ranging from 19 to 70 years. The highest frequency was for 30-49 years age categories. Guidance and high school education had the highest frequency in the literacy categories. Many participants (47.2%) had incomes between \$300 and 600. Thirty percent of participants were housewives. Table 1 shows the details of basic socio-demographic characteristics of the samples. Table 2 shows the mean weekly intakes of red meat (beef and veal, lamb, minced) and meat products (sausage, calbas, and hamburger) in consumers. Red meat consumption was  $531.8 \pm 543.5$  g/w. Meat products intake was  $132.5 \pm 251.1$ g/w. Men consumed significantly more ( $P < 0.05$ ) beef and veal than women. Post-hoc Duncan test showed that the intake of meat products was higher in the <30 years group alone ( $P < 0.05$ ). Post-hoc Duncan test also showed that veal and beef, lamb, and total red meat consumption were lower in the  $\leq$  \$300 income groups ( $P < 0.05$ ). Cuisine styles of red meat cooking were grilling (45.8%), boiling (36.8%), friezing (13.4%), and steamer (4%). Causes of tendency to red meat consumption are reported in Table 3. The most important

**Table 1: Demographic characteristics of participants' meat consumption in the West of Iran**

	<i>n</i>	%
<b>Gender</b>		
Male	122	40.7
Female	178	59.3
<b>Age (years)</b>		
<30	125	42.5
30-49	128	43.6
> = 50	41	14
<b>Literacy</b>		
Illiterate and primary school	41	13.8
Guidance and high school	138	46.4
Collegiate	118	39.7
<b>Income (\$ per month)</b>		
<300	56	18.7
300-600	141	47.2
600-1000	68	22.7
> = 1000	34	11.4
<b>Occupation</b>		
Unemployed	15	5
Housewife	90	30
Government employer	75	25
Retired	15	5
Student	26	8.7
Others	79	26.3

**Table 2: Intake amount of meat and meat products based on participants' demographic characteristics,a,b**

	Red meat				Meat products
	Beef and veal	Lamb	Minced	Total	
<b>Gender</b>					
Male (107)	192.5 ± 338.4	133.1 ± 209.3	227.9 ± 258.6	553.6 ± 517.6	187.4 ± 80.7
Female (163)	128.0 ± 131.1	129.8 ± 161.1	259.7 ± 471.7	517.6 ± 560.0	96.4 ± 232.2
P value	<0.05 <sup>a</sup>	NS	NS	NS	NS
<b>Age (years)</b>					
<30 (113)	153.4 ± 163.5	138.1 ± 182.5	254.7 ± 404.7	546.3 ± 547.9	180.3 ± 314.9
30-49 (113)	166.2 ± 280.2	116.1 ± 134.2	279.4 ± 451.2	561.7 ± 571.9	89.2 ± 164.3
>= 50 (38)	84.1 ± 98.1	141.1 ± 282.1	156.5 ± 195.1	381.7 ± 414.3	98.5 ± 212.3
P value	>0.05	>0.05	>0.05	>0.05	<0.05 <sup>b</sup>
<b>Literacy</b>					
Illiterate and primary school (40)	81.5 ± 83.6	75.7 ± 95.4	218.0 ± 320.8	375.3 ± 350.8	118.0 ± 231.6
Guidance and high school (126)	163.9 ± 259.2	136.8 ± 222.5	291.1 ± 467.9	591.9 ± 627.3	128.3 ± 257.2
Collegiate (101)	169.5 ± 249.8	147.3 ± 146.1	207.2 ± 336.1	523.9 ± 389.3	144.7 ± 255.3
P value	>0.05	>0.05	>0.05	>0.05	>0.05
<b>Income (\$ per month)</b>					
<300 (55)	80.0 ± 93.2	62.2 ± 98.4	209.1 ± 358.5	351.3 ± 412.1	188.6 ± 349.4
300-600 (125)	156.2 ± 147.8	158.1 ± 217.5	298.1 ± 506.0	612.5 ± 630.7	114.2 ± 200.1
600-1000 (57)	230.6 ± 414.4	147.5 ± 155.3	195.7 ± 195.9	573.8 ± 478.5	121.9 ± 248.3
>= 1000 (32)	137.4 ± 236.3	100.6 ± 125.8	210.5 ± 235.8	448.4 ± 410	123.7 ± 232.5
P value	<0.01 <sup>b</sup>	<0.01 <sup>b</sup>	>0.05	<0.05 <sup>b</sup>	>0.05
<b>Occupation</b>					
Unemployed (14)	134.5 ± 180.4	173.6 ± 244.9	126.8 ± 235.5	544.9 ± 417.3	99.4 ± 131.0
Housewife (86)	144.7 ± 135.9	134.7 ± 168.1	340.8 ± 616.6	620.2 ± 706.7	113.9 ± 193.4
Government employer (64)	173.8 ± 285.7	138.4 ± 137.1	187.3 ± 189.5	499.5 ± 363.8	151.7 ± 258.8
Retired (14)	92.4 ± 92.0	195.5 ± 433.4	223.6 ± 281.2	511.5 ± 576	59.4 ± 123.7
Student (22)	171.3 ± 173.7	127.6 ± 128.4	173.2 ± 172.2	472 ± 294.7	273.7 ± 396.0
Others (70)	155.5 ± 332.2	105.8 ± 153.2	222.9 ± 278.5	484.2 ± 542.3	115.5 ± 265.5
P value	P > 0.05	P > 0.05	P > 0.05	P > 0.05	P > 0.05
<b>Total consumption</b>	153.6 ± 237.6	131.1 ± 181.4	247.1 ± 400.7	531.8 ± 543.5	132.5 ± 251.1

<sup>a</sup>: meat products means: sausage, calbas and hamburger; all data are mean ± SD, amounts are g/week; <sup>b</sup>: all data in brackets mean the number of cases, NS: non significant, <sup>a</sup>: independent t-test, <sup>b</sup>: one-way ANOVA

factors were delectability, palatability, accessibility, cultural and traditional beliefs, lack of food diversity in Lorestan province, animal husbandry and nomadic life, and hospitality.

**Table 3: Scores of causes of participants' tendency to red meat consumption**

Rank	Items	Score (mean ± SD)
1	To be delicate	75.3 ± 20.1
2	Easy access	70.8 ± 23.8
3	Beliefs	70.4 ± 23.8
4	At least variety	69.0 ± 24.0
5	Animal husbandry and nomadic life	63.3 ± 24.5
6	Respect for the quest	59.5 ± 31.3
7	Easy in cooking	55.6 ± 27.5
8	Radio and TV	49.1 ± 29.4
9	Healthy	45.7 ± 26.1
10	Cost benefit	34.0 ± 26.5

## DISCUSSION

In this study, red meat consumption was 76 ± 77.6 g/d, nearly equal to the national mean which is 81 g/d.<sup>[14]</sup> Meat products intake in our study was 18.9 ± 35.9 g/d. Azadbakht and Esmailzade reported that red meat intake in Tehranian women teachers were 45.9

g/day.<sup>[15]</sup> In Irish adults, the mean intakes of red meat and processed meat were 51 and 26 g/d, respectively.<sup>[2]</sup> Gore *et al.* reported beef intake in British adults was less than that in our study, and meat products intakes were more than those in our results.<sup>[7]</sup> Cosgrove *et al.* in a similar study stated that men consumed all meat types significantly more than women. Meat products consumption in our study was more in the <30 groups age.<sup>[2]</sup> Gore *et al.* showed that there was a striking age gradient in the percentage that ate burgers and kebabs, from 45% of those aged 16-24 to only 13% of those aged 50-64.<sup>[16]</sup> Eastwood reported meat consumption in Europe as being relatively stable during the last decade, despite critical attitudes toward meat<sup>[17]</sup> while Richardson *et al.* found only doubtful empirical evidence for the reduction in meat consumption claimed by consumers.<sup>[18]</sup> A national food survey in the UK indicates that beef and veal consumption fell from an average of 175 g per day in 1990 to 145 g per day in 1997.<sup>[19]</sup> In our study, red meat (beef, lamb, veal) consumption was 76 g/day, which is lower than that of the UK,<sup>[19]</sup> but more than that in the Ireland.<sup>[2]</sup>

The My Pyramid Food Guidance System suggests that meat and beans intake to be 5.5 oz per day.<sup>[20]</sup> However,

er, our results showed that participants' intake of red meat and meat products were more than 3 oz per day. If we have to consider intake of chicken, fish, nuts and legumes, they will be certainly consumed very high than suggested guidelines.

Our unpublished data showed that fish consumption in Khorramabad people was low. There is evidence for the role of n-3 fatty acids in insulin resistance and diabetes. Omega-3 fatty acids help prevent glucose intolerance and have anti-inflammatory properties.<sup>[21]</sup> In another study, we showed that consumption of vegetables and legumes was lower in people suffering from hypertriglyceridemia than in normal people.<sup>[13]</sup> Azadbakht and colleagues showed that higher red meat consumption is associated with a greater risk of the metabolic syndrome.<sup>[7]</sup> In other studies, higher red meat consumption has been considered an independent risk factor for cardiovascular disease and cancer.<sup>[6,8]</sup> The French National Cancer Institute recommends to limit intake of red meat to less than 500 g per week.<sup>[5]</sup> However, red meat consumption in our study was more than this amount. It has been shown that the diets having less meat such as the DASH diet can play an important role in reducing inflammation, plasma levels of fibrinogen and have anti-diabetic, anti-hyperlipidemic and anti-inflammation properties.<sup>[21,22]</sup>

Since consumption of meat and meat products may create health concerns for people, as the results of this study showed it is suggested that people consume less red meat and more fish here and elsewhere.

In our study there was a significant linear relationship between the income and red meat consumption. Results from other studies confirmed our result.<sup>[23-26]</sup> Yen *et al.* showed that men consumed meat and fish more than women, and meat consumption had a relationship with age, religion and ethnicity.<sup>[27]</sup> Verbeke and Viaene indicated that the future of fresh meat consumption will be determined by the ability of the beef and pork sector to produce, deliver and guarantee products that are intrinsically safe, and moreover perceived as such by consumers.<sup>[9]</sup>

In our study, participants' viewpoints toward causes of red meat consumption were delectability and palatability, accessibility, cultural, traditional beliefs, lack of food diversity in Lorestan province, hospitality, convenience. While radio and television programs, food safety, and cost-effectiveness had less effects on red meat consumption. Morgan *et al.* showed that food safety of meat is more important than the price.<sup>[28]</sup> Step-toe *et al.* showed significant relationships between the

sex, age, income, and food choice.<sup>[1]</sup> In a study consisting of a series of focus groups and conjoint analyses conducted in four countries (France, Germany, Spain and the UK), the most important quality aspects of beef were good taste, tender, juicy, fresh, lean, healthy, and nutritious.<sup>[29]</sup> Among the most important factors influencing the changes in consumers' demand for meat and meat products in the USA are increased health concerns, change in demography characteristics, the need for convenience, and increased eating away from home, change in distribution, and change in relative prices.<sup>[30]</sup> Holm and Møhl found that critical attitudes about the following four themes were the manner in which meat is produced and processed in modern agriculture and industry, the fact that meat is derived from animals, the food culture associated with meat eating and the perceived unhealthiness of meat. They suggested that negative attitudes toward meat were not necessarily associated with decreases in meat consumption, but were associated with a tendency to re-structure meals with special reference to the role assigned to meat.<sup>[31]</sup>

It was found that people raised topics concerning meat more frequently than any other food, and that their comments on meat were often expressed with more emotion than comments of any other food.<sup>[31]</sup>

Meat production and offers processes in our country are different from western countries. In Lorestan province, red meat is produced by traditional or semi industrial methods and is offered in butchereries. However, in western countries, meat is usually sold in supermarkets and less traditional outlets as self serves and are packaged for convenience to the consumer.<sup>[30]</sup> These factors may affect tendency to red meat consumption.

Our study had some limitations. The data were based on self reports by participants, in which biases may exist. Furthermore, the sample size was low and a larger sample size is necessary for more accurate findings.

In conclusion, red meat and processed meat consumption among participants was high. Since consumption of meat and meat products may create health concern for people, it is necessary for policymakers to adopt effective strategies to advocate the use of fish and poultry. More studies are necessary in the area.

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