# A STUDY OF THE PREVALENCE OF THE USE OF DIFFERENT TYPES OF OIL AND FAT IN URBAN AND RURAL IRANIAN COMMUNITIES ACCORDING TO EDUCATION

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## Abstract

**INTRODUCTION:** The prevalence of cardiovascular risk factors is increasing in industrialized communities. Dyslipidemia is a modifiable cardiovascular risk factor which is related to diet, especially consumption of hard margarine and hydrogenated fat. The prevalence of cardiovascular diseases and their risk factors differs in communities. We studied the prevalence of consumption of different types of oil and fat in areas of Central Iran.

**METHODS:** The subjects were selected using randomized cluster sampling and divided into rural and urban groups. A 48-item standard food frequency questionnaire was filled out for every subject by a trained interviewer, who also obtained demographic data. Data were analyzed with SPSS. Different educational groups and the two sexes in urban and rural areas were compared using chi square test and paired t-test. P values below 0.05 were considered as significant.

**RESULTS:** This cross-sectional descriptive study was performed on 12600 adult subjects aged above 19 years in the cities of Isfahan, Najafabad, and Arak. Consumption of olive oil and other types of oil in the urban community of Isfahan was higher than in the rural community. Consumption of animal oil and fat was higher in the rural community of Isfahan. In subjects with high school education and higher, consumption of different types of oil was not found to be different between urban and rural communities, or between men and women. In Arak, no difference was found between rural and urban subjects with high school education and higher, in respect of consumption of different types of oil. Among subjects with lower education, however, consumption of olive oil and other types of oil was higher in urban areas and consumption of animal oil and fat was higher in rural men. In Najafabad, no difference was found between different educational groups in respect of the different types of oil consumed; only consumption of animal oil in rural subjects educated below high school diploma was higher than in cities.

**CONCLUSIONS:** Among individuals with high school education and higher, no difference was found between rural and urban populations in respect of the types of oil consumed. However, among individuals with low education, consumption of animal oil and fat as well as hard margarine was higher in the rural population, while the urban population consumed higher amounts of oil and olive oil. The pattern of oil and fat consumption in men and women was different in the cities of Najafabad and Arak, but almost similar in Isfahan. Geographical location and education affect the pattern of oil and fat consumption. Unhealthy lifestyle habits are more prevalent in members of the rural population with low education.

**Key Words:** Fat, oil, urban population, rural population, education.

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## Introduction

The prevalence of cardiovascular diseases (CVD) is on the rise in developing countries including Iran.[1-3] Multiple studies have demonstrated hyperlipidemia and hypercholesterolemia to be major CVD risk factors.[4-5]

A sedentary lifestyle, coupled with unhealthy nutrition has led to an increase in the prevalence of risk factors such as dyslipidemia, obesity, and hypertension. Studies have demonstrated that consumption of foods such as hard margarine, full-fat dairies, red meet, and hydrogenated vegetable oils which contain trans fatty acids increases levels of low-density lipoprotein cholesterol (LDL-C) and apolipoprotein A, and decreases levels of high-density lipoprotein cholesterol (HDL-C).[6-9]

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The prevalence of CVD risk factors differs between communities, depending on cultural and geographic characteristics, dietary habits and lifestyle.

Isfahan Healthy Heart Program (IHHP) has shown all CVD risk factors, except increased total cholesterol and LDL-C, to be more prevalent in individuals with lower education.[10] Other studies have demonstrated an inverse relationship between socioeconomic status and the prevalence of CVD risk factors.[11,12] Some studies, however, have suggested a direct correlation between socioeconomic status and CVD risk factors.[13] The Stanford study in the US and Canada demonstrated education to correlate more closely to the prevalence of CVD risk factors than occupation and income.[14] A study carried out by Vannoni showed an inverse relationship between unhealthy dietary habits and education.[15] Since education does not change with time and can be readily classified, we studied the pattern of oil and fat consumption in urban and rural populations according to level of education.

## Materials and methods

This descriptive cross-sectional study was based on information from phase I of IHHP, between 2000 and 2001. A total of 12600 individuals aged above 19 years were selected from three provincial cities of Isfahan, Najafabad and Arak, using randomized cluster sampling with equal sex distribution. Subjects with hemorrhagic diseases, mental retardation, or pregnancy were excluded. The community was divided into rural and urban populations.

Questionnaires with reliability and validity approved by two pilot studies were used to collect data.[16] Demographic data, as well as information on knowledge, attitude and nutritional habits of subjects was collected by trained interviewers using standardized questionnaires.

A 48-item food frequency questionnaire was also completed for each subject. SPSS was used to analyze data and P values below 0.05 were considered as significant. Subjects who used hydrogenated fat, oil, animal oil or fat, olive oil, or hard margarine at least once daily were considered as consumers of these products and included in our analysis.

Based on level of education, the subjects were divided into illiterate, primary-educated, secondary-educated, high school diploma-level, and highly educated groups. Chi square test was used to compare the prevalence of consumption of various types of oil according to sex within each group. T-test was used to compare mean age of subjects in cities and villages.

## Results

Table 1 shows subject demographics, i.e. place of residence, education, age, and sex. No significant difference was found between women of different educational groups in the urban and rural areas of Najafabad in respect of consumption of different types of oil.

**TABLE 1.** Subject demographics

| Variable | Cities | Villages |
|---|---|---|
| Age* | 38.83±14.94 | 39.05% |
| Sex (male)* | 48% | 49% |
| *Education* | | |
| Illiterate | 56.7% | 43.3% |
| Primary | 67.3% | 32.7% |
| Secondary (junior) | 75.9% | 24.1% |
| Secondary (junior high) | 86.7% | 13.3% |
| High school graduate | 85.7% | 14.3% |
| Higher education | 90.5% | 9.5% |
| *Geographical location* | | |
| Isfahan | 88.7% | 11.3% |
| Arak | 66.6% | 33.4% |
| Najafabad | 58.3% | 41.7% |

* Not significant

By contrast, high school-level men in Najafabad villages used more oil and olive oil than their urban counterparts (oil: 73% vs. 48.4%, P=0.02; olive oil: 20.3% vs. 5.4%, P=0.004).

Consumption of animal oil in illiterate, primary-educated, and secondary-educated rural subjects was significantly higher than in urban subjects with the same levels of education (Table 4).

In Isfahan, consumption of oil in urban men and women was significantly higher than in the rural population; this difference was observed in all educational groups.

Consumption of olive oil in urban women with primary and secondary education was significantly higher than in their rural counterparts. Consumption of olive oil in illiterate, primary-educated and secondary-educated urban men was significantly higher than in their rural counterparts. A significant difference was seen between urban and rural men. In villages, the percentage of subjects using animal fat was higher in all educational groups, however, consumption of animal oil was significant in diploma-level and illiterate groups (Table 3).

**TABLE 2.** Frequency of consumption of different types of oil and fat in the cities and villages of Isfahan according to level of education

| Variable | Illiterate | | Primary | | Secondary | | High school diploma | | Higher education | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cities | Villages | Cities | Villages | Cities | Villages | Cities | Villages | Cities | Villages |
| Women | | | | | | | | | | |
| Fat | 251(87.5) | 75(94.9) | 527(90) | 116(69.1)* | 390(90.3) | 31(100) | 396(87.2) | 9(100) | 125(86.8) | 1(50) |
| Oil | 127(44.3) | 20(25.3)* | 303(52.2) | 24(20.5)* | 281(65) | 5(16.1)* | 327(72) | 1(11.1)* | 101(70.1) | 1(50) |
| Olive oil | 22(7.7) | 3(3.8) | 65(11.2) | 3(2.6)* | 76(17.6) | 0* | 122(26.9) | 0 | 44(30.6) | 1(50) |
| Animal oil | 11(3.8) | 11(13.9)* | 37(6.4) | 23(19.7)* | 15(3.5) | 5(16.1)* | 36(7.9) | 0 | 18(12.5) | 0 |
| Animal fat | 13(4.5) | 9(11.4)* | 26(4.5) | 23(19.7)* | 15(3.5) | 8(25.8)* | 27(5.9) | 0 | 6(4.2) | 0 |
| Hard margarine | 70(24.4) | 28(35.4) | 285(49.1) | 88(70.2) * | 293(67.8) | 18(58.1) | 318(70) | 101(70.1) | 1(50) | |
| Men | | | | | | | | | | |
| Fat | 114(83.2) | 51(98.1)* | 349(88.6) | 80(95.2) | 430(89.2) | 47(95.9) | 396(87.2) | 25(89.3) | 228(85.7) | 2(100) |
| Oil | 73(53.3) | 3(5.8)* | 223(56.6) | 23(27.4)* | 292(60.6) | 18(36.7)* | 322(70.9) | 10(35.7)* | 210(78.9) | 4(20)* |
| Olive oil | 16(11.7) | 0* | 68(17.3) | 2(2.4)* | 83(17.2) | 0* | 118(26) | 4(14.3) | 86(32.3) | 1(50) |
| Animal oil | 8(5.8) | 8(15.4) * | 29(7.4) | 9(10.7) | 36(7.5) | 6(12.2) | 48(10.6) | 11(39.3)* | 42(10.8) | 5(25) |
| Animal fat | 7(5.1) | 11(21.2)* | 15(3.8) | 10(11.9)* | 28(5.8) | 9(18.4)* | 22(4.8) | 8(28.6)* | 16(6) | 2(10) |
| Hard margarine | 58(42.3) | 24(46.2) | 231(58.6) | 56(66.7) | 331(68.7) | 42(85.7)* | 343(75.6) | 22(78.6) | 211(79.3) | 94(70) |

*P<0.05; Even one-time consumption of any of the above fat or oil types was included in calculations

**TABLE 3.** Frequency of consumption of different types of oil and fat in the cities and villages of Arak according to level of education

| Variable | Illiterate | | Primary | | Secondary | | High school diploma | | Higher education | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cities | Villages | Cities | Villages | Cities | Villages | Cities | Villages | Cities | Villages |
| Women | | | | | | | | | | |
| Fat | 544(94.8) | 539(98.7)* | 671(97.7) | 355(97.8) | 333(96.5) | 130(98.5) | 370(97.1) | 46(100) | 95(95) | 2(100) |
| Oil | 218(38) | 162(29.7)* | 285(41.5) | 129(35.5) | 163(47.2) | 46(34.8)* | 216(56.7) | 14(30.4)* | 50(50) | 2(100) |
| Olive oil | 91(15.9) | 34(6.2)* | 121(17.6) | 34(6.6)* | 48(13.9) | 17(12.9) | 87(22.8) | 4(8.7)* | 33(33) | 1(50) |
| Animal oil | 63(11) | 58(10.6) | 81(11.8) | 39(10.7) | 38(11) | 19(14.4) | 45(11.8) | 4(8.7) | 19(19) | 0 |
| Animal fat | 43(7.5) | 45(8.2) | 50(7.3) | 43(11.8)* | 21(6.1) | 4(3) | 19(5) | 2(4.3) | 5(5) | 2(100) |
| Hard margarine | 261(5.5) | 269(49.3) | 420(61.1) | 236(65) | 236(68.4) | 95(72) | 286(75.1) | 29(63) | 68(68) | 1(50) |
| Men | | | | | | | | | | |
| Fat | 271(96.8) | 259(97) | 528(96.7) | 358(97.2) | 411(96.9) | 219(97.3) | 450(95.9) | 9(100) | 288(93.5) | 41(100) |
| Oil | 111(39.6) | 76(28.5)* | 278(50.9) | 152(38.4)* | 233(55) | 98(43.6)* | 281(59.9) | 37(41.1)* | 200(64.9) | 19(46.3) |
| Olive oil | 54(19.3) | 26(9.7)* | 118(21.6) | 39(9.8)* | 96(22.6) | 22(9.8)* | 121(25.8) | 10(11.1)* | 102(33.1) | 6(14.6) |
| Animal oil | 40(14.3) | 52(19.5) | 16(19.4) | 100(25.3)* | 85(20) | 56(24.9) | 100(21.3) | 20(22.2) | 52(16.9) | 12(29.3) |
| Animal fat | 19(6.8) | 32(12)* | 57(10.4) | 45(11.4) | 26(6.1) | 20(8.9) | 22(4.7) | 3(33.3) | 11(3.6) | 1(2.4) |
| Hard margarine | 143(51.1) | 159(59.6)* | 376(68.9) | 297(75)* | 337(79.5) | 182(80.9) | 379(80.8) | 67(74.4) | 243(78.9) | 34(82.9) |

*P<0.05

**TABLE 4.** Frequency of consumption of different types of oil and fat in the cities and villages of Najafabad according to level of education

| Variable | Illiterate | | Primary | | Secondary | | High school diploma | | Higher education | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cities | Villages | Cities | Villages | Cities | Villages | Cities | Villages | Cities | Villages |
| Women | | | | | | | | | | |
| Fat | 83(94.3) | 82(88.2) | 207(95.4) | 166(97.6) | 116(96.7) | 84(100) | 85(94.4) | 49(94.2) | 54(98.2) | 74(93.7) |
| Oil | 34(38.6) | 28(30.1) | 88(40.6) | 166(97.6) | 62(51.7) | 45(53.6) | 44(48.9) | 29(50.8) | 26(47.3) | 12(70.6) |
| Olive oil | 2(2.3) | 10(10.8)* | 20(9.2) | 20(11.8) | 16(13.3) | 12(14.3) | 13(14.4) | 9(17.3) | 11(20) | 6(35.3) |
| Animal oil | 11(12.5) | 8(8.6) | 27(12.4) | 27(15.9) | 17(14.2) | 11(13.1) | 13(14.4) | 2(3.8) | 10(18.2) | 2(11.8) |
| Animal fat | 12(13.6) | 7(7.5) | 20(9.2) | 11(6.5) | 15(12.5) | 9(15.7) | 10(11.1) | 5(9.6) | 5(9.1) | 2(11.8) |
| Hard margarine | 44(50) | 34(36.6) | 123(56.7) | 96(56.5) | 78(65) | 54(64.3) | 70(77.8) | 44(84.6) | 38(69.1) | 12(70.6) |
| Men | | | | | | | | | | |
| Fat | 60(96.8) | 46(88.5) | 183(96.8) | 132(96.4) | 142(94) | 56(95) | 89(95.7) | 65(87.8) | 16(94.1) | 29(90.7) |
| Oil | 60(96.8) | 46(88.5) | 83(44.1) | 59(43.1) | 78(51.7) | 42(41.6) | 45(48.4) | 54(73)* | 47(59.5) | 26(60.5) |
| Olive oil | 9(14.5) | 3(5.8) | 12(6.4) | 17(12.4) | 20(13.2) | 14(13.9) | 5(5.4) | 15(20.3)* | 10(12.7) | 11(25.6) |
| Animal oil | 5(8.1) | 12(23.1)* | 30(16) | 35(25.5)* | 21(13.9) | 27(26.7)* | 17(18.3) | 16(12.6) | 12(15.2) | 12(27.9) |
| Animal fat | 4(6.5) | 7(13.5) | 13(6.9) | 14(10.2) | 14(9.3) | 9(8.9) | 4(4.3) | 1(1.4) | 12(15.2) | 6(14) |
| Hard margarine | 35(56.5) | 28(53.8) | 120(63.8) | 97(70.8) | 119(78.8) | 79(78.2) | 63(67.7) | 61(82.4)* | 63(79.7) | 33(76.7) |

*P<0.05

In the city of Arak, the percentage of illiterate rural women using greater amounts of hydrogenated fat was higher than illiterate urban women; no significant difference was found between subjects in other educational groups in cities and villages. A greater percentage of illiterate, primary-educated, and diploma-level urban women used oil and olive oil compared to their rural counterparts. Consumption of hydrogenated fat, animal oil and hard margarine was not significantly different between rural and urban men in any of the educational groups; however, consumption of oil and olive oil in illiterate to diploma-level urban subjects was significantly higher than in rural subjects.

## Discussion

The pattern of oil consumption versus education, sex and geographical location was different in the three provincial cities of Isfahan, Najafabad, and Arak.

Consumption of oil, olive oil and hard margarine in diploma-level rural subjects was higher than in the urban population; consumption of animal oil was higher in illiterate and primary-educated rural subjects. By contrast, consumption of oil and olive oil in the urban population of Isfahan was higher than in its rural population; this pattern repeated itself in all educational groups.

Consumption of hydrogenated fat and animal oil in illiterate rural subjects was higher than in illiterate urban subjects.

The pattern of oil and fat consumption in Arak was similar to that in Isfahan, with more oil and olive oil and less hydrogenated and animal fat consumed in cities than in villages.

The results show cultural background and social status to be determinants of the pattern of oil and fat consumption; unhealthy dietary habits were more prevalent in subjects with lower levels of education.

Consumption of unhealthy types of fat and oil, e.g. animal fat and oil in villages was higher than in cities. These findings are similar to the results of other studies.[14,15]

In Isfahan, education did not affect consumption of oil and olive oil as the types of oil recommended for better health, whereas in Najafabad, educated individuals consumed greater amounts of oil and olive oil and those with lower education consumed greater amounts of animal oil.

In Arak, hydrogenated and animal fat was consumed in larger amounts by illiterate women, while consumption of hydrogenated fat, animal oil and hard margarine was similar in men of different educational groups and the prevalence of consumption of different types of oil and fat was unaffected by level of education.

The consumption of oil and olive oil in the urban population of Arak was higher than in its rural population. In the study conducted by Erkkila, men's education correlated to their nutrition, including their consumption of oil and fat, with men of lower educational groups consuming greater amounts; in women, however, this correlation was weaker.[17]

We conclude that education, geographical location, and cultural factors affect the pattern of oil and fat consumption in communities.

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