Original Article

Assessing the Changes in Iranian Household Food Basket Using National Household Budget and Expenditure Survey Data, 1991–2017

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Abstract

Background: The aim of the present study was assessing the changes in Iranian household food basket. The Households Income and Expenditure Survey (HIES) data of 717,432 of Iranian households from 1991 to 2017 were used in this repeated cross-sectional study. **Methods:** A cross-classified random-effects modeling (CCREM) specifications of hierarchical age-period-cohort (HAPC) in two models, one without controlling for the effects of key individual characteristics, namely socioeconomic status; household size; place; and household head sex, and another one with controlling for the effect of mentioned variables, was used in the present study. **Results:** The present study showed that the equivalent to an adult male daily consumption of "total calorie" (*P* value = 0.0001) and "fats, oils, sugars, and sweets" (*P* value = 0.0002) had an increasing trend from 1991 to 2004 and a decreasing trend from 2005 to 2017 among Iranian households. The daily consumption of "bread, cereal, rice, and pasta" (*P* value = 0.0001) had a decreasing and "fruits" (*P* value = 0.0002) had a rising trend during periods. After an increasing trend for the "meat, poultry, fish, eggs, legumes, and nuts" (*P* value = 0.0002) and "vegetable" (*P* value=<0.0001) by 2004, there was a decreasing trend from 2004 to 2017, but the share of them in the total calorie consumption increased. The "dairy" (*P* value = 0.0002) consumption had a decreasing trend in recent years. **Conclusions:** Iranian household food basket, during these years, had significant changes that some of them (increase in the share of the vegetables and fruits in the total calorie intake) are positive and some of them are negative (decrease in the consumption of dairy).

Keywords: *Food preferences, health transition, Iran, nutritional status*

Introduction

The structure of dietary intakes and the prevalence of obesity in low- and middle-income countries have been changing very rapidly from the last few decades.[1] Higher dietary energy, fat and saturated fat intakes, as results of these changes in diet, besides sedentary lifestyle, lead to a rapidly rising prevalence of overweight and obesity and, consequently, chronic noncommunicable diseases.[2-5]

Likewise, the nutrition transition is occurring rapidly in Iran.[6] Changes in per capita income and urbanization trends are two main effective factors related to the nutrition transition in Iran. The trend of consumption patterns in Iranians between 1961 and 2005 showed that the availability of energy and all food items had been increased. Also, available energy from fruits, meat, and oil had been raised, and energy from dairy and discretionary calories had been reduced.[7]

Assessment of changes in energy and different food groups intake of Iranians during recent years can provide useful information in regards to the food consumption dimension of nutritional transition that has not been paid attention yet. Previous studies used the food balance sheet of the Food and Agriculture Organization (FAO) data that represents only the energy available for consumption, not the real consumed values.[7] Also, Iran has experienced significant changes in socioeconomic status during the last years; however, there are no studies about changes in the Iranian household food consumption in these years. Therefore, the aim of the present study is to assess the changes in Iranian household food basket using the National Household Budget and Expenditure Survey data from 1991 to 2017.

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Methods

This repeated cross-sectional study used secondary data from the Households Income and Expenditure Survey (HIES) that is yearly carried out by the Statistical Centre of Iran (SCI). HIES data of Iran since 1991 to 2017 was used in the present study. All private and collective settled households in urban and rural areas are the target population of HIES. A three-stage cluster sampling method with strata was used in the survey. The samples were equally distributed between the months of the year to obtain estimations more representative of the whole year. The HIES, which aims to estimate the average income and expenditure for urban and rural households, included demographics, consumable (e.g., expenditures on foods) and nonconsumable costs, and household income information. Available socioeconomic variables in HIES data were as follow: 1) household's head variables: age, gender (male/female), and occupational category status; 2) household variables: education level, living area (rural/urban), annual income, house area, and size of the family (number of household members).[8] Principle component analysis (PCA) was used to extract a socioeconomic status variable by using the educational, occupational, and income status of households. The sample size for the whole study period (1991 to 2017) at the national level was 717,432 varied from 15,202 to 35,254 for each year.

Food cost data of HIES included the amount of all food items in household food basket during last month included purchased foods, foods received as gifts or donations, or food produced by household members. Household food basket data were converted to daily amounts. The household food basket data were collected for households as the sampling unit. Therefore, the total household intake should be divided by the number of household members to estimate nutrient intakes for individual household members. However, family members did not receive an even share of the food available for consumption. The food intake is influenced by food energy requirements, which are determined primarily by sex and age in addition to other factors such as activity level. Therefore, the use of per capita intake did not consider the composition of a household in terms of sex, age, and body size and instead of applying the estimates of per capita distribution, adult male equivalent units (AMEs) for each household member were calculated.[9] AME is the ratio of the energy requirement of a household member of a particular age and sex to the energy requirement of an adult male 18 to 30 years of age, with moderate physical activity, as recommended by the Food and Agriculture Organization (FAO) and World Health Organization (WHO).[10] Unlike per capita measurements, this tool allows identifying the contribution of various family members to the overall household food consumption pattern.[11] In this study, based on the age and sex of household members, the amount of total AME of the household was calculated. Then, the amount of each food item was divided into total AME of the household, which equivalent to an adult male daily intake of each food item was obtained. Therefore, the word "consumption" used in this study means the equivalent to an adult male daily consumption. Since this amount was purchased foods or foods received as gifts or donations or food produced by household members, we used FAO-estimated waste percentages for each food group in consumption step "in steps from supply to consumption" to estimate the real consumed amount of foods.[12] Then, an adapted version of NUTRITIONIST IV software for Iranian foods was used to assess the energy intakes. Food items were categorized into six food groups according to Table 1 to investigate the trend of changes in Iranian food consumption.

A cross-classified random effects modeling (CCREM) specifications of hierarchical age-period-cohort (HAPC) models developed by Yang and Land (2006) were used in the present study.[13] We formulated a CCREM specification of the HAPC model to assess the relative importance of the two contexts, cohort and period, in understanding household differences in food consumption outcomes as follows:

$Y_{ijk} = \gamma_0 + \beta_1$ household head $\text{age}_{ijk} + \beta_2$ household head $\text{age}^2_{ijk} + \beta_3$ socioeconomic $status_{ijk} + \beta_4$ household $\text{size}_{ijk} + \beta_5$ $\text{Place}_{ijk} + \beta_6$ household head $\text{sex}_{ijk} + u_{0j} + v_{0k} + e_{ijk}$ with $u_{0j} \sim N(0, \tau_u)$ $v_{0k} \sim N(0, \tau_v)$ $e_{ijk} \sim N(0, \sigma^2)$

for

$i = 1, 2., n_{jk}$ individuals within cohort j and period k;

$j = 1., 18$ birth cohorts;

$k = 1., 27$ survey years.

Table 1: Category of Food Items

Food groups	Food items
Bread, cereal, rice, and pasta	Breads, noodles, pasta, rice, barley, starch, popcorn, cornflakes, wheat germ, bulgur
Vegetables	Potatoes, cabbage, cauliflower, Brussels sprouts, broccoli, mixed vegetables, spinach, lettuce, cucumbers, eggplant, green peas, green beans, green peppers, turnips, corn, squash, celery, mushrooms, onions, garlic, tomatoes, carrots, olives
Fruits	Pears, apricots, cherries, apples, raisins or grapes, bananas, cantaloupe, watermelon, oranges, grapefruit, kiwi, grapefruits, strawberries, peaches, nectarines, tangerines, mulberries, plums, persimmons, pomegranates, lemons, pineapples, fresh figs, natural fruit juices, dried figs, dried dates, dried mulberries, other dried fruits
Milk, yogurt, and cheese	milk, yogurt, flavored milk, cream, cheese, ice cream, dough
Meat, poultry, fish, eggs, legumes, and nuts	Processed meats, red meats, organ meats, poultry, fish, shrimp, eggs, beans, peas, lima beans, broad beans, lentils, soy, peanuts, almonds, pistachios, hazelnuts, roasted seeds, walnuts
Fats, oils, sugars, sweets	Hydrogenated fats, animal fats, mayonnaise, vegetable oils, chocolates, candies, tamarisk, honey, artificial juice, jam, jelly, cookies, cakes, confections

The results were obtained using the residual maximum likelihood-empirical Bayes (REML-EB) estimation method via the application of the SAS PROC MIXED. In the present study, two different models were run. One was without controlling for the effects of key individual characteristics, namely socioeconomic status, household size, place, and household head sex and another one was with controlling for the effect of mentioned variables. We called them the "zero model" and "first model," respectively.

Results

Table 2 represents the socioeconomic characteristics of studied households in each year. As showed in this table, during studied years, the age of family head, household education, household income, and percent of the female-headed household had increasing trend, and household size had a decreasing trend.

The percent change of intercept of total calorie intake and different food groups during periods are presented in Figure 1. As shown in Figure 1, total calorie intake had an increasing trend from 1991 to 2004 and a decreasing trend from 2005 to 2017. The variance of the period in the zero model was 19,007 and significant (P value = 0.0001) [Table 3], and in the first model was 28,597 and was significant (P value = 0.0002) [Table 3].

As shown in Figure 1, the "bread, cereal, rice, and pasta" consumption had a decreasing trend during the period. The estimated average effect coefficients for periods are

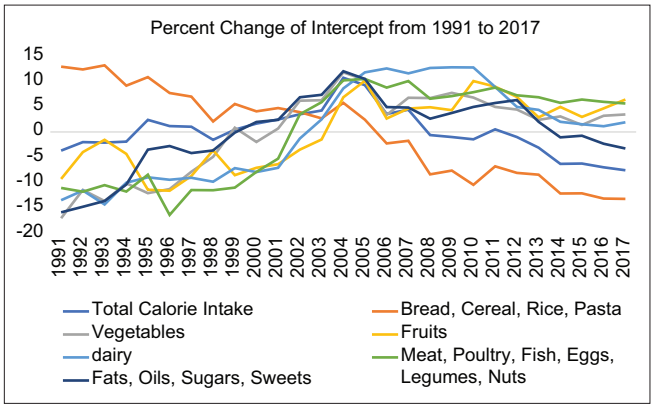

Figure 1: Percent change of intercept of periods

Table 2: The socioeconomic character of households in the study

Year	*n*	Age of family head		Household size		House area		Household education score		Household income		Job of head family rank		Sex of head family	Place
		mean	SE	mean	SE	mean	SE	mean	SE	mean	SE	mean	SE	% of female	% of Rural
1991	15202	46.82	0.12	5.52	0.02	89.51	0.48	3.56	0.02	2177822	48317.80	6.13	0.02	0.09	0.44
1992	15246	45.32	0.12	5.38	0.02	88.81	0.48	3.83	0.03	2778638	57188.55	6.09	0.02	0.07	0.44
1993	10807	46.32	0.14	5.24	0.02	89.82	0.57	4.01	0.03	3429260	63517.06	6.10	0.02	0.08	0.41
1994	17608	46.08	0.11	5.28	0.02	93.32	0.45	4.25	0.02	4896315	53292.27	6.03	0.02	0.08	0.35
1995	31799	46.93	0.08	5.35	0.01	95.93	0.33	4.12	0.02	6062084	43176.68	6.11	0.01	0.08	0.40
1996	19176	46.13	0.11	5.22	0.02	91.42	0.40	4.62	0.03	7991071	65063.39	6.25	0.02	0.07	0.46
1997	19267	46.05	0.11	5.13	0.02	91.43	0.41	4.79	0.03	9958109	92654.10	6.27	0.02	0.08	0.47
1998	15342	46.75	0.12	5.13	0.02	91.84	0.44	4.84	0.03	12250166	104149.80	6.30	0.02	0.07	0.49
1999	25769	47.35	0.09	5.16	0.01	91.23	0.35	4.77	0.02	14500433	162065.70	6.27	0.02	0.08	0.53
2000	23726	46.95	0.10	5.00	0.01	90.48	0.34	4.98	0.02	16599525	128480.80	6.33	0.01	0.08	0.52
2001	24165	47.61	0.10	4.92	0.01	91.01	0.34	5.12	0.02	19245184	128296.60	6.32	0.01	0.09	0.52
2002	28500	47.85	0.09	4.82	0.01	92.95	0.31	5.27	0.02	24221762	221226.40	6.32	0.01	0.09	0.50
2003	20684	46.43	0.10	4.71	0.01	93.65	0.35	5.56	0.03	30546117	230044.90	6.30	0.02	0.08	0.50
2004	21606	46.70	0.10	4.68	0.01	94.32	0.34	5.70	0.03	35805680	284557.90	5.18	0.02	0.08	0.50
2005	23878	47.00	0.10	4.56	0.01	93.66	0.33	5.71	0.02	42031891	289410.80	5.17	0.02	0.08	0.49
2006	27649	47.68	0.09	4.44	0.01	92.93	0.30	4.93	0.02	48600638	326677.40	6.33	0.01	0.09	0.53
2007	28005	47.77	0.09	4.34	0.01	93.45	0.30	5.07	0.02	58342611	349792.40	4.99	0.02	0.09	0.50
2008	35032	47.52	0.08	4.17	0.01	93.15	0.26	5.06	0.02	62686496	360643.90	6.39	0.01	0.10	0.49
2009	32790	48.25	0.08	4.14	0.01	92.33	0.26	5.02	0.02	66823575	357263.60	6.39	0.01	0.11	0.48
2010	34239	49.06	0.08	4.05	0.01	92.16	0.25	5.20	0.02	77080796	357050.80	6.35	0.01	0.11	0.50
2011	35118	49.86	0.08	3.99	0.01	93.73	0.24	5.26	0.02	101000000	400144.70	6.37	0.01	0.11	0.51
2012	34658	50.66	0.08	3.90	0.01	94.75	0.24	5.25	0.02	126000000	637835.00	6.39	0.01	0.12	0.51
2013	35326	48.11	0.08	3.72	0.01	92.98	0.22	6.11	0.02	149000000	603501.60	6.53	0.01	0.11	0.50
2014	35419	49.38	0.08	3.69	0.01	94.07	0.22	6.91	0.02	175000000	751542.10	6.51	0.01	0.12	0.50
2015	35591	50.28	0.08	3.64	0.01	94.52	0.21	6.90	0.02	202000000	831262.60	6.50	0.01	0.13	0.50
2016	35576	50.92	0.08	3.59	0.01	94.68	0.21	6.93	0.02	225000000	978253.00	6.48	0.01	0.13	0.50
2017	35254	51.28	0.08	3.59	0.01	95.24	0.21	7.03	0.02	257000000	1045793.00	6.38	0.01	0.13	0.50
Total	717432	48.20	0.02	4.41	0.00	93.08	0.06	5.40	0.00	82485913	142956.30	6.22	0.00	0.10	0.49

Table 3: HAPC-CCREM of the total energy intake: 1991-2017 (zero model and first model)

Fixed Effects	Parameter	Calorie intake (zero model)			Calorie intake (first model)		
		Coefficient	SE	*P*	Coefficient	SE	*P*
Intercept	γ_0	3140.97	31.83	<0.0001	3256.17	65.64	<0.0001
Household head age	β_1				0.25	0.88	0.777
Household head age^2	β_2				0.39	0.01	<0.0001
socioeconomic class	β_3				50.85	1.43	<0.0001
Household size	β_4				−101.40	0.84	<0.0001
Place (rural=0)	β_5				−356.23	3.14	<0.0001
Household head sex (female=0)	β_6				−85.41	5.07	<0.0001
Random effects							
Period							
1991	v_1	−115.59	28.27	<0.0001	22.86	35.72	0.522
1992	v_2	−62.65	28.26	0.027	37.51	35.48	0.290
1993	v_3	−65.37	28.91	0.024	32.74	35.73	0.360
1994	v_4	−59.83	28.04	0.033	51.54	34.84	0.139
1995	v_5	75.23	27.40	0.006	176.12	34.17	<0.0001
1996	v_6	36.53	27.92	0.191	87.58	34.34	0.011
1997	v_7	32.95	27.89	0.237	105.51	34.16	0.002
1998	v_8	−48.09	28.20	0.088	20.90	34.26	0.542
1999	v_9	14.77	27.53	0.592	87.71	33.61	0.009
2000	v_{10}	52.07	27.64	0.060	81.32	33.61	0.016
2001	v_{11}	77.30	27.62	0.005	96.09	33.49	0.004
2002	v_{12}	109.70	27.46	<0.0001	112.89	33.32	0.001
2003	v_{13}	133.31	27.79	<0.0001	123.48	33.55	0.001
2004	v_{14}	335.92	27.73	<0.0001	318.64	33.49	<0.0001
2005	v_{15}	290.86	27.63	<00001	275.57	33.42	<0.0001
2006	v_{16}	111.92	27.50	<0.0001	79.32	33.36	0.017
2007	v_{17}	138.43	27.48	<0.0001	96.63	33.39	0.004
2008	v_{18}	−19.48	27.31	0.476	−69.14	33.34	0.038
2009	v_{19}	−31.20	27.36	0.254	−82.11	33.48	0.014
2010	v_{20}	−45.34	27.32	0.097	−101.97	33.55	0.002
2011	v_{21}	16.31	27.31	0.550	−50.78	33.72	0.132
2012	v_{22}	−30.80	27.33	0.260	−103.21	33.90	0.002
2013	v_{23}	−97.36	27.33	0.0002	−183.71	34.08	<0.0001
2014	v_{24}	−197.80	27.30	<0.0001	−286.85	34.27	<0.0001
2015	v_{25}	−195.48	27.29	<0.0001	−286.88	34.48	<0.0001
2016	v_{26}	−219.48	27.30	<0.0001	−316.88	34.77	<0.0001
2017	v_{27}	−236.82	27.33	<0.0001	−324.90	35.05	<0.0001
Variance components		**Variance (ICC)**	**SE**	***P***	**Variance (ICC)**	**SE**	***P***
Period	τ_{v0}	19007 (0.12)	5219.29	0.0001	28597 (0.02)	8160.11	0.0002
Cohort	τ_{u0}	5219.29 (0.004)	1826.41	0.002	57168 (0.04)	21642.00	0.004
Individual		1511454 (0.98)	2530.36	<0.0001	1445349 (0.94)	2419.96	<0.0001
Model fit*		Deviance=	12394750		Deviance=	12360417	

*Deviance of zero model-deviance of first model=34333 (df=6, *P* of Chi-square is<0.0000. CCRM: cross-classified random-effects modeling, HAPC: hierarchical age-period-cohort

significantly higher than intercept from 1991 to 2004 (except for 1998 and 2003) and significantly lower than intercept from 2008 to 2017 in the zero model [Table 4] and in the first model [Table 5]. The variance of the period in the zero model was 4996.13 (*P* value = 0.0001 and in the first model was 5041.69 (*P* value = 0.0003).

As shown in Figure 1, the "vegetables" consumption had an increasing trend from 1991 to 2004 and a decreasing trend from 2005 to 2017. The variance of the period in the zero model [Table 4] and the first model [Table 5] was 1.54 and 0.76, respectively. (*P* value = 0.0002).

The "fruits" consumption had an increasing trend during periods [Figure 1]. The variance of the period was 0.71, and it was significant (*P* value = 0.0002) in the zero model [Table 4]. In the first model, despite the annual fluctuations in the "fruits" consumption, the trend kept stable over these years. The "fruits" consumption had a decreasing trend from 1991 to 1998, an increasing trend

Table 4: HAPC-CCREM of food groups intake: 1991-2017 (zero model)

Fixed Effects	Bread, cereal, rice, pasta			Vegetables			Fruits			Dairy			Meat, poultry, fish, eggs, legumes, nuts			Fats, oils, sugars, sweets		
	Coefficient	SE	*P*	Coefficient	SE	*P*	Coefficient	SE	*P*	Coefficient	SE	*P*	Coefficient	SE	*P*	Coefficient	SE	*P*
Intercept	804.69	14.22	<0.0001	15.38	0.27	<0.0001	12.39	0.22	<0.0001	12.96	0.28	<0.0001	12.09	0.23	<0.0001	11.47	0.22	<0.0001
Random Effects																		
Period																		
1991	103.91	14.10	<0.0001	−2.62	0.24	<0.0001	−1.15	0.17	<0.0001	−1.75	0.24	<0.0001	−1.34	0.22	<0.0001	−1.82	0.16	<0.0001
1992	99.50	14.09	<0.0001	−1.76	0.24	<0.0001	−0.49	0.17	0.004	−1.50	0.24	<0.0001	−1.43	0.22	<0.0001	−1.69	0.16	<0.0001
1993	105.86	14.28	<0.0001	−2.10	0.24	<0.0001	−0.19	0.17	0.267	−1.85	0.24	<0.0001	−1.27	0.22	<0.0001	−1.56	0.16	<0.0001
1994	73.78	14.03	<0.0001	−1.56	0.24	<0.0001	−0.53	0.17	0.002	−1.30	0.24	<0.0001	−1.42	0.22	<0.0001	−1.19	0.16	<0.0001
1995	87.17	13.85	<0.0001	−1.86	0.24	<0.0001	−1.41	0.17	<0.0001	−1.16	0.24	<0.0001	−1.02	0.22	<0.0001	−0.40	0.16	0.013
1996	62.05	14.00	<0.0001	−1.73	0.24	<0.0001	−1.44	0.17	<0.0001	−1.22	0.24	<0.0001	−1.98	0.22	<0.0001	−0.32	0.16	0.051
1997	56.31	13.99	<0.0001	−1.21	0.24	<0.0001	−1.08	0.17	<0.0001	−1.17	0.24	<0.0001	−1.39	0.22	<0.0001	−0.48	0.16	0.003
1998	16.63	14.08	0.237	−0.76	0.24	0.002	−0.45	0.17	0.009	−1.27	0.24	<0.0001	−1.39	0.22	<0.0001	−0.42	0.16	0.010
1999	44.53	13.88	0.001	0.13	0.24	0.583	−1.06	0.17	<0.0001	−0.92	0.24	<0.0001	−1.33	0.22	<0.0001	−0.02	0.16	0.924
2000	32.70	13.92	0.019	−0.30	0.24	0.214	−0.87	0.17	<0.0001	−1.02	0.24	<0.0001	−0.95	0.22	<0.0001	0.23	0.16	0.159
2001	38.03	13.91	0.006	0.11	0.24	0.658	−0.79	0.17	<0.0001	−0.92	0.24	0.000	−0.63	0.22	0.004	0.28	0.16	0.088
2002	31.49	13.87	0.023	0.95	0.24	<0.0001	−0.43	0.17	0.010	−0.17	0.24	0.482	0.42	0.22	0.052	0.79	0.16	<0.0001
2003	21.59	13.96	0.122	0.97	0.24	<0.0001	−0.18	0.17	0.275	0.32	0.24	0.171	0.71	0.22	0.001	0.84	0.16	<0.0001
2004	46.35	13.94	0.001	1.81	0.24	<0.0001	0.85	0.17	<0.0001	1.12	0.24	<0.0001	1.23	0.22	<00001	1.38	0.16	<0.0001
2005	19.46	13.91	0.162	1.58	0.24	<0.0001	1.26	0.17	<0.0001	1.52	0.24	<0.0001	1.27	0.22	<0.0001	1.20	0.16	<0.0001
2006	−18.13	13.88	0.192	0.52	0.24	0.031	0.33	0.17	0.049	1.62	0.24	<0.0001	1.06	0.22	<0.0001	0.56	0.16	0.001
2007	−14.00	13.87	0.313	1.04	0.24	<0.0001	0.57	0.17	0.001	1.50	0.24	<0.0001	1.22	0.22	<0.0001	0.55	0.16	0.001
2008	−67.25	13.82	<0.0001	1.03	0.24	<0.0001	0.61	0.17	0.000	1.64	0.24	<0.0001	0.79	0.22	0.000	0.30	0.16	0.062
2009	−61.35	13.84	<0.0001	1.19	0.24	<0.0001	0.53	0.17	0.001	1.66	0.24	<0.0001	0.86	0.22	<0.0001	0.43	0.16	0.008
2010	−84.03	13.82	<0.0001	1.04	0.24	<0.0001	1.25	0.17	<0.0001	1.65	0.24	<0.0001	0.95	0.22	<0.0001	0.57	0.16	0.000
2011	−54.44	13.82	<0.0001	0.76	0.24	0.002	1.11	0.17	<0.0001	1.15	0.24	<0.0001	1.06	0.22	<0.0001	0.66	0.16	<0.0001
2012	−64.93	13.83	<0.0001	0.68	0.24	0.005	0.86	0.17	<0.0001	0.64	0.24	0.006	0.88	0.22	<0.0001	0.72	0.16	<0.0001
2013	−67.92	13.83	<0.0001	0.37	0.24	0.127	0.36	0.17	0.031	0.57	0.24	0.016	0.83	0.22	0.000	0.23	0.16	0.156
2014	−97.75	13.82	<0.0001	0.47	0.24	0.049	0.61	0.17	0.000	0.26	0.24	0.265	0.70	0.22	0.001	−0.12	0.16	0.456
2015	−97.58	13.82	<0.0001	0.21	0.24	0.375	0.37	0.17	0.026	0.20	0.24	0.404	0.77	0.22	0.000	−0.09	0.16	0.594
2016	−105.77	13.82	<0.0001	0.49	0.24	0.040	0.58	0.17	0.001	0.15	0.24	0.534	0.72	0.22	0.001	−0.27	0.16	0.097
2017	−106.24	13.83	<0.0001	0.53	0.24	0.026	0.79	0.17	<0.0001	0.25	0.24	0.289	0.68	0.22	0.002	−0.37	0.16	0.021
Variance Components	**Variance (ICC)**	**SE**	***P***	**Variance (ICC)**	**SE**	***P***	**Variance (ICC)**	**SE**	***P***	**Variance (ICC)**	**SE**	***P***	**Variance (ICC)**	**SE**	***P***	**Variance (ICC)**	**SE**	***P***
Period	4996.13 (0.02)	1385.74	0.0001	1.54 (0.05)	0.43	0.000	0.71 (0.02)	0.20	0.0002	1.46 (0.04)	0.41	0.0002	1.25 (0.06)	0.35	0.0002	0.69 (0.04)	0.19	0.0002
Cohort	288.00 (0.001)	118.82	0.008	0.32 (0.01)	0.11	0.002	0.38 (0.01)	0.13	0.002	0.47 (0.01)	0.16	0.002	0.14 (0.01)	0.05	0.003	0.41 (0.02)	0.14	0.002
Individual	217229.00 (0.98)	363.67	<0.0001	30.19 (0.94)	0.05	<0.0001	41.91 (0.97)	0.07	<0.0001	38.31 (0.95)	0.06	<0.0001	19.96 (0.93)	0.03	<0.0001	15.37 (0.93)	0.03	<0.0001
Model fit	Deviance=	11010372		Deviance=	4672375		Deviance=	4906454		Deviance=	4842331		Deviance=	4377151		Deviance=	4190844	

Table 5: HAPC-CCREM of food groups intake: 1991-2017 (First Model)

Fixed effects	Bread, cereal, rice, pasta			Vegetables			Fruits			dairy			Meat, Poultry, Fish, Eggs, Legumes, Nuts			Fats, Oils, Sugars, Sweets		
	Coefficient	SE	*P*	Coefficient	SE	*P*	Coefficient	SE	*P*	Coefficient	SE	*P*	Coefficient	SE	*P*	Coefficient	SE	*P*
Intercept	813.37	19.55	<0.0001	14.81	0.30	<0.0001	10.35	0.21	<0.0001	12.38	0.21	<0.0001	11.40	0.22	<0.0001	11.52	0.18	<0.0001
Household head age	−0.88	0.31	0.004	0.00	0.00	0.232	−0.01	0.004	0.192	0.02	0.004	<0.0001	−0.003	0.003	0.338	−0.02	0.002	<0.0001
Household head age^2	0.10	0.00	<0.0001	0.00	0.00	<0.0001	0.001	0.00004	<0.0001	0.001	0.00004	<0.0001	0.001	0.00003	<0.0001	0.0002	0.00003	<0.0001
socioeconomic class	−15.70	0.55	<0.0001	0.80	0.01	<0.0001	1.69	0.01	<0.0001	1.30	0.01	<0.0001	0.89	0.01	<0.0001	0.43	0.005	<0.0001
Household size	−10.67	0.32	<0.0001	−0.61	0.00	<0.0001	−0.77	0.00	<0.0001	−0.57	0.004	<0.0001	−0.48	0.003	<0.0001	−0.23	0.003	<0.0001
Place (rural=0)	−73.85	1.21	<0.0001	0.65	0.01	<0.0001	1.67	0.02	<0.0001	0.66	0.02	<0.0001	0.42	0.01	<0.0001	−0.34	0.01	<0.0001
Household head sex (female=0)	−8.95	1.96	<0.0001	−0.28	0.02	<0.0001	0.77	0.03	<0.0001	−0.07	0.03	0.007	0.11	0.02	<0.0001	0.25	0.02	<0.0001
Random effects																		
Period																		
1991	110.89	14.67	<0.0001	−1.64	0.18	<0.0001	−0.08	0.12	0.479	−0.71	0.17	<0.0001	−0.67	0.17	<0.0001	−1.80	0.16	<0.0001
1992	99.65	14.60	<0.0001	−0.92	0.18	<0.0001	0.43	0.12	0.0002	−0.58	0.17	0.001	−0.86	0.16	<0.0001	−1.70	0.16	<0.0001
1993	108.02	14.71	<0.0001	−1.36	0.18	<0.0001	0.60	0.12	<0.0001	−1.04	0.18	<0.0001	−0.77	0.17	<0.0001	−1.57	0.16	<0.0001
1994	78.60	14.41	<0.0001	−0.87	0.18	<0.0001	0.18	0.11	0.102	−0.53	0.17	0.002	−0.95	0.16	<0.0001	−1.16	0.16	<0.0001
1995	90.03	14.18	<0.0001	−1.09	0.17	<0.0001	−0.54	0.11	<0.0001	−0.34	0.17	0.046	−0.48	0.16	0.003	−0.35	0.16	0.030
1996	56.29	14.25	<0.0001	−1.04	0.17	<0.0001	−0.58	0.11	<0.0001	−0.47	0.17	0.006	−1.51	0.16	<0.0001	−0.30	0.16	0.059
1997	57.52	14.20	<0.0001	−0.75	0.17	<0.0001	−0.58	0.11	<0.0001	−0.63	0.17	0.000	−1.06	0.16	<0.0001	−0.45	0.16	0.005
1998	18.50	14.25	0.194	−0.32	0.17	0.065	0.02	0.11	0.836	−0.77	0.17	<0.0001	−1.08	0.16	<0.0001	−0.38	0.16	0.019
1999	49.16	14.03	0.001	0.48	0.17	0.005	−0.71	0.10	<0.0001	−0.52	0.17	0.002	−1.08	0.16	<0.0001	0.03	0.16	0.835
2000	31.10	14.03	0.027	−0.05	0.17	0.748	−0.61	0.10	<0.0001	−0.73	0.17	<0.0001	−0.79	0.16	<0.0001	0.22	0.16	0.161
2001	35.75	14.00	0.011	0.30	0.17	0.082	−0.56	0.10	<0.0001	−0.67	0.17	<0.0001	−0.50	0.16	0.002	0.28	0.16	0.075
2002	28.54	13.94	0.041	1.04	0.17	<0.0001	−0.32	0.10	0.002	−0.04	0.17	0.798	0.48	0.16	0.003	0.77	0.16	<0.0001
2003	17.05	14.02	0.224	1.01	0.17	<0.0001	−0.11	0.10	0.276	0.40	0.17	0.017	0.74	0.16	<0.0001	0.83	0.16	<0.0001
2004	41.58	14.00	0.003	1.80	0.17	<0.0001	0.88	0.10	<0.0001	1.14	0.17	<0.0001	1.23	0.16	<0.0001	1.37	0.16	<0.0001
2005	16.96	13.97	0.225	1.48	0.17	<0.0001	1.14	0.10	<0.0001	1.45	0.17	<0.0001	1.20	0.16	<0.0001	1.20	0.16	<0.0001
2006	−21.80	13.95	0.118	0.34	0.17	0.046	0.16	0.10	0.130	1.46	0.17	<0.0001	0.94	0.16	<0.0001	0.56	0.16	0.001
2007	−17.38	13.96	0.213	0.78	0.17	<0.0001	0.30	0.10	0.003	1.24	0.17	<0.0001	1.04	0.16	<0.0001	0.54	0.16	0.001
2008	−69.31	13.93	<0.0001	0.66	0.17	<0.0001	0.19	0.10	0.062	1.25	0.17	<0.0001	0.54	0.16	0.001	0.27	0.16	0.090
2009	−61.10	13.98	<0.0001	0.75	0.17	<0.0001	0.00	0.10	0.985	1.16	0.17	<0.0001	0.54	0.16	0.001	0.40	0.16	0.013
2010	−84.31	14.00	<0.0001	0.56	0.17	0.001	0.70	0.10	<0.0001	1.13	0.17	<0.0001	0.62	0.16	0.000	0.55	0.16	0.001
2011	−55.73	14.04	<0.0001	0.26	0.17	0.127	0.58	0.10	<0.0001	0.61	0.17	0.000	0.73	0.16	<0.0001	0.65	0.16	<0.0001
2012	−65.32	14.10	<0.0001	0.11	0.17	0.506	0.24	0.11	0.022	0.02	0.17	0.921	0.50	0.16	0.002	0.72	0.16	<0.0001
2013	−67.39	14.15	<0.0001	−0.31	0.17	0.078	−0.42	0.11	0.000	−0.21	0.17	0.211	0.35	0.16	0.028	0.19	0.16	0.248
2014	−96.76	14.20	<0.0001	−0.22	0.17	0.201	−0.17	0.11	0.126	−0.54	0.17	0.001	0.22	0.16	0.180	−0.15	0.16	0.365
2015	−96.04	14.26	<0.0001	−0.50	0.17	0.004	−0.42	0.11	0.000	−0.64	0.17	0.000	0.29	0.16	0.077	−0.10	0.16	0.538
2016	−103.67	14.35	<0.0001	−0.26	0.18	0.134	−0.25	0.11	0.023	−0.75	0.17	<0.0001	0.21	0.16	0.206	−0.27	0.16	0.089
2017	−100.85	14.43	<0.0001	−0.24	0.18	0.174	−0.09	0.11	0.441	−0.69	0.17	<0.0001	0.15	0.16	0.343	−0.36	0.16	0.025

Contd...

Table 5: Contd...

Fixed effects	Bread, cereal, rice, pasta			Vegetables			Fruits			dairy			Meat, Poultry, Fish, Eggs, Legumes, Nuts			Fats, Oils, Sugars, Sweets		
Variance components	Coefficient Variance (ICC)	SE se	*P*	Coefficient Variance (ICC)	SE se	*P*	Coefficient Variance (ICC)	SE se	*P*	Coefficient Variance (ICC)	SE se	*P*	Coefficient Variance (ICC)	SE se	*P*	Coefficient Variance (ICC)	SE se	*P*
Period	5041.69 (0.02)	1453.87	0.0003	0.76 (0.03)	0.21	0.0002	0.25 (0.01)	0.07	0.0002	0.71 (0.02)	0.20	0.0002	0.66 (0.03)	0.19	0.0002	0.67 (0.04)	0.19	0.0002
Cohort	3336.34 (0.01)	1320.10	0.006	1.14 (0.04)	0.44	0.005	0.58 (0.02)	0.25	0.009	0.32 (0.01)	0.12	0.003	0.43 (0.02)	0.17	0.007	0.12 (0.01)	0.06	0.020
Individual	215003.00 (0.96)	359.98	<0.0001	28.09 (0.94)	0.05	<0.0001	36.33 (0.98)	0.06	<0.0001	35.46 (0.97)	0.06	<0.0001	18.34 (0.94)	0.03	<0.0001	15.02 (0.95)	0.03	<0.0001
Model fit	Deviance=	11000875		Deviance=	4620103		Deviance=	4803685		Deviance=	4786386		Deviance=	4315999		Deviance=	4173535	
	Diff deviance*	*P*		Diff deviance*	*P*		Diff deviance*	*P*		Diff deviance*	*P*		Diff deviance*	*P*		Diff deviance*	*P*	
	9497	<0.0001		52272	<0.0001		102769	<0.0001		55945	<0.0001		61152	<0.0001		17309	<0.0001	

*Deviance of zero model-deviance of the first model

from 1999 to 2005 and a decreasing trend from 2006 to 2015. The variance of the period was 0.25 and it was significant (*P* value = 0.0002) [Table 5].

As shown in Figure 1, the "dairy" consumption had an increasing trend from 1991 to 2005, a consistent trend from 2005 to 2010, and a decreasing trend from 2010 to 2017 in the zero model. The variance of the period was 1.46 and it was significant (*P* value = 0.0002) [Table 4]. In the first model, the "dairy" consumption remained stable from 1991 to 2001, then had an increasing trend from 2001 to 2006 and a decreasing trend from 2006 to 2017. The variance of the period in this model was 0.71 and significant (*P* value = 0.0002) [Table 5].

As shown in Figure 1, the "meat, poultry, fish, eggs, legumes, and nuts" consumption after an unchanged trend from 1991 to 1995 had an increasing trend from 1996 to 2004 and a decreasing trend from 2004 to 2017. The variance of the period was 1.25 and it was significant (*P* value = 0.0002) in the zero model [Table 4] and was 0.66 and significant (*P* value = 0.0002) in the first model [Table 5].

As shown in Figure 1, the "fats, oils, sugars, and sweets" consumption had an increasing trend from 1991 to 2004 and a decreasing trend from 2005 to 2017. The estimated average effect coefficients for periods are significantly lower than intercept for 1991–1998 (except for 1996) and 2017 and significantly higher than intercept from 2002 to 2012 (except for 2008) in the zero model [Table 4] and the first model [Table 5]. The variance of the period in zero model was 0.69 (*P* value = 0.0002) and in the first model was 0.67 (*P* value = 0.0002).

Discussion

The present study showed that "total calorie," "vegetables" and "fats, oils, sugars, and sweets" consumption had an increasing trend from 1991 to 2004 and a decreasing trend from 2005 to 2017 among Iranian households. The "bread, cereal, rice, and pasta" consumption had a decreasing trend during periods. The "meat, poultry, fish, eggs, legumes, and nuts" consumption after an unchanged trend from 1991 to 1995 had an increasing trend from 1996 to 2004 and a decreasing trend from 2004 to 2017. "Fruits" consumption had a rising trend during periods. The "dairy" consumption had an increasing trend from 1991 to 2005, a consistent trend from 2005 to 2010, and a decreasing trend from 2010 to 2017.

The average consumed calories had been increased worldwide by 20%, from 2,352 to 2,828, between 1961 and 2011. The fastest regional growth is observed in the Middle East and North Africa (MENA) region (42%).[14] Also, analysis of the Food and Agriculture Organization Corporate Statistical Database (FAOSTAT) data shows that dietary energy measured in kcal per capita per day has been steadily increasing on a worldwide basis; availability

of calories per capita from the mid-1960s to the late 1990s had been increased globally by approximately 450 kcal per capita per day and by over 600 kcal per capita per day in developing countries, and it is predicted to increase more in the future.[15] The trend of changing Iranians dietary patterns between 1961 and 2005 showed that the availability of energy had been increased.[7] However, the findings of the present study showed that calorie intake had a decreasing trend since 2004. Changes in economic conditions[16] and dietary patterns can be the possible reasons for this decline.[7]

On one hand, Iran has been sanctioned since 2006 by the United Nations (UN) and the European Union (EU) due to the uranium enrichment program. International sanctions appear to have a significant impact on the economic decline in Iran by contributing to acute inflation, a weakened currency, a reduction in Iranian daily oil production, and a drop in petroleum exports. Therefore, the sanctions had widespread negative impacts on civilian health and well-being.[16] On the other hand, increasing the portion of the fruits and vegetables and decreasing the contribution of "bread, cereal, rice, and pasta" from total calorie consumption happened during these years, which led to a considerable reduction in total calorie intake of Iranians.

In the case of the "bread, cereal, rice, and pasta," the results of dietary consumption trends in the MENA showed that the proportion of energy derived from cereals had shown a descending trend through 1961–2007.[17] Also, in South-East Asia, rice and cereal consumption decreased significantly from 1007 g/d in 1983 to 512 g/d in 2004.[18] It is expected that the share of cereals in calories for food use will continue to decline slowly from 54% in 2001 to 49% in 2030 and 46% in 2050.[19]

As mentioned, fruit consumption had an increasing trend during the periods of study. The study of Micha *et al*. shows that fruit consumption has modestly increased globally over the past two decades.[20] In the case of vegetable consumption, after a sharp increase from 1991 to 2004, there was slight mitigation afterward. Since this decrease was milder than the reduction in total calorie intake, the share of vegetables from total calorie intake was increased. The most common cause of an increase in vegetables and fruits consumption is the increased diversity of fruits and vegetables worldwide.[21] Also, owing to the inverse association between fruit and vegetable consumption and chronic diseases, most countries have increased their availability of fruits and vegetables to improve healthy eating and prevent chronic diseases.[18,21]

The "meat, poultry, fish, eggs, legumes, and nuts" and "fats, oils, sugars, and sweets" consumption had been increased in the present study by 2004 and after that had a decline. As for vegetables, these decreases were milder than the reduction in total calorie intake; the share of "meat, poultry, fish, eggs, legumes, and nuts" in total calorie intake had an increasing trend. The main reasons for the growing consumption of meats can be increased per capita income and continuing urbanization.[22] Per capita consumption is rising fast in those regions that experienced urbanization and rapid income growth, and it led to enable people to increase the variety of their diets. The consumption of sugar and animal products were directly associated with the gross domestic product (GDP) and urbanization rates.[23] The amount of meat consumed in developing countries over the past has grown three times as much as it did in the developed countries.[24] In emerging economies, the consumption of animal products has increased progressively as a consequence of the substitution of traditional dietary patterns, based mostly on unrefined vegetable products, with Western-style foods and high content of sugar and animal fat.[25] The consumption of vegetable oils has significantly increased in all regions of the world (threefold in developing countries and twofold in industrial countries) because of the low price and technological advances for increased production.[26,27]

The "dairy" consumption had an increasing trend from 1991 to 2005, a consistent trend from 2005 to 2010, and a decreasing trend from 2010 to 2017. The trend of dietary patterns in Iran between 1961 and 2005 showed that energy from dairy has reduced.[7] Other studies show the same result in Iran. The per capita consumption of dairy products stood at 95 kg in 2003, about 10 kg more than in 2002, but in the year 2014, per capita consumption of milk and dairy products was about 60 kg, which is extremely low and half the world average.[28] One of the important reasons for this situation was unprecedented increasing inflation that had a reverse effect on food product consumption, especially dairy products. Inflation effectively reduces the number of goods that can be purchased with a given amount of money.[29]

In the case of the fruit and dairy food group, the trend based on the justified model in our study had differences compared to the unjustified model that means socioeconomic differences in the community can affect the trends.

The strength of the current study is using CCREM specifications of HAPC models for considering the effect of periods, cohorts, and some socioeconomic factors on dietary intake in Iran.

The limitation of the current study is to calculate food consumption based on the household's food expenditure data. Although AMEs and FAO estimated waste percentages used to calculate individual consumption, some overestimation is not unexpected.

All in all, Iranian household food basket, during these years, had significant changes that some of them are positive, and some of them are negative. An increase in the share of the vegetables and fruits in the total calorie intake was a positive point of these changes. However, the consumption

of dairy decreased in recent years. Until 2004, the trend of nutrition transition in Iran, from changes in dietary consumption dimension, was according to the observed pattern in low- and medium-income countries, and the total calorie intake was increasing. After that, unexpectedly, the total calorie intake decreased. This change in trend can be due to the economic decline in Iran as a result of the international sanctions.

On the other hand, an increase in the share of the fruits and vegetables in total calorie intake and a decrease in the fats, oils, sugars, and sweets group and energy consumption can be a result of nutrition awareness. Iran experienced an ascending trend of death and disability related to noncommunicable diseases (NCDs).[30] In 2016, NCDs killed 287,000 people in Iran.[31] A high prevalence of NCDs can encourage policymakers and people to more care about their diet.[32] The trend of nutritional transition in Iran will be more understandable by studying simultaneous changes in food consumption with socioeconomic, anthropometric, and physical activity changes in future studies.

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Conflicts of interest

There are no conflicts of interest.

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References

1. Popkin BM, Gordon-Larsen P. The nutrition transition: Worldwide obesity dynamics and their determinants. Int J Obes 2004;28:S2.
2. Organization WH. Diet, Nutrition, and the Prevention of Chronic Diseases: Report of a Joint WHO/FAO Expert Consultation. Vol 916. World Health Organization; 2003.
3. Shetty P. Nutrition transition and its health outcomes. Indian J Pediatr 2013;80:21-7.
4. Thow AM. Trade liberalisation and the nutrition transition: Mapping the pathways for public health nutritionists. Public Health Nutr 2009;12:2150-8.
5. Popkin BM. An overview of the nutrition transition and its health implications: The Bellagio meeting. Public Heal Nutr 2002;5:93-103.
6. Ghassemi H, Harrison G, Mohammad K. An accelerated nutrition transition in Iran. Public Health Nutr 2002;5:149-55.
7. Jessri M, Mirmiran P, Golzarand M, Rashidkhani B, Hosseini-Esfahani F, Azizi F. Comparison of trends in dietary pattern in Iran, Middle Eastern and North African countries from 1961 to 2005. Pajoohandeh J 2011;16:1-10.
8. Statistical Center of Iran. Household, Expenditure and Income [Internet]. Available from: https://www.amar.org.ir/english/Statistics-by-Topic/Household-Expenditure-and-Income. [Last accessed on 2021 Jun 20].
9. Weisell R, Dop MC. The adult male equivalent concept and its application to Household Consumption and Expenditures Surveys (HCES). Food Nutr Bull 2012;33 (3 Suppl 2):S157-62.
10. Joint FAO. Human energy requirements. Report of a Joint FAO/WHO/UNU Expert Consultation, Rome, 17-24 October 2001. 2004.
11. Claro RM, Levy RB, Bandoni DH, Mondini L. Per capita versus adult-equivalent estimates of calorie availability in household budget surveys. Cad Saude Publica 2010;26:2188-95.
12. Gustafsson J, Cederberg C, Sonesson U, Emanuelsson A. The methodology of the FAO study: Global Food Losses and Food Waste-extent, causes and prevention"-FAO, 2011. SIK Institutet för livsmedel och bioteknik; 2013.
13. Yang Y, Land KC. Age-Period-Cohort Analysis: New Models, Methods, and Empirical Applications. Chapman and Hall/CRC; 2016.
14. Dave D, Doytch N, Kelly IR. Nutrient intake: A cross-national analysis of trends and economic correlates. Soc Sci Med 2016;158:158-67.
15. Vasileska A, Rechkoska G. Global and regional food consumption patterns and trends. Procedia-Social Behav Sci 2012;44:363-9.
16. Moret ES. Humanitarian impacts of economic sanctions on Iran and Syria. Eur Secur 2015;24:120–40.
17. Golzarand M, Mirmiran P, Jessri M, Toolabi K, Mojarrad M, Azizi F. Dietary trends in the Middle East and North Africa: An ecological study (1961 to 2007). Public Health Nutr 2012;15:1835-44.
18. Lipoeto NI, Lin KG, Angeles-Agdeppa I. Food consumption patterns and nutrition transition in South-East Asia. Public Health Nutr 2013;16:1637-43.
19. Alexandratos N, Bruinsma J, Bödeker G, Schmidhuber J, Broca S, Shetty P, *et al.* World agriculture: Towards 2030/2050, Interim report. Rome Glob Perspect Stud Unit, Food Agric Organ United Nations. 2006.
20. Micha R, Khatibzadeh S, Shi P, Andrews KG, Engell RE, Mozaffarian D. Global, regional and national consumption of major food groups in 1990 and 2010: A systematic analysis including 266 country-specific nutrition surveys worldwide. BMJ Open 2015;5:e008705.
21. Schmidhuber J, Traill WB. The changing structure of diets in the European Union in relation to healthy eating guidelines. Public Health Nutr 2006;9:584-95.
22. Sans P, Combris P. World meat consumption patterns: An overview of the last fifty years (1961–2011). Meat Sci 2015;109:106-11.
23. Siervo M, Montagnese C, Mathers JC, Soroka KR, Stephan BC, Wells JC. Sugar consumption and global prevalence of obesity and hypertension: An ecological analysis. Public Health Nutr 2014;17:587-96.
24. Delgado CL. Rising consumption of meat and milk in developing countries has created a new food revolution. J Nutr 2003;133:3907S-3910S.

25. Popkin BM. Global nutrition dynamics: The world is shifting rapidly toward a diet linked with noncommunicable diseases. Am J Clin Nutr 2006;84:289-98.
26. Kearney J. Food consumption trends and drivers. Philos Trans R Soc B Biol Sci 2010;365:2793-807.
27. Hawkes C. Uneven dietary development: Linking the policies and processes of globalization with the nutrition transition, obesity and diet-related chronic diseases. Global Health 2006;2:4.
28. Adham-Maleki E. Resisting economy, dairy products consumption and public health Policy: Current status and future planning. Int J Med Rev 2014;1:53.
29. Rahnama H, Rajabpour S. Factors for consumer choice of dairy products in Iran. Appetite 2017;111:46-55.
30. Minaie M, Movahedi A, Motlagh AD, Abdollahi Z, Djazayery A. Association of socioeconomic status and food security with anthropometric indices among 2–5-year-old urban children in eight different cities in Iran. Int J Prev Med 2019;10:173.
31. Vos T, Abajobir AA, Abate KH, Abbafati C, Abbas KM, Abd-Allah F, *et al.* Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: A systematic analysis for the Global Burden of Disease Study 2016. Lancet 2017;390:1211-59.
32. Rahimi H, Kalantari A, Rafiee N, Khosravi A. Social trends affecting the future of Iran's health system: A qualitative study using focus group discussion. Int J Prev Med 2019;10:115.