

## **Relationship between the Level of Physical Activity and Nutrition Status of Working Women: Adiyaman Case, S. Turkey**

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### **Abstract**

*Sufficient and balanced nutrition is important in both micro and macro-scale, because it affects workers' productivity in businesses. The research has been planned and conducted among 200 middle activity women and 200 light activity in order to identify the relationship between food consumption, physical activity and nutrition habits of women working at Adiyaman organized industrial zone and in public. The questionnaires, prepared for this purpose, were applied in January and April in the year of 2015. It has been determined that according to physical activities in working environments, women who works at light activity and middle activity jobs take their daily energy and nutrition mostly. It has been emerged that women who works in textile sector have low income; however, they take the necessary protein thanks to two main meal provided by the business, and the menu served at the businesses is balanced in the aspect of nutrition groups. Daily nutrient intakes from foods vary according to activity level.*

**Keywords:** Working Woman, Physical Activity, Nutrition, Productivity, Adiyaman

### **1. Introduction**

Thanks to industrialization, the number of workers' increasing has emerged the significance of the worker health. Ensuring the sound growth in both national economy principal and businesses principal is possible with the productivity increase. To ensure the growth, it's necessary for the inputs to turn into outputs. Inputs are production factors such as labour, capital, energy, stock, information etc., and they become output as a result of production process (O'Mahony & Timmer, 2009). The labour forms the most important parts of the inputs. To maintain the growth in production process, labour productivity of the employed, with other elements, has great importance. The workers must be healthy both physical and mental in order to maintain the productivity in workplaces. Health means that the individual has a body physically, mentally and socially developed. That's why, it's mandatory to maintain the factors such as nutrition, shelter and working place's being livable that are affects the workers health and workers basic needs. Physical productivity of a person not only depends on his or her strength and skill but also his or her physical and mental health and nutrition status (Okoruwa & Agulanna, 2004). Conducted studies reveal that when the workers get insufficient nutrition, their working productivity affects negatively (Tanır, Şaşmaz, Beyhan, & Bilici, 2001; Kadir, 2009). In this context, sufficient and balanced nutrition is a subject to be emphasized in increasing the working productivity.

Food intake and qualities vary according to worker's age, sex, special occasion, and physical situation. Because workers don't take sufficient nutrition, their immunity system gets weak and they start to become ill frequently, distractibility is seen, and the interest and desire to work decreases; therefore, industrial accidents occur. Since this situation affects the workers' attendance and productivity, it affects either creating a sound society or development of the economy negatively (Baysal, 2009; Beyhan, 2012).

It's mentioned that micronutrients insufficiencies such as iron affect the work efficiency in work life, and when these insufficiencies are eliminated, economic growth and evolution are ensured (Weinberger, 2004). Worker's working quality and efficiency depends on the level of calorie consumption (Kedir, 2009).

The food that is prepared for workers in businesses is limited to high-calorie food, and the menus are planned regardless the amount of nutrient. The nutrients and the energy must be taken in sufficient quantity in order to ensure sufficient and balanced nourishment. In some Asian countries, it is determined that the food shortage, which results from pellagra among the majority of population, causes productivity losses, which limits the growth of gross domestic product (Broca & Stamoulis, 2003). These losses caused by insufficient and unbalanced nourishment affects the businesses firstly and therefore the country's economy substantially. With all of these reasons, employee health emerges as one of the most important elements for the public development.

## 2. Methods

Adiyaman industry has developed in textile mostly. Especially, textile production sector constitutes the largest employment area for the women. The study has been carried out so as to specify whether the daily energy and food intake meet the daily need according to physical activity of the women who work in this big sector (middle activity) and the women who work in public sector (light activity). In this context, a questionnaire was applied to four hundred people. Two hundred of them work in moderate activity job (textile sector) and the other two hundred works in light activity work (public sector). The questionnaire form generated according to literature study covers the questions related to the demographic characteristics of working women, nutrition habits, frequencies of nutrition consumption and 24-hour-food consumption (Tanır et al., 2001; Pekcan, 2008).

### 2.1. Gathering the data

**2.1.1. 24-hour- food consumption:** 24-hour-food consumptions have been recorded by using reminder method by the researcher (Johansson, Hallmans, Wilkman, Biessy, Roboli, Kaaks, 2002). Daily energy, macro and micro food elements (carbohydrate, protein, fat, vitamin A, vitamin E, thiamine, riboflavin vitamin B2, vitamin B6, vitamin C, calcium, magnesium, phosphorus, iron, and zinc) and consumption amounts have been determined by Nutrition Information System version 7.2 (BeBis, 2007). The medium and standard deviation of the amounts of energy, macro and micro food elements have been calculated.

**2.1.2. Physical activity:** It has been noted that the answers to the questions in the questionnaire, conducted in order to determine the physical activity of working women, should be 1440 minutes (24 hours) for the physical activity. Basal metabolic rates have been calculated according to workers' weigh. Workers have been categorized as light and middle according to workers' weight. Daily energy requirement is 2100 kcal for the women working in light works (office, etc); 2300 kcal for the medium ones (chores, food sector, cashier, etc) (Beyhan, 2004).

**2.1.3. Food consumption frequency:** Consumptions have been rated as every day, once or twice in a week, once or none in the questions of nutrient consumptions frequencies. Foods have been written as nutrient groups while being written to form.

Anthropometric measurements: in order to calculate the body mass index of working women, a weighing machine with the sensitivity of 0,5 kg has been used, and for the height measurement, feet have been side by side and the head has been in Frankfurt plane (Thomas, 2004). Body mass index (BMI) has been calculated thanks to measurement results. BMI has been calculated via  $\text{Kilo (kg)} / \text{Height}^2 \text{ (cm)}$  according to WHO (2000). According to BMI values  $<18.5$  is as Underweight,  $18.5-24.9$  is as normal, and  $\geq 25$  is as Obese.

Statistical evaluation of data: the questions related to demographic characteristics and nutrition habits, and 24-hour nutrient consumptions, which have been analyzed via BeBis software, have been evaluated SPSS 17.0 software. Mean values have been obtained from descriptive statistics and percentages have been obtained from standard deviations (mean  $\pm$ SD).

## 3. Results

In the study; income status and demographic variables such as age, education, number of the family members have been put forth primarily. After that, the relationship between the physical activities and nutrition intake amounts, which is the main purpose of the study.

The average ages of the women taking participate in the study are  $36.4 \pm 7.8$  in light activity jobs and  $27.8 \pm 7.5$  in medium activate jobs. Workers who work in light activity jobs are postgraduate and have  $5569 \pm 833$  TL salary while the ones who work in middle activity jobs are high school graduate and have  $2094 \pm 1468$  TL salary. The women working in middle activity jobs have more family members, children and working people than the ones who work in light activity jobs (Table 1). As the number of the members and children in the family raises, the budget for the nutrition and the nutrition quality decreases (Baysal, 2009).

**Table 1: Demographics of the Working Women**

	Light Activity Job	Middle Activity Job
<b>Age Average</b> ( $\bar{X}$ ) $\pm$ Sd	36.4 $\pm$ 7.8	27.8 $\pm$ 7.5
<b>Educational Status (%)</b>		
Primary School	-	26.0
Middle School	6.5	20.5
High School	29.5	33.5
University	64	11.5
<b>Monthly income</b> (TL) ( $\bar{X}$ ) $\pm$ Sd	5569 $\pm$ 833	2094 $\pm$ 1468
<b>The number of family members</b> ( $\bar{X}$ ) $\pm$ Sd	2.9 $\pm$ 1.6	5.4 $\pm$ 2.6
<b>The number of the children</b> ( $\bar{X}$ ) $\pm$ Sd	1.1 $\pm$ 1.3	3.3 $\pm$ 2.6
<b>Working members in the family</b> ( $\bar{X}$ ) $\pm$ Sd	1.7 $\pm$ 0.6	2.0 $\pm$ 0.9

The averages of the women's height and kilo are close each other according to working activities while the obesity rate of the women working in light activity jobs (27 %) is higher than the ones who work in middle activity jobs (23%) (Table 2). Weigh gaining is inevitable because the energy consumption decreases depending on limited physical activity. This situation can be mentioned as desk jobs can lead obesity.

**Table 2: Body Mass Index of Working Woman**

	Light Activity Job	Middle Activity Job
<b>Height</b> ( $\bar{X}$ ) $\pm$ Sd	1.63 $\pm$ 5.0	1.62 $\pm$ 9.2
<b>Weight</b> ( $\bar{X}$ ) $\pm$ Sd	62.8 $\pm$ 8.4	59.6 $\pm$ 8.9
<b>Body Mass Index (%)</b>		
<18.5	8.5	10
18.5-24.9	64.5	67
$\geq$ 25	27	23

The number of the meal (69.5%) in middle activity jobs is more regular, and it has been found that the number of three-meals-consumer is higher than the workers in light activity jobs (52.5%). Since the personnel working in textile industry are given breakfast and lunch, skipping the meal is lower than other institutions. The most skipped meal in light activity jobs is breakfast (43.5%), and the reason for the skipping is not to feel to eat. In middle activity jobs, the most skipped meal is lunch, and the reason for the skipping is not to enjoy the meal (Table 3). In a similar study, it is inferred that workers usually skip the breakfast and it will be useful when the workers have one or two snacks and one lunch instead of energy loading given by the business (Tanır et al., 2001).

**Table 3: Nutrition Habits of the Women According to Physical Activity Status**

<b>Number of eaten Meals</b>	Light Activity Job	Middle Activity Job
One meal	11.5	7.5
Two meals	30	23
Three meals	52.5	69.5
<b>Skipping the Meal</b>		
Yes	45	23
Sometimes	45.5	57
No	9.5	20
<b>Skipped Meal</b>		
Morning	43.5	38.5
Brunch	5.5	8
Noon	27.5	43
Afternoon	3.5	12.5
Evening	20	20
<b>The Reason for skipping</b>		
Workload	28	21
I don't have habit.	23.5	11
I don't feel to eat.	30.5	38
Financial problems.	4.5	12
Being late.	13.5	1.5

It is found that in light activity jobs the consumption of daily meat and meat products, milk and milk products, vegetable, fruit, fat and beverage is higher than middle activity jobs. The consumption of legumes, milk and milk products, fruit, fat and beverage, which is once or twice in a week, for the workers in middle activity jobs, is higher than workers working in light activity jobs (Table 4).

**Table 4: The Frequency of Consumption of Women’s Food Groups According to Physical Activity (%)**

		Every day	Once or twice in a week	Once a month	Never
<b>Cereals</b>	Light Activity Job	18.5	63.5	14.5	3.5
	Medium Activity Job	38.5	55.5	3.5	2.5
<b>Legumes</b>	Light Activity Job	7.5	56.5	21	15
	Medium Activity Job	8	63	22	7
<b>Meat, meat products and egg</b>	Light Activity Job	13.5	76.5	7.5	2.5
	Medium Activity Job	11.5	56	15	17.5
<b>Milk and milk products</b>	Light Activity Job	62.5	25.5	2	10
	Medium Activity Job	54.5	27.5	2	16
<b>Vegetables</b>	Light Activity Job	57.5	39	3.5	-
	Medium Activity Job	37.5	39	10.5	13
<b>Fruit</b>	Light Activity Job	70.5	26	0.5	3
	Medium Activity Job	44.5	32.5	11.5	11.5
<b>Fats</b>	Light Activity Job	60.5	21.5	6	12
	Medium Activity Job	44.5	23.0	5.5	27
<b>Sugar</b>	Light Activity Job	20.5	30	16.5	33
	Medium Activity Job	22	21.5	16	40.5
<b>Beverages</b>	Light Activity Job	91.5	8.5	-	-
	Medium Activity Job	86.5	9	2	2.5

When the Table 5 is examined it is seen that women in light activity jobs take their daily energy needs from protein (17%), fats (32.9%), and carbohydrates (50.1%). On the other hand, women working in middle activity jobs take their daily energy needs from protein (14%), fats (33.8%), and carbohydrates (52.2%). When the workers energy and food intake is under the recommended value 67%, it is evaluated as inadequate; if it is between 67-133 %, it is sufficient; if it is over 133%, it is evaluated as extra (Şanlıer, 2005). In this context, although the daily energy consumption to be taken is low, the energy amount that the workers in light activity jobs take is higher than those who work in middle activity jobs. It is seen that workers in light activity jobs meet their energy needs by 98.6%, and those in middle activity jobs meet their needs by 87.3%. It is determined that thanks to the high rate of meat and meat product consuming in light activity jobs, daily intake of protein is over the daily need. Workers in middle activity jobs consume meat in the workplace and protein at home, so their meeting of daily protein requirement is high. Fat is not only an important energy source, but also its consuming amount meets daily requirement of workers in both activity. Vitamin E level is high because the fat, which is the source of Vitamin E, is used especially in food intensely.

**Table 5: Energy and Food Element Amounts of Women According to Physical Activity**

	Light Activity Job( $\bar{X}$ ) $\pm$ Sd	Daily meet %	RDA*	Food element income	Middle Activity Job( $\bar{X}$ ) $\pm$ Sd	Daily meet %	RDA	Food element income
Energy (kcal)	2070 $\pm$ 150.8	98.6	2100	Adequate	2009 $\pm$ 198.0	87.3	2300	Adequate
Protein (g)	88.0 $\pm$ 2.1	140	63	Over	70.3 $\pm$ 17.4	101.8	69	Adequate
Fat (g)	75.6 $\pm$ 18.4	108	70	Adequate	75.5 $\pm$ 17.6	98.1	77	Adequate
Carbohydrate(g)	259.6 $\pm$ 39.7	85.4	304	Adequate	262.1 $\pm$ 47.0	78.5	334	Adequate
Fiber (g)	22.0 $\pm$ 8.0	88	30	Adequate	20.8 $\pm$ 7.7	69.3	30	Adequate
Vitamin A ( $\mu$ )	1268.5 $\pm$ 560.3	181	800	Over	1080.3 $\pm$ 811.5	135	800	Over
Vitamin E (mg)	18.0 $\pm$ 6.9	120	15	Adequate	17.1 $\pm$ 9.1	114	15	Adequate
Vitamin B1 (mg)	0.92 $\pm$ 0.2	83.6	1.1	Adequate	0.85 $\pm$ 0.2	77.3	1.1	Adequate
Vitamin B2 (mg)	1.2 $\pm$ 0.4	100.1	1.2	Adequate	0.9 $\pm$ 0.4	75.0	1.2	Adequate
Vitamin B6 (mg)	1.4 $\pm$ 0.3	107.7	1.2	Adequate	1.7 $\pm$ 3.6	141.6	1.2	Adequate
Vitamin C (mg)	123.7 $\pm$ 8.8	137	100	Over	80.2 $\pm$ 3.7	80.2	100	Adequate
Sodium (mg)	4700 $\pm$ 115	235	2000	Over	5100 $\pm$ 125	255	2000	Over
Potassium(mg)	2500 $\pm$ 580	71.4	3500	Adequate	2100 $\pm$ 502	60	3500	Inadequate
Calcium (mg)	942.9 $\pm$ 321	94.3	1000	Adequate	690.3 $\pm$ 289	69.0	1000	Adequate
Magnesium (mg)	284.3 $\pm$ 59.7	91.7	310	Adequate	271.3 $\pm$ 99.8	87.4	310	Adequate
Phosphor (mg)	1216.6 $\pm$ 262.4	173.7	700	Over	820 $\pm$ 274.1	117.1	700	Adequate
Iron (mg)	12.5 $\pm$ 2.3	69.4	18	Adequate	12.0 $\pm$ 2.6	66.7	18	Inadequate
Zinc (mg)	12.2 $\pm$ 2.7	122	10	Adequate	12.1 $\pm$ 2.8	121	10	Adequate

\*RDA:Recommended Daily Allowance

While the meeting rate of energy coming from carbohydrates for the daily requirements in light-activity-job-workers is 85.4%, it is 78.5% in middle activity jobs. Though the daily consumption of fiber is adequate in both activities, the percentage of meeting the daily intake amount is low. Especially pepper has a very important role for the local cuisine. Pepper consumption is high from breakfast to dinner in every meal (Sabbag & Akca, 2015). In this context, the level of daily taken Vitamin A and C is high in the women working in both activities. The level of vitamin B1 (thiamin) and vitamin B6 (pyridoxine) is adequate in both light activity and middle activity jobs. The level of meeting the daily need of Vitamin B2 is 100% in light activity job, and 75% in middle activity job. The balance of Sodium and potassium is very important for cardiovascular diseases and it is a subject to emphasize. The amount of daily sodium consumption surpasses the required by two times. While the potassium amount is adequate in the light activity jobs where the food variety is high, it is quite low in middle activity jobs (60%). Calcium consumption rate is 94.3%; however, it is very low in middle activity jobs (69%) according to consumed food. Because foods rich in protein are also rich in phosphor, phosphor intake is high in all women. While the meeting rate of daily requirement of the workers is light activity jobs is 173%, it is 117% in middle activity jobs. Magnesium and zinc level is adequate in the workers in both levels, but iron intake level rate is low. Light-level-activity workers who take inadequate animal protein has low daily iron intake.

#### 4. Discussion

Toil factor, which is the most important factor among the production factors, should be fed sufficient and balanced, since the increasing the productivity level in the businesses depends on this mostly. Insufficient and unbalanced nutrition of the workers cause various health issues, and labor loss and cost increases emerge. Since the workers' attendance to the work hitches and their inefficiencies are affected negatively, economical deficiencies in micro and macro size insufficiencies can be the question. This situation is more important in the aspect of the women. Women are getting involved in working life day by day. That's why, in this study, it has been determined that to what degree the women working in both activity take the daily energy and food elements according to physical activity.

The average age of workers in Turkey increases as it does in the World (Beyhan, 2004). In the rural areas, women's participation to the labor force rate is at the age of 45-49 mostly; in the cities it is 25-29 (TSI, 2012). It is revealed in the study that the average age is 36.4 $\pm$ 7.8 in light activity job in which the education level is higher; however it is 27.8 $\pm$  7.5 in medium activity in which the education level is lower. Body mass index, one of the anthropometric measures, is one of the most used methods (Pekcan, 2008). It has been determined that women's body mass index is normal but due to the inactivity the obesity rate is higher than the ones who work in light activity jobs (27%). Various studies have reached similar results.

It has been put forth that 70.8% of the metal workers are overweight or obese (Sözen, Bilir, Yıldız, Yıldız, & Sözen, 2009); 22.8% of the workers that work in industry are overweight or obese (Bekar & Ersoy, 2011). In a study carried out in Greece has put forth that the majority of forest workers have normal body mass index (Gallis & Panagopoulou, 2007). Bekar & Ersoy (2011) suggest that industry workers' being obese is resulted from wrong eating habits, unbalanced nourishment and inactive life style. It is pointed out that at least three meals should be consumed and there must be 4-5 hours break between the meals in order to metabolism's functioning properly (Ministry of Health, 2007). The rate of the meal skipping in textile sector is lower than public sector because the workers in textile sector are given two meals in the business. Similar studies have determined that workers skip one or two main courses (Tanır et al., 2001; Bekar & Ersoy, 2011).

It's necessary to take every nutrition group sufficiently to ensure enough and balanced nutrition. In order to assure this diversity in nutrition is very important. In this context, it has been found that having low social-economy level, workers in middle activity jobs have lower consumption of meat and meat products, vegetables, fat, beverage than those in light activity jobs. It has been determined that middle activity workers consume legumes, milk and milk products, fruit, fat and beverage once or twice in a week, which is higher than light activity workers. Consuming more cereals but less meat, vegetables and fruit causes nutrition problems for middle activity workers. This will often cause illnesses, fatigue, so it will affect productivity.

When the menus are being planned, menus with balanced nutrition elements should be formed instead of menus having high energy values food. Thanks to menu with all nutrition groups and planned according to daily activity, food elements that are necessary for the body will be taken, thus sound and productive labor will emerge. Carbohydrates should give 55%-60%, fats should give 25%-30%, and proteins should give 12-15% of the daily energy need (Baysal, 2009). According to results of the study, the daily energy values of both the workers in light and middle activity jobs are close to these gaps; however those in middle activity jobs have more carbohydrates and fat rate. It has been determined that forest workers in Greece obtain their daily energy from carbohydrates (31.59%) and fats (40.3%) (Gallis & Panagopoulou, 2007).

Proteins are essential for the life. It is a necessary macro nutrition element for creating new tissues, and renewing the worn tissues. Proteins are necessary for the skin, muscle, tendons, neurons and blood (Eastwood, 2003). The amount of daily protein is sufficient for the women in both activities. However, as the social-economic level gets high the budget for the proteins gets high and thus this affects the consuming. Although the social-economic level of women working in industry is low, it is seen that their protein need is met thanks to two main courses given in the business. This outcome has emerged that menus presented by the businesses are balanced in the aspect of nutrition groups. Fats are the most important source of energy and crucial for the life activities. However, it's known that it must be consumed carefully, because, when the fat is taken too much, it will cause lots of diseases such as cardiovascular. Fats, consumed with food, is taken not only from herbal and animal fats but also from dairy foods, meat, biscuits, cakes, nuts, and fruit such as avocado (Eastwood, 2003).

That's why the amount of fat taken from the food throughout the day increases. The women participating in the study takes the necessary amount of fat. The amount of the carbohydrate taken with daily food is higher in women working in light activity jobs. So, the less activity level, the more amount of energy intake. This situation is thought to emerge from that the workers eat snacks mostly and consuming snack among the workers in light activity is higher. Deficiency of Vitamin B group, which is found in cereals and dairy products profusely, can cause neurotic system problems such as memory problems, weakness (Jamison, 2003; Powers, 2003). It is determined that because folate has a role in metabolism of homocysteine of vitamin B2 and B6, it will prevent the coronary artery disease (Rimm, Willett, Hu, 1998; Powers, 2003).

Vitamin B1 and B2 levels are sufficient, since *çiğköfte* and bulgur are consumed mostly. Nevertheless, Vitamin B2 is low in the middle activity job workers because of the low level of milk products consuming. While the sodium amount taken from daily food is above the daily necessity, potassium amount is low. Studies show that amount of sodium's being low but the potassium's being high decrease the risk of hypertension (Geleijnse, Kok, & Grobbee, 2003). Besides, it is determined that excessive sodium taking causes urinary calculus, asthma, and osteoporoses (Cappuccio, Kalaitzidis, Duneclift, & Eastwood, 2003; Lin, Ginty, & Appel, 2003). That's why decreasing the salt amount and not to use extra salt in meal is a must for a sound life. Phosphor and calcium has an important role in producing and storing the energy (Slinin, Blackwell, Ishani, Cummings, & Ensrud, 2011). The level of taken with food is lower than middle activity workers. Phosphor taking is, on the other hand, is over the daily requirement in both activities.

Researches which have been made in different countries has similarities with ours in the aspect of phosphor intake is high while the calcium intake is low (Cappuccio et al., 2003; Lin et al., 2003). Results revealed that for ensuring healthy and productive labor in business and governmental agencies balanced menus should be provided to staff. The menus should be planned based on gender, age, work load and level of activity especially in jobs with low physical activity high energy menu lead development of obesity among workers.

## 5. References

- Baysal A. (2009). Beslenme. Hatiboğlu Yayınevi, Ankara.
- BEBİS, (2007). Ebispro for Windows, Stuttgart, Germany; Turkish Version (BeBiS 7), Pasifik Dayanıklı Company (www.bebis.com.tr ); Istanbul, 2007.
- Bekar, A., Ersoy, A. F. (2011). Sanayide Çalışan İşçilerin Enerji Harcamaları ve Beslenme Durumlarının Değerlendirilmesi. Nwsa: Vocational Education, 6(3), 84-108.
- Beyhan Y. (2004). Çalışma Hayatı Sağlık Riskleri ve Beslenme. Türk Tabipleri Birliği İşyeri Hekimliği Ders Notları. 8. bs., 307-326.
- Beyhan, Y. (2012). İşçi Sağlığı-İş Güvenliği ve Beslenme. Sağlık Bakanlığı Yayınları;726, 29p.
- Broca, S., Stamoulis, K. (2003). Micro- and Macro evidence on the Impact of Under nourishment, FAO, Agriculture and Economic Development Analysis Division, ISBN 92-5-104975-0.  
<http://www.fao.org/3/a-y4850e/y4850e03.htm>
- Cappuccio F.P, Kalaitzidis R., Duneclift S., Eastwood J.B. (2000). Unravelling the links between calcium excretion, salt intake, hypertension, kidney Stone sand bone metabolism. J Nephrol;13:169e77
- Eastwood, M. (2003). Principles of Human Nutrition, Second edition, 680p. Edinburgh, UK
- Gallis, C.,and Panagopoulou, P. (2007). Nutrientin takes of Greek forest workers and researchers do not meet all Reference Dietary Intakes. Nutrition research, 27(6), 321-326.
- Geleijnse, J. M., Kok, F. J., Grobbee, D. E. (2003). Blood pressure response to changes in sodium and potassium intake: a meta regression analysis of randomisedtrials. Journal of human hypertension, 17(7), 471-480.
- Jamison, Jennifer R. (2003). Clinical guide to nutrition and dietary supplements in disease management, 790p.
- Johansson I.,Hallmans G., Wilkman A., Biessy C., Roboli E., Kaaks R. 2002). Validation and calibration of food-frequency questionnaire measurements in Northern Sweden Health and Disease cohort. Public Health Nutr 2002;5(3):487 - 96.
- Kedir, A. M. (2009). Health and productivity: panel data evidence from Ethiopia. African Development Review, 21(1), 59-72.
- Lin P.H., Ginty F., Appel L.J., et al: (2003). The DASH diet and sodium reductionism prove markers of bone turn over and calcium metabolism in adults. Journal Nutrition 2003;133:3130-3136.
- Okoruwa, V.O. and Agulanna, F.T. (2004). Sickness and Labor Productivity Among Farmers in Oyo and Osun States of Southwest Nigeria. African Rural Policy Analysis Networks Series. Winrock International Institute of Agricultural Development Arlington, VA and Morrilton, AR., U.S.A. pp. 1-19.
- O'Mahony, M.,Timmer, M. P. (2009). Output, input and productivity measures at the industry level: Theeuklems database\*. The Economic Journal, 119(538), 374-403.
- Pekcan, G. (2008). Beslenme durumunun saptanması. Diyet El Kitabı. HatipogluYayınevi. Ankara, 67-141.
- Powers, H. J. (2003). Riboflavin (vitamin B-2) and health. The American journal of clinical nutrition, 77(6), 1352-1360.
- Rimm E.B., Willett W.C., Hu F.B., et al: (1998). Folateand vitamin B6 from diet and supplements in relation to risk of coronary heart disease among women, JAMA 279(5):359-64, 1998.
- Sabbağ Ç., Akça E. 2015. Adıyaman Yerel Biberinin Besin ve Yetiştigi Toprak Özellikleri, GAP VII. Tarım Kongresi Bildiri Kitabı, 1-4. 28 Nisan – 01 MAYIS 2015 Şanlıurfa.
- Slinin, Y.,Blackwell, T., Ishani, A., Cummings, S. R., Ensrud, K. E. et al., (2011). Serum calcium, phosphorusandcardiovascularevents in post-menopausal women. International journal of cardiology, 149(3), 335-340.
- Sözen, S., Bilir, N., Yıldız, A. N., Yıldız, E., & Sözen, T. (2009). Metal sektöründe bir işyerinde çalışanların beslenme alışkanlıkları ve ilişkili antropometrik ölçümleri. Toplum Hekimliği Bülteni, 28(3), 7-14.
- Şanlıer, N. (2005). Gençlerde Biyokimyasal Bulgular, Antropometrik Ölçümler, Vücut Bileşimi, Beslenme Ve Fiziksel Aktivite Durumlarının Değerlendirilmesi. Gazi Eğitim Fakültesi Dergisi, 25(3).

- Tanır, F., Şaşmaz, C.T., Beyhan,, Y., Bilici, S. (2001). Doğankent Beldesinde Bir Tekstil Fabrikasında Çalışanların Beslenme Durumu, 22-25.
- Thomas, B. (2004). Manual of Dietetic Practice. 3rd ed. Oxford, Black wellScience. 580.
- Türkiye Sağlık Bakanlığı, Türkiye Sağlık Hizmetleri Genel Müdürlüğü, (2007). Hacettepe Üniversitesi Beslenme ve Diyetetik Bölümü. Türkiye'ye Özgü Beslenme Rehberi. Gökçe Ofset Matbaacılık Tic. Ltd. Şti.
- Weinberger, K. (2004). Micronutrient intake and labour productivity Evidence from a consumption and income survey among Indian agricultural labourers, Outlook on Agriculture, 33(4), 255-260.
- World Health Organisation (WHO). (2000). Obesity: Preventing And Managing The Global Epidemic. Report on A Who Consultation Technical Report Series, No 894, 265.