UNIVERSITI PUTRA MALAYSIA

DIETARY PATTERNS AND OTHER FACTORS IN RELATION TO COLORECTAL CANCER RISK IN TEHRAN PROVINCE, IRAN

AKRAM SAFARI

FPSK(M) 2012 48

DIETARY PATTERNS AND OTHER FACTORS IN RELATION TO COLORECTAL CANCER RISK IN TEHRAN PROVINCE, IRAN

By

AKRAM SAFARI

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, In Fulfillment of the Requirement for the degree of Master of Science

October 2012

DEDICATION

This thesis is dedicated to my husband and son who supported me throughout this study. Their understanding, patience and love made completion of this work possible. Additionally, I dedicate this thesis to the memory of my parents who taught me seeking knowledge is a lifelong duty.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in Fulfillment of the requirement for the degree of Master of Health Science

DIETARY PATTERNS AND OTHER FACTORS IN RELATION TO COLORECTAL CANCER RISK IN TEHRAN PROVINCE, IRAN

By

AKRAM SAFARI

October 2012

Chairman: Dr. Zalilah Mohad Sharif, PhD

Faculty: Medicine and Health Sciences

The mortality and morbidity of cancer are becoming major public health problems in many developed and developing countries. In Iran, colorectal cancer (CRC) is the third most common type of cancer in men and the fourth among women. Colorectal cancer is a multi-factorial disease and diet has a significant role in its etiology and progress. Examination of dietary patterns has been recommended as a promising method in nutrition epidemiology for understanding dietary risk of chronic diseases. The aim of this case-control study was to identify dominant dietary patterns and determine the relationship between dietary patterns and risk of colorectal cancer in Tehran, Iran.

A total of 71 patients with CRC (case group) and 142 patients without CRC (control group) between age 40-75 years old were recruited from four hospitals in Tehran city. Cases and controls were measured for body mass index and interviewed for information on social- demographic status, lifestyle behaviors, family history of cancer and dietary intake. Food intakes during the year before being diagnosed with

CRC in the case group and during the year before the interview for the control group were assessed. Principal component analysis (PCA) method was applied to determine dietary patterns based on the correlation coefficients among the identified 23 food groups.

Both family history of CRC in first (x^2=8.535, P= 0.004) and second degree relative (x^2=8.937, P= 0.003) and intake of mineral supplement (x^2=5.729, P= 0.017), aspirin (x^2=6.265, P= 0.012) and acetaminophen (x^2=7.907, P= 0.049) were found to be significantly different between case and control groups. In this study two dietary patterns were identified – Healthy dietary pattern (high intake of fruits, vegetables, liquid oil, olive, carrot, fish, yoghurt drink, whole grains, low-fat dairy products and nuts) and Western dietary pattern (high intake of sweets, desserts, processed and red meat, animal butter, refined cereals, tea, pickles, carbonated beverage, and sugars). The Healthy dietary pattern was related to respondents who were non-married, had diploma or higher degree, self-employed and with higher income, used acetaminophen and vitamins and consumed raw/ fresh vegetable. The Western dietary pattern was related to being married, current smoker, not using vitamins and aspirin and had high energy intake. After adjusting for confounding factors, the Healthy dietary pattern was associated with a decrease risk of CRC (OR= 0.227; 95% CI=0.108-0.478) while an increased risk of CRC was observed with the Western dietary pattern (OR=2.616; 95% CI= 1.361- 5.030).

In conclusion, this study confirms the beneficial effect of a healthy dietary pattern against the risk of colorectal cancer and the increased risk of colorectal cancer with a Western dietary pattern. Although the exact mechanism for dietary patterns to confer effects on risk of colorectal cancer remains unknown, results from this study support

the importance of using dietary pattern method to investigate the compound relationship between diet and colorectal cancer. This diet-disease relationship can be used for developing interventions that aim to promote healthy eating for the prevention of chronic diseases, particularly colorectal cancer in the Iranian population.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

PATTEN DIETARI DAN PUNCA LAIN YANG BERHUBUNG KAIT DENGAN RISIKO KANSER KOLOREKTUM DI WILAYAH TEHRAN, IRAN

Oleh

AKRAM SAFARI

Oktober 2012

Pengerusi: Dr. Zalilah Mohad Sharif, PhD

Fakulti: Perubatan dan Sains Kesihatan

Mortaliti dan morbiditi kanser merupakan masalah kesihatan di kebanyakan negara maju dan juga negara membangun. Di Iran, kanser kolorektal (CRC) adalah kanser yang ketiga paling biasa dalam kalangan lelaki dan keempat dalam kalangan wanita. Kanser kolorektal merupakan penyakit yang berkait dengan pelbagai faktor dan diet mempunyai peranan yang penting dari segi etiologi dan progres. Pemeriksaan corak pengambilan makanan telah dicadangkan sebagai satu kaedah dalam pemakanan epidemiologi yang dapat memberikan maklumat berkaitan risiko diet terhadap penyakit kronik. Tujuan kajian kawalan kes ini adalah untuk mengenalpasti corak pengambilan makanan yang dominan dan menentukan hubungkait di antara corak pengambilan makanan ini dengan risiko kanser kolorektal di Tehran, Iran.

Seramai 71 pesakit dengan CRC (kumpulan kes) dan 142 tidak menghidap CRC (kumpulan kawalan) berusia di antara 40-75 tahun telah direkrut dari empat buah hospital di Tehran. Kumpulan kes dan kumpulan kawalan telah diukur indeks jisim tubuh (IJT) dan ditemubual untuk maklumat tentang status sosio-demografi, gaya

hidup, sejarah kanser keluarga dan pengambilan makanan .Pengambilan makanan semasa tahun sebelum didiagnos dengan CRC untuk kumpulan kes dan semasa tahun sebelum temu bual untuk kumpulan kawalan telah diperolehi. Kaedah *Principle Component Analysis* (PCA) telah digunakan untuk mengenal pasti corak pengambilan makanan berdasarkan korelasi koefisien dalam kalangan 23 kumpulan makanan yang dikenalpasti.

Terdapat perbezaan yang signifikan di antara kumpulan kes dan kawalan bagi sejarah keluarga CRC pada peringkat pertama (x^2=8.535, P= 0.004) dan peringkat kedua (x^2=8.937, P= 0.003) serta pengambilan suplemen mineral (x^2=5.729, P= 0.017), aspirin (x^2= 6.265, P= 0.012) dan acetaminophen (x^2=7.907, P= 0.049). Dalam kajian ini, corak pengambilan makanan yang dikenalpasti adalah corak pengambilan makanan sihat *(Healthy Dietary Pattern – HDP)* (pengambilan yang tinggi untuk buah-buahan, sayur-sayuran, minyak cecair, buah zaitun, lobak merah, ikan, minuman yogurt, bijirin penuh, produk tenusu rendah lemak dan kekacang) dan corak pengambilan makanan Barat *(Western Dietary Pattern)* (pengambilan tinggi untuk manisan, pencuci mulut, daging merah dan produk daging proses, mentega dari sumber haiwan, bijirin proses, teh , jeruk, minuman berkarbonat dan gula). HDP adalah berkait secara signifikan dengan responden yang belum berkahwin, berkelulusan diploma ataupun ijazah, bekerja sendiri, mempunyai pendapatan yang tinggi, menggunakan acetaminophen dan suplemen vitamin dan mengambil sayur-sayuran yang segar/mentah. WDP pula berhubungkait secara signifikan dengan responden yang telah berkahwin, menghisap rokok, tidak menggunakan suplemen vitamin dan aspirin dan mempunyai pengambilan tenaga yang tinggi. Selepas pelarasan untuk faktor-faktor risiko yang lain, HDP dikaitkan dengan risiko CRC

yang rendah (OR= 0.227; 95% CI = 0.108-0.478) manakala peningkatan risiko CRC dilihat dengan corak WDP (OR=2.616; 95% CI = 1.361- 5.030).

Sebagai kesimpulan, kajian ini mengesahkan kebaikan corak pengambilan makanan sihat (HDP) untuk mengurangkan risiko kanser kolorektal dan peningkatann risiko kanser kolorektal dengan corak pengambilan makanan barat (WDP).Walaupun mekanisma sebenar untuk corak pengambilan makanan memberi kesan kepada kanser kolorektal masih belum dikenal pasti, hasil kajian ini menyokong kepentingan penggunaan kaedah corak pengambilan makanan untuk menyiasatkan perkaitan di antara kanser kolorektal dengan diet. Hubungan antara penyakit dan diet ini boleh digunakan untuk membentuk intervensi yang bertujuan mempromosikan tabiat makan yang sihat bagi mencegah penyakit kronik, terutamanya kolorektal kanser dalam populasi Iran.

ACKNOWLEDGEMENTS

Praise to God, the most merciful for blessing me with the strength to complete this undertaking. I wish to convey my sincere appreciation to all kind hearted people mentioned or otherwise in this limited space for their contribution and support throughout my study.

I would like to express my sincere gratitude and thanks to my supervisor Associate Professor Dr. Zalilah Mohd Shariff for her guidance and concern in the preparation of this thesis. She has put in great effort in supervising my research work, offering her valuable expertise and advising me at all times. I thank her for all the encouragement given to me at difficult moments. I would especially like to thank my co-supervisors, Prof. Dr. Mirnalini Kandiah and Associate Professor Dr. Bahram Rashidkhani for their careful reviewing of manuscript, encouragement and many helpful comments during my graduate study.

I appreciate the surgeons and staff of the Surgical Department of Cancer Institute of Imam Khomeini Hospital Complex, Surgical unit Hospital of Shariati, Imam Hussein and Ayatollah Taleghani for their co-operation and commitment in making this researches a success. My appreciation is also extended to all patients who have helped me to in gathering data and completing the questionnaires. Without their participation, this study would not have been possible. I am grateful to the department members of Nutrition and Dietetics of the Faculty Medicine and Health Sciences Universiti Putra Malaysia (UPM) for their views and critics. Appreciation also goes to the colleagues of the Faculty of Nutrition Science and Food Industries, University of Shahid Beheshti Medical Sciences, University of Tehran Medical

Sciences and University of Ghazvin Medical Sciences for the opportunity of my study.

Finally and most crucially, I would like to thank my family for their love, patience and prayers. Not forgetting my friends, who have been great supports. As there are too many of them, it is impossible to name everyone. Nevertheless all of them will always be remembered.

Thank you!

I certify that a Thesis Examination Committee has met on 19 October 2012 to conduct the final examination of Akram Safari on her thesis entitled "Dietary Patterns And Other Factors In Relation To Colorectal Cancer In Tehran Province" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U. (A) 106] 15 March 1998. The Committee recommends that the student be awarded the degree of Master of Science.

Members of the Examination Committee are as follows:

Hazizi Abu Saad, PhD
Associate Professor
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Chairman)

Mohad Nasir Mohd Taib, PhD
Associate Professor
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Internal Examiner)

Sherina Mohd Sidik, PhD
Professor
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Internal Examiner)

Fatimah Arshad, PhD
Professor
Department of Nutrition and Dietetics
International Medical University
(External Examiner)

SEOW HENG FONG, PhD
Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

Zalilah Mohd Shariff, PhD
Faculty of Medicine and Health Sciences
University Putra Malaysia
(Chairman)

Mirnalini Kandiah, PhD
Faculty of Medicine and Health Sciences
University Putra Malaysia
(Members)

Bahram Rashidkhani, PhD
Shahid Beheshti Medical Sciences University
Nutrition Sciences and Food Industries Faculty
(Members)

BUJANG BIN KIM HUAT, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

DECLARATION

I declare that the thesis is original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institutions.

_____

AKRAM SAFARI

Date: 19 October 2012

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ACS	American Cancer Society
AICR	American Institute for Cancer Research
ASR	Age Standardized Incidence Rate
BMI	Body Mass Index
CI	Confidence Interval
CRA	Colorectal Adenomas
CRC	Colorectal Cancer
CRN	Colorectal Neoplasm
COX-2	Cycoloxgenase-2
FAO	Food and Agriculture Organization
FAP	Familial Adenoma Polyposis
FOBT	Fecal occult blood test
FFQ	Food frequency questionnaire
EI	Energy intake
ENT	Ear Nose Throat
GI	Gastrointestinal
GF1	Growth Factor1
HAAs	Heterocyclic Aromatic Amines
HDP	Healthy Dietary Pattern
HNPCC	Hereditary Non-Polyposis Colorectal Cancer
IBD	Inflammatory Bowel disease
ICD-O	International Classification of Disease-oncology
IGFs	Insulin like growth factors
Kcal	kilocalories
METs	Metabolic Equivalents
MOR	Morbidity odds ratios
NFCR	National Foundation for Cancer Research
NIH	National Institutes of Health
NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
NOCs	N-Nitroso Compounds
NHS	National Health Surveys
OR	Odds Ratio
PA	Physical activity
PCA	Principal Component Analysis
PAHs	Polycyclic Aromatic Hydrocarbons
PUFAs	polyunsaturated fatty acids
RR	Relative Risk
SD	Standard Deviation
SFAs	Saturated Fatty Acids
TSNAs	Tobacco Specific Nitrosamines
WDP	Western Dietary Pattern

CHAPTER 1

INTRODUCTION

1.1 Introduction

Cancer is the abnormal growth and division of cells, which can then invade and destroy nearby tissues and other parts of the body through the lymphatic and blood systems (American Cancer Society, 2010). It is usually considered as a single disease but actually comprises more than 100 disorders that are caused by nearly 300 different growths (U.S. National Cancer Institute, National Institute of Health, 2006).

The global burden of cancer has more than doubled during the past three decades (World Cancer Report, 2008). The prevalence of cancer worldwide was approximately 10 million in 2000 and is estimated to reach 27 million in 2030. Furthermore, the total number of deaths from cancer is projected to rise from 6.2 million people in 2000 to 17 million in 2030 (Boyle *et al.*, 2008; Thun *et al*., 2010). The mortality and morbidity of cancer are becoming a major public health problem in many countries. The World Health Organization (WHO) reported that a higher proportion of cancer occurred in developing and newly developed countries with more than 50% of all cancer cases and 70% of deaths by 2008 (WHO, 2011).

In Iran, there was an increase in newly diagnosed cancer from 17,765 in 2000 to 47,217 in 2005 (Iran National Cancer Registry, 2001; 2006). The prevalence of cancer is high in Iran and mortality due to cancer is growing steadily. Cancer has recently become the third most common cause of death in Iran after car accidents and heart disease (Mousavi *et al.*, 2008; Kolahdoozan *et al*., 2010). An earlier study

indicated that the highest incidence rate of cancer was in Tehran city (capital of Iran), which had nearly half of all cancer patients in Iran (Sadjadi *et al.*, 2005).

One of the main types of cancer is colorectal cancer (CRC). In 2008, CRC was estimated to be the third and second most commonly diagnosed cancer in the world with 10.0% and 9.4 % of total cancer cases among males and females respectively (Center *et al.*, 2009 ; Ferlay *et al.*, 2010). In Iran, CRC is becoming the third most common type of cancer in men with an Age Standardized Incidence Rate (ASR) of 8.19 - 8.3 per 100,000 people and the fourth among women with an ASR of 6.5-7.56 per 100,000 (Moghibi *et al.*, 2008 ; Kolahdoozan *et al.*, 2010). Colorectal cancer seems to affect people in the second part of their lifespan and the incidence is related with increasing age (World Cancer Research Fund and American Institute for Cancer Research, 2010; American Cancer Society, 2005). Approximately up to 20% of the recognized risk factors for colon cancer cases are somehow genetically linked (Haggar *et al.,* 2009; Peppone *et al.,* 2009).

There is a general agreement that some features of the western diet can cause colorectal cancer disease. The risk of disease can increase if diets are high in calories, fat, red and processed meat, desserts, high fat dairy products, refined cereals along with inadequate in fruits, vegetables, and whole grains (WHO, 2003). It has also been hypothesized that colorectal cancer is caused by several lifestyle behaviours that include cigarette smoking, physical inactivity, alcohol consumption, obesity (American Cancer Society, 2008) and cooking methods (Mirvish *et al.,* 2002; Raju *et al.,* 2006). In addition, epidemiologic and laboratory studies indicate that the use of aspirin or other Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) (Harris *et al.,* 2008 ; Zhang *et al.*, 2008) and also vitamin and mineral supplements such as

calcium, folate, and vitamin A, C and D can have a chemo-preventive effect against large intestine cancer (GrauMv *et al.*, 2003 ; Greenwald *et al.,* 2007).

1.2 Statement of Problem

In Iran, the National Health Survey (NHS) indicated that the causes of mortality since 1992 have changed from infectious diseases to non-infectious diseases and the number of mortality attributable to cancer, heart diseases, accidents and diabetes has grown very rapidly in recent decades (Ghassemi *et al.,* 2002). Moreover, statistics show that deaths due to colorectal cancer have been rising steadily. In 1995, the mortality rate from CRC was 4.25 per 100,000 population. In 2003, this figure rose dramatically to 32.2 per 100,000 population (Mousavi et al., 2008; Pourhoseingholi *et al.*, 2010). A noticeable increase in the incidence of CRC disease was reported in Tehran city (capital of Iran) with 82% Morbidity odds ratios (MOR) during the last three decades (Yazdizadeh *et al.*, 2005 ; Malekzadeh *et al*., 2009). A shift in the patterns of mortality and high population growth, the increasing trend of urbanization and lack of economic development have been major contributing factors to changes in food consumption and lifestyle patterns of Iranians since 1980 and the consequent dramatic rise in chronic diseases (Ghassemi *et al*, 2002).

A comparison between the first nationwide household food consumption survey (1991-1995) and the second survey (1995-1998) which were obtained from 24 provinces of Iran showed that the total energy intake (EI) increased from 2600 to 2700 kcal/day with the mean intake already exceeded requirements. There was an increase in the consumption of cereals, fruits, vegetable, meat, and eggs but the consumption of sugar and dairy products remained steady. The results also indicated

that, the average daily intake of total fat increased twofold from 17.5% to 39% which was higher than the recommended range for macronutrients (RDAs). The intake of saturated fatty acids (SFA) as percentage of total EI was high (10%-15%) in the majority of provinces (n=19) with Tehran having the highest level (>15%) (Kimiagar *et al.,* 1998; Ghassemi *et al*., 2002).

The National Health Surveys in 1999 reported that the prevalence of both overweight and obesity in adults between the ages of 40-69 years for women and men in the urban areas of Iran were 28% and 11% respectively. A recent study of Tehranian adults revealed that there was a sharp trend in the prevalence of obesity from 1999 to 2008 in both sexes with 21% and 38.6% of men and women were obese, respectively (Azizi et al, 2008). The increasing prevalence of overweight and obesity is also related to the increasing prevalence of physical inactivity (WHO, 2006). The Third National Surveillance of Risk Factors of Non-Communicable Disease (SURFNCD, 2007) reported physical activity of 4,120 Iranian adults aged 15-64 years. About 40% of Iranians had moderate activity while 15% were sedentary. Inactive lifestyle was more common in females and in older adults (Ghassemi *et al.*, 2002; Esteghamati *et al.*, 2011).

Numerous studies have investigated the relationship between diet and incidence of CRC but mainly focused on the intake of single nutrients or a few foods, particularly high intake of fat, red meat, and low intake of fruits/vegetables (Terry *et al*., 2001; Jarvinen *et al*., 2001; Larsson et al, 2005). Although, these analyses are quite valuable, they give little information on the total diet, which includes a diversity of foods with complex combinations of nutrients (Hu, 2002; Yang *et al*., 2005; Moeller *et al.*, 2007). Therefore, dietary pattern is considered a suitable technique as it

reflects the overall diet or total eating patterns of people. However, the relationship between dietary patterns and the risk of colorectal cancer is not well understood. As there is no study on the relationship between dietary pattern and the risk of colorectal cancer in Iran, this case- control study aimed to address the following research questions:

1. What are the dietary patterns of the case (with colorectal cancer) and control (without colorectal cancer) groups?

2. Does the case group differ from the control group with respect to:

a) Dietary patterns?
b) Socio-demographic factors (education, marital status, occupation, and monthly household income)?
c) Family history of colorectal cancer
d) Lifestyle factors (cigarette smoking, physical activity, cooking methods and medication use)?
e) Body mass index (BMI)?

3. Is there any relationship between socio-demographic status, family history of CRC, BMI and lifestyle patterns with identified dietary patterns?

4. Is there any relationship between identified dietary patterns, socio-demographic status, family history of CRC, BMI and lifestyle patterns with case and control group?

1.3 Objectives of Study

1.3.1 General Objective

To determine dietary patterns and its relationship with colorectal cancer

1.3.2 Specific Objectives

1. To determine dietary patterns of case and control groups

2. To examine the differences between case and control groups in relation to

    a. Dietary patterns
    b. Socio-demographic factors
    c. Family history of colorectal cancer
    d. Lifestyle factors
    e. Body mass index (BMI)

3. To determine the relationship between

    a. Socio-demographic factors
    b. Family history of colorectal cancer
    c. Lifestyle factors
    d. Body mass index
    e. Dietary pattern

    and risk of CRC.

4. To determine the relationship between

    a. Socio-demographic factors

b. Family history of colorectal cancer

c. Lifestyle factors

d. Body mass index

and dietary pattern

5. To determine the independent effect of dietary patterns on the risk of colorectal cancer.

1.4 Hypothesis

1. There is a significant difference between case and control groups related to

a. Socio-demographic status

b. Family history of colorectal cancer

c. Lifestyle factors

d. Body mass index (BMI)

e. Dietary patterns

2. There is a significant relationship between

a. Socio-demographic factors

b. Family history of CRC

c. Lifestyle factors

d. Body mass index

e. Dietary patterns

and risk of colorectal cancer.

3. There is a significant independent effect of dietary patterns on risk of colorectal cancer.

1.5 Research Conceptual Framework

As shown in Figure 1.1, this study examined the risk factors of colorectal cancer, which are namely, socio-demographic, lifestyle, family history of CRC, anthropometric and dietary factors (Heavey *et al,* 2004, Raju *et al.*, 2006; Tamakoshi *et al.*, 2004; Howard *et al.,* 2008; Popkin, *et al.*, 2001; Giovannucci *et al.*, 2002). Socio-demographic factors comprised age, education, marital status, household monthly income and family history of CRC. Lifestyle factors included smoking status, physical activity pattern, cooking methods and medication use. Body mass index was also determined. Dietary patterns were determined using a 125 food items frequency questionnaire. The associations between independent risk factors and CRC were identified. Finally the association between the identified dietary patterns and the risk of CRC was assessed independently of the potential confounders.

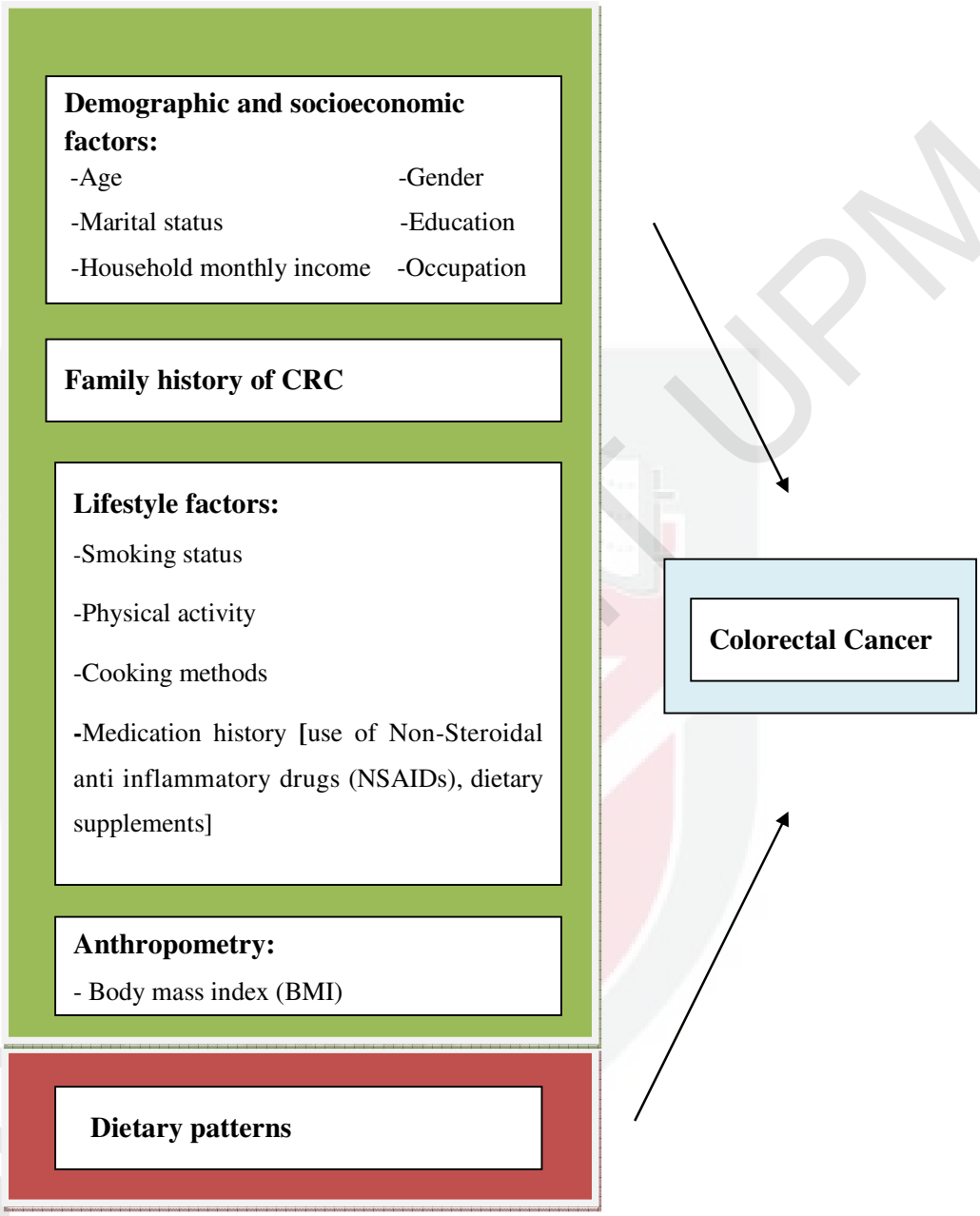

Figure 1.1: Research conceptual framework

1.6 Significance of the Study

In recent years, examination of patterns of dietary intake rather than focusing on the individual nutrients is recommended as a complementary and suitable approach for clarifying relationships between diet and health. These patterns are derived using factor analysis of commonly consumed food items and are based on the correlation between food and nutrient intake. They represent an extensive picture of nutrient and food compositions of diets. The study of dietary patterns definitely has significant implications for public health because these patterns may be easier for people to understand (e.g. healthy and less healthy dietary patterns) and can be used in the prevention of diseases.

The prevalence of CRC is gradually increasing in Iran. Therefore, identification of existing dietary patterns and lifestyle factors such as physical inactivity, obesity, cigarette smoking and alcohol consumption that are associated with CRC risk can be a basis for recommendations to the Ministry of Health on dietary and lifestyle modification strategy for prevention of colorectal cancer. In addition, these information can be used as baseline data by researchers and health professionals for planning intervention programs for patients with colorectal cancer.

Most of the existing data on cancer and its risk factors are collected from developed countries with almost two-thirds of these surveys conducted in either North America or Europe. There are only few published data on factors associated with colorectal cancer in developing and newly developed countries. More studies are

needed to understand risk factors of cancer in these countries as they may differ from those in developed countries due to different genetic predispositions and lifestyle behaviours. The findings of this study could add new knowledge to the existing literature on risk factors of CRC in developing countries.

1.7 Glossary of terms

Glossary of terms for some variables used in this study is as bellow:

1. **Colorectal cancer**: uncontrolled neoplastic cells that develop and grow within the walls of the colon and rectum tissue.

2. **Family history of cancer**: a family history of certain malignancies can place persons at increased risk of developing cancer.

3. **Dietary supplement**: any dietary ingredient that contains minerals, vitamins, herbs or plant products, enzymes and amino acids or a dietary substance used to supplement the diet by increasing total dietary intake.

4. **Non-Steroidal anti-inflammatory drugs**: medicines with anti-fever (or antipyretic) and pain-reducing (or analgesic) effects.

5. **Physical activity**: any bodily movement produced by skeletal muscle that results in a substantial increase over the resting energy expenditure.

6. **Cooking methods**: a method to prepare food by heat and undoubtedly has a functional impact on humans.

7. **Body mass index**: a mathematical formula that correlates with body fat and is expressed as weight in kilograms divided by height in meters squared.

8. **Factor analysis**: It is a method to reduce a large number of variables into smaller independent factors, for use future studies.

9. **Dietary pattern**: classification of food items into 'Healthy' and 'Western' patterns using factor analysis in relation to risk of colorectal cancer.

10. **Food frequency questionnaire** (FFQ): a semi-quantitative questionnaire that consisted of 125 food items commonly consumed by Iranians. Frequency and amount of food consumed were examined as intake prior to development of CRC (cases) or hospital admission (controls).

REFERENCES

Aadah, M., and Jorgensen, T. (2003). A new physical activity scale for measuring physical activity. *Medicine and Science in Sport and Exercise*; 35: 1196-1202.

Adeli, A.; Hasangholipour, T.; Hossaini, A.; Salehi, H.; and Shabanpour, B. (2011). Status of fish Consumption per capita of Tehran citizens. *Iranian Journal of Fisheries Sciences*; 10(4): 546-556.

Ainsworth, B. E., Haskell, W.L., Whitt, M.C *et al*. (2000). Compendium of physical activities: an update of activity codes and MET intensities. *Medicine and Science Sports Exercise;* 32:498-504.

Akhter, M., Kuriyama, S., Nakaya, N *et al*. (2007). Alcohol consumption is associated with an increased risk of distal colon and rectal cancer in Japanese men: the Miyagi study. *European Journal of Cancer*; 43(2): 383-390.

American Cancer Society. (2005). Colorectal Cancer Facts and Figures Special-Edition 2005. Atlanta: *American Cancer Society*. Available from: http://www.cancer.org/Research/CancerFactsFigures/ColorectalCancerFactsFigures/caff2005cr4pwsecured-pdf (Accessed 3 February 2012).

American Cancer Society. (2011). Can colorectal polyps and cancer be found early? www.cancer.org/Cancer/ColonandRectumCancer/DetailedGuide/colorectalcancer detection (Accessed 10 April 2012).

American Cancer Society. Cancer Facts & Figures 2010. Atlanta: American Cancer Society; 2010(Accessed 9 May 2012).

Annema, N., Heyworth, J.S., McNaughton, A.A *et al.* (2011). Fruit and Vegetable Consumption and the Risk of Proximal Colon, Distal Colon, and Rectal Cancers in a Case-Control Study in Western Australia. *Journal American Dietetic association*; 111: 1479-1490.

Appel. L., Moore, T.J and Obrazanek, E. (1997). For the DASH collaborative research group a clinical trial of the effects of dietary patterns on blood pressure. *New England Journal Medicin*; 336: 1117-1124.

Aune, D., Lau, R., Chan, D.S *et al*. (2011). Dairy products and colorectal cancer risk: a systematic review and meta-analysis of cohort studies. *Annals of oncology;* 23(1): 37-45.

Austin, A.L., Adair, L.A., Galanko, J. A *et al*. (2007). A diet high in fruits and low meats reduces the risk of colorectal adenomas. *Journal Nutrition*; 137(4): 999-1004.

Azizi, F., Azabdakht, L., Mirmiran, P. (2005). Trends in overweight, obesity andcentral fat accumulation among Tehranian adults between 1998-1999 and 2001-2002: Tehran lipid and glucose study. *Annals of Nutrition and Metabolism;* 49:3-8.

Barcellos, M.D., Aguiar, L.K., Ferreira, G.C *et al.* (2009). Willingness to Try Innovative Food Products: a Comparison between British and Brazilian Consumers BAR. *Curitiba*; 6 (1): 50-61.

Bale, S.J., Chakravarti, A., Strong, L.C. (1984). Aggregation of colon cancer in family data. *Genetic Epidemiology*; 1(1): 53-61.

Bersford, S.A., Johnson, K.C., Ritenbaugh, C *et al*. (2006). Low-Fat Dietary Pattern and Risk of Colorectal Cancer: The Women's Health Initiative Randomized Controlled Dietary Modification Trial. *The Journal of the American Medical Association*; 295(6): 643-654.

Bingham, S.A., Day, N.E., Luben, R *et al*. (2003). Dietary fiber in food and protection against colorectal cancer in the European Prospective Investigation into Cancer and Nutrition (EPIC): an observational study. *Lance*t; 361:1496-1501.

Brace N., Kemp, R., Snelgar, R. (2009). SPSS for Psychologists. Fourth edition. Published by Palgrave Macmillan, chapter 12.

Boffetta, P and Hashibe, M. (2006). Alcohol and cancer. *The Lancet Oncology;* 7 (2)149–156.

Botteri, E., Raimondi, S., Maisonneuve, P., Lowenfels, A.B. (2008). Cigarette smoking and adenomatous polyps: a meta-analysis. *Gastroenterology;* 134 (2): 388-395.

Boyle, P., Levin, B. (2008). World Cancer Report 2008, IARC, Lyon: International Agency for Research on Cancer.

Burn J, Bishop, D., Mecklin, *et al*. (2007). Effect of aspirin or resistant starch on colorectal neoplasia in the Lynch syndrome. *Journal of general internal medicine;* 22(8): 1166-71

Byers, T., Nestle, M., Tiernan, M., Doyle, C *et al*. (2002). American Cancer Society Guidelines on nutrition and physical activity for cancer prevention: reducing

the risk of cancer with healthy food choices and physical activity. *CA: a Cancer Journal for Clinicians*; 52(2): 92-119.

Calton, B.A., Lacey, J.V., Schatzkin, A *et al*. (2006). Physical activity and the risk of colon cancer among women: a prospective cohort study (United States). *International Journal of Cancer*; 119(2):385-91.

Calviello. G., Serini,S., Piccioni, F. (2007). N-3 polyunsaturated fatty acids and the prevention of colorectal cancer: molecular mechanisms involved. *Current Medicinal Chimistery*; 14(29): 3059-69.

Campbell, P.T., Cotterchio, M., Dicks, E *et al*. (2007). Excess Body Weight and Colorectal Cancer Risk in Canada: Associations in Subgroups of Clinically Defined Familial Risk of Cancer. *Cancer Epidemiology Biomarkers Prevention*; 16(9):1735-1744.

Cason, K.l., Non, L.V. (2004). Dietary pattern change and acculturation of Chinese Americans in Pennsylvania. *Journal of the American Dietetic Association*; 104(5): 771- 778.

Central Bank of the Islamic Republic of Iran. (2010). Iran: the 14 million Iranians live below the poverty line and the nuclear program. *Mostandpopular*. (Accessed 29 August 2011).

Center, M. M., Jemal, A., Ward, E. (2009). International Trends in Colorectal Cancer incidence rates. *Cancer Epidemiology Biomarkers & Preventio;* 18: 1688-1694.

Centritto, F., Jacoviello, L., Giuseppe, R *et al*.(2009). Dietary patterns, cardiovascular risk factors and C-reactive protein in a healthy Italian population *Nutrition, Metabolism & Cardiovascular Diseases*; 19(10): 697-706.

Chan, A.T., Giovannucci, E.L., Schernhammer, E.S *et al*. (2004). A prospective study of aspirin use and the risk of colorectal adenoma. *Annals of Internal Meicined*; 140(3):157-166.

Chan, A.T., Giovannucci, E.L., Meyerhardt, J.A *et al*. (2005). Long-term use of aspirin and nonsteroidal anti-inflammatory drugs and risk of colorectal cancer. *The Journal of the American Medical Association*; 294:914-923

Chan, A.T., Giovannucci, E.L., Meyerhardt, J.A *et al.* (2007). Aspirin Dose and Duration of Use and Risk of Colorectal Cancer in Men. *Gastroenterology;* 134(1): 21-28

Chan, D.S., Lau, R., Aune, D *et al*. (2011). Red and processed meat and colorectal cancer incidence: Meta-Analysis of Prospective Studies. *PLoS ONE;* 6(6): 20456.

Chao, A., Thun, A.J., Connell, C. J *et al.* (2005). Meat consumption and risk of colorectal cancer. *The Journal of the American Medical Association*; 293(2):172-182.

Chiu, B.C., Ji, B.T., Dai, Q *et al*. (2003)**.** Dietary factors and risk of colon cancer in Shanghai China. *Cancer Epidemiology, Biomarkers & Prevention*; 12: 201-208.

Chao, A., Connell, C.J., Jacobs, E.J *et al*. (2004). Amount, type, and timing of recreational physical activity in relation to colon and rectal cancer in older adults: the Cancer Prevention Study II Nutrition Cohort. *Cancer Epidemiology Biomarker*; 13(12):2187-95.

Cho, E., Smithwarner, S.A., Spiegelman, D *et al*. (2004). Dairy foods, calcium, and colorectal cancer: a pooled analysis of 10 cohort studies. *Journal of National Cancer Institute*; 96(13): 1015-1022.

Cho, Y.A., Shin,A., Kim, J. (2011). Dietary patterns are associated with body mass index in a Korean population. *Journal of the American Dietetic*; 111(8):1182-6.

Chyke, A., Doubeni, Adeyinka, O., Laiyemo, Jacqueline M *et al*. (2012). Socioeconomic status and the risk of colorectal cancer: An analysis of more than a half million adults in the National Institutes of Health-AARP Diet and Health Study. *Cancer;* 118(14): 3636-3644.

Cole, B.F., Logan, R.F., Halabi, S., Benamouzig, R *et al*. (2009). Aspirin for the chemoprevention of colorectal adenomas: meta-analysis of the randomized trials. *Journal of National cancer Institute;* 101(4): 256- 266.

Deneo- pellegrini, H., Boffetta, P., De Stefani, E *et al*. (2002). Plant foods and differences between colon and rectal cancers. *European Journal of cancer prevention*; 11(4):369-375.

Deneo-Pellegrini, H., Boffetta, P., De Stefani, E *et al*. (2005). Meat consumption and risk of colorectal cancer: a case-control study in Uruguay. *Cancer Therapy*; 3: 193-200.

Denova-Gutiérrez, D., Castanon, S., Talavera, J.O *et al*. (2011). Dietary Patterns Are Associated with Different Indexes of Adiposity and Obesity in an Urban Mexican Population. *Journal of Nutrition*; 141 (5): 921-927.

Dietary Supplement Health and Education Act of 1994. Public law 103-417,103rd congress. From: www.fda.gov/food/dietarysupplements/default.htm. (Accessed 9 February 2012).

Din, F.V.N., Theodoratou, E., Farrigton, SM., Tensea, A *et al*. (2010). Effect of aspirin and NSAIDs on risk and survival from colorectal cancer. *Carcinogenesis*; 32:1069-1077.

Doll, R., Peto, R., Boreham, J., Sutherland, I. (2004). Mortality in relation to smoking: 50 years observations on male British doctors. *British Journal of Cancer*: 92, 426–429

Dougherty, U., Cerasi, D., Taylor, L *et al.* (2009). Epidermal Growth Factor Receptor Is Required for Colonic Tumor Promotion by Dietary Fat in the Azoxymethane/Dextran Sulfate Sodium Model: Roles of Transforming Growth Factor-α and PTGS2. *Clinical Cancer Research*; 15(22): 6780–9

Dube, C., Rostom, A., Lewin, G *et al*. (2007). US Preventive Services Task Force. The use of aspirin for primary prevention of colorectal cancer:a systematic review prepared for the US Preventive Services Task Force. *Annals of Internal Medicine*; 146(5):365–375.

Esmaillzadeh, A., Mirmiran, P., Azadbakht, L., Etemadi, A., Azizi, F. (2006). High Prevalence of the Metabolic Syndrome among Iranian adolescents. *European Journal of Clinical Nutrition*; 14:377–382.

Esteghamati, A., Khalilzadeh, O., Rashidi, A., Kamagar, M *et al*. (2011). Physical Activity in Iran: results of the third National Surveillance of Risk Factors of Non-Communicable diseases (SURFNCD, 2007). *Journal of Physical activity & health*; 8(1): 27-35.

Feng, Z.; Hu, W.; Hu, Y.; Tang, M. (2006). Acrolein is a major cigarette-related lung cancer agent: Preferential binding at p53 mutational hotspots and inhibition of DNA repair. *Proceedings of the National Academy of Sciences of the United States of America* 103 (42): 15404–15409.

Food and Agriculture Organization. (2010). Nutrition Country Profiles – Iran summary.

Food and Agriculture Organization. (2002). Nutrition Country Profiles – IRAN.

Fang, J., Madhavan, S., Alderman, M.H. (2000). Dietary potassium intake and stroke mortality. *Storke*; 31 (7): 1532-1537.

Fedrico, A., Tramacer, V., Bagnardi, M *et al*. (2011) Alcohol drinking and colorectal cancer risk: an overall and dose-response meta-analysis of published studies. *Annals of oncology*; 22(9):1958-1972.

Felton, J.S., and Knize, M.G. (2006). A meat and potato war: Implications for cancer etiology. *Carcinogenesis;* 27 (12): 2367-2370.

Ferlay, J., Shin, H.R., Bray, F *et al.* (2010). GLOBOCAN 2008, Cancer Incidence and Mortality Worldwide: IARC Cancer Base No. 10. Lyon, France: International Agency for Research on Cancer; Year. Available from: http://globocan.iarc.fr. (Accessed 17 April 2012).

Ferlay, J., Shin, H.R., Bray, F., Forman, D et al. (2010). Estimates of worldwide burden of cancer in 2008: GLOBOCAN 2008. *International Journal of Cancer;* 127(12): 2893-2917.

Field, A. P. (2000). Discovering Statistics Using SPSS for Windows. Advanced Techniques for Beginners. First Published by London-Thousand Oaks –New Delhi: Sage, Chapter11, page 423-470. Google, e-book.

Flood, A., Rastogi, T., Wirfalt, E., Mitrou, P.N *et al*. (2008). Dietary patterns as identified by factor analysis and colorectal cancer among middle-aged Americans. *American Journal of Clinical Nutrition*; 88(1) 176-184.

Flood, A., Velie, E.M., Sinha, R *et al.* (2003). Meat, Fat, and their subtypes as risk factors for colorectal cancer in a prospective cohort of women. *American Journal of Epidemiology*; 158(1): 59-68.

Friedenreich, C.M., and Orenstein, M.R. (2002). Physical activity and cancer prevention, etiologic evidence and biological mechanism. *Journal Nutrition*; 132: 3456S-3464S.

Fung, T., S, D., Hu,F.B., Fuchs ,C.S,. Giovannucci, E., Hunter D. J *et al*. (2003). Major dietary patterns and the risk of colorectal cancer in women. *Archives of Internal Medicine;* 163: 309-314.

Fung, T.T., Stampfer, M.J., Manson, J.A *et al.* (2004). Prospective study of major dietary patterns and stroke risk in women. *Stroke*; 35: 2014-2019.

Gallagher, D., Heymsfield, S.B., Heo, M *et al.* (2000). Healthy percentage body fat ranges: an approach for developing guidelines based on body mass index. *American journal of Clinical Nutrition;* 72: 694-701.

Gallus, S., Bravi, F., Talamini, R *et al*. (2006) Milk, dairy products and cancer risk (Italy). *Cancer Causes Control;* 17(4): 429–437.

Galeone, C., Talaminini, R., Levi, F *et al*. (2007). Fried foods, olive oil and colorectal cancer. *Annals of Oncology*; 18(1): 36-39.

Ganesh, B., Talole, S.D., and Dikshit, R. (2009). A case control study on diet and colorectal cancer from Mumbai, India. *Cancer epidemiology*; 33:189-193.

Geelen, A., Schouten, J.M., Kamphuis, C *et al*. (2007). Fish consumption, n-3 fatty acids, and colorectal cancer: a meta-analysis of prospective cohort studies. *American Journal of Epidemiology*; 166(10):1116-25.

Ghaffarpour M., Houshiar-Rad A., and Kianfar H. (1999). The manual for household measures, cooking yields factors and edible portion of foods. Tehran: Keshaverzi Press; p. 1–46. (In Farsi)

Ghaffarpour, M., Houshiarrad, A., Kianfar, H., and Banieghbal, B. (2007). Food album.press, p 1-390 (In Farsi)

Gooderham, N.J., Zhu,H., Lauber, S., Boyce, A., and Creton, S. (2002) Molecular and genetic toxicology of 2-amino-1-methyl-6- phenylimidazo [4,5-b] pyridine (PhIP). *Mutation* Research; 506-507: 91–99.

Grau, M.V., Baron, J.A., Sandler, R.S *et al*. (2003). Vitamin D, calcium supplementation, and colorectal adenomas: Results of a randomized trial. *Journal of the National Cancer Institute*; 95(23): 1765-1771.

Greenwald, F., Anderson, D *et al*. (2007). Clinical trials of vitamin and mineral supplements for cancer prevention. *America journal of Clinical Nutrition;* 84(1): 314S-317S.

Ghassemi H., Harrison G., Mohammad, K. (2005). An accelerated nutrition transition in Iran Public Health Nutrition, 5:149-155.

Giovannucci E. (2002). Modifiable risk factors for colon cancer. *Gastroenterol Clinics North America.* 31(4): 925-943.

Giovannucci E. (2002). Epidemiologic studies of folate and colorectal neoplasia: a review, *Journal Nutrition*. 132 (8): 2350–2355.

Giovannucci E. (2001). An updated review of the epidemiological evidence that cigarette smoking increases risk of colorectal cancer. *Cancer Epidemiology Biomarkers Prevention;* 10 (7): 725-731.

Giovannucci, E., Chan, A.T. (2010). Role of vitamin and mineral supplementation and aspirin use in cancer survivors. *Journal of Clinical Oncology*; 28(26): 4081- 4085.

Grande, M., Milito, G., Attina, G.M *et al*. (2008). Evaluation of clinical, laboratory and morphologic prognostic factors in colon cancer. *World Journal of Surgery Oncology;* 6: 98.

Guadagni F, Ferroni P, Palmirotta R *et al*. (2007). Non-steroidal anti-inflammatory drugs in cancer prevention and therapy. *Anticancer Research*; 27(5A): 3147-3162.

Gunter, M.J., Probst-Hensch, N.M., Cortessis, V.K *et al.* (2005).Meat intake, cooking-related mutagens and risk of colorectal adenoma in a sigmoidoscopy-based case-control study. *Carcinogenesis*; 26(3): 637-642.

Haggar, F.A., Boushey, R.P. (2009). Colorectal Cancer Epidemiology: Incidence, Mortality, Survival, and Risk Factors. *Clinic in Colon Rectal Surgery*; 22(4): 191–197.

Hajizadeh, B., Rashidkhani, B., Houshyarrad, A *et al*. (2010). Dietary patterns and risk of oesophageal squamous cell carcinoma: a case-control study. *Public Health Nutrition*; 13(7): 1107-12.

Hamilton, S.R., Aaltonen, L.A. (2000). World Health Organization Classification of tumours. Pathology and genetics. Lyon: *International Agency for Research on Cancer* (IARC). IARC Press.

Hannan, L.M., Jacobs, E.J., and Thun, M.J. (2009). The association between cigarette smoking and risk of colorectal cancer in a large prospective cohort from the United States. *Cancer Epidemiology, Biomarker Prevention*; 18(12): 3362-3367

Harris, R.E., Beebe-Donk, J., and Alshafie, G. (2008). Similar reductions in the risk of human colon cancer by selective and nonselective cyclooxygenase-2 (COX-2) inhibitors. *BioMed Central Cancer*; 8: 237.

Heavey, P.M., McKenna, D., and Rowland, I.R. (2004). Colorectal cancer and the relationship between genes and the environment. *Nutrition and Cancer*.48 (2): 124-141.

Heber, D. (2004). Vegetables, fruits and photochemicals in the prevention of diseases. *Journal of Postgraduate Medicine*; 50: 145-149.

Herszenyi, L., Farinati, F., Miheller, P., and Tulassay, Z. (2008). Chemoprevention of colorectal cancer: feasibility in everyday practice? *European Journal of Cancer Prevention*; 17 (6): 502-514.

Higuchi, T., and Jass, J.R. (2004). My approach to serrated polyps of the colorectum. *Journal of Clinical Pathology;* 57(7): 682–686.

Hoffmann, D., Hoffmann, I., and El-Bayoumy, K. (2001). The less harmful cigarette: a controversial issue. a tribute to Ernst L. Wynder. *Chemical Research in Toxicology;* 14(7): 767-790.

Hoshiyama, Y., Kono, S., Sasaba, T *et al*.(2000). Relation of cigarette smoking, alcohol Use, and dietary habits to colon adenomas: a case-control study in Saitama, Japan. *Asian Pacific Journal of Cancer Prevention*; 1: 139-146

Hosseini Esfahani. F., Asghari. G., Mirmiran1. P and Azizi F. (2010). Reproducibility and Relative Validity of Food group intake in a food frequency questionnaire developed for the Tehran lipid and glucose study. *Journal of Epidemiology;* 20(2):150-158.

Howard, R.A., Freedman, D. M., Park, Y *et al*. (2008). Physical activity, sedentary behaviour, and the risk of colon and rectal cancer in the NIH-AARP Diet and Health Study. *Cancer Causes and Control*; 19(9): 939-53.

Huang, X. (2003). Iron overload and its association with cancer risk in humans: evidence for iron as a carcinogenic metal. *Mutation Research;* 533(1-2):153–171.

Hu, J., Morrison, H., Mery, L *et al*. (2007). Diet and vitamin or mineral supplementation and risk of colon cancer by subside in Canada. European Jou*rnal of cancer Prevention;* 16(4): 275-91.

Hu, F.B., Rimm, E., Warner, S.A. (1999). Reproducibility and validity of dietary patterns assessed with a food-frequency questionnaire. *American Journal of Clinical Nutrition*; 69; 243-249.

Hu, F.B. (2002). Dietary pattern analysis: a new direction in nutritional epidemiology. *Current Opinion in lipidology*; 13(1): 3-9.

Hully S.B., Cummings, S.R., Browner, W.S *et al*. (2001). Designing clinical research: an epidemiologic approach. 2nd ed. Philadelphia: lippincott Williams & Wilkins; pp 79.

International Agency for Research on Cancer. (2003). Fruit and Vegetables. IARC; Volume 8. Lyon, France, IARC.

Jacobs, D.R., Steffen, L.M. (2003). Nutrient, foods and dietary patterns as exposure in research: a framework for food synergy. *American Journal of Clinical Nutrition*; 78: 508s-513s.

Jacobson, H.N., and Stanton, J.L. (1986). Pattern analysis in nutrition. *Clinical Nutrition*; 5: 249–53.

Jaervinen, R., Knekt, P., Hakulinen, T *et al*. (2001). Original Communication Prospective study on milk products, calcium and cancers of the colon and rectum. *European Journal of Clinical Nutrition*; 55: 1000–1007.

Jarvinen, R., Knekt, P., Hakulinen, T. (2001). Dietary fat, cholesterol and colorectal cancer in a prospective study. *British Journal of Cancer*; 85: 357–361.

Jarvinen, R., Knekt, P., Halkulinen, T.A. (2001). A Prospective study on milk products, calcium and cancers of the colon and rectum. *European Journal of Clincal Nutrition*; 55(11): 1000-1007.

Jemal, A., Bray, F., Center, M.M., Ferlay, J *et al*. (2011). Global Cancer Statistics.*CA: Cancer Journal for Clinician*; 61 (2): 69-90.

Jemal, A., Siegel, R., Ward, E., Hao, Y., Xu, J *et al*. (2008). Cancer statistics, 2008. *CA: A Cancer Journal for Clinicians;* 58(2): 71-96

Joanne, R,. Brown, N., Raymond, N., DuBois. (2005).COX-2: A Molecular Target for Colorectal Cancer Prevention. *Journal of Clinical Oncology;* 23: 2840-2855

Johnsen, N.F., Christensen, J., Thomsen, B. L *et al*. (2006). Physical activity and risk of colon cancer in a cohort of Danish middle-aged men and women. *European Journal of Epidemiology*, 21(12): 877-884.

Johns, L.E., Houlston, R.S. (2001). A systematic review and meta-analysis of familial colorectal cancer risk. *American Journal Gastroenterology*; 96 (10): 2992-3003.

Kabat, G.C., Miller, A.B, Jain, M., Rohan, T.E. (2007). A cohort study of dietary iron and heme iron intake and risk of colorectal cancer in women. *British Journal of Cancer*; 97(1): 118–122.

Kamkar, A., Hosieny, H., Alavi, S., Bahonar, A. (2005) .The study of nitrite residue in meat products consumed in Tehran in 2003. *Pajouhesh and Sazandegi*; 63: 60-65.

Kana, W.u., Fran, B., Hu, C. F *et al*. (2004). Dietary Patterns and Risk of Colon Cancer and Adenoma in a Cohort of Men (United States). *Cancer Causes & Control*; 15(9): 853-862.

Kant, A.K. (2010). Dietary patterns: biomarkers and chronic disease risk. *Applied Physiology, Nutrition, and Metabolism*; 35 (2):199-206.

Kelshadi, R., Rabiee, K., Khosravi, A., Famouri, F *et al*. (2001). Assessment of physical activity in adolescents of Isfahan. *Journal of Shahrekord University of medical science*; 72: 912-21.

Kerver, J.K., Yang, E. J., Bianchi, L *et al*. (2003). Dietary patterns associated with risk factors for cardiovascular disease in healthy US adults. *American Journal of Clinical Nutrition*; 78 (6): 1103-1110.

Kesse, E., Clavel-Chapelon, F., and Boutron-Ruault, M .C. (2006). Dietary patterns and risk of colorectal tumors: a cohort of French women of the National Education System (E3N). *American Journal of Epidemiology*; 164 (11): 1085- 1093.

Kesses, E., Boutron, M.C., Norat, T *et al*. (2005). Dietary calcium, phosphorus, vitamin D, dairy products and the risk of colorectal adenoma and cancer among French women of the E3NEPIC prospective study. *International Journal of Cancer*; 117(1): 137-44.

Kimiagar S.M., Ghaffarpou M., Houshiar-Rad. A *et al*. (1998). Food consumption pattern in the Islamic Republic of Iran and its relation to coronary heart disease. *East Mediterranean Health Journal*, 4: 539-547.

Klurfeld, D.M. (1997). Fiber and Cancer Protection - Mechanisms. *Advance Experimental Medicine Biology*; 427: 249-257.

Knize, M.G., Felton, J.S. (2005). Formation and human risk of carcinogenic heterocyclic amines formed from natural precursors in meat. *Nutrition Review;* 63(5): 158–165.

Kobayashi, M., Taubono, Y., Otani, T *et al*. (2004). Fish, long-chain n-3 polyunsaturated fatty acids, and risk of colorectal cancer in middle-aged Japanese: the JPHC study. *Nutrition and Cancer*; 49(1): 32-40.

Kolahdoozan, S., Sadjadi, A., Radmard, A. R *et al*. (2010). Five common cancers in Iran. *Archives of Iranian Medicine*; 13(2): 143-146.

Koushik, A., Hunter, D.J., Spiegelman, D *et al*. (2007). Fruits, vegetables, and colon cancer risk in a pooled analysis of 14 cohort studies. *Journal of the National Cancer Institute;* 99(19): 1471–1483.

Krauss, R.M., Eckel, R.H., Howard, B *et al*. (2000). AHA Dietary Guidelines Revision 2000: a statement for healthcare professionals from the nutrition committee of the American Heart Association. *Circulation*. 102: 2284-2299.

Kruk, J., Aboul-Enein, H.Y. (2007). The role of physical activity in the prevention of cancer. Review Article. *Cancer Therapy*; 5: 169-180.

Kurotani, k., Budhathoki1, S., Joshi1, A.M *et al*. (2010). Dietary patterns and colorectal cancer in a Japanese population: The Fukuoka colorectal cancer study. *British Journal of Nutrition;* 104: 1703–1711.

Kyungwon, O., Willet, C.W., Charles, S *et al*.(2005).Dietary Marine n-3 Fatty Acids in Relation to Risk of Distal Colorectal Adenoma in Women. Cancer Epidemiology Biomarkers Prevention; 14: 835-841

Larsson, S.G., Giovannucci, E., Bergkvist, L and Wolk, A. (2005). Whole grain consumption and risk of colorectal cancer: a population-based cohort of 60,000 women. *British Journal Cancer*; 92(9): 1803-1807.

Larsson, S.C., Rutegard, J., Bergkvist, L., and Wolk, A. (2006). Physical activity, obesity, and risk of colon and rectal cancer in a cohort of Swedish men. *European Journal of Cancer*, 42(15): 2590-2597.

Larsson, S.C., and Wolk, A. (2007). Obesity and colon and rectal cancer risk: a meta-analysis of prospective studies. *The American Journal of Clinical Nutrition*; 86(3): 556-65.

Larsson, S.C., and Wolk, A. (2006). Meat consumption and risk of colorectal cancer: a meta-analysis of prospective studies. *International Journal of Cancer*; 119: 2657–2664.

Larsson, S.C., Bergkvist, L., Rutegard, J *et al*. (2006). Calcium and dairy food intakes are inversely associated with colorectal cancer risk in the Cohort of Swedish Men. *American Journal of Clinical Nutrition*; 83(3): 667-673.

Larsson,S.C,., Bergkvist, L., and Wolk, A. (2005). High-fat dairy food and conjugated linoleic acid intakes in relation to colorectal cancer incidence in the Swedish Mammography Cohort. *American Journal of Clinical Nutrition*; 82(4): 894-900.

Lasheras, C., Fernandez, S., and Patterson, A.M. (2000). Mediterranean diet and age with respect to overall survival in institutionalized, nonsmoking elderly people. *American Journal Clinical Nutrition*; 71(4): 987-92.

Laura, A., Susan, M., Peter, H *et al*. (2004). Cigarette smoking and colorectal carcinoma mortality in a cohort with long-term follow-up. *Cancer*; 100 (2): 288–293.

Lee, R. D., and Nieman, D.C. (2007). Nutritional assessment. Fourth edition. Published by McGraw-Hill. Chapter 6 pp.169-221.

Lee, I.M. (2003). Physical activity and cancer prevention–data from epidemiologic studies. *Medical Science Sports Exercise*; 11: 1823-1827.

Lee, S.A., Cai, H., Yang, G *et al*. (2010). Dietary patterns and blood pressure among middle-aged and elderly Chinese men in Shanghai. *British Journal of Nutrition*; 104(2): 265-275.

Lee, S.A., Shu, X.O., Yang, G *et al*. (2009). Animal origin foods and colorectal cancer risk: a report from the Shanghai Women's Health Study. *Nutrition Cancer*; 61(2): 194–205.

Levi, F., Pasch, C., Lucchini, F *et al* (2002). Macronutrients and colorectal cancer: a Swiss case-control study. *Annal of Oncology*; 13: 369–73.

Lin, J.K. (1990). Nitrosamines as potential environmental carcinogens in man. *Clinical Biochemistry*; 23(1): 67-71.

Lin, J., Zhang, S.M., Cook, N.R., Manson, J. E *et al*. (2004). Intakes of calcium and vitamin D and risk of colorectal cancer in women. *American Journal of Epidemiology*; 161(8): 755-764.

Lin, J., Zhang, S.M., Cook, N.R *et al*. (2005). Dietary intakes of fruit, vegetables, and fiber, and risk of colorectal cancer in a prospective cohort of women (United States).*Cancer Causes Control*; 16(3): 225-233.

Lin, J., Zhang, S.M., Cook, N.R *et al*. (2004). Dietary Fat and Fatty Acids and Risk of Colorectal Cancer in Women. *American Journal Epidemiology*; 160 (10): 1011-1022.

Link, L.B and Potter, J.D. (2004). Raw versus cooked vegetables and cancer risk. *Cancer Epidemiology Biomarkers & Prevention*; 13 (9): 1422-1435.

Linton, R.H., Dallas, R.E., John, P *et al*. (2007). Dietary patterns and cardiovascular mortality in the Melbourne Collaborative Cohort study. *American Journal of Clinical Nutrition*; 86 (1): 221-229.

Loh, H.Y., Jakszyn, P., Luben, R.N *et al* (2011). N-nitroso compounds and cancer incidence: the European Prospective Investigation into Cancer and Nutrition (EPIC)–Norfolk study. *The American Journal of Clinical Nutrition;* 93(5): 1053-1061.

Lipkin, M., Reddy, B., Newmark, H., and Lamprecht, S.A. (1999). Dietary factors in human colorectal cancer. *Annual Review of Nutrition*; 19: 545-586.

Lopez, E., Schulze, M.B,. Fung, T.T *et al*. 2004. Major dietary patterns are related to plasma concentration and endothelial dysfunction. *American journal of Clinical Nutrition*; 80: 1029-35.

Malekzadeh R., Bishesari, F., Mahdavinia, M and Ansari, R. (2009). Epidemiology and Molecular Genetics of Colorectal Cancer in Iran: A Review. *Archives of Iranian Medicine;* 12(2): 161 – 169.

Malik, V.S., Fun, T.T., Rob, M *et al*.(2011).Dietary Patterns During Adolescence and Risk of Type 2 Diabetes Mellitus in Middle-Aged Women; *Diabetes Care.*

Marchand, L.e., Donlon, T., Seifried, A *et al*. (2002). Red meat intake, CYP2E1 genetic polymorphisms, and colorectal cancer risk. *Cancer Epidemiology and Biomarkers Prevention*; 11(10 Pt 1): 1019-1024.

Martínez, M.E., Elizabeth T. Jacobs, E.T *et al*. (2007). Meat intake, preparation methods, mutagens and colorectal adenoma recurrence. *Carcinogenesis*; 28 (9): 2019-2027.

McCullough, M.L., Robertson, A.S., Rodriguez, C *et al*. (2003).Calcium, vitamin D, dairy products, and risk of colorectal cancer in the Cancer Prevention Study II Nutrition Cohort (United States). *Cancer Causes Control*; 14(1): 1-12.

McGarr, S.E., Ridlon, J.M., and Hylemon ,P.B. (2005). Diet, anaerobic bacterial metabolism, and colon cancer: a review of the literature. *Journal Clinical Gastroenterol*; 39(2): 98-109.

McNaughton, S., Mishra, G.D., and Brunner, E.J. (2008) Dietary Patterns, Insulin Resistance, and Incidence of Type 2 Diabetes in the Whitehall II Study. *Diabetes Care*; 31(7): 1343–1348.

Miller, P.E., Lazarus, P., Lesko, S.M *et al*. (2010). Diet index-based and empirically derived dietary patterns are associated with colorectal cancer risk. *The Journal of Nutrition*, 140: 1267-1273.

Mirmiran, P., Hosseini Esfahani, F., Mehrabi, Y *et al*. (2009). Reliability and relative validity of a food frequency questionnaire for nutrients in the Tehran Lipid and Glucose Study. *Journal Public Health Nutrition*; 13(5): 654 – 662.

Mirvish, S. S., Haorah, J., Zhou, L and Clapper, M. L. (2002). Total N-Nitroso compounds and their Precursors in hot Dogs and in the gastrointestinal tract and feces of rats and mice: possible etiologic agents for colon cancer. *The Journal of the Nutrition*; 132 (11): 3526S-3529S.

Mizoue, T., Yamaji, T., Tabata, S., Yamaguchi, K *et al*. (2005). Dietary patterns and colorectal adenomas in Japanese men the self-defense forces health Study. *American Journal of Epidemiology*; 161 (4): 338-345.

Moghibi-Dehkordi, B., Safaee, A and Zali, M.Z. (2008). Prognostic factors in 1,138 Iranian colorectal cancer patients. *International Journal of Colorectal Disease*; 22(7): 683-688.

Moeller, S.M., Reedy, J., and Millen, A. (2007). Dietary patterns: Challenges and Opportunities in Dietary Patterns Research. *Journal of American Dietetic* Association; 107: 1233-1239.

Moghaddam, A. A., Wodward, M., Huxley, R. (2007). Obesity and risk of colorectal cancer: a meta-analysis of 31 studies with 70,000 events. *Cancer Epidemiology Biomarkers Prevention*; 16 (12): 2533-2547.

Montonen, J., Knekt, P., Harkanen, T *et al*. (2005). Dietary Patterns and the Incidence of Type 2 Diabetes.*American Journal of Epidemiology*; 161 (3): 219-227.

Moradi, A., Khayamzadeh, M., Guya, M.M *et al*. (2009). Survival of colorectal cancer in Iran. *Asian Pacific Journal of Cancer Prevention*; 10(4): 583-586.

Mohebbi, M., Mahmoodi, M., Wolfe, R *et al.* (2008). Geographical spread of gastrointestinal tract cancer incidence in the Caspian Sea region of Iran: spatial analysis of cancer registry data. *BMC Cancer*; 8:137.

Moskal, A., Norat, T., Ferrari, P *and* Riboli, E. (2007). Alcohol intake and colorectal cancer risk: A dose–response meta-analysis of published cohort studies. *International Journal of Cancer*; 120(3): 664-671.

Mousavi, S. M., Gouya, M. M., Ramazani, R *et al*. (2008). Cancer incidence and mortality in Iran. *Annals of Oncology;* 20(3): 556-563.

Mousavi, M., Alamolhoda, A.A., Gouya, M. M and Lickss, N. (2008). Implementation of Comprehensive National Cancer Control Program in Iran: an experience in a developing country. *Annals of Oncology*; 19(2): 398-400.

Michels, KB., Willet, WC., Funchs, C and Gionnucci, E. (2005). Coffee, tea, and caffeine consumption and incidence of colon and rectal cancer. *Journal of National Cancer Institute*; 97 (4): 282-292.

Michels, K.B., Giovannucci, E., Chan, A.T *et al*. (2006). Fruit and Vegetable Consumption and Colorectal Adenomas in the Nurses' Health Study. *Cancer Research*; 66: 3942.

Murtaugh, M.A., Ma, K.N., Sweeney, C *et al*. (2004). Meat consumption patterns and preparation, genetic variants of metabolic enzymes, and their

association with rectal cancer in men and women. *Journal Nutrition*; 134(4): 776-784.

Murtaugh, M.A., Herrick, J. S., Baumgartner, K. B *et al.* (2007). Diet Composition and Risk of Overweight and Obesity in Women Living in the Southwestern United States. *Journal of the American Dietetic Association*; 107(8):1311-1321.

Mucci L.A., Adami, H.O., and Wolk A. (2006). Prospective study of dietary acrylamide and risk of colorectal cancer among women. *International Journal of Cancer*; 118(1): 169–173.

Nagy, LE. (2004). Molecular aspects of alcohol metabolism: transcription factors involved in early ethanol-induced liver injury. *Annual Review of Nutrition*; 24: 55-78.

National Cancer Registry Report 2000-2001. (2001). Tehran, Iran: Ministry of Health, Deputy for Health Directory, CDC Cancer Office (Persian).

National Cancer Registration in Iran 2004 - 2005. (2005) Center for Disease Control & Prevention, Ministry of Health and Medical Education (Persian).

National Cancer Registry Report 2005-2006. (2006) Tehran, Iran: Ministry of Health, Deputy for Health Directory, CDC Cancer Office (Persian).

National Health Survey. (1992). Teheran, Ministry of Health and Medical Education.

National Foundation for Cancer Research. (2006).Colorectal Cancer Prevention and Treatment.http://www2.nfcr.org/site/PageServer?pagename=cancers_colorectal. (Accessed 5 May 2012).

National Food Consumption Survey. Teheran, National Nutrition Institute, 1995. National Research Council - Committee on Diet and Health. 1989. Diet and health: implications for reducing chronic disease risk. Washington, DC: National Academy Press.

National Nutrient Database for Standard Reference Release 17 [database on the Internet].Washington: USDA. [Cited 2005 Sep 19]. Available from: http://www.nal.usda.gov/fnic/foodcomp. (For energy intake is used).

Navarro, A., Munoz, S.E., Lantieri, M.J *et al.* (2004). Meat cooking habits and risk of colorectal cancer in Cordoba, *Argentina Nutrition*, 20(10): 873-877.

Navarro, A., Diaz, M.P., Munoz, S.E *et al.* (2003).Characterization of meat consumption and risk of colorectal cancer in Cordoba, *Argentina Nutrition*; 19(1): 7-10.

Newby, P.K., Muller, D., Hallfrisch, J *et al*. (2003). Dietary patterns and changes in body mass index and waist circumference in adults. *American Journal of Clinical Nutrition*; 77(6): 1417-1425.

Nikpour, S., Habibi Sola, A., Seiedoshohadaei, M *et al*. (2006). Health promotion behaviors among elderly in Tehran-Iran 2006. *Middle East Journal of Age and Ageing;* ISSN; 1449-8677.

Nitzke, S., Freeland-Graves, J. (2007). Position of the American Deistic Association: total diet approach to communicating food and nutrient information. *Journal of the American Dietetic Association*; 107: 1224-1232.

Nock, N.L., Cherly, L., Thomas, C *et al*. (2008). Associations between obesity and changes in adult BMI over time and colon cancer risk. *Obesity;* 16 (5):1099–1104

Norat, T., Riboli, E. (2003). Dairy products and colorectal cancer. A review of possible mechanisms and epidemiological evidence. *European Journal of Clinical Nutrition;* 57(1): 1–17.

Norat, T., Lukanova, A., Ferrari, P *et al*. (2002). Meat consumption and colorectal cancer risk: dose-response meta-analysis of epidemiological studies. *International Journal of Cancer*; 98(2): 241-56.

Norman, A., Bellocco, R., Bergstrom, A., Wolk, A. (2001). Validity and reproducibility of self-reported total physical activity--differences by relative weight. *International Journal of Obesity related metabolic disorders*; 25(5):682-688.

Nomura, A.M.Y., Wilkens, L.R., Murphy, S.P., Jean *et al*. (2008). Association of vegetable, fruit, and grain intakes with colorectal cancer: the Multiethnic Cohort Study**.** *American Journal of Clinical Nutrition*; 88(3):730-737.

Oh, T.H., Byeon, J.S., Myung, S.J *et al*. (2008) .Visceral obesity as a risk factor for colorectal neoplasm. *Journal of Gastroenterol and Hepatology*; 23(3):411-417.

Nowell, S., Coles. B., Sinha, R *et al*. (2002). Analysis of total meat intake and exposure to individual heterocyclic amines in a case-control study of colorectal cancer: contribution of metabolic variation to risk. *Mutation Research/ fundamental and Molecular Mechanism of Mutagenesis; 506–* 507: 205–214.

Nkondjock, A., Shatenstein. B., Maisonneuve, P *et al*. (2003). Specific fatty acids and human colorectal cancer: an overview. *Cancer Detect Prevention*; 27: 55-66.

Nkondjock A, Shatenstein B, Maisonneuve P, *et al*. (2003). Assessment of risk associated with specific fatty acids and colorectal cancer among French-Canadians in Montreal: a case-control study. *International Journal of Epidemiology;* 32(2): 200–209.

Okasha, M., McCarron, P., McEwen, J., Smith, G. (2002). Body mass index in young adulthood and cancer mortality: a retrospective cohort study, *Journal of Epidemiology Community Health*; 56 (10): 780-784.

Osler, M., Andreasen,A.H., Heitmann, B *et al*. (2002). Food intake patterns and risk of coronary heart disease: a prospective cohort study examining the use of traditional scoring techniques. *European Journal of Clinical Nutrition*; 56(7): 568-574.

Oyesanmi, O., Snyder, D., Sullivan, N *et al.* (2010). Alcohol consumption and cancer risk: understanding possible causal mechanisms for breast and colorectal cancers. Rockville (MD): Agency for Healthcare Research and Quality (US); Evidence Reports/Technology Assessments, No. 197.

Pahlava, P.S., Jensen, K. (2005). A short impact of epidemiological features of colorectal cancer in Iran. *Tumori*; 91(4): 291-4.

Panagiotakos, D., Pitsavos, C., Chrysohoou, C *et al*. (2009). Dietary patterns and 5-year incidence of cardiovascular disease: A multivariate analysis of the ATTICA study. *Nutrition, Metabolism & Cardiovascular Diseases***;** 19(4): 253-263.

Paradis, A.M., Godin, G., Perusse, L *et al*. (2009). Associations between dietary patterns and obesity phenotypes**.** *International Journal of Obesity*; 33**,** 1419–1426.

Park, S.Y., Murphy, S.P., Wilkens, L.R *et al*. (2007). Calcium and vitamin D intake and risk of colorectal cancer: the Multiethnic Cohort Study. *American Journal Epidemiology*; 165(7): 784–793.

Park, Y., Spiegelman, D., Hunter, D.J *et al*. (2010).Intakes of vitamins A, C, and E and use of multiple vitamin supplements and risk of colon cancer: a pooled analysis of prospective cohort studies. *Cancer Causes Control*; 21(11): 1745-57.

Park, Y., Hunter, D.J., Spigeman, D *et al*. (2005). Dietary fiber intake and risk of colorectal cancer. *The Journal of the American Medical Association*; 294 (22): 2849-2857.

Park, K.M., Kim, K. M ., Park, Y.S *et a*l. (2007). Anti cancer activities of pure curry feeding in cancer cell-transplanted mouse. *Asia Pacific Journal of Clinical* Nutrition*;* 16 (1): 30-39.

Park, J.K., Mitrou, P.N., Dahm, C.C *et al*. (2009). Baseline alcohol consumption, type of alcoholic beverage and risk of colorectal cancer in the European Prospective Investigation into Cancer and Nutrition-Norfolk study. *Cancer Epidemiology*; 33(5): 347-354.

Pelucchi, C., Galeone, C., Levi, F., Negri, E *et al*. (2006). Dietary acryl amide and human cancer. *International Journal of cancer*; 118(2): 467-71.

Peppone, L.J., Hyland, A., B. Moysich, K.B *et al.* (2009). Examining the association between cigarette smoking and colorectal cancer using historical case-control data. *Cancer Epidemiology*; 33(3-4): 182-188.

Peters, U., McGlynn, K.A., Chatterjee, N *et al*. (2001). Vitamin D, calcium, and vitamin D receptor polymorphism in colorectal adenomas. *Cancer Epidemiology, Biomarkers& Prevention*; 10(12): 1267-1274.

Pischon, T., Lahmann, P.H., Boeing, H *et al*. (2006). Body size and risk of colon and rectal cancer in the European prospective investigation into cancer and nutrition (EPIC). *Journal of the national Cancer Institute*; 98(13): 920-31.

Popkin, B.M., Horton, S.H., and Soowon, K. (2001). The Nutrition Transition and Prevention of Diet- Related Diseases in Asia and the Pacific. *Food and Nutrition Bulletin*; 22 (4).

Pourhoseingholi, M.A., Faghihzadeh, S., Hajizadeh, E *et al*. (2010). Years of life lost due to colorectal cancer in Iran. *Gastroenterology and Hepatology from Bed to Bench*; 3(4): 187-189.

Powell SM, Zilz N, Beazer-Barclay Y, et al. (1992). APC mutations occur early during colorectal tumorigenesis. *Nature*; 359(6392): 235-237.

Pronko, P., Bardina, L., Satanovskaya, Vet al. (2002). Effect of chronic alcohol consumption on the ethanol-and acetaldehyde-metabolizing systems in the rat gastrointestinal tract. *Alcohol and Alcoholism*; 37(3): 229-235.

Pufulete, M. (2008), Intake of dairy products and risk of colorectal neoplasia. *Nutrition Research Reviews*; 21: 56–67.

Raju R., and Cruz-Correa M. (2006). Chemoprevention of colorectal cancer. *Disease of Colon and Rectum*; 49(1): 113-24.

Ramadas, A., Kandiah, M., Zarida, H *et al*. (2009).Obesity and Risk of Colorectal Adenomatous Polyps: a Case-Control Study in Hospital Kuala Lumpur. *Malaysia Journal of Nutrition*; 15(1): 1 – 10.

Rashidkhani, B., Hajizadeh A. B., Houshyarrad, A *et al*. (2008). Dietary patterns and risk of Squamous –cell carcinoma of oesophagus in Kurdistan province. *Iranian journal of nutrition sciences*; 3 (10): 11-21.

Rashidkhani, B., Rezazadeh, A., Omidvar, N et al. (2008). Relationships of major dietary patterns and their association with socioeconomic and demographic factors in 20- 50 years old women in the north of Tehran. *Iranian Journal of Nutrition Science & Food Technology*; 3 (2): 1-12 [In Persian].

Reddy, B. S. (2004). Omega-3 fatty acids in colorectal cancer prevention. *International Journal of cancer*: 112: 1–7.

Rezazadeh R, Rashidkhani B Omidvar N. (2010). Association of major dietary patterns with socioeconomic and lifestyle factors of adult women living in Tehran, Iran. *Nutrition*; 26(3): 337-341.

Roynette, C.E., Calder, P.C., Dupertuis, Y.M., *et al*. (2004). N-3 polyunsaturated fatty acids and colon cancer prevention. *Clinical Nutrition;* 23: 139-15.1

Ruel, M.T., Garrett, J.L., Haddad, L. (2008). Rapid urbanization and challenges of obtaining food and nutrition security. Nutrition and health in developing countries. *Nutrition and Health*; 639- 656.

Ryan-Harshman, M *et al*. (2007). Diet and colorectal cancer. Review of the evidence. *Caner physician medicine de family Canadian;* 53 (11): 1913-1920

Royak-Schaler, R., Blocker, D E., Yali, AM *et al*. (2004). Breast and colorectal cancer risk communication approaches with low-income African-American and Hispanic women: implications for healthcare providers. *Journal National Medical Association*; 96(5): 598–608.

Sabzghabaee, A., Mirmoghtadaee, P., Mohammadi, M *et al*. Fruit and Vegetable Consumption among Community Dwelling Elderly in an Iranian Population. *International Journal of Prevention Medicine*; 1(2): 98–102.

Sadjadi, A., Nouraie, M., Mohagheghi, M.A *et al*. (2005). Cancer occurrence in Iran in 2002, an International perspective. *Iran Asian pacific Journal cancer prevention*; 6 (3): 359-363.

Safavi, S.M., Omidvar, N., Jazayery, A.D *et al.* (2007). Development of Food-Based Dietary Guidelines for Iran: A Preliminary Report. *Annals of Nutrition and Metabolism*; 51(2):32-35.

Salimzadeh, H., Mohsenpour, B., Ghaderi E *et al*. (2007). Hypertension, hypercholesterolemia and diabetes in ischemic heart diseases. *Profession Medical Publication*; 23 (4): 597-601.

Samad, A.K., Taylor, R.S., Marshall, T and Chapman, M.A. (2005). A meta-analysis of the association of physical activity with reduced risk of colorectal cancer. *Colorectal Disease*; 7(3): 204-213.

Sansbury, L.B., Millikan, R.C., Schroeder, J.C *et al*. (2005). Use of Non-steroidal Anti-inflammatory drugs and risk of colon cancer in a population-based, case-control study of African Americans and Whites. *American Journal of Epidemiology;* 162(6): 548–558.

Santarelli, R. L., Pierre, F., and Corpet, D.E. (2008). Processed meat and colorectal cancer: a review of epidemiologic and experimental evidence. *Nutrition of Cancer*; 60(2): 131–144.

Sanjoaquin, M.A., Appleby, P.N., Thorogood, M *et al* (2004). Nutrition, lifestyle and colorectal cancer incidence: a prospective investigation of 10998 vegetarians and non-vegetarians in the United Kingdom. *British Journal of Cancer*; 90 (1): 118-121.

Sarkissian, N., Azar, M. (1980). Food composition table of Iran. 1st ed. Islamic Republic of Iran, Institute of Nutrition Sciences and Food Technology; Report No.: 131.28. (For Energy intake is used)

Satia, J. A., Tseng, M., Galanko, J.A *et al*. (2009). Dietary patterns and colon cancer risk in Whites and African Americans in the North Carolina Colon Cancer Study. *Nutrition and Cancer;* 61(2): 179-193.

Schatzkin, A., and Kipnis, V. (2004). Could exposure assessment problems give us wrong answers to nutrition and cancer questions? *Journal of the National Cancer Institute*; 96 (21): 1564-1565.

Schulz, M. B., Fung, T.T., Manson, J, E *et al*. (2006). Dietary patterns and changes in body weight in women. *Obesity (Silver Spring);* 14(8): 1444-1453.

Seow, A., Yuan, J.M., Puaykoh, W *et al*. (2006). Diabetes mellitus and risk of colorectal cancer in the Singapore Chinese Health Study. *Journal of the National Cancer Institute*; 98 (2): 135-138.

Shimazu, T., Kuriyama, S., Hozawa, A *et al*. (2007). Dietary patterns and cardiovascular disease mortality in Japan: a prospective cohort study. *International Journal of Epidemiology*; 36 (3): 600-609.

Shrubsole, M.J., Wu, H., Ness, R.M *et al*. (2008). Alcohol drinking, cigarette smoking, and risk of colorectal adenomatous and hyperplastic polyps. *American Journal Epidemiology*; 167 (9): 1050-1058.

Sinha, R., Peters, U., Cross, A.J *et al*. (2005) Meat, meat cooking methods and preservation and risk for colorectal adenoma. *Cancer Research*; 65(17): 8034-8041.

Solano, M.P., and Goldberg, R.B. (2006). Lipid management in type 2 diabetes. *Clinical Diabetes*; 24 (1): 27-32.

Slattery, M.L., Edwards, S., Curtin, K *et al*. (2003). Physical activity and colorectal cancer. *American Journal Epidemiology*; 158(3): 214-24.

Slattery, M. L., Curtin, K. P., Edward, S. L., and Schaffer, D. M. (2004). Plant foods, fiber, and rectal cancer. *American Journal Clinical Nutrition*; 79(2):274-281.

Slattery, ML. (2008). Defining dietary consumption: is the sum greater than its parts? *American Journal Clinical Nutrition*; 88(1): 14–15.

Sofi, F., Cesori, F., Abbate, R *et al*. (2008). Adherence to Mediterranean diet and health status: meta-analysis. *BMJ journal*; 337: 1344.

Stoneham, M., Goldacre, M., Seagroatt, V *et al*. Olive oil, diet and colorectal cancer: an ecological study and a hypothesis. *J Epidemiology Community Health* 2000; 54(10): 756–60.

Stuart, G. R., Thorleifson, E., Okochi, E *et al*. (2000). Interpretation of mutational spectra from different genes: analyses of PhIP-induced mutational specificity in the lacI and cII transgenes from colon of Big Blue rats. *Mutation Research*; 452 (1): 101–121.

Sugawara, Y., Kuriyama,S., Kakizaki, M *et al*. (2009). Fish consumption and the risk of colorectal cancer: the Ohsaki Cohort Study. *British Journal of Cancer;* 101: 849–854.

Sugimura, T., Wakabayashi, K., Nakagama, H *et a*l. (2005). Heterocyclic amines: Mutagens/carcinogens produced during cooking of meat and fish. *Cancer Science;* 95(4): 290-299.

Su L. J., and Arab, L. (2004). Alcohol consumption and risk of colon cancer: evidence from the national health and nutrition examination survey I epidemiologic follow-up study. *Nutrition Cancer*; 50(2): 111–119.

Symm, B., Morgan, M. V., Blackshear, Y and Tinsley, S. (2005). "Cigar Smoking: an Ignored Public Health Threat". *The Journal of Primary Prevention* 26 (4): 363.

Tabatabaei, S.M., Fritschi, L., Knuiman, M. W *et al*. (2011). Meat consumption and cooking practices and the risk of colorectal cancer. *European Journal of Clinical Nutrition*; 65: 668-675.

Tamakoshi, K., Wakaj, k., watanabe, Y *et al*. (2004). A prospective study of body size and colon cancer mortality in Japan: the JACC Study. *International Journal of Obesity Related Metabolic Disorder*; *28*(4): 551-558.

Teresa, T., Fung, Sc.D. Matthias, S., Joann, E *et al*.(2004). Dietary Patterns, Meat Intake, and the Risk of Type 2 Diabetes in Women. *Archives of Internal Medicine;* 164: 2235-2240.

Terry, P.D., Hu, F.B., and Wolk, H.A. (2001). Prospective study of major dietary patterns and colorectal cancer risk in women. *American Journal of Epidemiology*. 154(12): 1143-1149.

Terry, P. D., Miller, B. A., Rohan, E. (2002). Prospective cohort study of cigarette smoking and colorectal risk in women. *International Journal of Cancer.*99, 480–483.

Terry, P. D., Giovannucci, E., Michels, K. B *et al*. (2001). Fruit vegetables, dietary fiber, and risk of colorectal cancer. *Journal of the National Cancer Institute;* 93(7): 525-533.

Terry, P., Bergkvist, L., Holmberg, L and Wolk, A. (2001). No Association between Fat and Fatty Acids Intake and Risk of Colorectal Cancer. *Cancer Epidemiology, Biomarkers & Prevention*; 10: 913-914.

Terry, P., Giovannucci, E., Bergkvist, L et *al*. (2001). Body weight and colorectal cancer risk in a cohort of Swedish women: relation varies by age and cancer site. *British Journal of Cancer*; 85(3): 346–349.

Theodoraou, E., McNeill, G., Cetnarskyi, R *et al*. (2007). Dietary Fatty Acids and Colorectal Cancer: A Case-Control Study. *American Journal of Epidemiology*; 166 (2): 181-195.

Thompson, P.D., Buchner, D., Pina, I. L *et al*. (2003). Exercise and physical activity in the prevention and treatment of atherosclerotic cardiovascular disease. *Circulation*; 107: 3109-3116

Thorne, A., Mercer, S., Harris, G and Simson, J (2006). Reduction in Late Diagnosis of Colorectal Cancer Following Introduction of a Specialist Colorectal Surgery Service. Annals of the Royal College of Surgeons of England; 88(6): 562–565

Thun, M.J., Delancey, J.O., Center, M.M *et al*. (2010). The global burden of cancer: priorities for prevention. *Carcinogenesis*; 31 (1): 100-110.

Togo, P., Osler, M., Sorensen T *et al.* (2001). Food intake patterns and body mass index in observational studies. *International Journal of Obesity;* 25: 1741 – 1751

Tsubono, Y., Otani, T., Kobayashi, M *et al*. (2005). No association between fruit or vegetable consumption and the risk of colorectal cancer in Japan. *British Journal of Cancer*; 92: 1782–1784.

Tucker, K.L., Buranapin, S. (2001). Nutrition and ageing in developing countries. *Journal of Nutrition*; 131: 2417S-23S.

US National Cancer Institute. (2011). Comprehensive cancer information. Available from: www.cancer.gov/cancertopics (Accessed 11 May. 2012).

Van, D.R., Rimm, E.B., Willett, W.C *et al*. (2002). Dietary patterns and risk for type 2 diabetes mellitus in U.S. men. *Annals of Internal Medicine*; 136: 201–209.

Voorrips, L.E., Goldbohm, R.A., Popple, G.V *et al.* (2000).Vegetable and fruit consumption and risks of colon and rectal cancer in a prospective cohort Study the Netherlands cohort study on diet and cancer. *American Journal Epidemiology*; 152(11): 1081-1092.

Williams, C.D., Satia, J.A., Adair, L.S., Stevens, J *et al*. (2009). Dietary patterns, food groups, and rectal cancer risk in Whites and African Americans. *Cancer Epidemiology Biomarkers Prevention*; 18(5): 1552–1561.

Williams, C.D., Satia, J.A., Adair, L.S et *al*. (2010). Associations of red meat, fat, and protein intake with distal colorectal cancer risk. *Nutrition Cancer*; 62 (6): 701-709.

Williams, G. M., Williams, C.L and Weisburger, J.H. (1999). Diet and cancer prevention: the fiber first diet. *Toxicological science*; 52 (2): 72-86.

Williams, D., Prevost, A., Whichelow, M *et al*. (2000). A cross-sectional study of dietary patterns with glucose intolerance and other features of the metabolic syndrome. *British Journal of Nutrition*; 83(3): 257-266.

World Cancer Research Fund and American Institute for Cancer Research. (2010). Food, nutrition, physical activity and prevention of cancer: a global prospection. From: www.dietandcancerreport.org/ (Accessed 10April 2011).

World Cancer Report 2008. International Agency for Research on Cancer (IARC) Lyon: Edited by Peter Boyle and Bernard Levin. Available from: http://www.iarc.fr/en/publications/pdfs-online/wcr/2008/index.php (Accessed 10 May 2012).

World Health Organization. (2006). Fact sheet Number No, 311. From: http:// www.who.int/mediacenter/fs311/en/index.html (Accessed 5 April 2012).

World Health Organization. (2009). WHO- Cancer. http://www.who.int/cancer/en/ (Accessed 2 February 2012)

World Health Organization. WHO Mortality Database. http://www-dep.iarc.fr/. (Accessed 13 April, 2012)

World Health Organization & Food and Agriculture Organization. (2003). Diet, nutrition and the prevention of chronic disease. Report of joint WHO/FAO expert consultation.WHO Technical Report Series, Number. 916. Available from: www.who.int/hpr/NPH/docs/who_fao_expert_report.pdf (Accessed 2 February 2011).

World Health Organization. (2003). The nutrition transition: new trends in the global diet. *Nutrition Reviews*; 55: 31-43.

World Health Organization. (2005). Physical activity; Available from: www.who.int/dietphysicalactivity/pa/en/index.html (Accessed 3May 2012).

World Health Organization. (2011). Fact sheet No, 297: Available from: www.who.int/mediacentre/factsheets/fs297/en/index.html (Accessed 12 February 2011).

Wu, A.H., Shibata, D., Yu, M.C., Lai, M., and Ross, R.K. (2001). Dietary heterocyclic amines and microsatellite instability in colon adenocarcinomas. *Carcinogenesis*; 22 (10): 1681-1684.

Wu, K., Hu, F.B., Funchs, C., Rimm, E. B., C *et al*. (2004). Dietary patterns and risk of colon cancer and adenoma in a cohort of men (United States). *Cancer Causes & Control*; 15(9): 853-862.

Yang, E.J., Kerver, J.M., and Song, W. (2005). Dietary patterns of Korean Americans described by factor analysis. *Journal of American college of nutrition*, 24(2): 115-121.

Yang, M.A., Saiyi, P.A., Shi, W.U *et al*. (2003). Physical inactivity, energy intake, obesity and the risk of rectal cancer in Canada. *International Journal of Cancer;* 105: 831-837.

Yanping, L., Yuna, H., Lianqiang, L *et al*.(2011). Dietary Patterns Are Associated with Stroke in Chinese Adults. *Journal of the Nutrition*; 141(10): 1834-1839

Yazdizadeh, B., Jarrahi, A.M., Mortazavi, H *et al.* (2005). Time trends in the occurrence of major GI cancers in Iran. *Asian Pacific Journal Cancer Prevention*; 6(2): 130 – 134.

Young, L. R., and Nestle, M. (2002) .The contribution of expanding portion size to the US obesity epidemic .*American Medical Journal of Public Health*; 92: 246

Zhang, H., Ye, Y., Bai, Z., Wang, S. (2008). The COX-2 selective inhibitor-independent COX-2 effect on colon carcinoma cells is associated with the delta1/notch1 pathway. *Digestive Disease and Science*; 53(8): 2195-203.

Zhang, Y., Cantor, K.P., Dosemeci, M *et al.* (2006). Occupational and leisure-time physical activity and risk of colon cancer by subsite. *Journal of Occupational and Environmental Medicine*; 48(3): 236-43

Zhao, J., Halfyard, B., Roebothan, B *et al*. (2010). Tobacco smoking and colorectal cancer: A Population-based case-control study in Newfoundland and Labrador. *Cancer of Journal Public Health;* 101(4): 281-89