Overweight/obesity and lifestyle characteristics among Iranian preschool children

Parshin Yousefi

Nr 3/2012
Overweight/Obesity and lifestyle Characteristics among Iranian Pre-school children

Parshin Yousefi

2011

Supervisor: Yulia Blomstedt, PhD
Department of Public Health and Clinical Medicine
Epidemiology and Global health
Umeå University, Sweden
Abstract:

Objective: To assess the prevalence of overweight/obesity among Iranian preschool children in Tehran and to explore risk factors of childhood overweight/obesity with focus on mothers’ characteristics, lifestyles and children’s eating habits.

Methods: In July and August 2009 a cross-sectional study was conducted on pre-school children aged 3-5 years old in Tehran. 450 questionnaires were given to the mothers and 421 of them were filled (191 girls and 230 boys). Collected data includes date of birth, height and weight of both mothers and children, and eating habits of children and their families. Body Mass Index (BMI) was calculated by self-reported height and weight. Overweight/Obesity was defined according to National Center for Health Statistical (NCHS) and Centers for Disease Control and Prevention (CDC). Finally, simple and multiple logistic regression analyses were used to explore risk factors of childhood overweight/obesity.

Results: After adjusting for all potential existing confounders, eating fast foods per week was significantly associated with overweight/obesity in children both boys (OR=2.8, 95%CI=1.6-12.6) and girls (OR=4.8, 95%CI=1.1-20.0) and BMI of mothers was significantly associated with overweight/obesity in children both girls (OR=2.8,95%CI=1.5-5.4) and boys (OR=1.4, 95%CI=1.1-3.3).

Conclusion: This data suggests that overweight and obesity are also the public health concern among pre-school children in Tehran. Consumption of junk food as well as other eating habits among children should be taken into account when planning interventions to prevent adolescent obesity.

Keywords: Pre-school children, cross-sectional study, overweight/obesity, questionnaire, Iran/Tehran
Abstract: ........................................................................................................................................ 2

Background and definition of overweight and obesity .............................................................. 3

Extent of the problem ............................................................................................................... 3

Worldwide prevalence of overweight and obesity ................................................................. 3

Prevalence of overweight and obesity among some countries .............................................. 4

Prevalence of overweight and obesity in Iran ......................................................................... 5

Factor associated with overweight and obesity ................................................................. 7

Junk food .............................................................................................................................. 7

Diseases associated with overweight and obesity .............................................................. 10

Objectives .......................................................................................................................... 12

Material and methods ........................................................................................................ 12

Study area .......................................................................................................................... 12

General information .......................................................................................................... 13

Study design ...................................................................................................................... 14

Sample size ......................................................................................................................... 14

Study population and sampling ......................................................................................... 14

Data collection techniques and variables ........................................................................... 15

Body Mass Index (BMI) ........................................................................................................ 15

Ethical aspects ................................................................................................................... 19

Statistical analysis .............................................................................................................. 19

Results ............................................................................................................................... 20

Discussion .......................................................................................................................... 28

Limitations .......................................................................................................................... 31

Conclusion .......................................................................................................................... 31

References .......................................................................................................................... 32

Appendix .............................................................................................................................. 35
Introduction

Background and definition of overweight and obesity

It has been shown that obesity and overweight in childhood can be a major reason for being overweight in adulthood (Manios et al., 2007). Childhood is one of the critical periods in the development of obesity. Childhood overweight and obesity are increasing worldwide (Maddah & Nikooyeh, 2009).

Overweight and obesity can be defined as having a high amount of body fat compared to the optimal amount and this increase in body fat may cause health problems. Children’s obesity occurs as a result of over-consumption of calories and low physical activity (Dehghan et al., 2005). Total increases in overweight and obesity are attributable to several factors including: foods that are high in fats and sugars and low in minerals, vitamins and other micronutrients, increasing low-intensity work form due to urbanization, new modes of transportation, and decreased physical activity in general (Kids Health, 2010).

It is important to understand that obesity is increasing worldwide in both developed and developing countries. The sharpest increases in obesity are in children of low-socio-economic status who live in developed countries (Maddah & Nikooyeh, 2009). In contrast, in most developing countries, such as Iran, obesity has increased during the last two years, which is a major element of the epidemiological transition (Mohammadpour-Ahranjania et al., 2004).

The body mass index (BMI) is usually used to assess overweight and obesity (Kids Heath, 2010). In order to have a normal body growth as well as to avoid the range of obesity related illnesses that can lead to social, emotional, educational and physical problems (Harbaugh et al., 2009). The level of obesity in children is connected to the level of obesity in adulthood (Vidal et al., 2006). In the USA nearly 70% of youths become obese adults (Dehghan et al., 2005). The main determinant for rising obesity and overweight later in life is due to early-childhood eating habits (Harbaugh et al., 2009).

Extent of the problem

Worldwide prevalence of overweight and obesity

The prevalence of overweight and obesity is increasing rapidly worldwide in both adults and children (Jakimaviciene & Tutkuviene, 2007). In both developed and developing countries the number of overweight children is growing continuously (Vidal et al., 2006).
More specifically, according to the international obesity task force, the number of overweight adults is more than 1.1 billion and 312 million of the adults are obese worldwide. Among children, 155 million are overweight or obese worldwide (Hossain et al., 2007).

**Prevalence of overweight and obesity among some countries**

The prevalence of overweight among Lithuanian children nearly remained the same during 1986-2006. The prevalence of obesity was 0.8%-3.7% in boys and 0.0-1.9% in girls (Jakimaviciene & Tutkuviene, 2007).

In 2005 the prevalence of overweight among children aged 2 to 5 years in the USA was 13.9%. Among them, 12.3% were in danger of obesity according to the national survey data (Welsh et al., 2005).

During 2007-2008 the BMI for age growth charts among children and adolescents 2-19 years were: 11.9% were at or above 97th percentile; 16.9% were at or above 95th percentile; 31.7% were at or above 85th percentile (Figure 1 and 2) (Ogden et al., 2010).

---

**Figure 1:** Prevalence of high BMI for age in boys and girls aged 2 - 5 years, 1999-2008 (Ogden et al., 2010).

**Figure 2:** Prevalence of high BMI for age in boys and girls aged 6-19 years, 1999-2008.(Ogden et al., 2010).
In 2003-2004 the prevalence of overweight preschool children was 16.0% and 15.5% among boys and girls respectively. Among the boys 16.3% and among the girls 16.2% of preschool children were at risk of being overweight. Greek preschool children had a high prevalence of overweight which was linked to parental overweight (Manios et al., 2007).

In England the prevalence of being overweight among children rose from 13% to 20% between 1994 and 1998 (Figure 3). This shows that surplus bodyweight rose quickly in this country. In 1998, for every 25 children, one was obese, and for every five children, one was overweight (Lobstein et al., 2003).

![Figure 3: Rising trends in overweight among children aged 7-11 years in England in 1998 compared with surveys in 1974, 1984 and 1994 (Lobstein et al., 2003).](image)

**Prevalence of overweight and obesity in Iran**

Iran is a middle income country, experiencing a quick epidemiological transition. A high prevalence of type2 diabetes, hypertension and overweight have been reported. In the majority of cases, childhood overweight and obesity, follow into adulthood (Manios et al., 2007). Obesity is now the most common nutritional disease in Iran (Maddah & Nikooyeh, 2009) especially childhood overweight/obesity is an increasing problem. However the data on the prevalence of overweight and obesity among children and adolescents are limited (Amini et al., 2007). There is some information about overweight and obesity in Iran for those ages of 15-39 (Rashidi et al., 2005), 40-69 (Rashidi et al., 2005), 30-70 (Rashidy-Pour et al., 2009), and 11-16 (Mohammadpour-Ahranjania et al., 2004), and among urban and rural girls 14-17 years old (Maddah, 2009). However, the information on preschool children is missing.

Among urban Iranian people between the ages of 15-39 and 40-69, the prevalence of overweight was estimated to be 22% and 40%, respectively. Among rural areas, it was 16% and 26%, respectively (Rashidi et al., 2005).

Among urban and rural girls 14-17 years old in Gilan (a city in North of Iran), the prevalence of overweight and obesity was 22% and 24%, respectively (Maddah, 2009).
In Tehran (Capital of Iran), the overall prevalence of overweight and obesity was 21% and 7.8% among children 11-16 years old. The prevalence of overweight among the girls (23%) was higher comparing to the boys (19%) (Mohammadpour-Ahranjania et al., 2004).

According to the study in 1995, among 11139 children 0-5 years old in Iran, the prevalence of overweight was 3.3% which is shown in Figure 4 (Onis and Blössner, 2000).

Figure 4: Weight for age distribution of preschool children in 94 countries (Onis and Blössner, 2000).
Factor associated with overweight and obesity

Junk food

The foods that are high in fat and sugar, such as crisps, sweets, wafers, colas, fizzy drinks, pizza and burgers, are highly processed foods with poor nutritional value according to Foods Standards Agency (Figure 5) (India Parenting, 2010). These foods are labelled as junk foods. In fact, the concept of junk foods corresponds to any food that is immediate, delicious and convenient. They are usually eaten instead of traditional foods (India Parenting, 2010). Junk foods have food additives and colours to make them appetizing, and these are harmful for bodies (India Parenting, 2010). Additionally junk foods include a high level of calories, and even though they lack micro-nutrients such as, vitamins, minerals, amino acids, and fiber. This energy is not useful, because it includes harmful carbohydrates, fats and cholesterol (India Parenting, 2010) (Lee, 2010).

![Figure 5: Different kinds of junk food.](image)

Food guide pyramid

The preschool years present an opportunity for children to learn to eat and enjoy different kinds of food. It is important that young children are given the same opportunity as adults in choosing their favourite foods. Children can decide the amount of food to eat from what is offered, while adults can choose the foods and the time when children can eat (US Department of Agriculture, 2002). Parents and other adults have a major impact on children when choosing healthy food and having an active lifestyle (Shaw et al., 1998). Preschool children require fewer calories than adults but they need the same variety of foods (Shaw et al., 1998). For children, age 2 years or older, it is suggested that foods be medium in saturated fat, which will supply them with the nutrients and calories they need for normal growth (Shaw et al., 1998). Adults should offer children nutritious “meal foods” as snacks, because young children often eat just a small amount at a time, for example, cut-up fruit, vegetable sticks, milk or fruit juice, strips of cooked meat or poultry, or half a sandwich (Shaw et al., 1998). The Food Guide Pyramid (Figure 6), suggest of what to eat each day. The pyramid is made up of four food groups including:
1) Bread, cereal, pasta and rice group; 2) Vegetable and fruit group; 3) Dairy (milk, yogurt and cheese) and meat, poultry, fish, eggs, dry beans and nut group; 4) Fats, oil and sweets (Shaw et al., 1998, Ashkenazi, 2006).

The grain group is at the base because more portions should come from this group than any other (Figure 6). The food guide pyramid shows a certain amount of servings from each food group. For children, the number of servings from each group is the same as adults but in smaller portions (Forever Fit, 2009). For example, recommended amounts of foods for children (ages 2-5) are suggested in the following table: (Ashkezari, 2006) (Serrano, 2009).
<table>
<thead>
<tr>
<th>Categories</th>
<th>Ingredients</th>
<th>Size for serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains (rice, pasta, cereal, bread)</td>
<td>Fiber; Complex carbohydrates; Incomplete proteins; B vitamins</td>
<td>Bread: 1 slice; Rice and pasta: 1/2 cup</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Fiber; Complex carbohydrate; Low in fat; Vitamins A, C, K</td>
<td>Row vegetables: 1/2 cup; Cooked or row vegetables: 1/2 cup</td>
</tr>
<tr>
<td>Fruits</td>
<td>High in fiber; Complex carbohydrates; Low in fat; High in vitamin (citrus fruits, melons and berries)</td>
<td>Fruit juice: 1/2 cup; 100% fruit juice: 1 cup; Fresh fruit: 1/2 cup</td>
</tr>
<tr>
<td>Dairy (milk, yoghurt, cheese)</td>
<td>Phosphorus; Calcium; Riboflavin</td>
<td>Milk or yoghurt: 1 cup; Cheese: 2 slices</td>
</tr>
<tr>
<td>Meat, poultry, fish, dry beans and nuts</td>
<td>B-vitamins; Proteins; Mineral; Iron; Fiber (refried, dry and split beans, pork); Fat protein (nuts)</td>
<td>Meat: 1-2 ounces; Egg: 1; Cooked beans: 1/4 cup</td>
</tr>
</tbody>
</table>
Diseases associated with overweight and obesity

Obesity and overweight may lead to long-term health difficulties, which are important concerns for preschool children. It has been shown that 69% of children, who have a BMI greater than the 95th percentile between 6 to 10 years, will be obese as an adult (Manios et al., 2007). Overweight and obesity are related to different health problems in children, which may have an effect on the organ systems (Jakimaviciene and Tutkuviene, 2007). Also, extra weight can have a serious impact on the social and emotional improvement among children (Jakimaviciene and Tutkuviene, 2007).

Common health consequences and the global burden of diseases related to surplus weight among children are:

1. **Type 2 diabetes:** According to the WHO projections, the death related to diabetes will rise by more than 50% globally in the next 10 years. Ninety percent of type 2 diabetes are related to extra weight (Hossain et al., 2007).
2. **Cardiovascular diseases such as stroke and hypertensive heart** kill 17 million people worldwide each year (Hossain et al., 2007).
3. **Osteoarthritis** which is an example of musculoskeletal disorders (Hossain et al., 2007).
4. **Different kinds of cancers** such as kidney, breast and colon (Jakimaviciene & Tutkuviene, 2007, Philip et al., 2004).
5. **Metabolic syndrome** is also a result of obesity (Moayeri et al., 2006).
6. **Problems for bones** (Kids Health, 2010).
7. **Increasing the probability of developing asthma, shortness of breath during exercise, sports or any physical activity** (Kids Health, 2010).
8. **Overweight kids tend to mature earlier and they may be more sexually mature and taller than their peers** (Kids Health, 2010).
9. **Depression** (Kids Health, 2010).

Obesity is the fifth-most-common cause of the diseases affecting the middle income countries such as Eastern Europe, Latin America and Asia. In these countries the burden of type 2 diabetes, cardiovascular disease and some cancers are high mainly due to excess weight (Hossain et al., 2007).

Some examples of these types of severe health problems can be seen in different countries.
In the US, the prevalence of metabolic syndrome was 6.8% and 29%, respectively among people at the risk of being overweight and those overweight as an adolescent, between 1988 and 1994 (Mei et al., 1998). In Iran, 23% of adolescents were overweight with metabolic syndrome and 4.1% were at risk for overweight (Moayeri et al., 2006). In the north of Iran, the diseases with a high prevalence are coronary artery disease, hypertension, diabetes and osteoarthritis, which are the result of obesity or overweight (Moayeri et al., 2006).

![Perspective: Obesity and Diabetes in the Developing World — A Growing Challenge](image)

**Figure 7:** Millions of cases of diabetes in 2000 and projections for 2030 (Hossain et al., 2007)

According to the WHO, India, China, Southeast Asia and the Western Pacific Region are at the head of the diabetes epidemic (Figure 7). They are facing great challenges. In these countries, the prevalence of type 2 diabetes among children is increasing at a fast rate (Hossain et al., 2007).
Objectives

In the present study, I attempted to identify the association between overweight/obesity and lifestyle factors in pre-school children. In addition, the distribution of lifestyle factors among girls and boys have been investigated as well.

Material and methods

Study area

Figure 8: Map of Iran Source: http://www.oilempire.us/iran.html
General information

Figure 9: Tehran province map. Source: www.iranbusinesswatch.com

Tehran is the capital city of Iran and is the largest city with a population of 7,705,036 people and an area of 730 km². Tehran province has a population of 13,273,009 and an area of 18,814 km². Tehran province is located in the north central plateau of Iran (Tehran, 2010). According to the latest division of the country, Tehran region limits to Shemiranat region to the north, Damavand region to the east, Pakdasht, Rey and Eslamshahr counties to the south and Shahriar and Karaj regions to the west (Figure 9). The population of Rey is 297,711 (Rey, 2010).
**Study design**

In July and August 2009 a cross sectional study was conducted in Tehran city in the province of Tehran where the self-administered questionnaire was used.

**Sample size**

The formulae for calculating sample size is: \( n = \frac{z^2pq}{d^2} \) (\( z = 1.96, p = 0.13, q = 0.87, d = 0.04 \)). Since the prevalence of overweight in preschool children in Tehran was unknown, the prevalence of overweight (14%) among children in Rasht (North city of Iran) was used for calculations (Maddah and Nikooyeh, 2009). By using 95% confidence interval and 5% deviation from the true value, the required sample size is 272.

To account for possibly different prevalence rate and to increase the precision of the estimates, the sample size was increased to 450.

**Study population and sampling**

The target population was 3, 4 and 5 years old preschool children enrolled into kindergartens in Tehran. Kindergartens were chosen by the State Welfare Organization of the Islamic Republic of Iran. The State Welfare Organization of the Islamic Republic of Iran is an organization which has the responsibility for kindergartens in Iran. This organ provides services for about 9930 governmental and non-governmental kindergartens and educational services and educational care to pre-school children. The State Welfare Organization is the most important institution for governmental support and assistance through public funding to people with disabilities and disadvantaged community. Firstly, Tehran was divided into three areas, and then 10 kindergartens were chosen from each area. Thus, approximately 15 children were to be interviewed from each kindergarten. The children were randomly chosen by the headmaster of each of kindergarten.

Mothers were approached to fill the questionnaires at the kindergartens when they came to pick up their children.

Only 421 of the questionnaires were filled, 191 girls (45%) and 230 boys (55%). The mothers whom did not return the questionnaires were non respondents.
**Data collection techniques and variables**

Data were collected by questionnaires (Bodhani AR, 2006), which were written and answered in the Persian language. The questionnaire was designed into multiple choices and consisted of 25 questions. Questions included self-reported information about height and weight of both mothers and children, date of birth of mothers and children, children’s diet and some questions about their family.

*Children’s BMI* was calculated according to the National Center for Health Statistical (NCHS) and Center for Disease Control and Prevention (CDC) (Maddah et al., 2007). The Body mass index for age percentiles for children were used to classify as follows: <5th BMI percentiles (underweight); 5th–84th BMI percentiles (healthy weight); 85th–94th BMI percentiles (overweight); ≥95th BMI percentiles (obese) (CDC, 2010).

**Body Mass Index (BMI)**

*Height and weight of children* were used for calculating BMI for children (Q.3&4-Appendix).

*Height and weight of mothers* were used for calculating BMI for them (Q.20&21-Appendix).

Associations between body weight and health are typically expressed in terms of BMI rather than body fat. Body mass index is a scale that is normally used in classifying overweight and obesity in mature populations (Obesity and Overweight, 2006).

BMI, which is designed as weight (kg) divided by height squared (m2) is, selected as an easy measurement of body weight with regard to height (Ezzati et al, 2004).

For adults 20 years and older underweight is defined as BMI<18.5, overweight as BMI 25-30 and obese as BMI>=30 (Ezzati et al., 2004).

BMI is used for children and teens but it is specified according to age and sex. It is often referred to as BMI for age. After calculating BMI for children and teens according to their height and weight, the number of BMI is plotted on the growth charts for girls or boys based on their ages to acquire a percentile ranking. Percentile ranking is an indicator for evaluating the size and growth patterns of children.
Figure 10: Growth chart among Girls 2-20 years old (Centers for disease control and prevention, 2009).
Figure 11: Growth chart among boys 2-20 years old (centers for disease control and prevention, 2009).
Children’s age was categorized into “3”, “4” and “5” (Q.1- Appendix).

Children’s sex was categorized into “girls” and “boys” (Q.2-Appendix).

Information about children’s diet was categorized into four categories:

1) Children’s diet in general (Q.5-12-Appendix)

-Children’s diet: The response alternatives included “never”, “occasionally”, “usually “and “always”. For the purpose of analysis and due to low spread of answers, “never” and “occasionally” were considered as “seldom” and “usually” and “always” were considered as often.

-Eating fast foods in a week was categorized into: “never”, “1-2times”, “3-4times” and “more than 4times”. For analysis “never” and “1-2times” were considered as “seldom” and “3-4times” and “more than 4 times” were considered as “often”.

2) Children’s diet in a day (Q.13-17-Appendix)

-Children’s diet in a day was categorized into: “never”, “1-2times”, “3-4 times” and “more than 4 times” in a day. For the purpose of analysis, “3-4 times” and “more than 4 times” were considered “more than 2 times”.

-Time spent on using computer and watching Television was classified into “2hours or less” and “more than two hours” (Q.18-Appendix).

Family information (Q.20&23-25-Appendix):

-Mother’s age was categorized into 20-29, 30-39 and 40-49.

-Mother’s education was categorized “high education” (associate degree, Bachelors degree, and Master or Doctoral degree), and “low education” (less than high school and high school).

-Number of family members was divided into “2 people”, “3 people”, “4 people” and “more than 4 people”. For the purpose of analysis, “2 people” and “3 people” were considered as “2&3 people”, “4people” and “more than 4 people” were considered as “4 & more than 4 people”.

-Income was categorized into 4 items “less than 2,720,000 Rials”, “between 2.7-5.0 million Rials”, “between 5,000,000–10,000,000 Rials” and “more than 10,000,000 Rials”. For analysis “2,720,000 Rials” and “2,720,000-5,000,000 Rials” were considered as “low
income “and “5,000,000 – 10,000,000 Rials” and “more than 10,000,000 Rials” were considered as “high income”. 10,000 Rials is approximately equal to 1 US Dollars.

Mothers’ BMI was classified as follows: BMI<18.5 (underweight); BMI=18.5-24.9 (healthy weight); BMI=25.0-29.9 (overweight); BMI=>30 (obese) (CDC, 2010).

For the purpose of analysis for both mothers and children “underweight and healthy weight” were considered as “non-overweight” and “overweight and obese” were considered as “overweight”.

Ethical aspects
First the aim and method of the study was explained to the State Welfare Organization to get permission. Secondly consent was obtained from headmasters of kindergartens and then the aim and method of the study was explained in a consent letter for the mothers. When the mothers gave their written consent, the questionnaires were filled. Participation was voluntary.

Statistical analysis
The chi-square test was used to evaluate the distribution of lifestyle variables between children and the prevalence of overweight between them. The differences between the groups were considered significant where p<0.05.

Using binary logistic regression in order to calculate odds ratio (OR) with 95% confidence intervals, it evaluated the strength of the associations of mother’s overweight, eating habits and lifestyle of children to children’s overweight. Logistic regression analysis was performed for finding crude odds ratio; it was computed to look at the effect of different variables on overweight among preschool children. For controlling of potential confounding factors, logistic regression was performed with adjustment for all variables. In both models the depended variable was BMI of children. The analysis was done by using STATA version 10. The Hosmer-Lemeshow test used to assess fit of the data. The final model had good fit (p>0.05).
Results

Table 2: Characteristics of child participants and their mothers, by sex.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Category</th>
<th>Boys (n=172)</th>
<th></th>
<th>Girls (n=209)</th>
<th></th>
<th>Pvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Children’s age (years)</td>
<td>3</td>
<td>51</td>
<td>46</td>
<td>60</td>
<td>54</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>59</td>
<td>46</td>
<td>69</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>62</td>
<td>44</td>
<td>80</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Children’s BMI (percentiles)</td>
<td>&lt;5th</td>
<td>26</td>
<td>54</td>
<td>22</td>
<td>46</td>
<td>0.23</td>
</tr>
<tr>
<td></td>
<td>5th-84th</td>
<td>104</td>
<td>46</td>
<td>123</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td></td>
<td>85th-94th</td>
<td>10</td>
<td>31</td>
<td>22</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥95th</td>
<td>32</td>
<td>43</td>
<td>42</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>Mothers’ age (years)</td>
<td>20-29</td>
<td>41</td>
<td>41</td>
<td>58</td>
<td>59</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>30-39</td>
<td>113</td>
<td>46</td>
<td>131</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40-49</td>
<td>18</td>
<td>47</td>
<td>20</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Mother’s BMI</td>
<td>Non-</td>
<td>115</td>
<td>46</td>
<td>135</td>
<td>54</td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>overweight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overweight</td>
<td>57</td>
<td>44</td>
<td>74</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Mother’s education</td>
<td>Low</td>
<td>44</td>
<td>47</td>
<td>50</td>
<td>53</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>128</td>
<td>45</td>
<td>159</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>Number of family members</td>
<td>2-3 person</td>
<td>115</td>
<td>48</td>
<td>123</td>
<td>52</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>≥4 person</td>
<td>57</td>
<td>40</td>
<td>86</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Families’ income</td>
<td>Low</td>
<td>41</td>
<td>49</td>
<td>42</td>
<td>51</td>
<td>0.37</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>131</td>
<td>44</td>
<td>167</td>
<td>56</td>
<td></td>
</tr>
</tbody>
</table>
Table 2 shows the characteristics of the children and their mothers and families. There were more girls than boys in the sample. There were also more children aged five than in other age groups. Non-overweight children were more than overweight children among both girls and boys.

The age group 30-39 years accounted for the majority number of mothers, among boys 113 (46%) and among girls 131 (54%). Among girls 135 (54%) of them had non-overweight mothers and 74 (56%) of them had overweight mothers. As can be seen from the table, the number of mothers with high education was more than those with low education among both girls and boys. The children with high income families were more than those with low income.
Table 3: How often children had different kind of food in particular junk food, by sex

<table>
<thead>
<tr>
<th>Eating habits</th>
<th>Category</th>
<th>Boys (n=172)</th>
<th>Girls (n=209)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>Junk food</td>
<td>Seldom</td>
<td>139</td>
<td>79</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td>Often</td>
<td>36</td>
<td>21</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit or vegetable</td>
<td>Seldom</td>
<td>24</td>
<td>14</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Often</td>
<td>148</td>
<td>86</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat or fish</td>
<td>Seldom</td>
<td>12</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Often</td>
<td>160</td>
<td>93</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowing children to eat junk food</td>
<td>Seldom</td>
<td>149</td>
<td>87</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>Often</td>
<td>23</td>
<td>13</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using Junk food as a reward</td>
<td>Seldom</td>
<td>158</td>
<td>92</td>
<td>198</td>
</tr>
<tr>
<td></td>
<td>Often</td>
<td>14</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweet food</td>
<td>Seldom</td>
<td>82</td>
<td>48</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>Often</td>
<td>90</td>
<td>52</td>
<td>113</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denial of junk food</td>
<td>Seldom</td>
<td>47</td>
<td>27</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Often</td>
<td>125</td>
<td>73</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using fast food in a week</td>
<td>Seldom</td>
<td>163</td>
<td>95</td>
<td>198</td>
</tr>
<tr>
<td></td>
<td>Often</td>
<td>9</td>
<td>5</td>
<td>11</td>
</tr>
</tbody>
</table>

One out of five boys (21%) boys and girls often ate junk food and 12% often were allowed by their children to eat junk food (Table 3). There was no difference in how often the children of eating habits between boys and girls.
Table 4: Frequencies of eating habits among children in a day, by sex.

<table>
<thead>
<tr>
<th>Eating habits in a day</th>
<th>Category</th>
<th>Boys (n=172)</th>
<th>Girls (n=209)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>Fruits (apple, orange, ...)</td>
<td>Never</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1-2 times</td>
<td>124</td>
<td>72</td>
<td>151</td>
</tr>
<tr>
<td></td>
<td>More than two times</td>
<td>44</td>
<td>26</td>
<td>57</td>
</tr>
<tr>
<td>Vegetables (cabbage, carrot, ...)</td>
<td>Never</td>
<td>22</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>1-2 times</td>
<td>130</td>
<td>76</td>
<td>158</td>
</tr>
<tr>
<td></td>
<td>More than two times</td>
<td>20</td>
<td>11</td>
<td>25</td>
</tr>
<tr>
<td>Diary (milk, yogurt, ...)</td>
<td>Never</td>
<td>5</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>1-2 times</td>
<td>73</td>
<td>42</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>More than two times</td>
<td>94</td>
<td>55</td>
<td>111</td>
</tr>
<tr>
<td>Meat (fish, chicken, ...)</td>
<td>Never</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1-2 times</td>
<td>126</td>
<td>73</td>
<td>163</td>
</tr>
<tr>
<td></td>
<td>More than two times</td>
<td>41</td>
<td>24</td>
<td>41</td>
</tr>
<tr>
<td>Sweets (chocolate, cake, ...)</td>
<td>Never</td>
<td>16</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>1-2 times</td>
<td>128</td>
<td>74</td>
<td>165</td>
</tr>
<tr>
<td></td>
<td>More than two times</td>
<td>28</td>
<td>16</td>
<td>23</td>
</tr>
</tbody>
</table>
Watching television or using computer during the day is another variable which is not in these tables. Children watched television or used computer in a day. Over 70% of children both girls and boys watched TV or used computer 2 hours or less than 2 hours in a day (Boys=129 (75%), Girls=153 (73%)).
Table 5: Prevalence of overweight among children, bivariate and multivariable logistic regression analysis, by sex. OR (odds ratio); 95% CI: 95% confidence interval.

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Boys (n=172)</th>
<th>Girls (n=209)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overweight</td>
<td>Multivariable</td>
</tr>
<tr>
<td></td>
<td>Bivariate</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td></td>
<td>% Total No</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12 24 51</td>
<td>1.00 (0.4-2.4)</td>
</tr>
<tr>
<td>4</td>
<td>14 24 59</td>
<td>1.10 (0.5-1.9)</td>
</tr>
<tr>
<td>5</td>
<td>16 26 62</td>
<td>1.10 (0.5-1.9)</td>
</tr>
<tr>
<td>Junk food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seldom</td>
<td>29 21 136</td>
<td>1.00</td>
</tr>
<tr>
<td>Often</td>
<td>13 36 36</td>
<td>2.10 (0.9-4.6)</td>
</tr>
<tr>
<td>Allowing children to eat junk food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seldom</td>
<td>36 24 149</td>
<td>1.10 (0.4-3.0)</td>
</tr>
<tr>
<td>Often</td>
<td>6 43 23</td>
<td>1.10 (0.4-3.0)</td>
</tr>
<tr>
<td>Using junk food as a reward</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seldom</td>
<td>36 23 158</td>
<td>2.50 (0.8-7.8)</td>
</tr>
<tr>
<td>Often</td>
<td>6 43 14</td>
<td>2.50 (0.8-7.8)</td>
</tr>
<tr>
<td>Sweet food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seldom</td>
<td>21 26 82</td>
<td>0.10 (0.4-1.7)</td>
</tr>
<tr>
<td>Often</td>
<td>21 23 90</td>
<td>0.10 (0.4-1.7)</td>
</tr>
<tr>
<td>Denial of junk food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seldom</td>
<td>17 36 47</td>
<td>1.00</td>
</tr>
<tr>
<td>Often</td>
<td>25 20 125</td>
<td>0.40 (0.2-0.6)</td>
</tr>
<tr>
<td></td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td><strong>Sweets (No of times/XXX):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;3</td>
<td>33</td>
<td>75</td>
</tr>
<tr>
<td>≥3</td>
<td>9</td>
<td>32</td>
</tr>
<tr>
<td><strong>Fast foods (per week):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seldom</td>
<td>37</td>
<td>22</td>
</tr>
<tr>
<td>Often</td>
<td>5</td>
<td>55</td>
</tr>
<tr>
<td><strong>TV or computer (hours):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤2</td>
<td>33</td>
<td>26</td>
</tr>
<tr>
<td>&gt;2</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td><strong>Age of mother (years):</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>12</td>
<td>29</td>
</tr>
<tr>
<td>30-39</td>
<td>26</td>
<td>23</td>
</tr>
<tr>
<td>40-49</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td><strong>BMI of mother:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non overweight</td>
<td>24</td>
<td>21</td>
</tr>
<tr>
<td>Over weight</td>
<td>18</td>
<td>32</td>
</tr>
<tr>
<td><strong>Education of mother:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>17</td>
<td>39</td>
</tr>
<tr>
<td>Low</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td><strong>Family income:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>16</td>
<td>39</td>
</tr>
<tr>
<td>High</td>
<td>26</td>
<td>20</td>
</tr>
</tbody>
</table>

OR (odds ratio); 95% CI: 95% confidence interval.
Bivariate OR: ORs were adjusted for each variable (simple logistic regression)
Multivariable OR: ORs were adjusted for all variables (multiple logistic regressions)

In the bivariate logistic regression analysis only denial of junk food, frequency of eating fast food per week, mother’s education and BMI and family income was associated to the boys and girls overweight. In the multivariable logistic regression analysis eating fast food often and having an overweight mother significantly increased the risk for the child to be overweight.
Discussion

This study presents the results of a cross sectional study on the risk factors of being overweight for 381 Iranian preschool children, aged 3-5 years, from Tehran city. The results suggested that eating fast food (among both girls and boys), BMI of mothers (among both girls and boys) were associated with overweight in the crude model.

The risk of overweight/obesity was approximately three times greater among girls with an overweight/obesity mother than those whose mother was not overweight/obesity. The present findings seem to be consistent with other researches which found the risk of overweight/obesity among children was associated to maternal overweight/obesity (Luo and Hu, 2002). In western countries parental overweight particularly maternal overweight has been reported to be connected to childhood overweight (Maddah and Nikooyeh, 2009). In a study in Rasht the logistic regression analysis showed the risk of overweight/obesity among 6-11 years old children was higher for those who had overweight/obesity parents (Maddah and Nikooyeh, 2009).

Controlling the food intake can be considered as a preventive approach by parents (Jiang et al., 2006). A common way to encourage good eating habits and avoid childhood overweight/obesity is restriction and control of food intake by parents (Jiang et al., 2006). In a study in Beijing, China, a reverse causation was detected. The children whose mothers restricted snacks and who did not encourage them to eat junk foods or snacks often were more overweight than other groups (Jiang et al., 2006).

There was not any significant relationship between age and overweight/obesity in this study and it can be related the number of girls and boys are not the same. Although, in other study, the BMI increased significantly with age among adolescents in Tehran, in 2004-2005 (Moayeri et al., 2006).

Based on the findings, there was no association between consumption of junk foods and BMI in this study. Although this result was also observed in other studies (Amini et al., 2007), however the association of consumption of junk foods and overweight was shown by Karen Weber et al (Cullen and Zakeri, 2004). In a study among middle age school children, by increasing the utilization of sugar-sweetened drinks, children’s weight increased (Ludwig et al., 2001). In that study, the consuming of sugar-sweetened drink could be a main contributory factor for obesity.
(Ludwig et al., 2001). Findings in this study showed that there was no significant association between using sweet foods and overweight/obesity among preschool children.

The current study found that there was significant association between overweight/obesity and maternal education before adjusting for other variables among children. However, its result was not very encouraging, because the odds of being overweight/obesity among children whose mother had low education was less than those with high education mothers. After adjusting, there was not any association between maternal education and overweight/obesity among both girls and boys. In a study among adolescents in Tehran was no significant relationship between parents’ education and overweight/obesity in their children (Moayeri et al., 2006). While it was not found any association between maternal education and overweight/obesity after adjusting with other variables. In a study in Rasht, among 6-11 years old this association was found and children with more educated mothers were more overweight than those with less educated mothers (Maddah and Nikooyeh, 2009). Also another study in this city, among 12-17 years old children showed the prevalence of overweight/obesity among girls with high maternal education was higher than those with low educated mothers (Maddah and Nikooyeh, 2010). A study in China, among preschool children showed low maternal education was related to childhood overweight. A lot of studies have confirmed that children of less well educated mothers are more expected to be overweight than those of with high educated mothers (Jiang et al., 2006). In studies from westernized countries, a lower educated mother is linked to a further consumption of soft drinks by children, although higher maternal education is related to children’s more frequent consumption of fruits and vegetables (Jiang et al., 2006).

Boys who often ate fast food were about four times more overweight/obesity than those who seldom ate fast food before adjusting but girls who often ate fast foods were three times overweight than those who ate fast foods seldom. There was an association between fast foods and overweight/obesity among boys and girls before and after adjusting with other variables. Researches specified that eating fast foods lead to surplus energy intake and in turn increased threat of overweight and obesity (Grier et al., 2007). Fast foods consumption and higher intake of energy and percentage of energy from fat were positively associated with each other. Most fast foods are rich in saturated fats, trans fats, sodium and simple carbohydrates, so fast food consumption is a health concern. In a study it was found that the calories from out-of-home meals eaten by children were 55% higher than in-home foods (Grier et al., 2007).
Surprisingly, the results of this study did not show any significant association between the time of watching TV, using computer and overweight/obesity, maybe mothers did not answer this question carefully or they did not pay attention how long their children spent their times for watching TV or using computer. One of the risk factors for overweight/obesity is physical inactivity which can be provided by spending time watching TV and using computer. Spending time for TV and computer is also related to low socioeconomic (maternal education and low family income) (Kuepper-Nybelen et al., 2005). In a study in China was shown the association between overweight/obesity and watching TV (Luo and Hu, 2002).

In a cross sectional study in China, childhood overweight/obesity was associated with high level of watching television among preschool children (Jiang et al., 2006). This study has been unable to demonstrate that there is any association between watching TV or using computer and overweight/obese children. However, another study in Tehran showed the overweight/obese children who were 11-17 years, spent significantly more time in front of computer and TV (Moayeri et al., 2006). Most of the Iranian families have a second job and typically the income is underreported by them. Standard of living in Iran is not high because of international sanctions and internal inflation, so a lot of well-educated people don’t have employment opportunities (Maddah and Nikooyeh, 2010). Among low-income preschoolers in the United States from 1983 through 1995, there was constant increase in the prevalence of overweight (Mei Z et al,1998).

What is surprising is that, in this study the risk of overweight/obesity among children with low household income level was higher compared with those who had high household income. But, in a study in China the risk of overweight/obesity among children with high household income was twice as much as those who had low household income (Luo & Hu, 2002).

Also in another study, family income was not associated with childhood overweight. According to a study among Australian preschoolers between 1997 and 2003, high-income families were less responsible for less of the ongoing acceleration of overweight/obesity prevalence (Wake et al., 2007).

No association was found between using junk foods as a reward, sweets, age of mother with overweight/obesity.
Limitations

In this study there are some limitations. Parental and children’s body-weights and heights were self-reported and we can’t say these self-reported weights and heights are reliable. Also data on lifestyle and eating habits of children were from mothers’ self-report and, therefore could have memory and recording errors. Self-reported data can also create a reporting bias.

Reporting children’s food consumption by mothers can be also a limitation. The children’s own reports are more exact, but in this study the children were too young to remember to answer the questions. In my opinion using alternative research methods and multiple ways of obtaining this information reduced any method bias associated with self-report data. For example asking some questions about children’s eating habits from their teachers in their kindergartens.

Due to the small sample size, the study may not have sufficient power to identify an association between the eating habits of children, mothers’ information and the children BMI percentile. This may clarify why the majority of the analyzed associations were not statistically significant.

The information in this study may not be representative of whole population of pre-school children in Iran. They can only represent information about pre-school children in three areas of Tehran.

Conclusion

Obesity and overweight are the main public health problems all over the world among different groups of age. It is required to address to overweight or obesity and nutrition in health promotion strategies for increasing the value of children health.

This study has shown the prevalence of overweight and obesity was low among pre-school children in Tehran. This study showed that eating fast foods per week and BMI of mothers were associated to obesity and overweight among pre-school children in Tehran.
References


Appendix

**Number of questionnaire:**

The aim of these questions is to study the eating habits of pre-school children in Tehran.

In the questionnaire you will encounter the following term “Junk food”. Junk food is an informal term applied to some foods which are perceived to have little or no nutritional value, or to products with nutritional value but which also have ingredients considered unhealthy when regularly eaten or to those considered unhealthy to consume at all. Foods more likely to be considered junk food generally are those that are more convenient and easy to obtain in a ready-to-eat form, though being such does not automatically define the food as "junk food.". The term ‘junk food’ usually refers to foods like chocolate, soft drinks, cakes, ice cream, potato chips and some takeaway foods, such as burgers, hotdogs or hot chips.

The following questions are about your child: (Bodhani AR, 2006) Please fill in the blank or circle/mark the answer you choose:

1) How old is your child?
   1. 3years old
   2. 4years old
   3. 5years old

2) What is your child’s sex?
   1. Male
   2. Female

3) What is his/her weight? ..........(kg)

4) How tall is he or she? ..........(cm)

The following questions are about your child’s eating. Please mark the box that corresponds to the frequency in which each situation takes place

<table>
<thead>
<tr>
<th>Question</th>
<th>Never</th>
<th>Occasionally</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>5) Does your child eat junk food between meals?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) How often do the meals served at your house include vegetables or fruits?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7) How often do the meals served at your house include meat or fish?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8) Do you let your child decide how much junk food he/she wants to eat?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9) Do you use junk food to reward your child?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10) Does your child eat too many sweets(candy, ice-cream, cake)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11) Do you keep junk foods out of your child’s reach?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12) How often in a week does your child eat fast food?
   1. Never
   2. 1-2 times
   3. 2-3 times
   4. More than 3 times

How often, in a day, does your child eat the following items? (Mark appropriate column)

<table>
<thead>
<tr>
<th>Item</th>
<th>Never</th>
<th>1-2 times</th>
<th>3-4 times</th>
<th>More than 4 times</th>
</tr>
</thead>
<tbody>
<tr>
<td>13) Fruits (apples, orange, banana, grapes, etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14) Vegetables (carrots, celery, lettuce, etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15) Dairy (milk, yogurt, cheese)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16) Meats (fish, poultry, etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17) Sweets (candy, cakes, etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18) How many hours do they watch TV or playing video games per day?
   1. Less than 1 hour
   2. 1-2 hours
   3. 2-3 hours
   4. More than 3 hours

Mothers’ questions: Please fill in the blank or circle/mark the answer you choose and please answer these questions about mother.

19) How old are you?

20) What is your weight? ............ (Kg)

21) How tall are you? ............ (cm)

22) What is the highest degree or level of school you have completed?
   1. Less than high school
   2. High school
   3. Associate degree
   4. Bachelors degree
   5. Master or doctoral degree

23) How many people are there in your family?
   1. 2 people
   2. 3 people
   3. 4 people
   4. More than 4 people
24) How much salary do you have?
   1. Less than 2,720,000 Rials
   2. between 2,720,000 – 5,000,000 Rials
   3. between 5,000,000 – 10,000,000 Rials
   4. More than 10,000,000 Rials
Acknowledgements

Warmest thanks to my dear supervisor Yulia Blomstedt for providing me with continuous help and excellent guidance, whenever it was needed. Her efforts led me in the right direction and I have learned so much from her.

I would like to warmly thank the whole personnel of the Public Health department of Umea University for providing such a friendly and stimulating atmosphere.

Special thanks to my dear parents who encouraged me from a distance, to go forward and explore, and continuously supported me to achieve my interests. I dedicate this work to my beloved parents.

Finally, I would like to present my special thanks to my sister and brother.
A list of master theses from previous years, 1996-2007, is available at:
www.phmed.umu.se/english/divisions/epidemiology/research/publications

Centre for Public Health Report Series
(ISSN 1651-341X)

2009


2009:25  **Yihuai Liang.** Parental corporal punishment and emotional maltreatment (PCPEM) in childhood, mental health and risk behaviors among youth students in Beijing and Hebei, China. *Master thesis...


<table>
<thead>
<tr>
<th>Year</th>
<th>Title</th>
<th>Author</th>
<th>Institution</th>
<th>Department</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Rift Valley Fever. A Resurgent Threat. Case Studies from Sudan and</td>
<td>Osama Ahmed Hassan Ahmed</td>
<td>Umeå International School of Public Health, Epidemiology Global Health,</td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>the Kingdom of Saudi Arabia. <em>Master thesis in public health</em>.</td>
<td></td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Motorcycle related maxillofacial injuries in a semi-urban town in</td>
<td>Oziegbe Paul Akhigbe</td>
<td>Umeå International School of Public Health, Epidemiology Global Health,</td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>Nigeria. A four year review of cases in Irrua Specialist Teaching</td>
<td></td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Role of socio-demographic factors on utilization of maternal health</td>
<td>Eyerusalem Dagne</td>
<td>Umeå International School of Public Health, Epidemiology Global Health,</td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>care services in Ethiopia. <em>Master thesis in public health</em>.</td>
<td></td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Determinants of Antenatal Care, Institutional Delivery and Skilled</td>
<td>Yalem Tsegay Assfaw</td>
<td>Umeå International School of Public Health, Epidemiology Global Health,</td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>Birth Attendant Utilization in Samre Saharti District, Tigray,</td>
<td></td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Bangladeshi girl: “My parent’s didn’t allow me to learn to swim, so</td>
<td>Stefanie Butz</td>
<td>Umeå International School of Public Health, Epidemiology Global Health,</td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>I drowned”. A gender theoretical perspective on environmental</td>
<td></td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td></td>
<td>migration by applying Connells hegemonic masculinity theory in the</td>
<td></td>
<td>2010</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>The economic burden of occupational asthma in Europe. *Master thesis</td>
<td>Huo Jinhai</td>
<td>Umeå International School of Public Health, Epidemiology Global Health,</td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>in public health*.</td>
<td></td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>The Cholera Epidemic and Barriers to Healthy Hygiene and Sanitation</td>
<td>Ernest Njoh Malange</td>
<td>Umeå International School of Public Health, Epidemiology Global Health,</td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
</tr>
<tr>
<td>2010</td>
<td>Association of severe periodontitis with microalbuminuria and chronic</td>
<td>Shabnam Salimi</td>
<td>Umeå International School of Public Health, Epidemiology Global Health,</td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>kidney disease. <em>Master thesis in public health</em>.</td>
<td></td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Risk factors and causes of mortality among HIV/AIDS patients</td>
<td>Tewodros Bizuwork</td>
<td>Umeå International School of Public Health, Epidemiology Global Health,</td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>receiving antiretroviral therapy; Zomba central hospital; Zomba,</td>
<td></td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Salutogenic perspective and it’s contribution to improve the care</td>
<td>Michael Tesfamariam</td>
<td>Umeå International School of Public Health, Epidemiology Global Health,</td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>of orphans in Eritrea. <em>Master thesis in public health</em>.</td>
<td></td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Risk factors for (predictors of) loss to antiretroviral therapy in</td>
<td>Agegnehu Tesfaye Abdeberhan</td>
<td>Umeå International School of Public Health, Epidemiology Global Health,</td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>Oromia, Ethiopia. <em>Master thesis in public health</em>.</td>
<td></td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Overweight and lifestyle characteristics among Swedish adolescents.</td>
<td>Masoud Waazghasemi</td>
<td>Umeå International School of Public Health, Epidemiology Global Health,</td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>A study in four pilot areas of Västerbotten. *Master thesis in</td>
<td></td>
<td>Department of Public Health and Clinical Medicine, Umeå University</td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td></td>
<td>public health*.</td>
<td></td>
<td>2010</td>
<td>2010</td>
<td></td>
</tr>
</tbody>
</table>


