

## HEALTH STATUS OF LEISURE WALKERS IN KUWAIT

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## ABSTRACT

**Aim:** This study is designed to assess health status among pedestrians using different walking paths in several areas around Kuwait during March to June 2005. This cross-sectional research evaluates the prevalence of respiratory complaints and assesses the possible confounding effects that may be associated with distribution of disease.

**Methods:** The adapted method is a self-report questionnaire to extract information about health status using a convenience sampling technique. The selected sample was pedestrians from both genders and all age groups using walking-paths. The data was analyzed by calculating proportions, and odd ratios were estimated using a logistic regression model.

**Results:** The outcome revealed that nearly a quarter of the sample had some kind of respiratory diseases. Females were twice more likely to have food allergy than males. Genetic factors and gender are the main risk determinants that are associated with respiratory diseases, and specifically tobacco smoking is an extra confounder that is related to cases with asthma and bronchitis.

**Conclusion:** This study indicate that a quarter of the sample who use walking paths in Kuwait have some kind of respiratory disease or allergy.

**Key words:** Kuwait, Walking, physical activity, Respiratory diseases, Asthma.

## INTRODUCTION

Physical inactivity and outdoor urban air pollution are two of the top 15 global causes of health impairment.<sup>(1)</sup> Inactivity and insufficient activity have been causally linked with heart disease, several cancers, diabetes, and other adverse health impacts both are associated with high body mass index (BMI), overweight and obesity, which can lead to additional adverse effects on health.<sup>(2)</sup> The relation of the building environment and obesity was mentioned by Sallis et al<sup>(3)</sup> for low and high walkability neighborhoods.

Walking an inexpensive and accessible activity is protective against unhealthy outcomes.<sup>(4)</sup> Physical activity recommendation was defined as >or = 150 min/ week of walking. Poor and uneducated people are less likely to walk specially leisure walking.<sup>(4)</sup> Walk-ability is objectively measured by the residential density, intersection density, retail shop for area ratio compared to land area, and land use mix.<sup>(5)</sup>

Several studies have documented the association between outdoor air pollution and mortality, as well as hospital admissions.<sup>(6)</sup> Concentrations of CO and NO<sub>2</sub> exhibited the most consistent associations with the increase in emergency room visits for myocardial infarction, angina and heart failure.<sup>(7)</sup> An

association between ozone and emergency room visits was observed by Mar and Koenig.<sup>(8)</sup> Air pollution was also inversely associated with total bone density in elderly men.<sup>(9)</sup>

Marshall et al identified neighborhoods that do especially well (or poorly) for both issues (walk-ability, air pollution).<sup>(5)</sup> They compared quantitative estimates for these two neighborhood-scale environmental health attributes and demonstrated important health impacts of spatial exposure to the built environment in Metro Vancouver Canada. Noise was another factor, there was an excess of cardiovascular mortality in the highest noise category with elevated risk of ischemic heart disease and heart failure mortality.<sup>(10)</sup> The exposure of pedestrians to traffic related pollution and fine particulates was higher than other road users.<sup>(11)</sup> Traffic accidents are a major health problem in Kuwait. And the severity of pedestrian accidents is higher than other road users. The vulnerability of children is also of concern and Hotz et al<sup>(12)</sup> presented an educational curriculum directed to this age group with positive results.

Kuwait is a designed urban city with separate neighborhoods built as the residential super blocks around a central nucleus housing a shopping center, a high school, police station. The streets are built around the residential blocks in a way to discourage passing through traffic. Kindergartens are located inside the residential blocks; the location is chosen to allow the young children to walk safely to and

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from school. No high rise building is allowed inside the residential blocks, these are located at the city center and the municipality of Kuwait does not allow any violation. Multi story buildings are allowed in certain designated areas where rented homes are also available.<sup>(13)</sup>

The health impacts of air pollution are well recognized locally, some short and long term effects of air pollutants on human health were illustrated in Kuwait. After the oil fires episodes in 1991 some researchers indicated that asthma and chest complaints increased in 1991 compared to 1986.<sup>(14,15)</sup> Further studies in 1992 on Kuwaiti children showed a relationship between the levels of 'black smoke' and respiratory complaints.<sup>(16)</sup> Long term association between exposure to oil fires and severe asthma in adolescents (11-15 years) was reported.<sup>(17)</sup>

#### Aim of the study

To find out the demographic characteristics and determine the prevalence of respiratory diseases among a convenient sample using walking paths in designated areas in Kuwait city during March to June 2005.

#### METHODS

Using a self reported questionnaire to collect information. Subjects who reported disease were grouped and statistically related to confounders to determine possible effects through odds ratio measurements.

**Design:** The study related cross sectional prevalence of disease conditions by questionnaire to personal habits, and walking path. Possible risk from personal habits or walking path which induce respiratory disease was assessed using logistic regression analysis to measure odds ratios and determine the major predictors that were statistically associated with disease occurrence among the sample.

**Settings:** Walking paths located in nine residential areas around Kuwait city. The paths were located in Khaldiya, Yarmuk, Al-Adan, Salmiya 1 (Green Island), Salmiya 2 (Marina Mall), Surra, Adeilia, and Skuwaik.

**Subjects:** This is a non probability sample (convenience sample) based on the availability of subjects in the study areas. The subjects were from both genders, residents in Kuwait (i.e. Kuwaitis and non Kuwaitis), 10 – 75 years old.

**Main outcome measure:** A modified version of "The International Study of Asthma and Allergies in Children (ISAAC)" questionnaire protocol was adopted to screen the cases for respiratory diseases<sup>(18, 19)</sup>. Reporting of disease and personal habits were dependent on the response of the subjects. Prevalence of respiratory disease was calculated for the groups according to path location. Cross-

tabulation between the cases with disease (asthma, allergy, and respiratory disease) and possible causal variables were assessed. Logistic regression was implemented on multi-variables to calculate odds ratios and assess the importance and possible statistical significance of confounders using the statistical package (SPSS version 14.0).

#### RESULTS

The survey team managed to screen nine paths and elicit responses from 925 subjects. The sample represented leisure walkers using the selected paths. All the interviews were conducted during the evening time (most walkers prefer that time to avoid the hot weather and are mostly off work, the distribution according to the sex, age, nationality and education is shown in table I; most of the interviewed were males (62.3%) the proportion of the females (37.7%), however relating the figures to the distribution of the population at large reveal that there was almost no difference between the gender which were 3.22 and 3.25 per 10,000.

A larger proportion of the subjects in which the nationality was reported, where Kuwaitis (K) 74.7% with variability in proportions to other nationalities in different locations. The distribution would be different if we relate the figures to the population at large; the participation of the nationals (6.87/10000) would be over 5 times the participation of the non Kuwaitis (NK). The age structure of the two groups is quite different; where as the Nationals have a normal distribution; that for the NK is biased towards the working age groups with relatively higher proportions of males.<sup>(20)</sup>

Nearly half (49.6%) of the sample were from the mid age group (20 - 39 years) and almost a quarter (23.6%) were aged from 40 to 59 years. Few cases (1.3%) were adolescents (10-14 years) and the elderly group (60 years and over) amounted to 15.2%. The proportion of the elderly was the third on the list; relating the age distribution to that for the population at large showed a different pattern. The participation ratio of the three groups 15, 20 and 40 years would be less than 5 per 10000 each. The participation ratio of the oldest group would come to 16.8%. The ratios should be taken cautiously since the study was based on a convenience sample of leisure walkers and not on a random sample of a population.

The distribution according to the education level showed that nearly 40% of the sample was having a university degree and another 5.0% had a higher education, the subjects with elementary education were amounted to 8.5% of the sample. The bulk was composed of those that finished high school or had a diploma; accounting collectively to (46.2%) of the sample. The relative distribution would vary if the figures were related to the population structure;

the ratio for the least educated will drop to 0.3 per 10000. A steady rise in the proportion of the participants was seen with the level of education. The ratio came up to 18.8/10000 with university degrees and to 59.6/10000 with the subjects having post graduate qualification.

The distribution of walking paths is shown in the 4<sup>th</sup> part of table I. As reported with the other variables both sample percentage and ratios per 10000 of the population residing in the areas are shown. Leisure walkers from Shuwaik represent 13.0% of the sample but had the highest ratio 21.5/10000, Salmiya paths from which over one third of the sample came, had a ratio of nearly 14/10000. Yarmouk and Surra represent 9.0 and 17.8% of the sample respectively; but had nearly similar ratios (4.0 and 4.9/10000). There was marked variability in gender with respect to walking paths (table II). The proportion of males was appreciably higher in Salmiya paths (39.4%), the corresponding figure for females were 28.4%; the proportion of males was also relatively higher in Shuwaik (14.0% vs 11.5%) and Khaldiya (2.6% vs 0.3%). The proportion of the females was relative higher in Yarmouk (10.6% vs 7.8%), Surra (20.6% vs 16.0), and Meshrif (22.3% vs 14.6%).

Smoking habits, exposure to bakhour, and pets owing are illustrated in table III. Nearly a quarter of the sample (24.2%) was smokers, and more than half of them were moderate to heavy smokers. The whole sample was exposed to a certain degree to passive smoking, and nearly 62% of them reported they inhale smoke from nearby smokers. More than 60% of the sample used bakhour (Sandalwood /Essence), a traditional solid perfume that is burned with charcoal and frequently used indoors. One fifth of the sample used the bakhour all the times, a larger proportion (41.2%) used that for some time and nearly 20% were not exposed. The combustion products will be added to the other types of particulates and air pollutants generated a confined area or percolating through the doors and windows into the home. More than 30% of the sample owned pets with highest proportions (18.4%) having birds. Cats and dogs were not reported as frequently.

The relative prevalence of respiratory conditions, allergy, and asthma or bronchitis is shown in table IV, both the sample percentage and ratios computed per 10000 populations is presented in the table. The prevalence of the respiratory conditions revealed that a larger proportion came from Salmiya (35%), Meshrif (21%), Surra (16%) and Shuwaik (12%), the least came from Al Adan. Comparing the ratios based on the population in walking paths showed that Shuwaik was on the top of the list (48/10000), followed by Meshrif (13.2./10000). The lowest came from Al Adan (1.4/10000) and Khaldiya (0.5/10000). Reports about allergy were

less common than the respiratory conditions. The relative distribution showed that a higher proportion came from Salmiya (42.3%) followed by Meshrif (17.8%) and Surra (16.9%). The ratios gave another distribution pattern, however Shuwaik had the highest ratio (17.7/10000) similar to that seen with the respiratory conditions. The ratios for Surra and Meshrif were higher than the overall ratio (3/10000). With Asthma or bronchitis most of the cases were contributed to Salmiya (27.5%), Meshrif (22.4%), Shuwaik (16.3%) and Yarmouk (10.2%). The highest ratio was for Shuwaik (28.6/10000), Salmiya came next (11.8/10000). The ratio for Meshrif was (6/10000), Yarmouk and Surra were the same (4.8/10000). The ratios for Al Adan and Adeilia were appreciably lower than any other path.

More detailed distribution of the respiratory conditions is summarized in table V. Respiratory diseases and allergy with the family history of the related diseases is presented in the table, almost a quarter of the sample reported some kind of respiratory disease. More than half of them had certain kind of allergy and about 42.2% of them reported having asthma or bronchitis. About 18.4% of sample complained of food allergy, and nearly 16.3% of the sample reported that their parents suffered from asthma or allergy. The figures do not add up since several subjects had more than one condition.

A multivariable logistic regression model was used to determine the association between reported respiratory diseases, allergy, asthma and bronchitis with potential confounders shown in table VI. Seven main factors were included in the regression: 1) Path: public paths variability as a factor 2) Exposure: Kuwait fires as a major factor. 3) Owning pets: has owned a pet at any time in the past. 4) At least one parent had any respiratory disease or allergy. 5) Smoking: subjects smoking as a factor 6) Bokhur (sandal wood/essence): exposure to smoke from Sandalwood/Essence use 7) Gender: as a factor that may increase variability shown in the table, the odd ratio and the 95% confidence interval also reported. Significance of the regression was shown by astricks and explained at the bottom of the table.

Considering subjects who reported respiratory diseases (N=232); all the variables gave an odd ratio more than 1; parental respiratory disease were a significant predictor with odds ratio equals to 1.99 (1.35-2.95 CI). Gender were also significantly associated with reported respiratory disease with odds ratio of 1.6 (1.12-3.23 CI). These observations were also seen in subjects who reported allergy, cases were strongly related to parental respiratory diseases with an OR=1.91 (1.17-3.10 CI), and gender is the strongest predictor with an odd ratio of 2.15 (1.39-3.33 CI). Subjects who reported asthma or bronchitis were also significantly related to parental respiratory

diseases (OR=1.67 – 0.98 – 2.82 CI) but smoking is significantly more associated with asthma or bronchitis cases with an odds ratio of 1.93 (1.18-3.14 CI).

**Table I:** Frequency and proportions of sample related to their gender, age groups, nationalities and educational level and Walking paths

	Variables	No	%	Population	Ratio
Gender (N= 925)	Male	576	62.3	1791397	3.22
	Female	349	37.7	1075491	3.25
Nationality (N=895)	Kuwaitis	669	74.7	973286	6.87
	Non Kuwaitis	226	35.2	1893602	1.19
Age (N=855)	10 - 14	12	1.3	188760	0.64
	15 - 19	87	10.2	179507	4.85
	20 - 39	424	49.6	1363819	3.11
	40- 59	202	23.6	614599	3.29
	60- 80	130	15.2	77394	16.80
Education (N=878)	Elementary	75	8.5	2224226	0.3
	Secondary	213	24.3	387490	5.5
	Diploma	192	21.9	124355	15.4
	University	352	40.1	187340	18.8
	Higher Education	46	5	7718	59.6
Walking paths (N=925)	Shuwaik	121	13.1	5591	21.5
	Yarmouk	82	9.0	20879	4.0
	Adeilia	39	4.2	20149	1.9
	Surra	164	17.8	33233	4.9
	AlAdan	16	1.7	27493	0.6
	Salmiya 1	109	11.5	233481	4.6
	Salmiya 2	216	23.4	233481	9.3
	Meshrif	162	17.5	37191	4.3
	Khaldiya	16	1.7	16966	0.9
	Total	925	100	394983	2.3

**Table II:** Distribution of gender within walking paths

Walking paths	Male		Female		Total	
	no	%	no	%	no	%
Shuwaik	81	14.1	40	11.5	121	13.0
Yarmouk	45	7.8	37	10.6	82	8.9
Adeilia	22	3.8	17	4.9	39	4.2
Surra	92	16.0	72	20.6	164	17.7
AlAdan	11	1.9	5	1.4	16	1.7
Salmiya 1	78	13.5	31	8.9	109	11.8
Salmiya 2	148	25.7	68	19.5	216	23.4
Meshrif	84	14.6	78	22.3	162	17.5
Khaldiya	15	2.6	1	0.3	16	1.7
Total	576	100	349	100	925	100

**Table III:** Frequencies and percentages of confounders reported by subjects (smoking habits, bakhour use, and pets' ownership)

Variables	Reports	No	%
Smoking (N=916)	No	694	75.8
	Yes	222	24.2
Smoking intensity (N= 219)	10 cig	89	40.6
	20 cig	76	34.7
	>20 cig	54	24.7
Passive Smoker (N=905)	All the time	274	30.3
	Some times	294	32.5
	Rarely	140	15.5
	Never	197	21.8
Bakhour -Essence (N=907)	All the time	194	21.4
	Some times	374	41.3
	Rarely	160	17.6
	Never	179	19.7
Pet ownership (N=907)	No	620	68.4
	Yes	287	31.6
Pet type	Birds	167	18.4
	Cats	42	4.6
	Dogs	16	1.7
	Others	62	6.4

**Table IV:** The distribution of the respiratory and other disease conditions According to the walking paths (Ratios computed as per 10000)

Walking paths	Respiratory			Allergy			Asthma or Bronchitis			Population
	no	%	Ratio	no	%	Ratio	no	%	Ratio	no.
Shuwaik	27	12	48.1	10	8.4	17.7	16	16.3	28.6	5591
Yarmouk	19	8.2	9.1	9	7.6	4.3	10	10.2	4.8	20879
Adeilia	11	4.7	5.4	7	5.9	3.5	3	3.1	1.9	20149
Surra	38	16	11.4	20	16.9	6.0	16	16.3	4.9	33233
AlAdan	4	1.7	1.4	0	0.0	0.0	4	4.1	1.5	27493
Salmiya (1&2)	82	35	3.5	50	42.3	2.1	27	27.5	11.8	233481
Meshrif	49	21	13.2	21	17.8	5.6	22	22.4	6.0	37191
Khaldiya	1	0.4	0.5	1	0.8	0.6	0	0	0	16966
Total	232	100	5.9	118	100.0	3.0	98	100	2.5	394983

**Table V:** Prevalence of respiratory diseases, food allergy and parental allergy or asthma within the two genders

Sample Reported Diseases	Whole sample (N=913)	Males (N=565)	Females (N=348)
Respiratory Diseases	232(25.4)	130 (23)	102 (29.3)
Kind of Respiratory Disease (N=232)			
Asthma	81(34.9)	48(8.6)	33 (9.6)
Bronchitis	17(7.3)	15 (2.7)	2 (0.6)
Allergy	118(50.8)	57 (10.2)	61 (17.7)
Others	8(3.4)	5 (0.9)	3 (0.9)
Food Allergy	167(18.4)	93 (16.5)	74 (21.6)
Parental Allergy or Asthma	148(16.3)	85 (15.2)	63 (18.1)

**Table VI:** Logistic Regression Coefficient ( $\beta$ ) and Odds Ratio (OR) for respiratory diseases, allergy and asthma or bronchitis associated with independent variables

Variables	$\beta$	SE	OR	95% - CI
Respiratory diseases (N=232)				
Paths	0.04	0.3	1.04	0.99-1.11
Exposure to oil fires	0.19	0.18	1.21	1.10-1.74
Owning pets	0.23	0.17	1.26	0.98-1.76
Parental respiratory disease	0.69	0.2	1.99***	1.35-2.95
Smoking	0.24	0.19	1.28	0.98-1.86
Use of Sandalwood/Essence	0.08	0.08	1.1	0.92-1.29
Gender	0.45	0.17	1.58**	1.12-2.23
Allergy (N=118)				
Paths	0.06	0.04	1.06	0.99-1.15
Exposure to oil fires	0.41	0.24	1.52	0.95-2.43
Owning pets	0.11	0.18	1.12	0.98-1.58
Parental respiratory disease	0.65	0.25	1.91**	1.17-3.10
Smoking	-0.75	0.26	0.93	0.98-1.55
Use of Sandalwood/Essence	0.16	0.11	1.12	0.95-1.46
Gender	0.77	0.22	2.15***	1.39-3.33
Asthma or Bronchitis (N=98)				
Paths	-0.02	0.04	0.98	0.98-1.07
Exposure to oil fires	0.02	0.23	1.02	1.10-1.75
Owning pets	0.12	0.19	1.13	0.99-1.64
Parental respiratory disease	0.51	0.27	1.67*	0.98-2.82
Smoking	0.65	0.25	1.93**	1.18-3.14
Use of Sandalwood/Essence	-0.04	0.12	0.96	0.98-1.22
Gender	0.06	0.25	1.1	0.95-1.75

(\* , p< 0.05; \*\*, p< 0.01; \*\*\*, p< 0.001)

## DISCUSSION

The present study is based on a convenient sample and the ratios are computed using gross population denominators, the figures should be taken conservatively. The similarity of the participation of males and females is encouraging; women are more likely to stay at home due to traditional and religious reasons, the results are different from a study from Australia.<sup>(21)</sup> The relatively higher ratio for the older age group (60-80 years) walking is another important point; the study did not address the time spent walking, the minimum activity guideline is 150 minutes per week that is 30 minutes on at least 5 days.<sup>(22)</sup>

The relation with the nationality is important, probably reflects the social and financial class, the findings are in line with reports from Portland Oregon USA, the relation of the economic status with walking time was not similar to reports in the literature Li et al,<sup>(23)</sup> the relation of walking with the education class was also similar to reports from Ball et al.<sup>(21)</sup> The better educated group may be the proportion that are more aware of the advantages of exercise and leisure walking, or these are the more active class in the society who practice with the

intention to reduce the risk from having a chronic disease.

Smoking is an established cause of urinary bladder cancer, cancers of the upper digestive, and respiratory tract.<sup>(24)</sup> The prevalence of smoking seen among the walkers (24.2%) was a bit lower than that reported by Memon et al<sup>(25)</sup> from Kuwait. Among the Kuwaitis aged 20 years and over, working in the government sector (34.4% for males and 1.9% for females), prevalence in population studies<sup>(26)</sup> was 27.4 and 2.1 for males and females respectively, another more recent survey<sup>(27)</sup> found a prevalence of 32,4 for males and 1.5 for females. The present study didn't analyse the data according to the gender however the low prevalence among women in Kuwait and most of the Middle East countries is appreciably lower than that from industrial countries.<sup>(28)</sup>

Passive smoking was elaborated in the present study the proportion of those reporting no exposure were less than a quarter of the sample. The number of cigarettes was generally inline of that reported by Memon et al.<sup>(25)</sup> Active and passive smoking may double the risk factors of asthma or bronchitis. Such risk where reported by Spengler et al and the

National Cancer Institute where health conditions and lifetime exposure to environmental tobacco smoke were related.<sup>(29, 30)</sup> Having an asthmatic child at home is a strong motive for reduction or cessation of smoking. Because the causal relationship between secondary smoking and asthma in children could not be determined for this cross-sectional design, we did not include passive smoking in our adjusted factors

The exposure to combustion products resulting from Arabian incense, locally termed (Bakhour) is a known risk factor triggering asthma in Omani children, causing wheezes in 40% of children having Asthma. The effect was higher among girls probably due to spending more time indoors.<sup>(31)</sup> The use of Bakhour is common in the Gulf States; the probable adverse effect was discussed by Abdul et al,<sup>(32)</sup> a history of exposure to Bakhour in 80% of the asthmatic children was evident in Qatar. Another study also reported that exposure to Bakhour was a precipitating factor in 19% of asthmatic children.<sup>(33)</sup> In Kuwait exposure to Bakhour triggered asthma in 26% of the asthmatic children.<sup>(34)</sup> The mechanism of action is not well known; however in animal experiments exposure induced significant morphological changes in rat pneumocytes.<sup>(35)</sup>

Regression analysis revealed that respiratory disease in subjects using the public paths is associated with parental diseases and gender. International reports pointed the positive relationship between asthmatics and family history of asthma.<sup>(36)</sup> Saraclar et al. found that a family history of atopy was the strongest risk factor for having ever had wheezing, current wheezing and severe wheezing in school children in Ankara, using the ISAAC questionnaire.<sup>(37)</sup>

### Conclusion & Recommendations

There are some limitations to this study. Our health measures were self reported. Thus we cannot say whether our results indicate that those with a disease are over-reporting symptoms or not. Some bias may arise from inequality of sample distribution within the pathways, and male to female ratio. This study indicate that a quarter of the sample who use walking paths in Kuwait have some kind of respiratory disease or allergy. Genetic factors and gender are the main risk determinants that are associated with respiratory diseases, and specifically tobacco smoking is an extra confounder that is related to cases with asthma and bronchitis. Further investigations are recommended to determine the magnitude and incidence of respiratory diseases among pedestrians and possible effects of road emissions and other confounding risk factors.

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