Safety level at home and household pollutants; problem awareness among women at Al-Madīnah Al-Munawwarah– KSA

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Abstract: An accident or injury can occur in any part of the home. Meanwhile, some of the most toxic substances that are released into air and water come from own homes. The aims of the present study were to assess the level of awareness regarding safety level at home and household pollutants among women at Al-Madīnah Al-Munawwarah – KSA. A cross sectional design was utilized in this study. A convenient sample of two hundred thirty women who were affiliated to health centers participated in this study between the periods of October 2011 to May 2012. Two tools were utilized to collect the pertinent data of this study; the first one was to assess safety level at home by a hundred questions checklist categorized as yes or no and interpreted to seven levels of safety. The second tool was to assess ten aspects of household pollutants covered biological, organic, carbon monoxide, formaldehyde, respirable particles, environmental tobacco smoke, asbestos, nitrogen dioxide, radon, and pesticides. Household pollutant resources, health effects and steps to reduce exposure assessed in each type. The total household pollutants categorized as satisfactory and unsatisfactory awareness level. In addition to, the socio-demographic data of the study participants' was assessed. The mean age score of the study participants' was (28 year), while the average monthly income was (3800 SR), moreover, (44.3%) were having University education level and (67.8 %) were not working. Concerning the safety level at home; it was found that more than two third (67.8%) of the study participants' were fallen between the categories of an unacceptable level of safety with needs for periodical checkup /week and urgent repair (34.8%) and absolute unacceptable level of safety and needs for periodical checkup /day and urgent repair (33%). As regards household pollutants; the study findings revealed unsatisfactory awareness level with total mean score of 45.86±11.42. The study findings revealed crucial attention should be paid for safety at home among the majority of the study participants. Also, unsatisfactory level of awareness regarding household pollutants was clearly present. These study findings indicated great needs for public health campaigns to change and provide a wide range of resources to inform, educate and help to prevent accidents in the home and reduce exposure of household pollutants.

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Key words: household awareness, Home safety level, household pollutants.

1. Introduction

The home may be viewed as place to escape the dangers of the outside world, but a new report shows dangers abound on the home front as well - causing as many as 20,000 deaths, 7 million disabling injuries, and 20 million hospital trips in the U.S. each year. Also, every year in the UK more than 5,000 people die in accidents in the home and 2.7 million turn up at accident and emergency departments seeking treatment. People who spend more of their time at home suffer proportionally more accidental injuries, i.e. the very young and older people. In 2009, 236 people died following an injury sustained in the home. But, because the accidents happen behind closed doors in isolated incidents they rarely attract public and media attention **(ISD 2010)**. Home accidents are a major cause of death and injury and contribute substantially to potential years of life lost. There are three main categories of home accident; impact accidents including falls, being hurt by falling objects and general 'bumping into' type accidents; heat accidents including burns and scalds; and through mouth and foreign body accidents including accidental poisonings, suffocation, choking and objects in the eye/ear/nose, (Finkelstein, Corso, & Miller, 2006).

Falls are by far the major problem, followed by poisonings. Poisonings occur not just in little children, but also in large numbers of adults -- even middle-aged adults - who appear to die from mixtures of prescription drugs and in some cases illicit drugs as well. After falls and poisonings, the most common causes of death at home were fires, inhalation and suffocation, and drowning. Rates of home-related injuries and death also varied widely across the USA (Beckert, 2012).

Fatal accidents within the home are a leading cause of death in the United States. At the time being that many of these accidents that occur in the domicile can be prevented by taking extra precautions. Regular checks of safety equipment as well as maintaining appliances and structures around the house can greatly reduce the risk of such accidents, (Faul, Xu, Wald, Coronado, 2010 and Runyan, 2011). On average, two children die daily from accidental poisoning. Over 80 percent of children seen in emergency rooms for poisoning took medicine they found at home. The NCIPC suggests that adults carefully read directions on medicines and obey warnings about combining painkillers and alcohol. Make sure children cannot reach prescription or over-the-counter medications and always use childproof bottles (NHTSA, 2010, CDC, 2011& Dergham,et al, 2012).

In concerning, pollution is the introduction of a contaminant into a natural environment, usually by humans. The health effects of pollution affect more than 100 million people worldwide - more widespread than global pandemics. Life expectancy may be as low as 45 years because of cancers and other diseases. Around 3 billion people still cook and heat their homes using solid fuels in open fires and leaky stoves. About 2.7 billion burn biomass and a further 0.4 billion use coal. Most are poor, and live in developing countries. Such cooking and heating produces high levels of indoor air pollution with a range of health-damaging pollutants, including small soot particles that penetrate deep into the lungs. In poorly ventilated dwellings, indoor smoke can be 100 times higher than acceptable levels for small particles. Exposure is particularly high among women and young children, who spend the most time near the domestic hearth (Christopher, et al 2013, Francesca, et al 2013).

Many potential sources of household pollution are exists, including; combustion sources such as oil, gas, kerosene, coal, wood, automobiles in attached garages, and tobacco products, poorly maintained central heating and cooling systems, and humidification devices. (Katharine, 2012) One of the most significant toxicants for home pollution is formaldehyde, typically found at higher levels indoors than outside. Formaldehyde is suspected as being involved in respiratory, allergy and other health ailments as well as being a suspected carcinogen. Carbon monoxide is often released as a by-product of combustion, in small amounts from cigarettes but in much larger amounts during the combustion of fossil fuels. Faulty furnaces, water heaters and/or gas dryers can all release carbon monoxide. In high concentrations carbon monoxide is fatal. In lower doses symptoms of carbon monoxide poisoning include headache, fatigue, drowsiness and other symptoms. Asbestos is a group of naturally-occurring minerals that separate into strong, very fine fibers. These fibers are heat-resistant and extremely durable, which made asbestos popular in home construction until health problems came to light. Fibers can be released and may pose a health risk, including lung cancer. In these cases, asbestos should be removed by a professional. Lead has long been recognized as a harmful environmental pollutant, and is a particular concern for children's health and intellectual development. Radon Gas is a radioactive gas which can migrate through soils and accumulate in the basements of residences. Produced by radioactive break-down in the soil, it seeps through cracks and fissures in foundations and enters basements. The situation is made more problematic if there is little ventilation or air-exchange in the vicinity allowing the radon to concentrate, although older residences with cracked, unstable foundations are far less likely to be as air-tight as their modern counterparts (Hsiao-Chi, Kelly, Shih-Chun. Lung, Kuan-Jen, 2013, Gert. Maritz, Muyunda 2013, and Natalia et al 2013). In addition, dust, pollen, and other air-borne particulates are also a concern as indoor air pollution. Health symptoms come from air borne particulates can take on a range of forms; from fairly subtle sneezing, allergy-like irritations to more serious health problems such as asthma attacks and other respiratory problems, (Niki, 2009).

There is virtually no data on the level of awareness about level of home safety, and household pollution among women at Al-Madīnah Al-Munawwarah– KSA. Such present study is a step in the direction wherein the awareness about level of home safety, household pollutants of women at Al-Madīnah Al-Munawwarah– KSA was assessed in which findings are important to plan community health services.

2. Material and method:

Subject and setting: The city of Al-Madīnah Al-Munawwarah– KSA has a population of about 1.3 million in 2006. Al-Madīnah Al-Munawwarah is 210 mi (340 km) north of Mecca and about 120 mi (190 km) from the Red Sea coast. It is situated in the most fertile part of all the Hejaz territory, the streams of the vicinity tending to converge in this locality. An immense plain extends to the south; in every direction the view is bounded by hills and mountains. The present study was conducted between the periods of October 2011 to May 2012. Cross sectional descriptive design was utilized in this study. Two hundred thirty women who were affiliated to health centers at Al-Madīnah Al-Munawwarah – KSA. Two main tools were utilized to collect the pertinent data of this study, the first one; to assess safety level at

home and the second to assess knowledge regarding household pollutants. Regards the safety at home tool which developed by Dr Adnan Sultan (www.dr-adnan.com/*)*, it included one hundred questions covered the household hazards. All questions responses were yes equal two and no equal one. Seven categories were was identified based on number of no responses as follows; category one; from 1 -15 meant satisfactory level of safety with need for periodical checkup / 3 months, category two; from 16-25 meant accepted level of safety with need for periodical checkup /one month and needs for improvements. Category three; from 26-40 meant unaccepted level of safety with need for periodical checkup /week and needed for urgent repair. Category four; from 41-55 meant absolutely unacceptable level of safety and need for urgent repair with periodical checkup /day. Category five; from 56-76 meant critical and dangers level of safety, may lead to hazard and need for urgent repair with periodical checkup /day, Category six; from 77-90 meant very poor and dangers level of safety, and needed for urgent repair with periodical checkup /day. Category seven; from 91-100 meant very low and very dangers level of safety and hazards, need for urgent comprehensive repair with periodical checkup /day. The second tool was to assess knowledge apropos the household pollutants developed by the first researcher and covered household pollutants aspects. Each aspect assessed to its resources, health effects and steps to reduce exposure. Types of household pollutants assessed were; biological (21 points), organic (27 points) , carbon monoxide (25 points), formaldehyde (20 points), respirable particles (19 points), environmental tobacco smoke (14 points), asbestos (7 points), nitrogen dioxide (17 points), radon (12 points), and pesticides pollutants (18 points). Each item scored as mentioned equal one degree and none mentioned/ or wrong equal zero. The total household pollutants categorized as, total in each item below 30 degree= unsatisfactory level of household pollutants knowledge, at 30 degree= fair level, up to 45 considered good level. In addition to the relevant socio-demographic characteristics was collected. The ethical considerations; all women have been informed about the purpose of the study with overview to obtain their acceptance to participate in the study translated in oral consent, insuring that all data obtained were to be strictly confidential.

Procedure: an official permission from the director of the primary health care department was obtained, the study subjects were interviewed during their visit to the MCH centers inform them about the nature and objectives of the present study. A structured interview was conducted with woman who was agreed to participate in the study. Tools to collect the study data were taken 45-60 minutes to fill in. Tips of home safety and household pollutants in the form of brochures were distributed in MCH centers in order to the benefits of the public.

Statistical analysis: The collected data were organized, categorized, analyzed using the statistical packages for social science (SPSS), version 16. Numerical data were expressed as mean and standard division. Regression test was done to study relationship among quantitative data and chi-square test for qualitative data. Probability (P – value) < 0.05 was considered significant.

3. Results:

Among seven safety categories the study participants were ranged from level one to five. At the time, more than two third (67.8%) were fallen in category three and four with total means score was SD 34.8 ± 13.9 **(table 1).**

Table 1: Description of safety levels categories at home of the study sample.

Number of no responses	No=230	%
1 -15 satisfied level of safety with periodical checkup / 3 months.	22	9.6
16 – 25 accepted level of safety with periodical checkup /one month and needs for improvements	42	18.3
26 – 40 unaccepted level of safety with periodical checkup /week and needed for urgent repair	80	34.8
41 -55 absolutely unacceptable level of safety and needed for urgent repair with periodical checkup /day	76	33
56 – 76 critical and dangers level of safety, may lead to hazard and needed for urgent repair with periodical checkup /day	10	4.3
Mean ± SD 34.8 ± 13.9		

Table 2: Means scores of household pollutants awareness (N= 230).

Type of home pollutants	Sources	Health Effects	Steps to Reduce Exposure	Mean ± SD
Biological pollutants	9	6	6	5.97±2.18
Organic pollutants	13	10	4	5.31±1.71
Carbon monoxide pollutants	9	7	9	5.64±2.07
Formaldehyde pollutants	8	8	4	4.32±.95
Respirable Particles pollutants	4	6	9	4.98±1.42
Environmental tobacco smoke pollutants	3	9	2	4.32±1.25
Asbestos pollutants	3	2	2	3.00 ±0.00
Nitrogen dioxide pollutants	4	4	9	3.66±0.47
Radon pollutants	4	2	6	3.66±0.47
Pesticides pollutants	3	6	9	4.98±1.42
Total mean score	Total questions 180			45.86±11.42

As regards the home pollutants in **table 2** the mean score was 45.86±11.42 out of 180 degrees include questions about sources, health effects and steps to reduce exposure concerning different types

of home pollutants. These types were biological, organic, carbon monoxide, formaldehyde, respirable particles environmental tobacco, smoke, asbestos, nitrogen dioxide radon pesticides pollutants.

Concerning source of information of home pollutants were relatives, friends, neighbors, mass media and internet. The study participants opinions, regarding need help & information more one third agree while the questions about self awareness barriers toward home pollutants; more than two third of them viewed themselves were having lack of knowledge, almost equivalent financial aspect and in need for these risky objects. As well absent of alternatives and the minority were having disinterest feeling (attitude) **(table 3).**

The description of socio-demographic in **Table (4)** shows that the mean score was 28.00±8.52, average monthly income 3800±1447.36. The majority (75.7) were diploma & university educational level, the minority (10.4%) the crowdedness index was room / member and two bathrooms per family. Also in table 4 most variables were shown a significant relationship while the main insignificant relationship were found between the average income with awareness level of home safety, household pollutants and source of information as well between family size and safety level, household pollutants and pollutants awareness barriers.

Table 3: Percentages distribution of source of information, need for helping information and Self awareness barriers toward home pollutants among the study sample

Variables	No	%
Source of information*		
relatives, friends and neighbors	146	63.5
mass media	92	40
Internet	106	46
Need for helping information		
No	52	22.7
Uncertain	30	13.0
Yes	148	64.3
Total	230	100.0
Self awareness barriers toward home pollutants*		
Lack of knowledge	164	71.4
Financial aspect	28	12.2
In need for these risky objects	24	13.1
Absence of alternatives	54	21.7
Disinterest	22	9.5

* Responses are not mutually exclusive (responses more than one).

Table 4: Relationship among safety level, household pollutants awareness, source of information, awareness barriers, need for information and socio-demographic characteristics of the study sample.

Variable	No=230	%	Total safety level	Total pollution awareness	Source of information	awareness barriers toward home pollutants	Need for helping information
Age:[0] 20-29 year	156	67.8					
30-39 year	28	12.2	t 2.207	t -3.671	t-.425- sig.671	t-.506	t-1.328
40-49 year	36	15.7	sig.028	sig.000	(n.s)**	sig-.613	sig-.185
50-59 year	10	4.3	(s)*	(s)*		(n.s)**	(n.s)**
Mean ± SD	28.00 ± 8.52						
Average monthly income/SR[0]	166	72.2	t -1.958				
<3000	32	13.9	sig -.051	t -.439	t -1.316	t-6.285	t-4.653
3000- <6000	32	13,9	(s)*	- sig.661	sig -.190	sig-.000	sig-.000
6000 - <9000				(n.s) **	(n.s)**	(s)*	(s)*
Mean ± SD	3.800± 1447.36						
Level of education[00]:							
Basic education	56	24.3	P<.000	P<.000	P<.000	P<.000	P<.000
Diploma	72	31.4	(s)*	(s)*	(s)*	(s)*	(s)*
University	102	44.3					
Social status[00]:							
Single	84	36.5	P<.000	P<.000	P<.000	P<.000	P<.000
Married	112	48.7	(s)*	(s)*	(s)*	(s)*	(s)*
Divorced	26	11.3					
Widowed	8	3.5					
Occupational status[00]:							
Working	74	32.2	P<.000	P<.000	P<.000	P<.000	P<.000
Not working	156	67.8	(s)*	(s)*	(s)*	(s)*	(s)*
Smoking status[00]:							
Smoker	24	10.4	P<.020	P<.000	P<.040	P<.038	P<.000
Non smoker	206	89.6	(s)*	(s)*	(s)*	(s)*	(s)*
Mean ± SD	1.90±0.31						

Family size[0] 1-4 5-8 9-12 Mean ± SD	80 122 28 1.78± 0.65	34.8 53.0 12.2	t -.483 sig -.630 (n.s) **	t 1.028 sig.305 (n.s) **	t -1.991 sig -.048 (s)*	t1.037 sig.301 (n.s) **	t-2.317 sig-.021 (s)*
Number of rooms [0] 1-4 5-8 9-12 Mean ± SD	54 136 40 1.94±0.64	23.5 59.1 17.4	t -5.557 sig.000 (s)*	t -3.185 - sig.002 (s)*	t -.563 sig -.574 (n.s) **	t 4.192 sig.000 (s)*	t1.477 sig.141 (n.s) **
Number of bathrooms[0]: 1-2 3-4 5-6 Mean ± SD	98 122 10 1.62± 0.57	42.6 53.0 4.3	t 4.314 sig.000 (s)*	t 2.242 sig.026 (s)*	t -.693 sig -.489 (n.s) **	t-3.950 sig-.000 (s)*	t-.976 sig-.330 (n.s) **

[0] Regression test [00]Chi-square test * s (significant) ** n.s (not significant)

4. Discussion:

Home accidents represent a major national problem; they affect large numbers of people in every locality. They are of the greatest relative importance in the preschool and aged groups. Home accidents are the first cause of death in children from one to five years old. However, the greatest absolute number of fatal home accidents occurs among persons over 65 years of age. These facts have led to the recognition of home accidents as a national health problem (Home safety factsheet 2010). The home may be viewed as place to escape the dangers of the outside world, but the present study revealed many findings that configure risk factors among families at home. One aspect of these risks highlighted through while 72.1% were at unacceptable level of home safety and in needed for some sort of periodical check up, and periodical maintenance which represent threats for the families with a significant relationship with all the socio-demographic data of the study except with their family size. Despite those staggering statistics, more than half of American adults surveyed reported that they can't think of anything they would do in the coming year to make their homes safer or to prevent unintentional injuries and don't even know the problem of home hazards exists (Hsiao-Chi, et al 2013). Likewise, almost 5,000 people die in home accidents and 2.7 million visit their local accidents and emergency departments seeking help in the UK every year and 236 people died following an injury sustained, in the home in Scotland in 2009. In peace the place that all believe should be safe-are homes. People who spend more of their time at home suffer proportionally more accidental injuries, (i.e the very young and older people) (ISD, 2010).

On the other side; a report by WHO and the UN Development Programme (UNDP) in November 2009 noted that 1,200 of the 1,777 deaths could be directly attributed to solid fuel use. Burning wood, crop waste, charcoal and animal dung indoors for cooking and heating results in high levels of air pollution inside the living space, where small soot particles and other pollutants are inhaled and enter the lungs of young children. WHO warns that such exposure more than doubles the risk of pneumonia for children. Other than, air pollutants such as particulate matter (PM), nitrogen dioxide, and carbon monoxide are just a few that researchers and public health professionals have identified as asthma triggers. During the winter months, this fact is even more evident when families use a variety of heating sources to keep their homes warm, (APA, (2012) & -Hsiao-Chi, et al (2013)).

The present study findings revealed low awareness level about household pollutants sources, their health effects and steps to reduce exposure with significant relationship with all socio-demographic characteristics except with family size and income which is meaningless in conducting public intervention to raise their awareness regarding household pollutants as well maintain environmental sanitation. In addition to, the majority of the present study sample got their information related to household pollutants from personnel around them and/or mass media and/or internet, more than two third reported needs for information in which they were aware of lacking information. A research done by Niphadkar, et al (2009) to study poor awareness and knowledge about indoor air pollution (IAP) in the urban population of Mumbai, India showed that 83.9% of the respondents were aware of IAP and their major sources of information were health workers (40.2%), teachers (33%) and the mass media (23.1%) (Radio / TV). Eighty one point three percent (81.3%) of respondents were aware of the hazards associated with IAP. Commonly known indoor air pollutants include cooking in the sleeping areas (77.9%), filthy environment (73.4%), overcrowding (70.1%) and use of mosquito coils (65.6%).

Respondents were also observed to have poor practices.

The age groups of the study sample weren't having significant to the household pollutants sources, their health effects, steps to reduce exposure, their average income and for both safety level and household pollutants as well the family size. These findings have a sound in articulation health education plans to raise the awareness of the public special households about home safety and household pollutants and its effects to compliment their attitude and practices. Also, there is a need to understand better the potential health effects of these household pollutants, as well as strategies for reducing exposure.

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