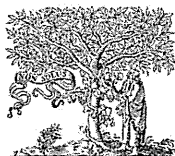


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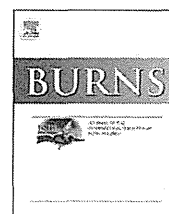




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Risk factors of burns among children in Mongolia

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ABSTRACT

Burn is one of the leading causes of under-5 childhood injuries. Identification of risk factors and awareness level of caregivers could help reduction of burn-related morbidity. The objectives of this study were to identify general perceptions of risk factors of childhood burns, prevalence of burns among under-five Mongolian children, and to assess knowledge and practice of burn care and care seeking behaviors for care givers of those children. A household-based cross-sectional survey was conducted from September to October 2010 including 865 households with 1154 under-5 children. Data were collected by face-to-face interview using semi-structured questionnaire. Of total 1154 children, 291 (25.2%) had burn injury in their life-time. Above half of them had suffered a scald. Majority of burns occurred at home and urban children were at higher risk. The age up to 36 months, boys, and fewer children (<3) in the household were found as significant risk factors for childhood burns. Caregivers' knowledge and practices on childhood burns were generally insufficient; most of them indicated the importance of physical environment at home. We concluded that burns were common among under-5 children, and caregivers' knowledge and practices on burns was inadequate. Specific interventions like "Caregivers education program" encouraging safe domestic environmental conditions should be undertaken to increase their awareness on burn-related issues to reduce childhood burns in Mongolia.

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1. Introduction

Burns have aroused widespread public health concern and constitute a global public health problem [1–3]. According to the World Health Organization Global Burden of Disease estimates for 2004, more than 310,000 people died as a result of fire-related burns. Fire-related burns are the 11th leading cause of death for children between the ages of 1 and 9 years. Overall, children are at higher risk of death from burns, with a global rate of 3.9 deaths per 100,000 population; highest death rates being observed among infants [1]. In the developing

countries, burns have been found as a major cause of injury morbidities, disabilities and deaths [1].

Burns appear to be most devastating among younger children that require long hospitalization and may result in important physical as well as psychological sequelae [1,2,4]. It is disproportionately concentrated among children below five years of age in South-East Asia and Africa [5]. In terms of functional, social, and psychological impairment burns have been identified as one of the most catastrophic causes of child injury. Childhood burns are of special importance as children are much more vulnerable, have less perception about dangerous situations and have limited ability to react promptly

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and properly against it [2,4]. Many children die each year as a result of burns, many more suffer burn-related disabilities and disfigurements leading to considerable personal and economic effects for both individuals and their families.

In Mongolia, deaths due to injury, poisoning and other consequences of external causes have been steadily increasing during the last decades for both adults and children and have become the leading causes of death. For instance, compared to 1996 the incidence has increased from 274.6 to 409.1 per 10,000 populations, whereas the mortality has increased by more than 80% resulting in rate of 11.69 per 10,000 populations in 2007. Incidence for children has been reported to be 297.09 per 10,000 populations. In respect to mortality, injuries and poisoning are the first and second leading causes of death among children under five years [6]. Around 8.7% of under-5 child mortality was caused by burns and this is the leading cause of the under-5 child injuries. Incidence and mortality rate of burns, also disability is increasing year by year in Mongolia [7].

A range of factors put children at particular risk of burns including age, gender, and environmental issues such as supervision and housing [8]. Because of limited awareness about childhood burns prevention, lack of timely access to emergency care, risks of burns get severe, hence mortality, morbidity and disability increase year by year [3,9].

Previous studies conducted in Bangladesh [4], Greece [3], South Africa [8], United Kingdom and Mongolia [6] were directed at the epidemiology of childhood burns and they have investigated the individual demographics, the circumstantial characteristics of burns and, more recently, the mechanisms underlying them. These mechanisms are reported to be complex with contributors identified at various levels, including that of the individual, family and home environment [9,10]. The Government of Mongolia adopted "National Program on prevention of Injury and Violence" by resolution no. 279 in 2009 [11]. The government is undertaking measures to create safer environment for children, but knowledge and practice of caregivers regarding child burns yet have not been investigated too. However, despite the urgent need to investigate the problem of childhood burns, there was not enough burn-related information in Mongolia. Therefore, it was important to determine the magnitude and risk factors of burns among under-5 children.

Thus, this first household-based study was aimed to: (1) identify general perceptions of risk factors associated with childhood burns in Mongolia; (2) determine prevalence of burns among under-five children; and (3) assess knowledge and practice of burn care and care seeking behaviors for caregivers of under-five children.

2. Methods

2.1. Study population

It was a household-based cross-sectional survey conducted from September to October in 2010. It is documented that burns as well as falls are common among children under five years of age both in developing and developed countries. Once children reach the age of five years, unintentional injuries are no longer

the biggest threat to their survival. So, our study focused on these vulnerable group of children under five years of age [12]. The sample was selected using multistage cluster sampling. Administratively, Mongolia is divided into provinces and the capital city Ulaanbaatar. Provinces and the capital city are divided into districts and districts into sub-districts. Presently, the country is consisted of 21 provinces which have 329 districts with 1564 sub-districts, while capital city Ulaanbaatar is divided into 9 districts with 132 sub-districts. We randomly selected four districts from Ulaanbaatar city and one district from one province (Tuv) from countryside. In the second stage 18 sub-districts from four districts of Ulaanbaatar and 4 sub-districts from one district of Tuv province were chosen randomly. Each sub-district was treated as a cluster. Households having under-5 children in each selected cluster were identified from the list of Family General Practitioners' records. All household with under-5 children were included which was in total 865 households (651 households out of 3215 households in urban area and 214 households out of 1051 households in rural area) having a total of 1154 under-5 children.

2.2. Data collection

Six data collectors collected data from respondents by face-to-face interview using semi-structured questionnaire in the household level. The questionnaire contained closed-ended questions which included questions on general information about children, risk factors regarding childhood burns, knowledge and practices related to childhood burns. The potential respondents were mainly mothers. When mother was absent, the children's major caregiver or any responsible adult member of the household responded the interview. Respondents were asked whether there was any history of burns of any type to their children in their life-time. We identified a 'burn case' from the history of burns in their life-time regardless of number of burns and its severity.

Informed written consent was obtained from all respondents before interview. This study was approved for ethical clearance by Scientific Committee of Public Health Institute, Ministry of Health in Mongolia.

2.3. Statistical analyses

Burns were categorized by gender, age groups, family size, residence, lifestyle and demographic characteristics. Age groups were defined in months. We had multiple responses for questions related to dwelling types, heating system, and type of cooking devices of the respondents. For convenience of analysis, multiple responses were collapsed into two categories. Accordingly, dwelling system was recategorized into 'Traditional Mongolian house (ger)' including 4-5 sides, and 6 more side and 'Building' including apartment, adobe house 1-2 room and 3-5 rooms, private house and others. The heating system was recategorized into 'Open heating system' which included the hearth and the furnace, and the 'Central heating system'. Type of cooking devices was recategorized into 'Furnace' and the 'Other cooking devices' including oven, Chinese hot pot, gas, etc.

Statistical analyses were carried out using Statistical Package for the Social Science[®] (SPSS) for Windows, version 18.0 software (SPSS Inc., Illinois, USA). Standard descriptive

statistics was used to analyze the characteristics of burn children. Life-time prevalence of burns was calculated based on the history of burn at least once in their life-time. The knowledge and practice of caregivers regarding childhood burns were estimated by frequency and percent. For each correct answer regarding knowledge of the respondents were scored '1' and total score calculated to generate mean and standard deviation (SD). Binary logistic regression and cross-tabs were used to calculate odds ratio (OR) with 95% confidence interval (CI) to evaluate different socio-demographic covariates of childhood burns including age groups, residence, sex, number of children in household, education of mother, type of house, type of heating system, and childhood status. All statistics were two tailed and P-value <0.05 was considered significant.

3. Results

3.1. Demographic characteristics

A total of 865 households with 1154 under-5 children were investigated. About two-third (805) of the children were up to 36 months of age and 853 (73.9%) were from urban area. Around 638 (55.3%) of them were boys and 516 (44.7%) were girls. Overall, 291 (25.2%) had undergone burn injury in their life-time, of them 247 (84.9%) were from urban areas. Taking into account of multiple burns for some children, the total number of burns was 332 altogether, occurred in their lifetime. Use of 'Furnace' as a cooking device was more among burned children than those of non-burned. Majority of the households were living in traditional houses and using open heating system (Table 1). About 9.7% of households had the fire-sprinkler and 22.7% of them had the fire-detector.

3.2. Risk factors

The home environment was found to be the most frequent place for childhood burns. Around 84.5% of burns occurred at home (Fig. 1A). Inside the home, kitchen appeared to be the

Table 1 – Main characteristics of the respondents.

Variables	Burn injury		Total N (%)
	Yes	No	
	N (%)	N (%)	
Overall	291 (25.2)	863 (74.8)	1154 (100.0)
Age			
0-36 months	227 (78.0)	578 (67.0)	805 (69.7)
37-60 months	64 (22.0)	285 (33.0)	349 (30.3)
Gender			
Girls	104 (35.7)	412 (47.7)	516 (44.7)
Boys	187 (64.3)	451 (52.3)	638 (55.3)
Residence			
Rural	44 (15.1)	257 (29.8)	301 (26.1)
Urban	247 (84.9)	606 (70.2)	853 (73.9)
Number of children in household			
1-2	241 (82.8)	631 (73.1)	872 (75.6)
≥3	50 (17.2)	232 (26.9)	282 (24.4)
Type of house			
Building ^a	169 (58.1)	553 (64.1)	722 (62.6)
Traditional house (ger)	122 (41.9)	310 (35.9)	432 (37.4)
Type of heating system			
Central heating system	76 (27.0)	266 (32.0)	342 (29.6)
Open heating system ^b	206 (73.0)	566 (68.0)	772 (70.4)
Type of cooking devices			
Other cooking devices	113 (38.8)	448 (52.0)	561 (48.7)
Furnace	178 (61.2)	414 (48.0)	592 (51.3)

^a Building include apartment, adobe house, private house and other house.

^b Open heating system include the furnace and hearth.

most risky (66.7%) place for childhood burns. The next common places were other room (18.9%), the living room (12.0%) and bathroom (2.4%) (Fig. 1B). Fig. 1C depicts that most of the burns (53.9%) were caused by hot liquid, such as hot tea, meal, hot water (Scald) followed by hot objects at 37.7%. Few percentage of burns were also reported to be due to electric current (4.8%), fire (2.7%), and chemicals (1.0%).

As shown in Table 2, urban residence, younger age, boys, less children in the household, cooking device 'furnace' were found to be significant risk factors for childhood burns. Table 3 illustrates risk factors of burns depending on area and gender.

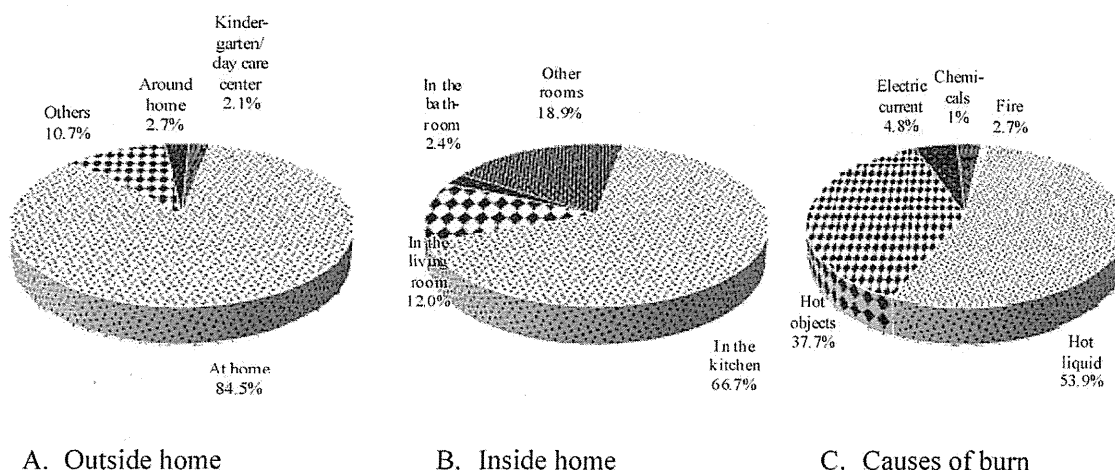


Fig. 1 – Distribution of burns according to place (outside or inside home) and causes.

Table 2 – Association between related factors and burn.

Variables	OR ^a	95% CI ^b	P value
Age			
37–60 months	1	Ref.	
0–36 months	1.7	1.3–2.4	<0.001
Gender			
Girls	1	Ref.	
Boys	1.7	1.3–2.2	<0.001
Residence			
Rural	1	Ref.	
Urban	2.4	1.7–3.4	<0.001
Number of children in household			
≥3	1	Ref.	<0.001
1–2	1.8	1.3–2.5	
Type of house			
Building ^c	1	Ref.	
Traditional house (ger)	1.3	1.0–1.7	0.067
Type of heating system			
Central heating system	1	Ref.	
Open heating system ^d	1.3	0.9–1.7	0.11
Type of cooking devices			
Other cooking devices	1	Ref.	
Furnace	1.7	1.3–2.2	<0.001

^a OR, odds ratio.
^b CI, confidence interval.
^c Building include apartment, adobe house, private house and other house.
^d Open heating system include the furnace and hearth.

Household with up to 2 children was notable risk factor for childhood burns in urban areas (OR = 4.0, 95% CI = 1.4–11.7, $P = 0.010$), than in rural area (OR = 1.5, 95% CI = 1.1–2.3, $P = 0.021$) compared to household having 3 or more children. When the number of children was compared by gender, the number of children up to 2 in the household has been significant risk factor for girls (OR = 3.2, 95% CI = 1.7–6.0, $P < 0.001$) than boys (OR = 1.2, 95% CI = 0.8–1.8, $P = 0.43$). Although, we could not find an association between mothers' education and child burns (OR = 1.1, 95% CI = 0.8–1.4, $P = 0.68$),

when we analyzed the data separately for urban and rural areas, we found that urban children whose mothers had higher education were almost 2 times at lower risk to get burns (OR = 0.5, 95% CI = 0.3–1.0, $P = 0.067$). On the contrary, in rural areas lower education of caregivers was more risk for childhood burns (OR = 1.3, 95% CI = 0.9–1.7, $P = 0.16$) (Table 3).

3.3. General knowledge of burn

Table 4 presents that most (92.3%) of participants had knowledge about the possibility of prevention of childhood burns and around 97.7% of the respondents knew that childhood burns was "very unsafe". Necessity of the fire-sprinkler and fire-detector in every household was mentioned by 77.0% and 83.5%, respectively. More than 93% of them stated that there should be a separator for oven and hot pot to protect children from burns. However, few respondents have proper knowledge about how to give first aid assistance and preventive measure of burns after childbirth. Overall, 47.2% of the respondents have knowledge more than mean score of 66.9 (SD = ± 14.78).

The causes of childhood burns by the opinion of mothers were lack of parental care (61.1%), placing hot meals and objects within the reach of children (28.1%), lack of knowledge about burns (10.1%), and other (0.7%).

3.4. Practice of burn care and care seeking behavior

The data regarding the practices of caregivers about burn care and care seeking behavior are highlighted in Table 5. As it reveals, only 51.3% of participants stated correct practice of checking the temperature of water in the baby bath by their elbow; however, keeping children away from boiling water or meal has been proved to be an important practice to prevent childhood burns by 96.1% of the respondents. Around 30.5% of respondents mentioned correct answer not to eat or drink hot meal and tea while they were breastfeeding. Fortunately, 95.5% of them used to wait till the hot meal or tea get cooler

Table 3 – Determinants of childhood burns through binary logistic regression analysis.

Variables	Residence			
	Rural area		Urban area	
	P-value	OR ^a (95% CI ^b)	P-value	OR (95% CI)
Number of children in household				
≥3		Ref.		Ref.
1–2	0.021	1.5 (1.1–2.3)	0.01	4.0 (1.4–11.7)
Education of caregivers				
Above 10 years of schools		Ref.		Ref.
Up to 10 years of schools	0.16	1.3 (0.9–1.7)	0.067	0.5 (0.3–1.0)
	Gender			
	Female		Male	
	P-value	OR (95% CI)	P-value	OR (95% CI)
Number of children in household				
≥3		Ref.		Ref.
1–2	<0.001	3.2 (1.7–6.0)	0.431	1.2 (0.8–1.8)

^a OR, odds ratio.
^b CI, confidence interval.

Table 4 – Percentage of caregivers with correct responses to questions regarding knowledge on childhood burns.

Questions	Yes	%
Is it possible to prevent childhood burns? (n = 865)	798	92.3
Is childhood burn unsafe?	846	97.7
Should every household have a fire sprinkler?	666	77.0
Should every household have a fire detector?	722	83.5
Should household have a separator for oven to prevent burns?	806	93.2
What will you do if your child gets burn?		
Will go to hospital directly	564	65.2
If small size burn, will not go to doctor	137	15.8
Will take pain relief medicine	216	25.0
Put khormhon ^a oil	240	27.7
Will not apply laundry soap	573	66.2
Will not apply rare meat	819	94.7
Will not spread sugar	683	79.0
Do you know how to give first aid assistance?	523	60.5
Remove from the accident place	186	21.5 ^b
Take-off clothes	270	31.2 ^b
Cold running water	291	33.6 ^b
After child was born, did you do anything regarding prevention of burns at home? (n = 865)		
Placed hot things beyond the reach of a child	402	46.5
Did not keep matches within the reach of a child	84	9.7
Taught child what is very hot	239	27.6
Consumed hot meals only after breastfeeding a child	14	1.6
Gave a child hot meal or milk only after cooling	67	7.7
Others	59	6.8

^a Natural antibacterial disinfectant oil that recovers promptly when used on minor burns.

^b The percentage regarding 523 respondents who answered positively to the previous question.

before they fed their children. Almost half (49.4%) of households had smokers which was a risk factor for fire at home.

4. Discussion

This is the first household-based survey on childhood burns in Mongolia. The key findings of the study were identification of

Table 5 – Percentage of caregivers with correct responses to questions regarding practices on childhood burns.

Correct answers	Yes	%
Check water temperature before bath by elbow	444	51.3
Keep children away from the boiling meal or tea	831	96.1
Do not eat and drink hot things while breastfeeding	264	30.5
Keep child on lap while feeding	561	64.9
Always wait till the meal or tea get cooler before feeding her/him	826	95.5
Does not smoke	438	50.6

risk factors of childhood burns, such as younger age, male gender, urban residence, fewer children in the household, traditional type of housing, and open heating system as well as inadequate knowledge and practices of caregivers regarding childhood burns.

A major proportion of childhood burns occurred at home, as it was reported previously in other studies [2,3,5,13-16]. The most risky place for childhood burns identified inside the home was a kitchen and it was also reported by several studies [2,3,5,13,17,18]. It may be because that around 45.2% of Mongolian households use an open space for cooking and heating device instead of kitchen and heating system, especially in the traditional houses (Ger) [19]. Since cooking and heating space are located at the center of house, children might easily reach the furnace and other utensils [20,21]. The negative impact of adverse housing conditions, informal settlements and dwelling structures including of demarcations between cooking and washing areas, the number of rooms and some related factors were investigated in previous researches [2,5,9,14] and our results were in agreement with their findings.

Our findings that scald (burn by hot liquid) were most frequent type of childhood burns among under-5 children in Mongolia (Fig. 1C) was consistent with findings of many other studies [5,13,15-18,22-24]. Due to harsh climate of Mongolia most households consume hot food and drinks and use traditional spherical bottom shape utensils [5], which is easy to fall and cause spilling of hot liquid food. In addition, Mongolian households frequently use water boiler that is usually placed within the reach of children. Unfortunately, adults are often unable to look closely after children. Accident analysis based on the local database revealed coffee to be the most frequent liquid causing scalds, which mostly occurred in a kitchen. We also stratified the children in different age group and analyzed to find the leading cause of burn; however, we could not find anything but scald as the leading cause followed by hot objects. This finding is also in agreement with the report of the American Burn Association which stated that scald injuries are most prevalent in children under 5 while fire/flame injuries dominate the remaining age categories [25].

Urban children were found to be more vulnerable to burns than their rural counterpart, which was in agreement with the findings of the other studies [15,23]. Urban children spend their time mostly at home while rural children spend most of their time playing in the courtyard or in the play ground. Urban parents usually work outside [3,18] or self-employed with household chores [10], hence, often forget to keep track of the whereabouts of their younger children. Also, urban residents usually do not teach children how to distinguish hot things. On the contrary, in rural areas where traditional customs are much more preserved and people live in Mongolian traditional houses, the parents always warn their children about the dangers of hot things and introduce them with possible sources of burns. These are some reasons why our findings were different from the study in Bangladesh where they reported higher prevalence of childhood burns in the rural areas of Bangladesh [2,4,5,17,24].

Number of children up to 2 in the household was a significant risk factor for childhood burns compared with 3 or more children. It is expected that having more children in the

family poses a greater threat of being prone to accidental injuries including burns. However, traditional cultural practice of Mongolia reflects that older children usually take care of the younger one, thereby, in the households with 3 or more children ensures lower risk for childhood burns. Moreover, rural children, by nature, are more responsible than urban children. Consequently, this excess risk for fewer children in the urban family is far more than rural families. This result also confirms again that children in urban area are at higher risk for childhood burns than children in rural area. Similarly, OR for rural girls was 3.2 in the households with up to 2 children. Rural girls usually help their mothers in different household chores very often. Their involvement in such activities including working near open cooking and heating devices impend them to be at more risk of burns which have been previously reported in some other studies [4,14].

We observed that knowledge and practices related to childhood burns was inadequate among the care givers for child which was also reported by many other studies [4,5,18,26]. Interestingly, most of the participants knew child burns as preventable and childhood burns are "very unsafe", but they have not enough knowledge about how to prevent childhood burns.

Most of them stated there should be a separator for oven. In Mongolia, even today the nation widely use open space for cooking. Hence, they have to make the fence for separating cooking areas from living areas and increase their knowledge about how to make and utilize those devices. The traditional Mongolian house (mobile tent-house) lacks of several amenities generating high risk for childhood burns. Detailed analysis of cooking and heating system inside the ger revealed that main deficiency lead to burns was absence of demarcation between the furnace (common cooking and heating device) and surrounding area which functions as living, eating and playground area for children [2-5]. Simple fencing around the furnace would reduce incidence of burns in Mongolian traditional house.

Over half of them had correct knowledge about providing first medical assistance, but some people were availing traditional first aid practices, such as using oil, laundry soap, sugar, rare meat or other household products on the first and second degree burns, just what was observed in Bangladesh [4]. Such kind of knowledge is liable to make the burns more complicated, infected, prolonging the illness and contributing to permanent disabilities. Lack of appropriate knowledge and having incorrect knowledge is the reason for such improper practices [4].

Regarding practice on the prevention of childhood burns, half of participants expressed they checked the temperature of bath water by elbow before putting a child in to the tub. Around 69.5% answered incorrectly that eating and drinking hot meals and drinks while they breastfed their children. Those findings are very high risk practice of caregivers for childhood burns; especially it is leading cause of scalds among younger children. Also, half of the respondents mentioned that there were smokers at home which are risky both in terms of getting burns and fire hazard [1].

Knowledge and practice of care givers regarding prevention of burns require educating and informing the public about the risk factors and ways of avoiding them of burns, introducing

the safety of cooking and heating devices, fire detector and sprinkler. Such kind of educational program should be especially focused on burns affecting younger children, could help lead to better supervision of the children by caregivers, and improved knowledge and practice regarding management of childhood burns, which should reduce the risk of burns [4,5,13,15,22,24,26].

The results of our research contribute to broaden the present knowledge about risk factors of childhood burns. It was the first large scale burns study in Mongolia, where this injury is one of the leading causes of childhood morbidity and disability.

There are several limitations in our research. As the study area was pre-selected, the profile, level of knowledge and practices of our study population might not be representative of the caregivers in Mongolia, since most of them were from urban areas. A study with random sampling from various areas in the country would be more representative of Mongolian population which was unaffordable in our study because of time and financial limitations. However, the chosen Tuv aimag can represent well a Mongolian countryside, since it has typical lifestyle, traditions, household infrastructure, etc., similar with any rural area. It would be highly appreciated if future researches on this problem to focus on preventive interventions and be designed appropriately to figure out risk and hazard ratios, as well as to evaluate correlations between preventive interventions and measurement outcomes. We calculated life-time prevalence of burns based on the history of at least one burn during their life time. So, actual number of burns may be more than our estimation if some children had more than one burn history in their lifetime. We diagnosed a case of 'burn' from the history of the caregivers. We could not verify its authenticity and classify stages of burns from the history. Possibility of recall bias and hence overestimation of burns prevalence cannot be ruled out. Despite those limitations, we believe this study results will have substantial contribution in the prevention of burn from Mongolian children.

5. Conclusions

The results of our study suggest an effective comprehensive intervention to reduce risk factors of childhood burns, particularly, focusing on children up to 36 months of age, boys, and households with fewer children who are highly vulnerable groups. Intervention should also focus on cause of burns and to modify the isolation devices between cooking, heating devices and living area, usage of fire detectors and fire sprinklers. At the same time, priority should be given to improve existing knowledge and its implementation into practice of caregivers related to how, when and where to provide first aid, to encourage to be more responsible for prevention of childhood burns among under-5 children in Mongolia.

Conflict of interest statement

None declared.

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SOCIAL CORRELATES OF FEMALE INFERTILITY IN UZBEKISTAN

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ABSTRACT

The purpose of this matched case-control study was to investigate the social correlates of primary infertility among females aged 35 years or less. The study was conducted in the Clinics of Samarkand Medical Institute, Uzbekistan, among 120 infertile and 120 healthy women matched by age, residential area, and occupation from January to June 2009. Data were collected by face-to-face interviews using a structured questionnaire. Median duration of infertility was 10.0 months (interquartile range = 6.0–13.0). The rate of remarriage was 3.5 times higher among infertile women compared with healthy subjects. Insufficient family income, poor quality of life, life stress, and discontentment with daily routines as well as 'bad' relationships with family members (husband, mother- and father-in-law) were significant correlates of female infertility. Infertile women were more likely to underestimate the importance of sexual intimacy, and a negative attitude to sex. Female infertility is associated with various social correlates leading to higher remarriage rates and to further complicating the problem of infertility. Thus, a correction of women's basic attitudes and their relationships to their surrounding social habitat should be an essential component of any program of infertility management.

Key Words: Female infertility, social correlates, relationship with family members, sexual intimacy

INTRODUCTION

The World Health Organization (WHO) has defined infertility as a failure to conceive over 12 months of exposure (which is a good practical guide to management), and leaves a longer term residual incidence of infertility of 10–15%.¹⁾ However, the chance to conceive is reduced almost twofold after the age of 35 years.¹⁾ Epidemiological data suggest that approximately 80 million people worldwide are infertile.²⁾ WHO indicates the highest incidence in some regions of Central Africa where the infertility rate may reach 50%, compared to 20% in the Eastern Mediterranean region, and 11% in the developed world.³⁾ Although infertility is a problem among both men and women, about one-third of infertility cases are caused exclusively by women's

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problems, whereas one third are due to men, and the rest are attributed to a mixture of both or by problems unknown.⁴⁾

Infertility can have a serious impact on both the psychological well-being and the social status of women in the developing world.⁵⁾ As a result of their infertile status, they suffer physical and mental abuse, neglect, abandonment, economic deprivation and social ostracism as well as exclusion from certain social activities and traditional ceremonies.^{6, 7)} This becomes particularly traumatic with previous pregnancies that end in abortions, stillbirths and neonatal/infant deaths or in live births of daughters only.⁸⁾ A survey conducted in Southern Ghana revealed that the majority (64%) of women felt stigmatized, and that higher levels of perceived stigma were associated with increased infertility-related stress as well as lower levels of education.⁹⁾ Some findings from the qualitative analysis concerned a major difference between primary and secondary infertility in terms of its implications for the affected women.¹⁰⁾

It is convenient to divide the literature into articles which explore the possibility that infertility may have psychological causes (Psychogenic Hypothesis) and those which examine the psychological consequences of infertility (Psychological Consequences Hypothesis).¹¹⁾ Though the psychogenic hypothesis is now rejected by most researchers,¹¹⁾ several sources provided reliable evidence that certain social factors might further complicate infertility among women. Available evidence suggests that social factors, such as stress, anxiety or sudden weight loss after a crash diet inhibit normal gonadotropin-releasing hormone secretion, leading to ovulation failure.¹²⁾ The literature has clearly indentified a series of modifiable lifestyle factors, such as psychological stress, smoking, alcohol and caffeine consumption, poor diet, obesity, and insufficient exercise that could potentially impact fertility in the general population.¹³⁻¹⁷⁾

Infertility has much stronger negative consequences in developing countries compared with those in Western societies.¹⁸⁾ In Uzbekistan where, traditionally, having children is mandatory in terms of family happiness, this problem acquires crucial social actuality. However, we could find no comprehensive study in Uzbekistan on the various social correlates of female infertility. Assessments of social consequences, including attitude to family income, family and social relations, lifestyle, quality of life, nutrition, and intimacy, play important roles in understanding the problem of female infertility on a wider scale. Thus, the purpose of this study was to determine the social correlates of female infertility in Uzbekistan.

MATERIALS AND METHODS

A case-control study with 120 infertile (cases) and 120 healthy women (controls) was conducted in the Clinic of the Samarkand Medical Institute, Uzbekistan. Infertile patients were selected consecutively from infertile women admitted to the Gynecology Department during the six months from January to June 2009. The inclusion criteria for infertile patients were: 1) Women from 19 to 35 years of age, and 2) with a confirmed diagnosis of primary infertility. The diagnosis of infertility was based on the WHO definition of infertility as a failure to conceive over 12 consecutive months of regular, active, and unprotected sex. All cases were diagnosed by a gynecologist involved in infertility management in the hospital. Age 19 was determined as the lowest cut-off point since the age of legal permission to marry in Uzbekistan was set at 18. Since chance to conceive diminishes significantly after the age of 35,^{12, 19)} that was accepted as the highest cut-off in our study.

The group of healthy women was randomly selected from those who gave birth in the Maternity Complex of the Samarkand Medical Institute's clinic from January to June 2009. Known confounders of social correlates, such as the area of residence, age and occupation were taken

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as matching criteria for selecting the control group. Any evidence of infertility in the past was an exclusion criterion, as were women with a known infertile husband.

Data collection was done by face-to-face interviews using a researcher-developed structured questionnaire, and by medical examinations using a checklist. The questionnaire included closed-ended questions (except age and duration of infertility) on basic information about patients and clinical data, a woman's self-rating of social status, and intimacy during their married life. Our checklist included physical and gynecological examination results recorded by the research team. There were 13 specific questions including a self-estimation of family income, life quality, nutrition quality, daily routine, life stress, relationships with a husband, parents-in-law and Mahalla members (a unit of the local community in Uzbekistan) as well as attitudes to intimacy after a diagnosis of infertility. A checklist and a questionnaire were developed, revised, and finalized after piloting among patients with and without infertility in the same department.

Each interview took place in a private setting either before or after consultation with a physician. Before answering specific questions, patients were informed about the meaning of each question to avoid information bias. For example, before asking 'how do you estimate your nutrition quality?', the interviewer briefly explained what 'nutrition quality' meant, i.e., the optimal balance of essential nutrients as well as timing between meals, etc.

The study aimed to focus on women's self-rating of social variables rather than the actual state of such matters. For example, a self-rating of family income solely reflected a subject's personal feelings towards their income with no relation to their actual income.

It was necessary to determine the definition of some variables such as quality of life, daily routine, life stress, and intimacy. Quality of life is a broad term used to evaluate the general well-being of individuals and societies over a wide range of contexts, including healthcare. In our study, "quality of life" was defined as women's perceptions about widely-valued aspects of life, such as social well-being and happiness.²⁰ Satisfaction with daily routine included women's contentment with the sequence and volume of daily social activities (work, household chores, relaxing, etc.). "Life stress" was defined as a condition that resulted when person-environment transactions lead the person to perceive a difficulty to cope with the demands of a life.²¹ "Intimacy" in this study was used as a substitute for a woman's sexual life. Under Uzbek norms, it was embarrassing for a woman to answer a direct question about her sexual life. To avoid such an awkward situation, we used the term 'intimacy.'

The anonymity of a respondent's identity was strictly preserved. Written informed consent was obtained from all the women before collecting data. They were ensured of full freedom to participate in the study or to decline to do so at any time without prejudice. Moreover, this study was ethically approved by the Institutional Review Board of the Samarkand Medical Institute.

Statistical analyses

Statistical analyses were conducted using the software Statistical Package for Social Science® (SPSS) for Windows, version 18 (SPSS Inc., Illinois, USA). Descriptive statistical tests were applied to all data. Continuous data were presented as the mean (\pm standard deviation [SD]) for normally distributed data, and as the median (interquartile range [IQR]) for non-normal data. Categorical data were expressed as numbers and percentages, while chi-square analyses were used to compare those categorical variables. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated to identify various social correlates of infertility, such as socioeconomic factors (including family income, quality of life, satisfaction about daily routine, life stress, and quality of nutrition), relationship with family members and neighbors, and various aspects of attitudes towards intimacy using conditional logistic regression. All tests were two-tailed, with statistical significance fixed at the level of $P < .05$.

RESULTS

The main known cause of infertility was the anovulation diagnosed in 65.0% (78) of patients. Anovulation was associated with menstrual cycle disorders, algodysmenorrhoea, dyspareunia, general and genital infantilism and other conditions. Tubal blockage was diagnosed in 23.3%, immunologic factors in 1.7%, with the remaining 10.0% of women suffering unexplained infertility (Fig. 1).

Women with infertility ranged between 19 and 35 (mean age 25.8 years), around $\frac{3}{4}$ of whom were aged 21 to 30. Residents of rural areas comprised 51.7%, while 48.3% were urban residents. Nearly half of the infertile women (47.5%) were service holders, 28.4% were industrial workers, and 15.8% were housewives. Median duration of infertility was 10.0 (IQR=6.0–13.0) months from the first diagnosis of infertility. There was no difference in the demographic data between women with infertility and those in the healthy group except for the order of marriage of women and their husbands (Table 1). Significantly more women (21.0%) were in their second marriage, which is more than three times higher than those in the comparison group (6.0%). This discrepancy was also found among men: 30.3% and 23.1% for the husbands of women in the infertile and comparison group, respectively (Table 1); however, the difference was not significant.

Studying social correlates was based on a significant variety of factors including attitude to family income, self-rated quality of life and nutrition, self-estimation of daily routine, attitude to social environment and the evaluation of a woman's attitude to sexual intimacy. Insufficient family income and the fear of poverty among women were significantly associated with infertility. Out of a total of 118 infertile women who responded, 59.3% estimated their income as 'less than needed' and 'barely sufficient', while in the comparison group only one third (32.2%) chose that answer (Table 2). ORs compared with the first category ('excellent') were 2.8 (95% CI = 1.2–6.8) and 3.1 (95% CI = 1.1–8.5) for the 'barely sufficient' and 'less than needed' categories ($P < .05$). The same pattern was detected with self-estimations of life quality. When asked about their quality of life, 46.2% infertile women responded 'not bad' (in Uzbek informal speech 'not bad' actually means 'not so good') or 'poor' and which was 29.4% for the control group, with ORs 3.3 (95% CI = 1.6–6.4) and 3.8 (95% CI = 1.2–11.5), respectively ($P < .05$).

A lack of contentment with their daily routine was another social correlate of infertility, with OR being 1.9 (95% CI = 1.2–2.9) between the 'well contented' and 'moderate', and 3.1 (95% CI = 1.4–7.1) between 'well contented' and 'not contented' categories ($P < .05$). Self assessments of life stress were especially important to demonstrate the relationship between social factors and female infertility. The number of subjects who 'never' experienced stress was three times higher in the healthy group compared with the infertile group, while the number of patients who felt stress 'very often' was almost twice as high among the infertile women. OR equalled to 2.7 (95% CI = 1.5–4.9) between the 'no, never' and 'sometimes', and 3.6 (95% CI = 1.9–7.0) between the 'no, never' and 'yes, very often' categories ($P < .05$). We could not find an association of female infertility with self-rated nutrition quality (Table 2).

The social environment within the family, and a poor relationship with family members were also found to be associated with women's infertility. An assessment of participants' relationships with their husbands, mothers-in-law, fathers-in-law, and members of the local community is illustrated in Table 3. As seen from the Table, the former three showed a significant association with women's infertility. Inadequate relationships (combination of 'bad' and 'not bad') with husbands was mentioned by 63.2%, with mother-in-laws by 65.0%, and with father-in-laws by 66.7% of infertile women. The comparable numbers were 46.2%, 45.3% and 37.6%, respectively, in the healthy group. The 'Not bad' and 'Bad' categories were significant correlates of women's infertility, compared with an 'excellent' relationship as a reference category, with ORs of 2.9

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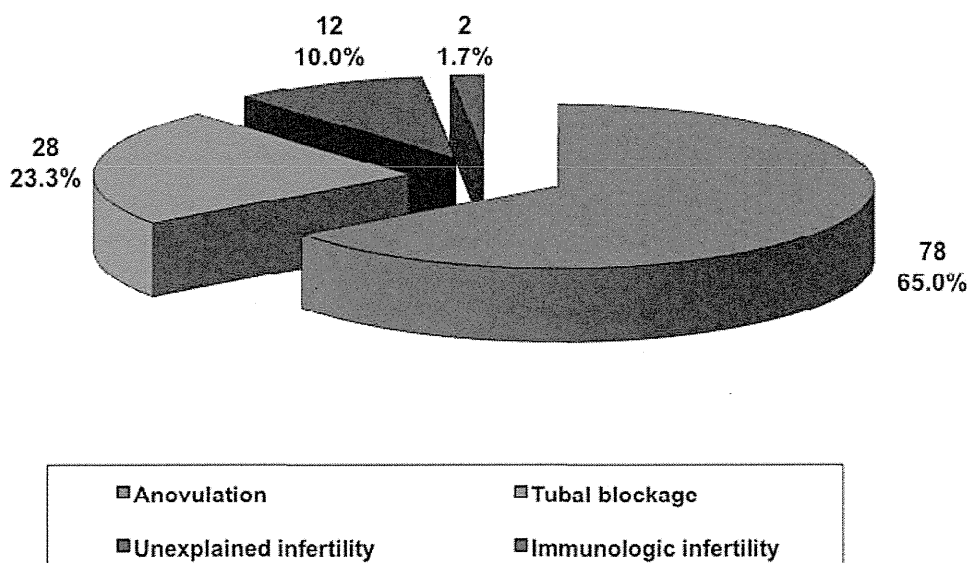


Fig. 1 Clinical factors in female infertility

Table 1 Demographic characteristics of the respondents

Variables	Infertile group	Healthy group	<i>P value</i>
	(n=120)	(n=120)	
	N (%)	N (%)	
Residential area			0.897
Rural	62 (51.7)	63 (52.5)	
Urban	58 (48.3)	57 (47.5)	
Age groups (year)			0.922
19–20	9 (7.5)	10 (8.3)	
21–30	91 (75.8)	92 (76.7)	
31–35	20 (16.7)	18 (15.0)	
Mean (\pm standard deviation)	25.8 (\pm 3.9)	25.4 (\pm 3.6)	
Duration of infertility (months) ^a			
Median (interquartile range)	10.0 (6.0–13.0)	–	
Occupation			0.928
Housewife	19 (15.8)	17 (14.2)	
Service holder	57 (47.5)	62 (51.7)	
Industrial worker	34 (28.4)	31 (25.8)	
Student	10 (8.3)	10 (8.3)	
Order of marriage for women			.001
First marriage	94 (79.0)	110 (94.0)	
Second marriage	25 (21.0)	7 (6.0)	
Order of marriage for men (husband)			0.214
First marriage	83 (69.7)	90 (76.9)	
Second marriage	36 (30.3)	27 (23.1)	

^aDuration of infertility was calculated from the first diagnosis of infertility after 12 months of unprotected sex.

Table 2 Subjective self-rating of some socioeconomic factors by the respondents

Social factors	Infertile group	Healthy group	OR ^a (95% CI ^b)	<i>P</i> value
	(n=120)	(n=120)		
	N (%)	N (%)		
Family income				
Excellent	9 (7.6)	19 (16.1)	1	Reference
Good	39 (33.1)	61 (51.7)	1.6 (0.7–3.6)	0.275
Barely sufficient	49 (41.5)	27 (22.9)	2.8 (1.2–6.8)	.019
Less than needed	21 (17.8)	11 (9.3)	3.1 (1.1–8.5)	.032
Quality of life				
Excellent	15 (12.6)	43 (36.1)	1	Reference
Good	49 (41.2)	41 (34.5)	2.6 (1.4–4.8)	.003
Not bad	44 (37.0)	29 (24.4)	3.3 (1.6–6.4)	.001
Poor	11 (9.2)	6 (5.0)	3.8 (1.2–11.5)	.019
Satisfaction with daily routines				
Well contented	32 (27.1)	65 (55.1)	1	Reference
Moderate	66 (56.0)	44 (37.3)	1.9 (1.2–2.9)	.004
Not contented	20 (16.9)	9 (7.6)	3.1 (1.4–7.1)	.008
Self-assessment of life stress				
No, never	15 (12.6)	45 (37.8)	1	Reference
Sometimes	51 (42.9)	43 (36.1)	2.7 (1.5–4.9)	.002
Yes, very often	53 (44.5)	31 (26.1)	3.6 (1.9–7.0)	<.001
Quality of nutrition				
Good and rational	6 (5.1)	7 (5.9)	1	Reference
Moderate	58 (49.6)	68 (57.1)	1.0 (0.3–3.0)	0.976
Poor and irrational	53 (45.3)	44 (37.0)	1.4 (0.4–4.2)	0.597

^aOR, Odds ratio; ^bCI, Confidence interval.

(95% CI = 1.2–6.9) and 3.6 (95% CI = 1.4–9.1), respectively, with $P < .05$. However, we did not find a significant association between infertility and women's relationships with Mahalla (local community) members (Table 3).

One of the main points of interest was the assessment of infertile women's attitude to sexual intimacy on the basis of three questions related to that topic. To determine their attitude to the issue in general, the first question was 'Is sexual intimacy important?' ORs between the reference category ('very important') and the other two categories were 1.8 (95% CI = 1.1–3.0) and 1.7 (95% CI = 1.1–2.9), indicating a statistically significant association between women's underestimation of sexual intimacy and their infertility (Table 4).

The second question was aimed to evaluate the role of satisfaction of sexual intimacy on infertility and was stated as 'Are you contented with your sexual intimacy?' Positive responses such as 'yes, very often' was a reference category, and ORs between that and two negative responses were 2.2 (95% CI = 1.1–4.3) and 3.8 (95% CI = 1.7–8.7), indicating their significant association with infertility ($P < .05$).

A significant association was found between infertility and their current feelings about sexual intimacy. Positive feelings were revealed in 9.5% of cases and 25.0% of controls. ORs of 2.6 (95% CI = 1.3–5.3) and 4.8 (95% CI = 2.0–11.1) ($P < .05$) fell between the reference category and two other categories with negative responses (Table 4).

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Table 3 Respondents' self-rating of their relations with family members and neighbors

Relationships	Infertile group	Healthy group	OR ^a (95% CI ^b)	<i>P</i> value
	(n=120)	(n=120)		
	N (%)	N (%)		
With husband				
Excellent	8 (6.8)	22 (18.8)	1	Reference
Good	35 (29.9)	41 (35.0)	2.2 (1.0–5.3)	.067
Not bad	46 (39.3)	36 (30.8)	2.9 (1.2–6.9)	.014
Bad	28 (23.9)	18 (15.4)	3.6 (1.4–9.1)	.008
With mother-in-law				
Excellent	6 (5.1)	18 (15.4)	1	Reference
Good	35 (29.9)	46 (39.3)	2.3 (0.8–6.4)	0.107
Not bad	57 (48.8)	40 (34.2)	3.3 (1.2–8.9)	.018
Bad	19 (16.2)	13 (11.1)	3.3 (1.2–9.3)	.024
With father-in-law				
Excellent	9 (7.7)	19 (16.2)	1	Reference
Good	30 (25.6)	54 (46.2)	1.3 (0.5–3.0)	0.608
Not bad	62 (53.0)	35 (29.9)	2.5 (1.1–5.8)	.039
Bad	16 (13.7)	9 (7.7)	3.0 (1.1–8.5)	.036
With Mahallac members				
Excellent	7 (5.9)	8 (6.8)	1	Reference
Good	53 (44.9)	55 (47.0)	1.2 (0.36–4.03)	0.756
Not bad	45 (38.1)	39 (33.4)	1.5 (0.4–5.4)	0.544
Bad	13 (11.1)	15 (12.8)	1.0 (0.3–4.2)	0.952

^aOR, Odds ratio; ^bCI, Confidence interval; cMahalla – a neighborhood unit in Uzbekistan.

Table 4 Assessment of women's attitude to sexual intimacy

Question and answer options	Infertile group	Healthy group	OR ^a (95% CI ^b)	<i>P</i> value
	(n=120)	(n=120)		
	N (%)	N (%)		
Is sexual intimacy important?				
Very important	35 (30.4)	61 (52.6)	1	Reference
Important	38 (33.1)	26 (22.4)	1.8 (1.1–3.0)	.036
Not important	42 (36.5)	29 (25.0)	1.7 (1.1–2.9)	.040
Are you contented with your sexual intimacy?				
Yes, very often	12 (10.3)	26 (22.4)	1	Reference
Sometimes	55 (47.4)	62 (53.5)	2.2 (1.1–4.3)	.027
No, never	49 (42.2)	28 (24.1)	3.8 (1.7–8.7)	.002
Has your attitude to sexual intimacy changed in previous year?				
Positively	11 (9.5)	29 (25.0)	1	Reference
Did not change	60 (51.7)	62 (53.4)	2.6 (1.3–5.3)	.006
Negatively	45 (38.8)	25 (21.6)	4.8 (2.0–11.1)	<.001

^aOR, Odds ratio; ^bCI, Confidence interval.

DISCUSSION

Although various studies have demonstrated the importance of the mind–body connection in infertility management, the psychosocial aspects of infertility in Uzbek women who are strongly bonded to their community have yet to be adequately addressed.²²⁾ In this study we tried to find as many social correlates as possible that were associated with female infertility. The social correlates of women's infertility, such as a higher remarriage rate, inadequate family income, discontentment with daily routines, stress, poor life-quality as well as inadequate relationships with family members have not been previously reported. Hence, the association among such explanatory variables and infertility is a relatively new finding in the prospect of investigating female infertility in Uzbekistan.

In the past decade, countries in Eastern Europe and Eurasia have undergone economic and social transformations to a degree that women's reproductive health has markedly improved along with overall health.²³⁾ Although the total fertility rate in Uzbekistan (2.8 per women) is the highest, and the rate of abortion is the lowest (0.6 per women) in central Asian countries, the infertility rate still remains high. About 15–29% of married women were reported to be abused by a spouse or partner. Such information is crucial to reaching an accurate estimate of their psychological injuries resulting from various social factors.²⁴⁾

Though it is more likely that social correlates are consequences of infertility, we cannot confirm for sure that such was the case with all women, since some might have preceded infertility or even contributed to its development. Since the objective of the study was to determine the association between these factors and infertility regardless of their causal or consequential relationship with infertility, we did not concentrate on that aspect. Nevertheless, it became clear that those social correlates had a strong association with female infertility and that, according to previous studies, they seriously complicate the problem.¹²⁻¹⁷⁾

Bearing children is very important in Uzbek society, and most of the time it is the determining factor in the sustainability of conjugal life. It is not uncommon to find that many happy couples end up getting divorced only because of an infertility issue. However, it is also true that many couples will survive separation only because of their children. That same scenario was reflected in our study showing that the rate of remarriage was 3.5 times higher among infertile women compared with healthy women. Although uncommon, opinions contrary to our findings do exist as mentioned in the works of Schmidt (2010) who found that some infertile couples experience marital benefits, i.e., infertility brings them closer together and actually strengthens their marriages.²⁵⁾ Whereas that occasionally may be the case in developed countries, we still believe that in the developing world childless couples often suffer a frail conjugal bond.

A previous case-control study reported that infertile women were found to be at greater risk for sexual dysfunction, and that lower sex-life satisfaction scores often resulted in infertility-related stress.²⁶⁾ To determine whether sexual dysfunction was associated with infertility we focused our attention on women's perception of the importance of sexual intimacy and how it soon changed in only one year following a diagnosis of infertility. Since in Uzbek culture women never talk openly about their attitude to sexual life, we can only clarify their attitude by asking 'How is your attitude toward men', since in their view 'attitude to sexual intimacy' is equivalent to 'attitude to sexual life'. As study results showed, the number of women with a negative attitude towards intimacy was twice as high in the mean study group compared with healthy women, which clearly indicates its association with infertility. The same result was seen in a negative change to intimacy during that same period.

To some extent, our study can offer a contribution to knowledge about the close connection of psychosocial factors with female infertility.^{11, 20, 25, 26)} It is well known that mental stress may

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cause an ovulatory dysfunction due to the inhibition of normal gonadotropin-releasing hormone pulsative secretion in the hypothalamus.¹⁹⁾ Continuous mental suppression may cause not only anovulation but reduced fecundability i.e., the likelihood of conception depending on the pattern of sexual and pregnancy preventive behaviours.²¹⁾ Thus, the treatment of infertility gets more and more difficult as infertility duration increases. Recent epidemiological studies in Uzbekistan reported that the infertility incidence in the Fergana Valley was 16.8%, with polycystic ovaries' disease (PCOD) appearing to be the most frequent cause.²⁷⁾ In addition, the authors claimed that PCOD was the typical model of a metabolic syndrome which is thought to be closely related with social factors.^{28, 29)}

The delivery of good infertility care in a community requires awareness of the implications of infertility and an insight into the context in which they occur.³⁾ Social workers and health care professionals should be sensitive to the emotional experiences of couples during infertility treatment.²¹⁾ There is a strong need for psychological and ethical counseling in the treatment of infertile couples.^{30, 31)} An inference can be made that a positive reset of a woman's basic relationships and attitude to her surrounding social habitat has to be an important component of the management of infertile couples. It could relieve inhibitions in the central regulation of the reproductive system and restore normal ovulation. Furthermore, a well-designed prospective study with stress-relieving intervention (travelling, physio- and psychotherapy, etc.) would contribute more in the long run to our understanding of the psychogenic aspect of infertility and its management.

Although we identified several correlates of female infertility, this study recognizes several limitations. First, it was conducted with only two small groups of cases and controls. Second, we elicited the respondents' subjective feelings about different socioeconomic factors, which can vary depending on the personality and other factors of the respondents. Third, we conducted this study in only one hospital and only on hospitalized patients, which might have included a specific group of subjects with specific social and economic attributes. In such a case, the generalizability of the study findings may not hold up. Finally, some respondents may have developed a bias toward answering sensitive questions about their sexual intimacy and their relationships with others. A cohort study addressing all of the above limitations might better represent the actual status of the infertile women. Despite all those limitations, we consider that our findings provide helpful baseline information for future researchers as well as policy makers.

In conclusion, female infertility is strongly associated with various social correlates such as insufficient family income, poor quality of life, stress, poor relationships with family members and a lack of contentment about sexual intimacy, leading to a higher remarriage rate and further complicating the problem of infertility. Thus, correcting women's basic attitudes and relationships to their surrounding social habitat should be an essential component of any program for infertility management.

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FEMALE INFERTILITY IN UZBEKISTAN

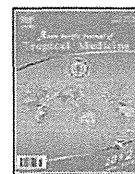
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Knowledge, attitudes, and practices towards avian influenza A (H5N1) among Cambodian women: a cross-sectional study

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ABSTRACT

Objective: To measure highly pathogenic avian influenza (HPAI)-related knowledge, attitudes, and practices (KAPs) among Cambodian women. **Methods:** This cross-sectional study selected 246 married women aged between 18–55 years who had backyard poultry and lived at least one year in the areas of the survey through multi-stage cluster sampling. An average score of correct answers was generated to evaluate respondents' knowledge (Good/Poor), attitudes (Positive/Negative), and practices (Good/Bad). **Results:** We reported that about 2.4% of the respondents had good knowledge and good practices and four-fifth of them had positive attitudes towards HPAI. Odds ratios (ORs) and 95% confidence intervals (CIs) were estimated through a logistic regression model to explore contributing factors that raise their KAP levels. Most of the sources were significant in increasing knowledge of the respondent, like television (OR=1.6, 95% CI=1.0–2.7), radio (OR=2.5, 95% CI=1.3–4.9), leaflets/booklets (OR=2.1, 95% CI=1.2–3.9), school students (OR=18.4, 95% CI=2.4–142.9), village health volunteers (OR=4.5, 95% CI=2.2–10.9) etc. Factors such as television (OR=3.7, 95% CI=2.1–6.4), leaflets/booklets (OR=2.6, 95% CI=1.4–5.1), and public health staff (OR=2.2, 95% CI=1.2–4.1) had similar influence on practices. Although, we found similar effect on raising the attitudes of the responded, it was not significant. **Conclusions:** We report a satisfactory level of positive attitudes, and moderate level of knowledge and practices related to HPAI among Cambodian women. Raising KAPs through television, radio and other medias may be more efficient than using usual information, education and communication materials to prevent HPAI.

1. Introduction

Highly pathogenic avian influenza A (HPAI), also called avian flu or bird flu, is a highly contagious disease of birds caused by avian influenza (AI), a virus of subtype H5N1, occurred across Asia, Africa and Europe. It spreads through domesticated and wild birds, and transmitted from poultry to poultry and occasionally from poultry to humans, generally through close contact with infected birds and inhalation of dust or droplets containing the viruses. The disease is very fatal and causes death within 48 hours [1,2]. HPAI viruses are generally strong, and occasionally cause

illness or death, not only in humans but also in animals, such as cats, dogs, tigers that consume sick or dead birds infected by HPAI viruses [2–4]. Until March 2010, 486 cases of avian influenza A (H5N1) in human, resulting in 287 deaths [Case fatality rate (CFR)=59.05%], have been reported since 2003 with the first fatal case confirmed H5N1 positive in human in China [5,6]. Most of the cases were in the Southeast Asia, Indonesia, Vietnam, Thailand, China, Cambodia, and Hong Kong [6–9].

Between February 2005 and April 2010, Cambodia had confronted 10 positive cases confirmed AI in human of which 8 already died with the CFR of 80% [10,11]. Four cases happened in one remote, rural area near Vietnam border, in Kampot province, the southern part of Cambodia. First case was detected in February 2, 2005. Ministry of Health of Cambodia in cooperation with World Health Organization (WHO) and other non-government organizations focused more on developing public health awareness to combat

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