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Infection with the Human Immunodeficiency Virus and Fertility Desires: Results from a Qualitative Study in Rural Uganda

A Qualitative Assessment of the Iraqi Primary Healthcare System

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Saudi Healthcare System: A View from the Minaret

"Saudi Healthcare System: A View from the Minaret": More Similarities than Differences

Perceptions and Utilization of Primary Healthcare Services in Iraq: Findings from a National Household Survey

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From the Editor-in-Chief

This issue of *World Health & Population* presents an interesting and varied set of papers that have been published online by *WHP* during the last quarter. They are selected here as representative of recent outstanding contributions to the journal and include five papers and a commentary.

The first two papers are qualitative studies, the first on HIV infection and fertility desires in Uganda, and the second a study of primary healthcare in Iraq. In "Infection with the Human Immunodeficiency Virus and Fertility Desires: Results from a Qualitative Study in Rural Uganda," Jennifer Heys et al. report focus group results indicating that nearly all HIV-positive participants do not wish more children. Moreover, there was reinforcement of this attitude by the HIV-negative focus group participants, who stated community norms dictating that HIV-positive mothers should not have further children. Both groups seemed relatively unaware of the advances of highly active antiretroviral therapy (HAART) that greatly reduce the risk of mother-to-child transmission of the virus. The focus groups also revealed a number of other misconceptions about the infection and the need for ongoing education and delivery of HIV healthcare and family planning programs.

The second qualitative paper in this issue, "A Qualitative Assessment of the Iraqi Primary Healthcare System" by Nazar Shabila, Namir Al-Tawil et al., presents results from an open-ended questionnaire of policy makers, academic researchers and primary healthcare providers in a district of Kurdistan. Not surprisingly, the survey revealed a primary healthcare system in considerable disarray from the near constant impacts of war and civil unrest over the last 25 years in that country. The authors did uncover several agreed-upon positive aspects of the primary healthcare system, including immunizations and antenatal care. The qualitative study conducted by Shabila et al. provides good background for the design of more definitive quantitative studies in Iraq.

In an explicitly quantitative study, "Breastfeeding as a Time-Varying–Time Dependent Factor for Birth Spacing: Multivariate Models with Validations and Predictions," Rajvir Singh, Vrijesh Tripathi et al. use the 1992–93 Indian National Family Health Survey data to examine the impact of breastfeeding and socio-demographic covariates on birth spacing. Although widely acknowledged that breastfeeding positively impacts birth spacing, Singh et al. found that the role of covariates is critical, but varies by covariate from first to subsequent births. Only breastfeeding is consistently significant in all the models, perhaps reflecting in part its physiological component. It is important to understand, however, the socio-demographic moderators to this component, which the authors of this paper also found to vary from locale to locale.

The fourth paper in this issue, "The Saudi Healthcare System: A View from the Minaret" by *WHP* Associate Editor Amir Khaliq, provides an excellent overview of Saudi healthcare from its earliest design (not all that old!) to its current challenges in evolving to a more privatized system. Michael Landry and Jacqueline Schleifer Taylor provide a helpful commentary on Khaliq's article, entitled "The Saudi Healthcare System: More Similarities Than Differences," pointing out that structural changes in healthcare are occurring broadly – not just in the stressed or under-resourced economies of the world but also in relatively well-off economies in the Middle East.

The final paper in this issue is an open access reprint, "Perceptions and Utilization of Primary Healthcare Services in Iraq: Findings from a National Household Survey" by Gilbert Burnham, Connie Hoe et al. This paper complements the Shabila et al. paper well, through presenting more quantitative results of a nationwide survey on primary healthcare services. Burnham is a regular contributor of manuscripts to *WHP*, and we are happy to reprint his open access article.

In conclusion, we hope that you find the papers in this issue interesting and worthwhile, and that you will also consult others recently released online at www.longwoods.com/publications/world-health-population. *WHP* remains committed to its mission to provide a forum for researchers and policy makers worldwide to publish and disseminate health- and population-related research, and to encourage applied research and policy analysis from diverse global and resource-constrained settings. *WHP* is indexed on MEDLINE and is accessible through PubMed.

We look forward to continued enthusiastic submission of manuscripts for consideration, peer review and publication. Finally, the editors and publishers of *WHP* are always interested in any comments or suggestions you might have on the papers or about the journal and our mission. Please feel free to write or e-mail us.

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Infection with the Human Immunodeficiency Virus and Fertility Desires: Results from a Qualitative Study in Rural Uganda

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Abstract

The rationale of this qualitative study was to determine how a positive HIV diagnosis influenced fertility desires and reproductive decisions for women and men living in western Uganda and what the reasons were behind these fertility desires. The qualitative study was undertaken as part of a larger study on the same topic in order to better understand the quantitative findings. Five focus groups with a total of 35 participants, 20 women and 15 men were conducted. Eighteen participants were HIV positive. Almost all HIV-positive participants reported that they did not wish to have more children. The most important reasons given were the devastating impact of HIV on the health of the mother and the high risk of HIV transmission to the child. Most participants were not aware of the benefits of highly active antiretroviral therapy on reducing the risk of mother-to-child transmission of HIV. Some HIV-negative

participants viewed ongoing childbearing by HIV-positive individuals as the result of a lack of education regarding the risks of childbearing while HIV-positive and also as contrary to the current expectations of lifestyle practice. They also emphasized that the community's perceptions of having children when mothers are HIV-infected was unfavorable and that fertility norms for all persons in the study area have now changed due to economic concerns and desire to educate all children in the family. The study findings have to be incorporated in the counselling curriculum for programs directed at HIV prevention and care and family planning. Specific recommendations are provided to improve the districts' primary healthcare programs for HIV care/prevention and family planning.

Introduction

The possibility of passing HIV from mother to child and the likelihood that one or both parents could die prior to the child reaching adulthood are crucial issues for HIV-positive couples to consider in deciding whether they want to have more children or not (Newell et al. 2004). In spite of these concerns, many couples still decide for various personal, cultural and economic reasons to have children after receiving a positive HIV diagnosis (Gregson et al. 1998). In most places in Africa a common expectation of marriage is that the couple will have children. This is an especially important expectation in Uganda, as children become members of the paternal clan (Feldman and Maposhere 2003; Lutalo et al. 2000). Women are valued for their ability to bear children, and a high societal value is placed on fertility. Because of these expectations and social pressures, women and couples may continue childbearing when they are HIV-infected, and they may ignore the risks for the health of the mother and the child. The desire to avoid social stigma and isolation is still strong.

Though there is evidence that HIV/AIDS reduces women's fertility, the relative contributions of social, biological and behavioural factors have not been fully elucidated (Fabiani et al. 2006; Ross et al. 2004). Some studies have shown that an HIV diagnosis causes people to choose to have fewer children (Allen et al. 1993; Feldman and Maposhere 2003; Grieser et al. 2001). Other research has shown that HIV/AIDS does not have a marked impact on fertility decisions, particularly for those who show no signs or symptoms of disease (Baylies 2000; Gregson et al. 1998; Rutenberg and Baek 2004). In Uganda, few studies have investigated the effect of an HIV diagnosis on reproductive decision making. Given its extremely high fertility rate, Uganda may differ from other countries in sub-Saharan Africa (Wakabi 2006). One study from eastern Uganda with HIV-positive participants on highly active antiretroviral therapy (HAART) from a home-based care program indicated that few participants wanted more children (Homsy et al. 2009). A second study from western Uganda showed similar results (Nakayiwa et al. 2006). Overall, the literature revealed the shortage of published material in regard to HIV infection and childbearing decisions.

To further investigate the relationship between HIV status and desire for children, we undertook a study that utilized qualitative methods. The two purposes of the study were (1) to examine if and how a negative or positive HIV diagnosis influences reproductive desires, behaviour and the decision-making processes in individuals living in rural districts in western Uganda, and (2) to investigate why HIV-positive individuals stop childbearing. Another justification for this study was to better explain the findings from our quantitative study on the same topic, which also showed that HIV-positive couples have less desire for future children than HIV-negative ones (Heys et al. 2009).

This study was conducted from September to December 2006 in the districts of Kabarole and Kamwenge in western Uganda.

Methods

The intent for our qualitative study was exploratory in nature, with content analysis using ethnographic principles of qualitative research. The framework for conducting the study was based on the recognition that cultural and social factors play a significant role in fertility desires and decisions, as this has been reported and highlighted in the literature (Nattabi et al. 2009). In his model for fertility intentions, Airhihenbuwa focuses on "enabling factors," the endogenous factors that may facilitate or hinder childbearing, and "nurturers," factors external to the family that influence and motivate

health behaviour and action (e.g., extended family, peers) (Airhihenbuwa 1995). This study was a component of a larger one on this topic, including quantitative and qualitative study components. The results from the quantitative study are already published (Heys et al. 2009).

Study Area

An estimated 22,400 persons living with HIV reside in Kabarole district in southwestern Uganda which corresponds to an HIV prevalence in the district is 11.6% (Together Against AIDS, 2012). This is substantially above the national average of 6.4% (Ministry of Health [MOH; Uganda] and ORC Macro 2006). Fertility is high, with a total fertility rate of 7.1, also much higher than the national average. Participants were recruited from three health centres in the Rwimi and Kibiito sub-counties in the Kabarole District and the Bigodi sub-county in the Kamwenge District. The health centres are located along two major roads and are government-run. They offer clinical and public health services, as well as voluntary counselling and testing (VCT) and prevention counselling for mother-to-child transmission of HIV/AIDS.

Study Participants

Participants were a convenience sample of the 421 HIV-positive and -negative individuals who participated in the cross-sectional quantitative study mentioned above (Heys et al. 2009). Study inclusion criteria for the original cross-sectional sample were age 18 to 44 years, married or cohabitating with a partner, and having an HIV test result and a known village address. HIV-positive and -negative persons were selected from two health centres and one HIV support group. HIV-positive and -negative persons were selected from the VCT registries from two health centres (Rwimi and Kibiito), wherein all consecutive persons who had been HIV tested to date were included. To increase the sample size, all HIV-positive individuals of an HIV patient support group in the Bigodi sub-county were also included in the study. Spouses of an HIV-positive participant who met the eligibility criteria were invited to participate. Thirty-five participants from this sample were interviewed in five focus group discussions (FGDs) (for details see Table 1). The participants in one FGD reported that they became pregnant after receiving their HIV diagnosis.

Focus Group Discussion Question Guide

An FGD question guide was developed with input from the research team and local health providers involved in HIV care/prevention and family planning programs. FGDs were held separately for men and women. Cultural appropriateness of the questions was discussed with the local health providers. In addition to the question guide, probing questions were asked at any time during the sessions if more information about a particular topic was sought. At the end of each focus group, participants were invited to ask questions or provide comments about any aspect of health to the researcher or the focus group facilitator, who was a trained Clinical Officer but not employed at the same healthcare facility where participants received services.

The duration of each FGD session varied from 40 minutes to two hours, depending on the amount of discussion and the willingness of participants to donate their time to the project. All sessions were conducted in the local language (Rutooro) by an experienced FGD facilitator fluent in both Rutooro and English. The local health centres were chosen as the discussion sites since they were private, neutral and easily accessible for all participants. All FGDs were recorded with two audio recorders, after consent for recording was obtained from all participants. Notes were written by the principle author during and immediately following these sessions to summarize the discussions and capture the tenor and mood of the participants and the dynamics of the group.

Data Analysis

Surface readings of all transcripts were first conducted to obtain a general impression of the data. The five FGDs were then analyzed using thematic analysis in the manner described by Roth (Roth 2000). This entailed organizing the data into categories and then extrapolating overarching themes. Session

content was first coded into four main categories: childbearing in general, family planning, HIV/AIDS in general, and HIV/AIDS and childbearing. The main categories were further subdivided into two to four subcategories. These subcategories were sometimes separated into sections when they contained a large amount of information. Overarching themes were derived by assimilating information from multiple categories supporting the same general concept.

Ethical Considerations

The study was approved by the University of Alberta Health Research Ethics Board in Edmonton. Upon our arrival in Uganda, the study was also approved by the Uganda National Council for Science and Technology in Kampala, and the Ugandan Ministry of Health via the Kabarole District Health Officer. An information letter about the study was read to all participants, and informed consent was obtained from all participants by their signing the consent form.

Results

Participants' characteristics are shown in Table 1. The majority were subsistence farmers with a primary level of education and living in metal-roofed mud huts. Participants had a wide range of tribal and religious affiliations.

Table 1. Characteristics of FGD participants (n = 35)

Participants	Number	Age in years Mean (range)
HIV-negative		
Men	9	29 (19–37)
Women	8	29 (23–28)
HIV-positive		
Men	6	32 (26–42)
Women	6	27 (20–37)
Women who became pregnant following their HIV diagnosis	6	31 (25–35)

Three main themes emerged from the transcripts: (1) the negative impact of an HIV diagnosis on the desire to have more children, (2) women's lack of control over their fertility, and (3) changing norms in fertility desires (see Table 2).

Table 2. Summary of thematic analysis by gender and HIV status

Theme 1: HIV/AIDS has a negative impact on the desire for future children	
Group	**Quotation**
HIV– woman	*I think that if you are HIV+ and you continue giving birth you die so fast.*
	I think if you continue giving birth, when you die the children might die or you yourself; you die and leave the children when they are still young.
	It is up to your life – you should care about your life as a woman because if you die the man can get other women – me I won't give birth and the man finds other women.
	I say that I don't get married, I just stay alone because even the baby I want to have, I may die and leave him/her – I don't get married.

Group	Quotation
HIV– man	*If I tested and found I am HIV+, definitely my decision of giving birth will change. I will stop because of this reason – the woman will weaken if she is sick and she continues giving birth, and the child born is on the risk of getting this disease.*
	… after you test and you are HIV+, that forces you to stop giving birth because you'll have many children, and when you die they start suffering, or maybe they are also infected – you never know.
	… it is better to have few children you can afford to take care of so that you don't have many who will start suffering after you have died.
	… some of us have tested and we have AIDS, so you see that when you continue giving birth you will die very fast so you decide to stop giving birth.
	… if I tested and found am sick – the issue of giving birth, I limit it because you can give birth and in the end you have children who are HIV+.
HIV+ woman	*For example, when you don't know your status you can say, I will have my six children, but then after testing positive you give birth and maybe the child dies or you yourself will die and leave the child suffering; that will force you to limit your births.*
	… giving birth in villages, it affects us as AIDS patients, when you keep on producing that means too much bleeding whenever you give birth, and you lose a lot of blood and you die very fast, so I came to an understanding with my husband and we decided to stop producing.
	… now that we have tested and we know our status, you can give birth to a baby and he/she is also sick – you die and the baby also dies – me, I say it is better we stop giving birth instead of leaving our children to suffer.
	… now that we know we are HIV+, because now it is useless to have many children whom we will not be able to look after – we are weak and the income is too little.
	If you both test and you are both positive before giving birth – I think you can stay without children.
HIV+ man	*… since now we know our status, we should stop on the children we already have, look after them and plan for their future.*
	Yes, I would have even six, but now since I know my status why should I have all those children? I can have more than three? No.
	I know I am sick, so if possible, I wouldn't like to have more children – the ones I already have would be enough.
	After knowing our status we decided the children we have are enough and now we have to plan for their future.
	Weakness – this makes you sexually weak; how will you then give birth when you cannot have sex?
	… after testing HIV+ then you decide to stop giving birth so at least you can live longer, because the more children you have the more problems.
Theme 2: Women lack of control of their fertility	
Group	**Quotation**
HIV– woman	*It is the man who decides that now we have two children or one or ten.*
	The man wins because he is the head of the family; he is the one who plans for the family and he knows his income.
	The man is the one who wins.
	Some men tell us that let us stop giving birth, but the woman insists that she still wants to give birth – some men talk about it.

Table 2. Continued.

Group	Quotation
HIV– man	*… it is the man to decide because he is the household head – he can decide and tell the wife "those children are enough; let us now start using family planning," and the wife will follow what the man has told her.*
	It is the man who decides; being the household head he knows his income and therefore knows how many children he can be able to take good care of.
	You see I the man; I am the household head, am the one who looks for the money. I know how much money I have so I will tell the woman to continue giving birth according to my income, and if she refuses I divorce her and marry another woman.
	… if my wife wants to have many children and I don't want – I am the man; I will just keep quiet and monitor her; if she is not in her safe period then I will not have sex with her – she has to obey me as the man and head of the family.
HIV+ woman	*… after finding out that I am HIV+ I had not wanted to produce again, but the man refused and he forced me to get pregnant again. I have one boy child and he said he cannot stop, thought I would deliver another boy but then I gave birth to a boy again but then me, I want to stop.*
	It is not easy – if you the woman accepts but the man refuses you cannot use family planning.
	… if a woman starts saying we should have these children – three or any number – the man will ask you, "where do you work; it is you to provide for them?"
	… we have little assistance; you find you are married to a man but you have nothing, not even a piece of land that you can build a house, no source of income, no job that will earn anything – you rent and have to look for money; even getting what to eat is hard – at least if we could get capital to at least start up something, that will raise you something.
	… after finding out that I am HIV+ I had not wanted to produce again, but the man refused and he forced me to get pregnant again. I have one boy child and he said he cannot stop; thought I would deliver another boy but then I gave birth to a boy again but then me, I want to stop.
	If you tell the man that let's have maybe three children whom we can manage to look after, he tells you he still wants to have more, and as a woman you are weakening but the man does not weaken.
	Helping especially us women – we don't have even a certificate. The man will abandon you in the house, and he will go and marry another woman, and some men will leave you and go for prostitutes. He will take the little money you have and you the woman will remain suffering with the children – it is you feeding the children, feeding them; it is you who has to dig[meaning to do the farm work] – make sure you get them beddings, blankets – really a woman suffers a lot.
HIV+ man	*It is the man who mostly forces the woman that they should have children because he wants to expand his family and clan.*
	It is me to decide – If I decide that we stop then we stop, and if I decide that we have more children then we go ahead and have more children.
Theme 3: Fertility norms are changing	
Group	Quotation
HIV– woman	*… you want to give birth but then you should give birth and plan – have children that you can afford to look after, educate, look after them in all ways, medical care.*
	Now with this generation now we know that we should have few children.
	What makes me stop giving birth is poverty – it needs you give birth to children you can afford to look after not to have many and they suffer.
	I see that nowadays people get families which they don't desire because, for example, you find a person having about 10 or 8 children and cannot afford looking after them, no education; there is no food; the children start suffering, and even you see the parents are not okay – they have no income at all; that is why they say that big families are a problem.

Group	Quotation
	… the pregnancy I have now I wish it would be the last one, because if I have more children I will not be able to look after them.
HIV– man	*You have little or no income at all, and you are not in position to look after many children; that is why we have decided to have few children – those that we can be able to take care of, be able to take them to school, feed and dress them.*
	I am also saying it is better to have few children you can afford to take care of so that you don't have many who will start suffering after you have died.
	I also say one should have the children he is able to look after – you can have many children; you fail to feed or cloth them; you are not able to treat them in case of any sicknesses – people should have children they can manage to take care of, and they grow up healthy.
	I want to say that people should have the number of children they are able to look after.
HIV+ woman	*Some are poor, and they say if I give birth to many children where will I put them?*
	Taking care of the children – like when you have many children you find others are not even going to school because you have no money – others are not healthy; the feeding is poor, but if they are like two at least – though you are poor you can manage to look after them.
	I want three children because I can be able to take care of them – get them what to eat, wear or have treatment in case of sickness, but if you have six you can even fail to take care of them – start begging.
	I say four because I can be able to take care of them, cloth them, educate them. I now have one, but four children are okay for me.
HIV+ man	*These days you don't give birth to expand the clan; things have changed and the responsibility is on you.*
	Some of us are weak – sickly, not like people of some years back; for them, they used to produce many children because they had enough property and this disease hadn't come – so they had nothing to worry about, but nowadays that is why we have decided to have few children that we can manage to look after.
	In the past people gave birth to many children because they had a lot of property, but nowadays fewer people just give birth even after knowing they are HIV+; they just want to see children fill in the house, not bothering how hard it is to look after them.
	In the past there was no family planning.
	These days we can plan, but in the past you would just hear that so and so's wife is pregnant [laughs].

HIV/AIDS Has a Negative Impact on the Desire for Future Children

Almost all participants stated that an HIV diagnosis did/would impact their reproductive decisions. Most participants agreed that when a couple finds that one of them tests positive for HIV, their best course of action is to stop childbearing.

> (HIV+ man): … since now we know our status, we should stop [at] the children we already have, look after them and plan for their future.

> (HIV– man): If I tested and found I am HIV+, definitely my decision of giving birth will change. I will stop because of this reason – the woman will weaken if she is sick and she continues giving birth, and the child born is [at] risk of getting this disease.

If a couple was newly wed and/or did not have any children yet, the situation was perceived differently. While many participants still thought that these individuals should remain without children, some were sympathetic and felt that they could have a small number of children.

(HIV– woman): … maybe if they are newly married and they test HIV+ before even having a child, if they see they can afford [it] they can maybe give birth to at least one child or two.

(HIV– woman): … if you have not given birth, you also feel you want to have a child – that of saying you are positive won't work, a person will say I rather give birth and the child dies other than being there without giving birth [laughter]. [This participant wanted to express that the great social pressure to have children may override the concerns HIV-positive couples have towards childbearing].

Thus, rather than stopping childbearing, participants often noted that having smaller family sizes was the best course of action for HIV-positive couples. Participants also reported that another reason why HIV-positive individuals limit childbearing is because they lose their sexual desire. However, it was reported that this desire returns with HAART, which can motivate people to resume childbearing.

Three of the six women who became pregnant following their positive HIV diagnosis reported that their pregnancy was unintentional. Failure to use family planning was mentioned as the reason. It was reported that some HIV-positive individuals have children because either they do not know their status or they have not disclosed it to their partner.

Eighty percent of participants (including those who were HIV-positive) stated that they did not have enough information with respect to childbearing if HIV infected. Often individuals were unsure about what to do in this situation and wanted more information from healthcare providers:

(HIV+ woman): Giving birth, I still want to, but when we tested and found me and my husband were both HIV+ [at] that time there was a training here about reproductive health, so I came and attended to know if I can go on with giving birth or totally stopping – I have not yet decided.

(HIV+ woman who became pregnant): I think we don't have information – the information we have is little, but we beg you as nurses and doctors to teach us so we can know more.

One of the major concerns mentioned with respect to childbearing for HIV-positive individuals was their physical well-being, in particular if the mother was HIV-positive. Many participants thought that having a child would cause an HIV-positive woman to weaken and/or lose a lot of blood, which may lead to her death. Many participants were also concerned that having children when HIV positive could lead to infection of the child. Worries that the parents would die and leave the child orphaned were also voiced:

(HIV+ woman): For example, when you don't know your status you can say, I will have my six children, but then after testing positive you give birth and maybe the child dies or you yourself will die and leave the child suffering; that will force you to limit your births.

Some participants were confident that if a mother is on HAART then HIV cannot be transmitted to the child. However, most respondents were unsure what effect HAART has on mother-to-child transmission and asked for more information. The HIV-positive women who became pregnant following their diagnosis mentioned hospital delivery as one of the main interventions they utilized to ensure the safe delivery of their children.

Some participants commented on those HIV-positive people who knowingly became pregnant, as shown in the following responses:

(HIV– man): If I see someone who has tested HIV+ and they have gone ahead to give birth, then I take such people as people who don't reason.

HIV– man): If people came here as husband and wife and tested HIV+, then I think they [should] be given some counselling to show them the problems and dangers of giving birth when you are HIV+; then I think they can also decide on what to do if they show them the danger of AIDS.

Interviewer: Now if they are taught but then go ahead and give birth – what do you think about?

(HIV– man): There I say they don't reason – they are illiterate.

The comments from these participants reflected a belief that those who knowingly become pregnant while HIV-positive are "illiterate" and "uneducated" and do not think about the consequences.

Women Lack Control of Their Fertility

One major theme that emerged from the responses was women's near complete lack of control over their own sexual and reproductive lives. This included their inability to make decisions regarding the number of children they wish to have as well as their inability to use family planning if their husband objects. Thus, women are often unable to avoid becoming pregnant if they are HIV infected and are unable to protect the unborn from HIV transmission through HAART.

(HIV+ woman who became pregnant): … after finding out that I am HIV+ I had not wanted to produce again, but the man refused and he forced me to get pregnant again. I have one boy child and he said he cannot stop, thought I would deliver another boy but then I gave birth to a boy again but then me, I want to stop (I gave birth to a boy in spite of wanting to stop childbearing because my husband insisted on having more children).

(HIV+ woman): It is not easy – if you the woman accepts but the man refuses you cannot use family planning.

The main reason women were reported to have such a lack of control over decision making is that they lack economic power. Men control all of the money in the relationship, and women fear destitution for themselves and their children if they become divorced. Many women were not officially married to their husband, and felt they would not receive any support if their relationship were to end. Thus, they felt helpless and believed the only way to survive was by following their husband's demands. These challenges are illustrated in the following quotations:

(HIV+ woman): … if a woman starts saying we should have these children – three or any number – the man will ask you, "where do you work; it is you to provide for them?"

(HIV+ woman): … we have little assistance; you find you are married to a man but you have nothing, not even a piece of land that you can build a house, no source of income, no job that will earn anything – you rent and have to look for money. Even getting what to eat is hard – at least if we could get capital to at least start up something, that will raise you something.

(HIV+ woman): … helping especially us women – we don't have even a certificate. The man will abandon you in the house, and he will go and marry another woman, and some men will leave you and go for prostitutes. He will take the little money you have and you the woman will remain suffering with the children – it is you feeding the children, feeding them; it is you who has to dig [meaning to do the farm work] – make sure you get them beddings, blankets – really a woman suffers a lot.

Fertility Norms Are Changing

Participants noted that it is now becoming more common for people to discuss with their partner how many children they desire and to choose smaller family sizes. Some of this change appears to be due to the HIV/AIDS epidemic: participants noted that it is difficult to have many children if you are sick. However, some of these changes are attributed simply to changing attitudes and norms in the community and appear to be independent of HIV/AIDS. For example, land fragmentation was frequently noted as a reason why people are now deciding to have fewer children: large family sizes of the past are now limiting the number of children these participants can have because parents need to ensure their male children each inherit enough land to support a family. The following quotations portray the changing norms with respect to fertility desires:

> (HIV+ man): These days you don't give birth to expand the clan; things have changed and the responsibility is on you.

> (HIV+ man): Some of us are weak – sickly, not like people of some years back; for them, they used to produce many children because they had enough property and this disease hadn't come – so they had nothing to worry about; but nowadays that is why we have decided to have few children that we can manage to look after.

> (HIV+ man): In the past people gave birth to many children because they had a lot of property, but nowadays fewer people just give birth even after knowing they are HIV+; they just want to see children fill in the house, not bothering how hard it is to look after them.

> (HIV+ man): These days we can plan, but in the past you would just hear that so and so's wife is pregnant [laughs].

Discussion

We conducted a qualitative study on fertility desires in HIV-positive and -negative individuals of reproductive age (18 to 44 years) in western Uganda. One strength of our study was the qualitative study design, which enabled us to probe beyond the simple question= "Do you want more children in future" and to elucidate reasons for the participants' fertility desires. We included both HIV-positive and -negative men and women; thus we are able to make the voices of both HIV-positive and -negative men and women heard. The majority of other studies reviewed included only HIV-positive participants.

One finding of our study was that HIV serostatus had a large impact on the desire for children. HIV-positive participants were less likely to want more children in future compared to HIV-negative participants, according to the statements of HIV-positive and -negative respondents. These results confirmed those from the quantitative component of our study, where the strongest predictor of not wanting more children was HIV positivity, and other significant predictors such as female sex, older age, and higher number of living children had an odds ratio of only 2.5 or less (Heys et al. 2009). The responses of all participants were very consistent in this finding, and even the women who became pregnant after receiving a positive HIV diagnosis stated that their pregnancies were not intentional and were due to lack of access to effective family planning services or their spouse's wish. Our findings are supported by several other studies that reported a positive HIV status caused lower fertility desires (Hoffmann et al. 2008; Baek and Rutenberg 2005).

Most prior studies on the effect of an HIV diagnosis on fertility desires are quantitative in nature and based on the outcome of a single question (i.e., if participants wanted more children or not). The qualitative nature of our study design enabled us to examine the reasons why HIV-positive respondents wanted fewer children. Many participants, both men and women, stated that the devastating impact of HIV on the health of the parents and the possibility of mother-to-child transmission were the primary reasons why HIV-infected individuals desire fewer children. The

most common concern was for the mother's health, as participants stated that if an HIV-infected woman becomes pregnant, her infection will progress more rapidly and lead to earlier death. These responses are probably based on longstanding observations and experiences with HIV infection in this high-HIV-prevalence community.

The study finding that persons who are HIV positive and knowingly conceive children are viewed as "uninformed" or "illiterate" is important to note, as it indicates some stigma against pregnancy in HIV-infected women/couples in the community. This finding was surprising to us, as it was not reported in the literature or in the quantitative portion of our study. It has likely played a role in the strong negative influence of HIV-infection on the desire for future children. It is important to determine to what extent this stigma exists in the community, how severe it is and how much it affects the reproductive decision-making process for HIV-infected persons. This stigma could also be an obstacle to promoting HAART for HIV-positive pregnant/breastfeeding women, a group that has been found to underutilize HIV treatment options within the program for the prevention of mother-to-child transmission of HIV in Uganda (Mbonye et al. 2009; UNAIDS 2010). Another important finding in our study is the evidence that participants do not know about or fully understand the huge beneficial impact of HAART on reducing mother-to-child transmission of HIV. This underlines the critical importance of educating the public that all HIV-positive pregnant/breastfeeding women should receive HAART, which is the policy of the Ugandan Ministry of Health but is not happening for many HIV-positive women.

To assist HIV-positive couples who wish to have greater control over their decision to have children and fully understand the available options, both family planning and HIV prevention and care services should be extended to all couples in the study districts. The integration of HIV/AIDS and family planning programs should be accelerated to ensure that counselling about both the prevention of HIV and unwanted pregnancy is the norm. The population should be informed about the benefits of HAART in reducing mother-to-child transmission of HIV, so that HIV-infected couples can make better choices regarding their fertility, based on the entire range of options available to them.

Limitations

(1) As this was a qualitative study with a relatively small sample, the results are not intended to be generalized to the population at large. (2) Social desirability bias cannot be excluded, as the study topic dealt with sensitive issues. This could potentially alter participants' responses, causing them to provide answers that conform to socially accepted norms. To reduce this bias, highly trained interviewers familiar with qualitative interview techniques were used.

Conclusions and recommendations

The most cited reason why HIV-positive women and couples do not desire more children is the devastating impact of HIV on the health of the parents and future children, based on their past experiences or those of others in the community. Women's lack of control over their own fertility emerged as an important finding from this study. Responses from some participants revealed a community sentiment that it is "unacceptable" for HIV-infected women/couples to have children. These perceptions do not take into account the enormous benefits of HAART on reducing the risk of mother-to-child transmission and improving maternal health (Ciaranella et al. 2008; Goetghebuer et al. 2009; Rasmussen et al. 2008).

Based on the study findings we suggest four recommendations for Kabarole's and Kamwenge's healthcare delivery services.

- Managers of the primary healthcare programs, particularly for HIV/AIDS prevention and care programs and family planning services, have to ensure that healthcare workers who deal with reproductive and HIV/AIDS issues know that HIV-positive persons/couples are less likely to want more children. This knowledge would be very important for appropriate client counsel-

ling on HIV/AIDS and reproductive issues. Relevant and updated information could be easily included in the ongoing training programs for healthcare workers in the districts.

- Both men and women have to be informed about the beneficial effect of HAART on HIV transmission from mother to child and on the health of HIV-positive pregnant/postpartum women. This is especially important for HIV-positive persons/couples who want a child but decide not to have one because of the negative health effects of HIV/AIDS on mother and child. This information also needs to be included in the education program for the communities. In addition, HAART services have to be made available to all HIV-positive persons/couples in the reproductive age group, as to date approximately only half of this population group has access to HIV/AIDS treatment in Kabarole district. District guidelines for HIV/AIDS and family planning counselling of HIV-infected persons/couples and community education should be updated to include this recommendation.
- Participants' negative sentiments about HIV/AIDS and childbearing should be counteracted by accurate information on the relationship between HIV/AIDS, HAART and reproduction/family planning. Healthcare workers have to be informed about this, and they should be required to raise the topic in counselling sessions. It would also be important to investigate (a) if healthcare workers express these negative sentiments themselves, and (b) to what extent these negative sentiments are prevalent in the community and how they can be best addressed.
- Healthcare services staff have to be reminded again of the consequences of gender bias in a male-dominated society like in western Uganda. For example, an HIV-positive women who does not want a child can be coerced into becoming pregnant. Addressing the gender gap must include couple counselling in HIV/AIDS and family planning clinics; this is still largely absent in the study area, where mostly women are dealing with the issues and men do not participate. Couple counselling should be offered to all clients, and they should be encouraged to utilize it. It must be included in the counselling guidelines and checklists for reproductive health programs. Couple counselling must be widely marketed and made mandatory at each clinic, and staff competence in the area must be developed promptly.

The study findings can be summarized as follows: HIV-positive couples are seeking to exercise responsible family planning by curbing their desires to have more children as a result of their positive HIV status. These same couples should have more up-to-date counselling to ensure their awareness of the benefits of HAART for improving health outcomes for the mother during pregnancy and childbirth and reducing the risk of mother-to-child HIV transmission. Responsible family planning now allows for couples receiving HAART to realize their desired family seize.

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A Qualitative Assessment of the Iraqi Primary Healthcare System

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Abstract

With the limited availability of empirical and documented knowledge about the Iraqi primary healthcare (PHC) system, this study aimed to identify the main problems facing the Iraqi PHC system and the priorities for change. A qualitative study based on a self-administered questionnaire survey involving 46 primary care managers, public health professionals and academics was conducted in Erbil, Iraq. The questionnaire addressed participants' views on positive aspects, problems, priorities and barriers to change of the PHC system through seven open questions. The qualitative data analysis comprised thematic analysis. The survey revealed significant impediments to delivering PHC services, including problems in organization and management of the system, shortage of and poor quality of medications, and inadequate or uneven distribution of manpower and expertise. Priorities for improving the primary healthcare system included reorganization of the services and leadership involving adoption of family practice and regulation of public–private practice, placing emphasis on prevention and health education, and provision of continuing professional training and development. The enormous problems facing the system might signal the need for important and comprehensive improvements based on more in-depth assessment.

Background

The events of the last few decades have significantly affected the healthcare system in Iraq. The nation and its healthcare system were devastated by the effects of different wars, internal conflicts, international sanctions and political instability (Ali and Shah 2000). These difficult years resulted in a substantial fall in major health indices and left a crippled health system struggling to meet the population's needs (Alwan 2008; WHO 2006). Unfortunately, the system of primary healthcare (PHC) in Iraq did not escape these devastating effects and continues to suffer from problems common throughout the healthcare system (Ali and Shah 2000; Alwan 2004).

There is consensus on the poor functioning of the Iraqi PHC system, including in the Kurdistan region, and the desperate need for reorganizing and restructuring PHC services (Alwan 2004, 2008). However, there is only limited empirical and documented knowledge about the system. Therefore, comprehensive assessment is essential to better understand the problems, needs and obstacles to development of this important sector of health. A first step is to assess the perspectives of policy makers, PHC managers and public health academics about the positive aspects of the system in Erbil Governorate, problems facing the system and priorities for its improvement. To elicit the views of these individuals, a questionnaire survey was conducted; the results are reported in this paper.

Methods

This was a qualitative study based on a self-administered questionnaire survey of policy makers, PHC managers and academic public health specialists in Erbil Governorate, Kurdistan region.

A sample of key informants consisting of health policy makers, PHC managers and academic public health specialists in Erbil was selected, representing the College of Medicine, College of Nursing, Directorate of Health and eight main PHC centres in Erbil Governorate. The PHC centres were selected through a stratified random sampling technique. At the first stage, the centres were stratified into three geographical strata. At the second stage, a judgemental sample of centres was selected from each stratum, based on the number of centres and population size in these areas. Thus, three PHC centres were selected from Erbil city centre, three from the district and sub-district centres close to Erbil city (60 km) and two from areas remote from Erbil city (over 60 km). The eight main centres selected from the 84 centres in Erbil Governorate represented three out of eight districts. In each centre, the manager and the administrative director were invited to participate in the survey. A purposive sample of key informants from health policy makers at the Erbil Directorate of Health and public health academics at the College of Medicine and College of Nursing was selected. In total, 60 participants were invited to participate in the study, which was carried out between June and November 2010.

Since this study involved only PHC centres from Erbil Governorate, its findings might not be generalizable to other parts of Iraq or the Iraqi Kurdistan region. However, the general situation of the PHC system in the other parts of Iraq could be largely similar.

A questionnaire was developed through a literature review of earlier healthcare assessments conducted in countries of similar contexts as well as expert opinion (Atun et al. 2006; Ehiri et al. 2005; Kahveci and Meads 2008; Nasiripour et al. 2009). The questionnaire was originally developed in English and translated to Kurdish, the primary language in the region. The translation was validated by an independent translator with a bachelor's degree in English language, who translated the Kurdish version back to English to ensure accuracy. The questionnaire was pilot-tested for the two language versions and subjected to two cycles of modifications, based on iterative feedback from nine respondents. The questionnaire was administered to participants in their preferred language. The English version is shown in Appendix 1.

The questionnaire included seven closed items on age, gender, educational background, profession, place of work, work experience within the PHC system and whether the participant held a managerial position. It also addressed, through seven open items, the participant's view on the best- and worst-functioning services, positive aspects and problems, priorities for the system and barriers to change, and the type of training needs for PHC providers. Open items were used to allow participants to better express their views.

The qualitative data analysis comprised thematic analysis of open-ended questions, using common coding techniques (Boyatzis 1998). The analysis started with a familiarization process with the data, where two investigators independently read and re-read the answers on each question many times to identify or label categories. These investigators then discussed and compared the initial codes and reconciled the differences. Categories that emerged from the data after the initial stage of coding were combined under wider themes. Finally, the themes were revised and refined, ensuring that they reflected respondents' answers. For example, the initial coding of the 126 answers about problems facing the PHC system yielded 58 categories. These categories were later aggregated into 14 themes. Each open item was analyzed and reported independently, except for the item of education and training needs, which was analyzed and reported with the item of priority needs. More than one response was coded for each subject when necessary. Duplicate answers were coded only once. Illegible, blank and off-subject answers received from five respondents on one of the open questions, were coded as missing data.

The Research Ethics Committee of Hawler Medical University approved the study. An informed consent was obtained from each participant after the purpose of the study had been explained and confidentiality and participant anonymity assured. Great care has been taken to preserve the anonymity of survey participants and their institutions through coding them in the transcripts and removing their names from the quotations in the results.

Results

Of the 60 PHC managers and public health specialists invited to participate in the survey, 46 individuals (76.7%) completed the questionnaire. Respondents' mean age ± SD was 41.9 ± 9.3 years, and their average duration of employment in the PHC sector was 9.8 ± 8.0 years. Females constituted 45.7% of respondents. The majority of respondents were physicians (67.4%), while 4.3% were dentists and 28.2% were skilled healthcare workers. In terms of workplace, 32.6% worked at the Directorate of Health, 34.8% at PHC centres and 32.6% at the university. Around 41% held management positions. Basic data collected about non-respondents showed no important differences between them and respondents in terms of age, gender and professional characteristics.

The majority of respondents (71.1%) recognized immunization as the best-functioning service in the PHC centres, followed by antenatal care services (25.4%). Health education and treatment of diseases were recognized as the worst-functioning services (47.8% and 37.0%, respectively), followed by nutrition and growth monitoring.

Identifying immunization as the best-functioning service was mainly due to availability of proper plans and programmes for immunization (40%) and availability of trained and experienced staff (31.4%). Recognizing antenatal care as one of the best-functioning services was mainly due to its having a special unit with trained staff (57.1%) and its emphasis on prevention (21.4%). Identifying health education as the worst-functioning service was related to its lack of special programmes or plans (72.7%) and shortage of trained or experienced staff in this field (27.3%). Shortage of and poor quality of medications (64.7%) and irrational use of drugs (29.4%) were the main reasons for recognizing treatment of disease as one of the worst-functioning services. Reasons for identifying specific PHC services as best- or worst-functioning are shown in Table 1.

Participants recognized a number of positive aspects in the current PHC system. The most prominent theme identified was having a number of properly working programmes like immunization and antenatal care (43.5%). This was best described by one of the respondents as follows:

> At least a number of useful programs like immunization and antenatal care are in place in PHC centres, and poor people can somehow benefit from them. (Academic)

Other positive aspects of the system included provision of services to most people, especially for simple cases (30.4%), the nearly free-of-charge services (19.6%) and easy accessibility (10.9%). The

Table 1. Reasons for identifying specific primary healthcare services as best- or worst-functioning

Reason		Positive response[a]	
		No.	(%)
Best-functioning services			
	Immunization (*n* = 35)		
	Availability of proper plans and programmes	14	(40.0)
	Availability of trained, experienced and committed staff	11	(31.4)
	Vaccine availability	9	(25.7)
	Emphasis on prevention	8	(22.9)
	Presence of follow-up and monitoring	4	(11.4)
	Increasing coverage and approaching the targets	3	(8.6)
	The high level of awareness of the communities in this aspect	3	(8.6)
	Support of international organizations to the programme	2	(5.7)
	Antenatal care (*n* = 14)		
	Presence of special unit and trained staff	8	(57.1)
	Emphasis on prevention	3	(21.4)
	Presence of follow-up and monitoring	2	(14.3)
Worst-functioning services			
	Health education (*n* = 22)		
	Lack of special programme or plan	16	(72.7)
	Lack or shortage of trained or experienced staff	6	(27.3)
	No emphasis on health education	6	(27.3)
	Overload of staff by patients (short of time)	2	(9.1)
	Treatment of disease (*n* = 17)		
	Shortage of and bad-quality medications	11	(64.7)
	Irrational use of drugs	5	(29.4)
	Lack of provision of enough care to patient due to the private interest of staff	4	(23.5)
	Lack of necessary investigations	3	(17.6)
	Overload of doctors by patients (short of time)	2	(11.8)
	Poor support from DoH and MoH	2	(11.8)
	Lack of experienced staff and specialists	1	(5.9)

DoH = Directorate of Health; MoH = Ministry of Health.
[a]Multiple responses are considered.

complete list of positive aspects that respondents identified is shown in Table 2. Comments about these aspects of the system included:

Table 2. Positive aspects in the current primary healthcare system as perceived by respondents

Positive aspects		Response[a]	
		No.	(%)
1	Availability of properly working programmes (e.g., immunization and antenatal care)	20	(43.5)
2	Provision of services to majority of people, especially simple cases, reducing load on hospitals	14	(30.4)
3	Low charge/convenient to poor people	9	(19.6)
4	Easy accessibility	5	(10.9)
5	Support from Directorate of Health and presence of real intentions to improve the primary health-care services	2	(4.3)
6	Availability of staff and their hard-working character	1	(2.2)

[a]Multiple responses are considered.

> PHC centres can deal conveniently with simple cases, which constitute more than 80% of visitors to PHC centres. (PHC manager)

> The system helps people to have the basic primary care services easily. (Academic)

> Patients can get advice and treatment for nearly free [of] charge. (PHC manager)

> PHC services reduce [the] load on general hospitals to some extent with somewhat convenient management of patients. (PHC Manager)

Participants recognized different problems in the current PHC system, and organization and management were emphasized most frequently (56.5%). Comments related to this problem include:

> The treatment options are limited, leading to excessive referral to general hospitals. (Academic)

> The working hours are restricted to the morning time only. (PHC Manager)

> The low cost of services leads to overuse of services and unnecessary visits. (PHC manager)

> The same staff working at PHC centres in the morning are also working in private clinics in the evening, so they try not to be serious in the morning. (PHC manager)

Other common problems reported by respondents included a shortage of and poor quality of medications and supplies (39.1%), and inadequate or uneven distribution of human workforce and expertise, including rapid turnover of skilled staff (34.8%). Comments related to these two aspects included:

> Lack of medications sometimes makes patients withdraw from using PHC centres. (Policy maker)

> [There is] unavailability or severe shortage of most essential drugs, while the available drugs are of low quality or non-functioning. (PHC manager)

There is lack of qualified and skilled staff in many units of many PHC centres, and there is the problem of rapid turnover of physicians and skilled staff from PHC centres. (Policy maker)

The complete list of the problems, and additional examples of participants' comments about these problems, are shown in Tables 3 and 4, respectively.

Table 3. Problems facing the current primary healthcare system as perceived by respondents

Problems		Response[a]	
		No.	(%)
1	Problems with organization and management of the system, including ineffective referral system	26	(56.5)
2	Shortage of or bad quality of medications and supplies	18	(39.1)
3	Inadequate or uneven distribution of manpower and expertise and rapid turnover of skilled staff	16	(34.8)
4	Inadequate emphasis on prevention	14	(30.4)
5	Lack of diagnostic and therapeutic equipment	12	(26.1)
6	Lack of continuing professional training and development	8	(17.4)
7	Problems with staff responsibility and commitment, low motivation/private interest	9	(19.6)
8	Overcrowding	7	(15.2)
9	Inadequate wages and/or financial support	5	(10.9)
10	Low health awareness of population	4	(8.7)
11	Irrational use of drugs	3	(6.5)
12	Poor patient–provider relationship	2	(4.3)
13	Low cost of services	1	(2.2)
14	Shortage in the number of primary healthcare centres	1	(2.2)

[a]Multiple responses are considered.

Table 4. Examples of respondents' comments about problems facing the current primary healthcare system

The referral system to secondary care is weak or inefficient with approximately zero feedback. (Policy maker)
The supervision and monitoring from the directorate and Ministry of Health is poor. (Academic)
PHC system lacks an accurate system of statistics for collecting information. (Policy maker)
The same physician does not provide the quality of care to patients in PHC centres that he/she provides in the private clinic. (Policy maker)
PHC providers work according to their private clinics interests, with no disciplines or regulations to control this. (PHC manager)
There are differences between physicians and other staff of PHC centres in many aspects, especially the working time and risk incentives. (PHC manager)
The system does not differentiate between committed and hardly working physicians and staff and the careless ones. (Academic)
The behaviour and mentality of decision makers and university teaching staff are not with preventive health, but they always think to apply curative methods and are concerned more with the secondary and tertiary care. (Academic)

PHC = primary healthcare.

Respondents recognized a number of priorities for improving the PHC system, such as reorganizing the services and leadership, including adoption of family practice and clear separation of public and private practice (73.9%), a need for more emphasis on prevention and health education (52.2%), provision of continuing professional training and development (41.3%) and provision of adequate medications, materials and technology (34.8%). The complete list of priorities for improving the PHC system, and examples of participants' comments about these priorities, are shown in Table 5 and 6, respectively.

Table 5. Priorities for improving the primary healthcare system as identified by the respondents

Priority areas		Response[a]	
		No.	(%)
1	Reorganizing services and leadership, including adoption of family practice and separation of public and private practice	34	(73.9)
2	Need for more emphasis on prevention and health education	24	(52.2)
3	Provision of continuing professional training and development	19	(41.3)
4	Provision of adequate medications, materials and technology	16	(34.8)
5	Need for experienced and knowledgeable staff, including increased number of physicians trained in family medicine	12	(26.1)
6	Need for more emphasis on monitoring and evaluation and adopting disciplinary actions	12	(26.1)
7	Provision of support to staff (incentives, financial)	7	(15.2)
8	Improving financial allocation and support	5	(10.9)
9	Enhancing patients rights, ethics, communication	4	(8.7)
10	Strengthen the role of research (academics, policy makers)	3	(6.5)
11	Enhancing computer technology, reporting, statistics	2	(4.3)
12	Need for more primary healthcare centres	1	(2.2)

[a]Multiple responses are considered.

Respondents also identified a number of barriers to improvements of the PHC system, including weakness of the current health system characterized by bureaucracy and lack of planning (41.3%), the population's poor awareness (26.1%), political interference and pressure (21.7%) and professional interests and rejection (17.4%).

Discussion

The presence of a number of preventive programmes that work well, such as immunization and antenatal care, provision of treatment services to most patients, and the related low charge and easy accessibility of PHC services have been recognized as the main positive aspects in the current PHC system. The two preventive programmes mentioned above, particularly immunization, have good financial, logistical and training support from international organizations such as the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) as part of their worldwide programmes, as well as by the Ministry of Health (WHO 2005). As a result, staff members involved in these programmes are better trained, receive better incentives and are better established in their positions. These factors, in addition to the fact that the services are almost free, lead to higher

use and eventually a more positive perception of the programmes. Studies from Afghanistan and Nigeria have also reported a generally higher satisfaction with maternal and child care services in PHC centres compared to other services (Hansen et al. 2008; Uzochukwu et al. 2004). Easy access and almost no charge make the system appropriate for the poor, and, because the services are available to most people, help decrease the load on hospitals and other health institutions. Easy accessibility of PHC services as a positive aspect was also reported by Khudhairi (2005), who revealed that around 30% of patients walk to PHC centres.

Table 6. Examples of respondents' comments about priorities for improving the primary healthcare system

There is a need for a good and scientific review of the general health system in the country. (PHC manager)
The PHC centres can be changed to family medicine centres gradually by changing two PHC centres to family practice each year. (Policy maker)
We need to develop guidelines of care to all clients and the common conditions. (Academic)
Legislation should be put in place to control employees' attendance so that services can be provided during the whole opening time of PHC centres and cover the days off as well. (Policy maker)
There is a need to activate the referral system with efficient feedback. (Policy maker)
Work should be done for inclusion of doctors and nurses in the continuing medical education system. (Academic)
We need to prevent the rapid turnover of the trained medical and the paramedical staff. (Policy maker)
Active and efficient directors should be appointed in PHC centres. (Policy maker)
There is a need to employ an efficient appraisal system and continuous monitoring of PHC services. (PHC manager)

PHC = primary healthcare.

In contrast, many negative themes or problems were reported about the current PHC system, including problems with organization and management, an ineffective referral system, and a shortage of and poor quality of medications and supplies. The main curative service, treatment of disease, and an important preventive programme, health education, were identified as the worst-functioning services. Poor disease treatment services can be attributed to shortage and poor quality of medications, as well as to irrational use of medications. A study from Afghanistan identified poor patient–provider interaction and non-availability of essential drugs as main impediments for disease treatment in PHC centres (Hansen et al. 2008). Poor health education is mainly attributed to complete lack of education activities and shortage of trained staff in this field. Poor access to and effectiveness of health education, in addition to shortage in educators, are common features of PHC systems in the region and in many developing countries (Al-Ahmadi and Roland 2005).

As the study specifically asked respondents about their perspectives on both the positive aspects and problems in the PHC system, it elicited some contradictory viewpoints about a number of topics. For example, a PHC manager stated that PHC centres reduce the load on hospitals, while an academic thought that there is excessive referral from PHC centres to the hospitals. As the study involved participants from different professions, with different roles and responsibilities in the PHC system and from different geographical areas, these types of contradictory viewpoints could be expected. In general, academics and PHC managers emphasized problems related to poor organization of services, while policy makers emphasized shortage of resources.

Different themes were reported as priorities for improving the PHC system, the main one being reorganization of services and leadership, with the related adoption of family practice and public–private sector segregation. In a study on assessing Serbia's PHC system, Nelson et al. (2003) similarly

recognized reorganization of services and leadership, in addition to ensuring adequate materials and technology and provision of continuing professional development as the main priorities for reform. On the other hand, the weakness of the current health system, lack of planning, low health awareness of the population and political interference were identified as main barriers to future improvement. Tawfik-Shukor and Khoshnaw (2010) also underlined the weakness of the health system in Iraqi Kurdistan and its failure to provide an affordable, basic level of primary care to its population. Unlike the study of Tawfik-Shukor and Khoshnaw (2010), affordability was not an issue in the current study, as it assessed only PHC services in the public sector, which are provided nearly free of charge. The concern of Tawfik-Shukor and Khoshnaw (2010) is related mainly to people who cannot find the services they need in the public sector and seek them from the private sector.

Problems in organization and management of the PHC system and the limited allocation of funds were also reported by the WHO (2006). In their profile of the Iraqi health system, they described it as hospital-based and capital-intensive, requiring imports on a large scale. The WHO also emphasized underinvestment in the PHC system since the 1980s. The problem of poorly trained personnel was also reported by Alwan (2004), who identified inadequate staff training as one of the main factors responsible for progressive deterioration of the Iraqi health system. Poor patient–provider relationships and shortage of medications were also reported by Khudairi (2005), who also emphasized poor patient education, poor instructions about treatment, and incompetent or improper clinical examination, in addition to a shortage of essential medical products. In Egypt, Gadallah et al. (2003) reported a high level of good patient–provider relationships and a high level of satisfaction with the quantity of prescribed drugs (Gadallah et al. 2003). This difference between Iraq and Egypt could be related to the study methodology and the definition of satisfaction, but it could also be related to Egypt's more stable health system.

The priorities of reorganization of services, provision of adequate medications and supplies, and improvement of financial allocations were also reported by other studies from Iraq (Alwan 2004; Khudhairi 2005; WHO 2006). A number of new priorities emerged from this study, including the need for public–private sector segregation, greater emphasis on preventive health services and health education, greater emphasis on monitoring and evaluation, and a need for an increased number of experienced and qualified staff, especially physicians trained in family medicine practice. Although respondents emphasized public–private sector segregation as a priority for improving the system, experience shows that a public–private sector mix or partnership has been an important component of health system reform in countries throughout the world. Clear and applicable legislation needs to be integral to such partnerships in order to prevent adverse effects or misuse of the public sector (Agarwal et al. 2007; Nishtar 2004).

While this study has reported different problems in the Iraqi PHC system and a number of priority needs for its improvement, with many quotations from respondents about these aspects, more in-depth studies need to explore many of these problems in order to better understand their causes and effects. Therefore, further research is essential to explore the identified problems through in-depth qualitative studies, and to determine their magnitudes through quantitative studies. Such research should also engage other important stakeholders who were not included in this study, particularly consumers and service providers at different levels.

Conclusions

The study identified a number of positive aspects of the current PHC system, including a number of properly functioning programs. However, it highlighted many problems facing the system, particularly those related to poor organization of health services and shortage of resources. Main priorities for improving the system included reorganization of services and leadership, with particular emphasis on family practice. Further research in greater depth is needed to better understand the problems facing the PHC system and to identify the needs of this important health system component.

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Breastfeeding as a Time-Varying–Time-Dependent Factor for Birth Spacing: Multivariate Models with Validations and Predictions

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Abstract

Data used in the present study are from the National Family Health Survey (NFHS-I) 1992–93 (International Institute for Population Sciences 1995), India. Our study has developed Cox model analyses to see the effect of breastfeeding as a time-varying and time-dependent factor on birth spacing. While it is acknowledged that breastfeeding has a protective effect on birth spacing, such analysis of breastfeeding allows for a more nuanced understanding of that effect. Multivariate analysis revealed that breastfeeding, ever experience of fetal loss, education of women, employment status of women, education of husband, media exposure, survival status of index child and place of residence played an important part in extending birth space in at least one of the birth-spacing intervals (first to fifth). However, the variables varied from the first birth spacing to the fifth birth spacing. Breastfeeding is the only covariate found to be a significant protective factor associated with each birth spacing. Furthermore, this study validates the developed models with their prediction utilities for birth spacing.

Introduction

Birth spacing/birth interval has been identified as an important component of reproductive health leading to many known documented benefits for women's and children's health (Setty-Venugopal and Upadhyay 2002). Birth spacing for at least three years can have tremendous health benefits: for children, it lowers risk for fetal death, pre-term birth, low birth weight, small for gestational age, neonatal death, stunting and being underweight; for mothers, it lowers the risk of maternal death, third-trimester bleeding, anemia, premature rupture of membranes, puerperal endometritis and malnutrition (Faramand and Salvador-Davilia 2003). However, there is need of a region-specific understanding and a thorough grasp of the dynamics of fertility. The determinants of changes in the pace of child-bearing and a comprehensive epidemiological understanding of birth spacing are needed to better understand small and short-term changes in reproduction. Literature on a sequential model of fertility provides strong theoretical justification for expecting different effects across parities.

This study utilizes the Cox model analysis approach for understanding birth spacing data in India. Most prior studies have considered a breastfeeding variable in the form of a fixed covariate with a fixed effect, whereas the appropriate form for this covariate is time-varying with time-dependent effects. Furthermore, few studies validate the developed models with their prediction utilities for birth spacing. In this regard, the present study has utilized the Cox model analyses to see the effect of breastfeeding as a time-varying and time-dependent factor on birth spacing in order to provide input to policy planners.

Material and Methods

Data used in the present study are from the National Family Health Survey (NFHS-I) 1992–93, India (International Institute for Population Sciences [IIPS] 1995). The NFHS in Uttar Pradesh (UP) is a state-representative survey of 11,438 ever-married women of age 13–49 years. The parity-specific hazards models for birth spacing in UP have been worked out utilizing available data on 2,118 women of parity-I, 1,897 women of parity-II, 1,511 women of parity-III, 1,180 women of parity-IV and 918 women of parity-V. These women were non-sterilized and currently married. Results in this study provide information on factors associated with experiencing next live birth, namely the second (first birth spacing), third (second birth spacing), fourth (third birth spacing), fifth (fourth birth spacing) and sixth (fifth birth spacing). For all analysis related to birth spacing, as per the method followed by Trussell et al. (1985), the interval between two live births was divided into five categories: ≤15 months, 16–21 months, 22–27 months, 28–33 month and ≥34 months, for meaningful results.

All the selected probable covariates for analysis to identify important factors related to first to fifth birth spacing in UP were considered in Cox hazards model analysis. This was done because each variable showed at least a moderate association ($p < .25$) under univariate analyses in at least one birth spacing (Cox 1972; Harrell 2001). Linearity and proportionality assumptions were checked in the model. However, in some cases, more importance was given to theoretical rather than purely statistical considerations. Among all the covariates, breastfeeding did not satisfy the proportionality assumption. To assess the proportionality assumption of period of breastfeeding in the present study, birth spacing was categorized as 0–15 months, 16–21 months, 22–27 months, 28–33 months and ≥34 months, based on exploratory analysis to derive meaningful results. Hence, consideration of breastfeeding in Cox hazards model analysis was taken as a time-varying covariate with a time-dependent effect (Trussell et al. 1985).

First-order interaction between covariates was tested using stratified analysis. No interaction was found between the variables; therefore, interaction terms were not considered in data analysis. There was also no evidence of perfect or strong collinearity among the covariates after exploratory correlation analysis (Fox 1997).

Validation to quantify the prediction utility of the models was done through the bootstrapping procedure (Efron 1983 1986; Efron and Gong 1983; Efron and Tibshirani 1993; Linnet 1989). This procedure (with 200 re-samples) is used to estimate the optimism in how well predicted survival

probability estimates from the developed Cox model track the corresponding Kaplan–Meier survival probability (Kaplan and Meier 1958). This validates the model for calibration accuracy. A shrinkage coefficient (Van Houwelingen and Le Cessie 1990) was also calculated to quantify overfitting of the model. The discrimination aspect of the validation of the model is further measured through Somer's Dxy rank correlation between predicted log hazard and observed survival time (Harrell 2001; Harrell et al. 1996).

In an attempt to demonstrate the predictive utility of the developed models for policy planners, the expected probabilities for a woman not attaining her next live birth with some selected characteristics were worked out. The event of "next live birth" was identified as delivery of a live baby. These probabilities may help in finding that if a change in relation to selected variable(s) is made possible, what additional gain may be expected in comparison to its prevailing average level. This additional gain can easily be obtained by subtracting the probabilities reported against a considered level of a variable or a combination of variables from that reported against the average level of variables present in the model. Obviously, average probability provides the probability of not attaining the next live birth at a prevailing average level of variables present in the final model under a particular period of breastfeeding. Predictive probabilities for a woman not attaining next live birth are calculated as explained by Dickson et al. (1989).

The analyses were performed in various packages, namely SPSS 12.00, BMDP version 7.0 (University of California, 1992) and S-Plus 4.0, 1988–97, (Mathsoft Inc., Seattle, WA 98109-3044). Predicted probabilities of survival were performed through macros on Microsoft Excel 2000.

Results

Parity-specific percentages according to different variables regarding who experienced the next live birth are presented in Table 1. As a general trend, the proportion of women experiencing next live birth decreased with an increase in the parity of the woman. A lower proportion of women belonging to the following groups experienced a next live birth: urban background, ever contraceptive use, higher previous birth interval, surviving index child, higher husband's education, *semi-pucca* and *pucca*[1] houses, media exposure, less distance from primary health centres and breastfeeding for more than or equal to 28 months.

Table 1. Parity-specific demographic characteristics of women who experienced next live birth

Variables	Category	Parity				
		I	II	III	IV	V
Religion/caste	SC/ST Hindu	42.0	36.1	40.6	44.1	33.0
	Other Hindu	40.0	37.0	30.1	30.2	29.2
	Non-Hindu	49.0	37.1	41.2	32.9	32.3
Place of residence	Rural	42.0	39.4	33.3	34.2	31.2
	Urban	40.6	26.1	31.3	30.2	27.6
Women's education	Illiterate	42.1	39.2	35.9	34.9	31.1
	Primary	44.5	42.6	28.4	24.8	32.3
	Middle	45.0	33.1	32.3	36.7	17.7
	≥High school	34.4	18.3	16.3	24.5	29.2

Ever contraceptive use	No	40.6	37.1	34.9	33.9	31.8
	Yes	47.0	35.9	24.6	31.5	32.1
Ever fetal loss	No	40.9	37.2	34.0	33.7	31.9
	Yes	46.2	35.5	28.6	32.8	26.4
Previous birth interval	<24 Months	–	40.5	37.6	45.0	38.4
	24–36 Month	–	40.3	36.3	34.2	31.6
	>36 Months	–	30.1	25.9	24.6	16.0
Sex of index child	Male	42.1	36.1	32.0	34.0	28.8
	Female	41.1	35.6	34.0	32.9	32.6
Survival status of index child	Alive	38.9	34.1	30.7	31.1	27.3
	Dead	59.7	64.6	59.3	54.2	54.2
Woman's occupation	Not employed	41.6	37.0	34.0	33.1	30.7
	Employed	41.3	36.2	27.6	35.3	30.4
Husband's occupation	Not employed	(36.6	26.4	34.9	22.7	35.7
	Employed	41.9	37.3	32.9	33.7	30.5
Husband's education	Illiterate	41.0	39.4	37.7	34.6	30.2
	Primary	46.2	41.0	34.2	39.1	34.2
	Middle	40.7	39.0	34.5	33.7	31.7
	≥High School	40.7	32.0	26.6	27.7	27.2
Type of house	Kuchha	42.7	39.5	34.6	35.6	31.7
	Semipucca+Pucca	40.4	35.1	31.0	30.8	29.2
Media exposure	No	42.8	40.1	35.4	35.6	32.2
	Yes	40.0	32.0	28.6	29.1	26.1
Distance of primary health centre	≥2 kms	41.5	39.2	32.6	35.3	31.3
	<2 kms	41.9	30.6	34.0	28.2	28.1
Breastfeeding (months)	≥1	39.6	35.5	31.7	31.4	29.6
	≥16	43.9	39.6	35.1	35.0	32.4
	≥22	44.5	38.9	37.2	35.8	31.4
	≥28	32.4	23.9	20.4	18.1	20.8
	≥34	32.8	19.5	16.8	13.3	14.6
Total		41.6	36.9	33.0	33.5	30.6

SC/ST = scheduled caste/scheduled tribe.

The majority of these women belonged to categories of other Hindu, rural residence, no (ever) contraceptive use, surviving index child and employment of husband. Women at each parity were similar in relation to religion/caste, place of residence, (ever) contraceptive use, previous birth interval, sex of index child, survival status of index child, husband's occupation, type of house, distance of primary health centre and breastfeeding. As parity increased, there was an increase in the proportion of women in the categories of illiteracy, employment status (earning for livelihood), illiteracy of husband, no media exposure and breastfeeding for longer periods. In the same way, for obvious reasons, the average age of women at the time of birth of the index child also revealed an increasing trend with increasing parity.

Univariate analysis of first to fifth birth intervals is presented in Table 2. These results are in the form of exp(β) along with 95% confidence interval (CI) where exp(β) means unadjusted rate ratio (RR). As is evident from these results, religion/caste, place of residence, woman's and husband's education, ever contraceptive use, ever fetal loss, sex of index child, woman's and husband's occupation, type of house, distance of primary health centre, media exposure, previous birth interval and breastfeeding played an important part in extending birth space in at least one of the birth intervals (first to fifth).

Table 2. Unadjusted RR and 95% CI of first to fifth birth

Variables	Categories	Model I	Model II	Model III	Model IV	Model V
		RR & C.I. 95%	RR & C.I. 95%	RR & C.I. 95%	RR & CI 95%	RR & CI 95%
Religion/ caste[a]	Non-Hindu	1.08 (0.91–1.28)	0.80 (0.66–0.98)	0.75 (0.59–0.95)	0.67 (0.53–0.85)	0.81 (0.61–1.08)
	Other Hindu	1.50 (1.21–1.85)	1.03 (0.80–1.34)	1.03 (0.78 –1.36)	0.84 (0.62–1.14)	0.95 (0.66–1.35)
Place of residence[b]	Urban	1.01 (0.85–1.20)	0.54 (0.44–0.67)	0.76 (0.60–0.97)	0.70 (0.54–0.91)	0.75 (0.54–1.05)
Women's education[c]	Primary	1.13 (0.92–1.39)	1.05 (0.84–1.32)	0.83 (0.62–1.12)	0.60 (0.40 –0.88)	1.09 (0.70–1.70)
	Middle	1.10 (0.86–1.42)	0.90 (0.66–1.23)	0.55 (0.36–0.86)	0.82 (0.51–1.32)	0.46 (0.20–1.04)
	≥High school	0.88 (0.71–1.10)	0.35 (0.25–0.48)	0.31 (0.19–0.52)	0.54 (0.31–0.94)	0.87 (0.41–1.84)
Ever contra-ceptive use[d]	Yes	1.10 (0.93–1.31)	0.79 (0.65–0.96)	0.61 (0.47–0.78)	0.72 (0.55–0.94)	0.62 (0.45–0.86)
Ever fetal loss[e]	Yes	0.80 (0.66–0.97)	0.80 (0.66–0.97)	0.79 (0.63–1.00)	0.79 (0.63–1.00)	0.67 (0.50–0.89)
Previous birth interval[f]	24–36 months	–	0.94 (0.78–1.11)	1.05 (0.85–1.30)	0.85 (0.67–1.07)	0.83 (0.63–1.09)
	36+ months	–	0.75 (0.62–0.91)	0.81 (0.65–1.03)	0.65 (0.50–0.83)	0.57 (0.42–0.76)
Sex of index child[g]	Male	0.86 (0.76–0.99)	1.16 (1.01–1.35)	1.21 (1.01–1.44)	1.10 (0.91–1.34)	1.36 (1.07–1.71)
Survival status of index child[h]	Alive	0.48 (0.40–0.56)	2.39 (1.96–2.93)	2.62 (2.03–3.38)	2.60 (1.98–2.40)	2.69 (2.02–3.60)
Women's occupation[i]	Employed	0.85 (0.70–1.04)	0.80 (0.65–0.99)	0.71 (0.55–0.92)	0.87 (0.68–1.12)	0.90 (0.68–1.19)
Husband's occupation[j]	Employed	0.93 (0.69–1.24)	1.16 (0.73–1.83)	0.98 (0.59–1.64)	1.08 (0.4–2.62)	0.71 (0.29–1.73)

Husband's education[k]	Primary	1.18 (0.96–1.45)	1.05 (0.85–1.31)	1.02 (0.81–1.31)	1.25 (0.96 –1.62)	1.12 (0.83–1.51)
	Middle	1.10 (0.90–1.35)	1.01 (0.81–1.27)	0.96 (0.74–1.25)	1.00 (0.74–1.35)	1.27 (0.88–1.82)
	≥High school	1.05 (0.90–1.24)	0.74 (0.61–0.89)	0.72 (0.57–0.90)	0.78 (0.60–1.01)	0.83 (0.60–1.15)
Type of house[l]	Pucca+Semi Pucca	1.04 (0.91–1.18)	0.83 (0.71–0.96)	0.82 (0.68–0.98)	0.79 (0.64–0.96)	0.88 (0.69–1.12)
Media exposure[m]	Yes	1.00 (0.87–1.14)	0.74 (0.63–0.87)	0.67 (0.55–0.81)	0.71 (0.57–0.89)	0.69 (0.53–0.91)
Distance primary health centre[n]	<2 km	1.02 (0.88–1.18)	0.69 (0.58–0.83)	0.97 (0.79–1.19)	0.68 (0.54–0.87)	0.76 (0.57–1.02)
Birth interval	1–15 month	0.17 (0.12–2.09)	0.16 (0.10–0.27)	0.18 (0.10–0.33)	0.16 (0.08–0.30)	0.13 (0.06–0.29)
Breastfeeding[o]	≥1 month	1.42 (1.11–1.81)	1.93 (1.43–2.59)	1.48 (1.00–2.18)	1.36 (0.95–1.96)	1.64 (1.01–2.66)
Birth interval	16–21 month	0.17 (0.11–0.25)	0.79 (0.47–1.29)	0.26 (0.12–0.56)	0.27 (0.10–0.73)	0.21 (0.07–0.64)
Breastfeeding[o]	≥16 month	0.99 (0.80–1.22)	0.77 (0.61–0.97)	0.91 (0.69–1.21)	0.91 (0.66–1.25)	0.95 (0.67–1.34)
Birth interval	22–27 month	0.18 (0.11–0.29)	0.52 (0.27–1.02)	0.80 (0.29–2.16)	1.59 (0.52–4.90)	1.21 (0.29–5.09)
Breastfeeding[o]	≥22 month	0.79 (0.62–1.01)	0.65 (0.50–0.83)	0.66 (0.49–0.88)	0.60 (0.43–0.85)	0.51 (0.35–0.75)
Birth interval	28–33 month	0.05 (0.01–0.22)	0.70 (0.32–1.53)	0.40 (0.15–1.11)	0.39 (0.11–1.36)	1.65 (0.58–4.69)
Breastfeeding[o]	≥28 month	0.70 (0.48–1.04)	0.62 (0.41–0.95)	0.54 (0.34–0.87)	0.53 (0.32–0.87)	0.61 (0.32–1.14)
Birth interval	≥34 month	0.73 (0.34–1.54)	1.44 (0.57–3.65)	0.82 (0.31–2.15)	1.32 (0.39–4.45)	10.8 (1.30–91.3)
Breastfeeding[o]	≥34 month	0.64 (0.32–1.31)	0.28 (0.13–0.62)	0.31 (0.13–0.75)	0.24 (0.08–0.70)	0.04 (0.01–0.32)

CI = confidence interval; RR = relative risk; SC/ST = scheduled caste/scheduled tribe.
Reference categories: [a]SC/ST Hindu; [b]Rural; [c]Illiterate; [d]No; [e]No; [f]<24 Months; [g]Female; [h]Dead; [i]Not employed; [j]Not employed; [k]Illiterate; [l]Kuccha; [m]No; [n]≥2 km ; [o]Less than the given.

The multivariate Cox models are presented in Table 3. The subset of variables entered into the parity-specific final model vary from first to fifth birth spacing. Under this procedure, some of the variables partially entered into the model. However, to make a meaningful presentation, partially entered variables are fully considered in presentation of final models. Moreover, irrespective of statistical significance, women's age at index child was forced into the model at step zero for necessary adjustment in relation to age, because age is a well-known confounder of birth spacing. Further, the square of women's age at index child was also considered in the model in view of the non-linear relationship.

The variables in the order they entered into the models for various birth intervals are (i) for first birth spacing: breastfeeding (22–27 months), breastfeeding (28–33 months), breastfeeding (0–15 months), ever fetal loss, religion/caste, education of woman (high school and above) and sex of index child; (ii) for second birth spacing: breastfeeding (22–27 months), education of woman (high school and above), breastfeeding (≥34 months), breastfeeding (0–15 months), breastfeeding (16–21 months), survival status of index child, breastfeeding (28–33 months), place of residence, occupation of woman, education of husband (primary), ever fetal loss; (iii) for third birth spacing: breastfeeding (28–33 months), education of woman (high school and above), breastfeeding (22–27 months), breastfeeding (≥34 months), education of woman (middle), ever fetal loss, occupation of

woman, ever contraceptive use, breastfeeding (0–15 months), survival status of index child, distance from primary health centre, media exposure to women[2]; (iv) for fourth birth spacing: breastfeeding (28–33 months), breastfeeding (22–27 months), place of residence, breastfeeding (≥34 months), education of husband (primary), contraceptive use, ever fetal loss, breastfeeding (0–15 months), occupation of woman; and (v) for fifth birth spacing: breastfeeding (22–27 months), breastfeeding (≥34 months), education of husband (high school and above), media exposure, ever fetal loss, breastfeeding (0–15 months), place of residence, breastfeeding (28–33 months), education of woman (primary) and education of husband (middle).

Table 3. Multivariate extended Cox hazards models for first to fifth birth intervals

Variable	Categories	Model I	Model II	Model III	Model IV	Model V
		RR & 95% CI	RR & 95% CI	RR & 95% CI	RR & 95% CI	RR & 95% CI
Women's age at index child	Continuous	1.34 (1.07–1.68)	1.26 (0.87–1.46)	1.11 (0.87–1.42)	1.05 (0.84–1.31)	1.09 (0.79–1.50)
Women's age² at index child	Continuous	0.99 (0.98–1.00)	0.99 (0.99–1.00)	0.99 (0.99–1.00)	0.99 (0.99–1.00)	0.99 (0.99–1.00)
Place of residence[a]	Urban	–	0.69 (0.54–0.88)		0.53 (0.39–0.71)	0.73 (0.52–1.02)
Religion/ caste[b]	Other Hindu	1.11 (0.93–1.33)	–	–		
	Non-Hindu	1.33 (1.06–1.66)	–	–		
Women's education[c]	Primary	0.93 (0.75–1.15)	1.01 (0.80–1.29)	0.98 (0.72–1.33)		1.50 (0.92–2.42)
	Middle	0.86 (0.66–1.11)	0.79 (0.57–1.10)	0.57 (0.36–0.91)		0.68 (0.29–1.60)
	≥High school	0.73 (0.57–0.93)	0.35 (0.24–0.52)	0.26 (0.15–0.46)		0.95 (0.41–2.18)
Husband's education[d]	Primary	–	1.30 (1.04–1.61)		1.38 (1.06–1.79)	1.21 (0.89–1.64)
	Middle	–	0.99 (0.79–1.25)		1.13 (0.83–1.52)	1.49 (1.02–2.17)
	≥High school	–	0.77 (0.63–0.94)		0.95 (0.72–1.24)	0.77 (0.53–1.12)
Ever contraceptive use[e]	yes	–	–	0.73 (0.55–0.96)	0.74 (0.56–0.97)	
Ever fetal loss[f]	Yes	0.74 (0.61–0.90)	0.77 (0.63–0.94)	0.69 (0.54–0.88)	0.76 (0.60–0.97)	0.72 (0.53–0.97)
Sex of index child[g]	Male	0.88 (0.77–1.01)	–	–		
Survival status of index child[h]	Alive	–	0.73 (0.58–0.92)	0.72 (0.52–0.99)		
Occupation of women[i]	Employed	–	0.74 (0.60–0.92)	0.75 (0.58–0.98)	0.78 (0.61–1.01)	
Media exposure[j]	Yes	–	–	0.83 (0.67–1.02)		0.68 (0.50–0.91)

Distance of primary health centre[k]	<2 km	–	–	1.22 (0.98–1.52)		
Birth interval	0–15 month	0.18 (0.12–0.27)	0.16 (0.10–0.27)	0.18 (0.10–0.34)	0.16 (0.09–0.31)	0.13 (0.06–0.30)
Breastfeeding	≥1 month	1.46 (1.15–1.87)	2.46 (1.80–3.36)	1.93 (1.25–2.99)	1.49 (1.0–2.15)	1.67 (1.02–2.73)
Birth interval	16–21 month	0.18 (0.12–0.27)	0.82 (0.50–1.37)	0.29 (0.14–0.63)	0.28 (0.10–0.77)	0.20 (0.07–0.63)
Breastfeeding	≥16 month	0.90 (0.73–1.11)	0.68 (0.54–0.87)	0.79 (0.60–1.05)	0.82 (0.59–1.14)	0.93 (0.65–1.32)
Birth interval	22–27 month	0.19 (0.12–0.30)	0.57 (0.29–1.11)	0.82 (0.30–2.22)	1.69 (0.55–5.22)	1.29 (0.31–5.40)
Breastfeeding	≥22 month	0.77 (0.60–0.98)	0.59 (0.46–0.76)	0.63 (0.47–0.85)	0.57 (0.41–0.81)	0.54 (0.37–0.80)
Birth interval	28–33 month	0.05 (0.01–0.23)	0.69 (0.31–1.51)	0.40 (0.15–1.10)	0.38 (0.11–1.35)	1.70 (0.60–4.84)
Breastfeeding	≥28 month	0.69 (0.47–1.02)	0.67 (0.44–1.02)	0.57 (0.35–0.92)	0.52 (0.32–0.86)	0.51 (0.27–0.96)
Birth interval	≥34 month	0.65 (0.31–1.38)	1.28 (0.50–3.23)	1.09 (0.41–2.88)	1.11 (0.33–3.76)	9.95 (1.18–83.68)
Breastfeeding	≥34 month	0.72 (0.35–1.45)	0.29 (0.13–0.63)	0.33 (0.14–0.80)	0.25 (0.08–0.75)	0.05 (0.01–0.37)

CI = confidence interval; RR = relative risk.
Reference category: [a]Rural; [b]Hindu; [c]Illiterate; [d]Illiterate; [e]No; [f]No; [g]Female; [h]Dead; [i]Not employed; [j]Yes; [k]≥2 km.
*Significant at < .05.

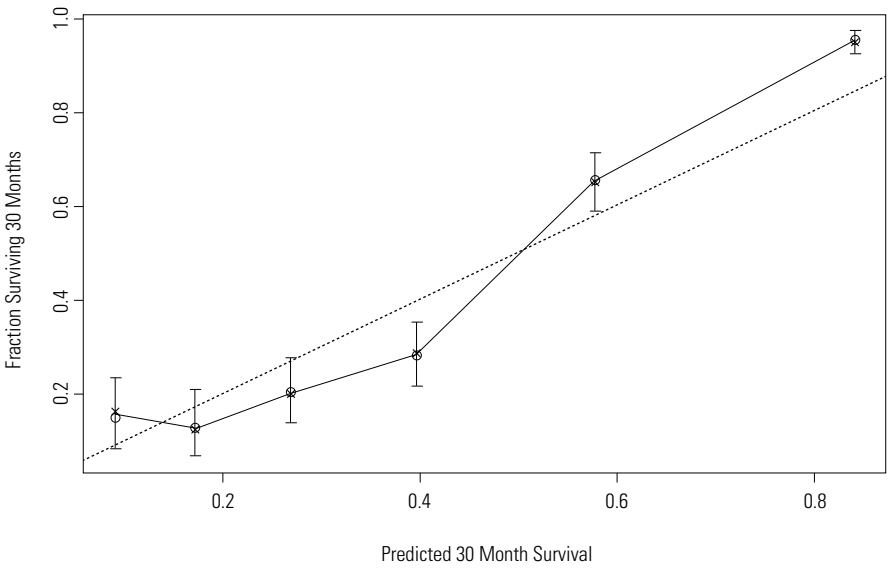
A comparison of variables entered in the final multivariate extended Cox models related to various birth spacing reveals that after breastfeeding, ever experience of fetal loss emerged as an important covariate in extending each of the examined birth intervals. Education of woman (specifically high school and above) was revealed as a significant protective factor between first to third birth spacing. This variable was not significant under the fifth birth spacing, and it did not enter in the model for the fourth birth spacing at all. Employment status of woman was also a significant protective factor under second and third birth intervals. Education of husband (at the middle and primary level) was also significantly associated with second, fourth and fifth birth intervals, quite often as a risk factor. It is obviously a contrary result. Media exposure was a significant protective factor for the fifth birth spacing. While survival status of index child emerged as a significant protective factor for birth intervals two and three, ever contraceptive use emerged as a protective factor for intervals three and four. Place of residence also entered into the model but did not reveal any specific pattern in relation to various birth intervals. In summary, variables varied from the first to the fifth birth intervals.

Validation

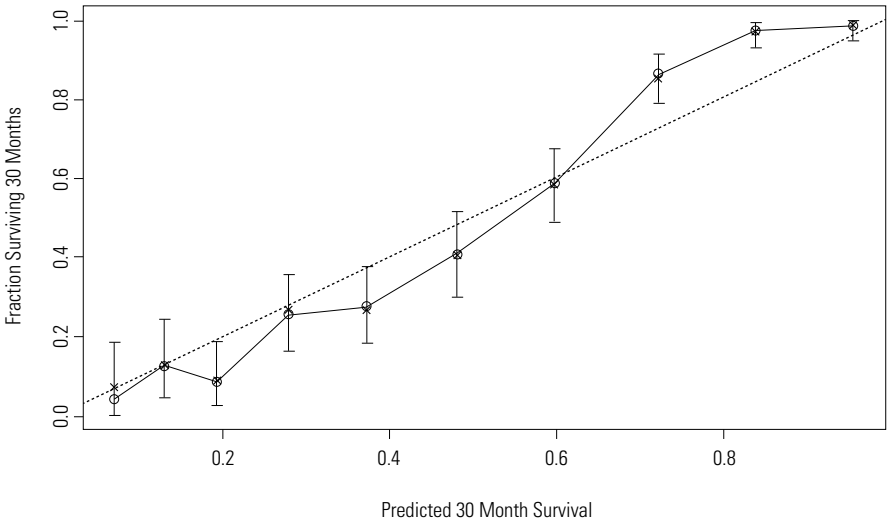
Calibration curves dealing with the bootstrap estimate of calibration accuracy for 30 months for first to fourth birth intervals and calibration accuracy for 24 months for the fifth birth interval from the final extended Cox models are presented in Figures 1–5. Bias-corrected calibration seemed satisfactory in each case, with a few exceptions. These exceptions were noticed for three groups under the first, second and fifth intervals, five groups under the third, and four groups under fourth interval. However, their not having next childbirth probabilities were slightly better than predicted. Further, these errors fall in a low range in absolute terms. Table 4 clearly shows that shrinkage coefficients related to first to fifth birth intervals are 0.97, 0.96, 0.78, 0.93 and 0.93, respectively. This clearly indicates that with regard to calibration accuracy, 3%, 4%, 22%, 7% and 7% of the model fitting will be noisy in relation to those with first, second, third, fourth and fifth birth intervals, respectively. Thus, the shrinkage coefficient could easily be used to shrink predictions to yield better calibration

in the case of the third birth spacing. However, the calculated Somer's Dxy rank correlation related to models for various birth spacing are –0.40, –0.61, –0.68, –0.65 and –0.69 respectively. As the honest estimate of the discrimination aspect of predictive accuracy, this measure also indicates satisfactory validity of the developed models, including that for third birth spacing. In summary, the measures of validity of developed models demonstrate that these models are good enough to describe the parity-specific birth spacing in UP.

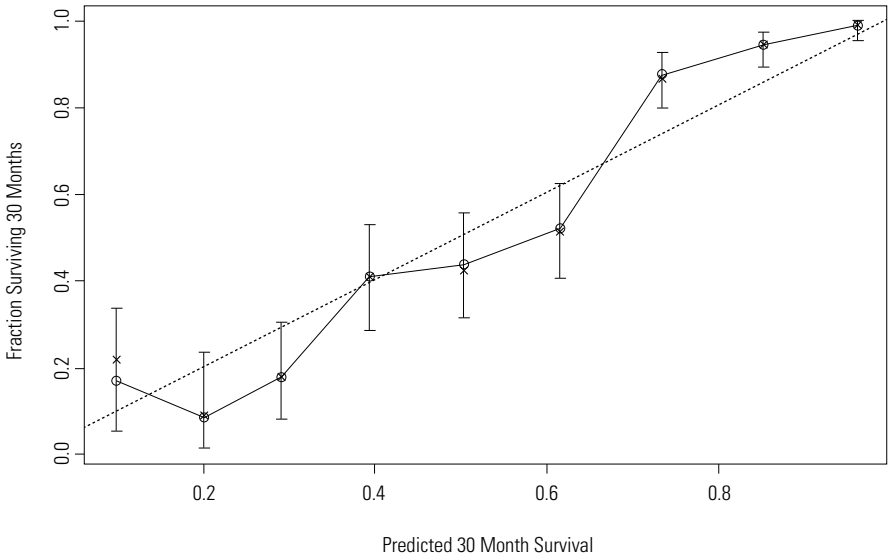
Figures 1–5. Calibration curves



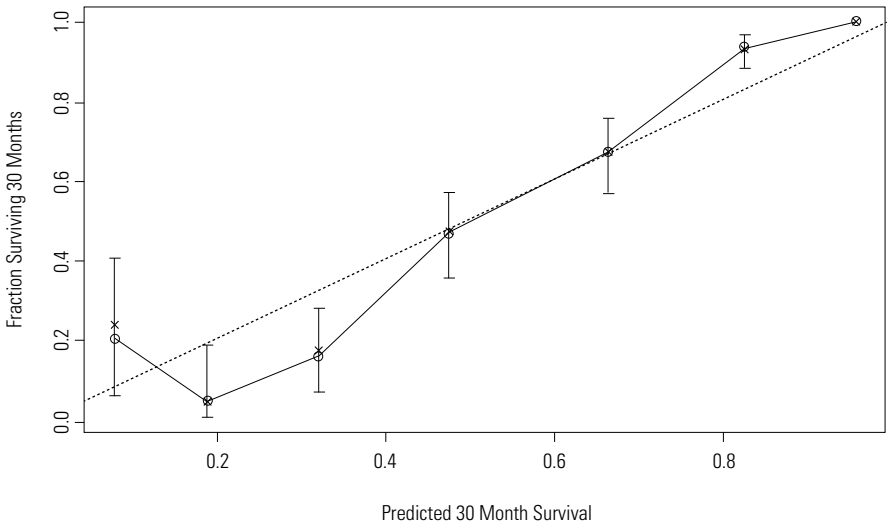
Bootstrap estimates of calibration accuracy for 30 months estimates for the final extended Cox model for 1st birth spacing. Dots correspond to apparent predictive accuracy. X marks the bootstrap-corrected estimates.



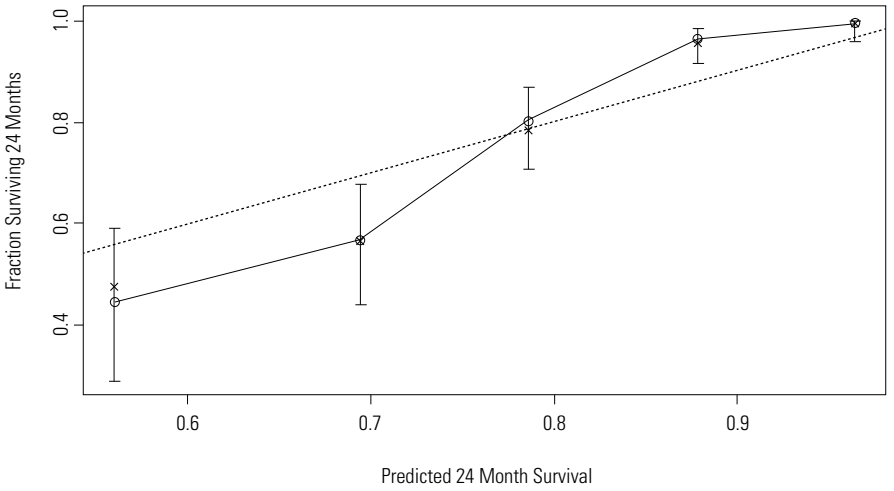
Bootstrap estimates of calibration accuracy for 30 months estimates from the final extended Cox model for 2nd birth spacing. Dots correspond to apparent predictive accuracy. X marks the bootstrap-corrected estimates.



Bootstrap estimates of calibration accuracy for 30 months estimates from the final extended Cox model for 3rd birth spacing. Dots correspond to apparent predictive accuracy. X marks the bootstrap-corrected estimates.



Bootstrap estimates of calibration accuracy for 30 months estimates from the final extended Cox model for 4th birth spacing. Dots correspond to apparent predictive accuracy. X marks the bootstrap-corrected estimates.



Bootstrap estimates of calibration accuracy for 24 months estimates from the final extended Cox model for 5th birth spacing. Dots correspond to apparent predictive accuracy. X marks the bootstrap-corrected estimates.

Predictions

Predictions based on final models for first to fifth birth intervals are listed in Tables 5.1 to 5.5, respectively, in relation to some selected individual as well as group of variables, which may be modified through some interventions.

As evident from Table 5.1, survival probability (i.e., not having a second live birth after the first) related to first birth spacing decreased over a period of time (i.e., from 12 to 48 months). However, it increased with an increased period of breastfeeding up to the category of 28–33 months. In contrast, the survival probability within the category of 34 and above months was smaller than even the category 0–15 months. Within each category, there was an increasing trend in the probability of not having the next live birth in relation to an increase in the education of women. But the maximum benefit is noticed once the woman's education is high school (and above). These results clearly indicate that if women are educated at the high school (and above) level and they breastfeed their children, maximum benefit with regard to extension of birth spacing can be derived, specifically up to the period of 27 months after the birth. Similar results are evident for second and third birth intervals (Tables 5.2 and 5.3). Woman's education did not enter in the model for fourth birth spacing (Table 5.4). Hence, the prediction analysis under the fourth birth spacing in this relation is not possible. No specific trend could be noticed for the fifth birth spacing (Table 5.5). It is interesting to note that these probabilities increased up to the third birth spacing with an increase in parity of women. However, this observation may be attributed to some extent to change in variables in the final model. As evident from Tables 5.2 and 5.3, high school (and above) education of women may contribute more than even the survival of the index child. The importance of high school (and above) education for women is also visible in comparison to the employment status of women (Tables 5.2 and 5.3). Also, women's education is found to be more important than that of the husband (Table 5.2).

Table 4. Validity indices of extended Cox hazards models developed for parity-specific birth spacing (first to fifth)

	Index original	Training	Test	Optimism	Index corrected	Re–Sample
Parity-I						
Shrinkage	1.00	1.00	0.97	0.03	0.97	200
Coefficient						
D_{xy}	–0.41	–0.42	–0.41	–0.01	–0.40	200
Parity-II						
Shrinkage	1.00	1.00	0.96	0.04	0.96	200
Coefficient						
D_{xy}	–0.61	–0.62	–0.61	–0.01	–0.61	200
Parity-III						
Shrinkage	1.00	1.00	0.78	0.22	0.78	200
Coefficient						
D_{xy}	–0.72	–0.74	–0.70	–0.04	–0.68	200
Parity-IV						
Shrinkage	1.00	1.00	0.93	0.07	0.93	200
Coefficient						
D_{xy}	–0.66	–0.66	–0.64	–0.01	–0.65	200
Parity-V						
Shrinkage	1.00	1.00	0.93	0.07	0.93	200
Coefficient						
D_{xy}	–0.70	–0.70	–0.69	–0.01	–0.69	200

D_{xy}: Somer's D-rank correlation.

Table 5.2 provides the opportunity to compare the relative role of survival of the index child and high school (and above) education of the husband. It is clearly demonstrated that each of these variables contributed equally if they were considered individually. This is also true in the case of consideration with the high school (and above) education of women in the model. A similar comparison between media exposure and survival of the index child is shown in Table 5.3. This reveals that media exposure may contribute slightly more to extended birth spacing than the survival of index child in the case of individual consideration. Once they are considered individually along with high school (and above) education of women, an additional slight gain is observed for these two variables, but it is of the same magnitude in both cases. In the same way, comparison between high school (and above) education of the husband and media exposure (Table 5.5) reveals that each makes an almost equal contribution individually. This is also true in cases where these variables are considered along with high school (and above) education of women.

Table 5.1. Estimated probabilities of not having second live birth at specific months after first live birth, by selected characteristics, according to model (first birth spacing)

Characteristics	Probability of not having births at months						
	12	18	24	30	36	42	48
BREASTFEEDING (0–15 MONTHS)							
Average	0.98	0.91	0.80	0.68	0.58	0.44	0.36
Primary educated women	0.98	0.91	0.80	0.69	0.58	0.44	0.36
Middle educated women	0.98	0.92	0.82	0.71	0.61	0.47	0.39
High school and above educated women	0.98	0.93	0.84	0.75	0.66	0.53	0.45
BREASTFEEDING (16–21 MONTHS)							
Average	0.99	0.95	0.88	0.80	0.72	0.61	0.55
Primary educated women	0.99	0.94	0.87	0.79	0.72	0.61	0.53
Middle educated women	0.99	0.95	0.88	0.81	0.74	0.63	0.56
High school and above educated women	0.99	0.96	0.90	0.84	0.77	0.68	0.61
BREASTFEEDING (22–27 MONTHS)							
Average	0.99	0.95	0.88	0.81	0.73	0.62	0.56
Primary educated women	0.99	0.95	0.88	0.81	0.74	0.63	0.56
Middle educated women	0.99	0.95	0.89	0.82	0.75	0.65	0.59
High school & above educated women	0.99	0.96	0.91	0.85	0.79	0.70	0.64
BREASTFEEDING (28–33 MONTHS)							
Average	1.00	0.99	0.97	0.95	0.92	0.89	0.86
Primary educated women	1.00	0.99	0.97	0.95	0.93	0.89	0.86
Middle educated women	1.00	0.99	0.97	0.95	0.93	0.90	0.87
High school and above educated women	1.00	0.99	0.98	0.96	0.94	0.91	0.89
BREASTFEEDING (≥34 MONTHS)							
Average	0.96	0.85	0.67	0.51	0.38	0.23	0.16
Primary educated women	0.96	0.85	0.68	0.51	0.38	0.23	0.17
Middle educated women	0.96	0.86	0.70	0.54	0.41	0.26	0.19
High school and above educated women	0.97	0.88	0.74	0.60	0.47	0.32	0.25

Table 5.2. Estimated probabilities of not having third live birth at specific months after second live birth, by selected characteristics, according to model (second birth spacing).

Characteristics	Probability of not having births at months						
	12	18	24	30	36	42	48
BREASTFEEDING (0–15 MONTHS)							
Average	0.98	0.95	0.88	0.78	0.67	0.55	0.48
Primary educated women	0.99	0.96	0.89	0.81	0.71	0.60	0.53
Middle educated women	0.99	0.95	0.89	0.80	0.70	0.59	0.51
High school and above educated women	0.99	0.98	0.95	0.91	0.85	0.79	0.74
Survival of index child	0.99	0.95	0.88	0.78	0.67	0.56	0.48
Employed women	0.99	0.95	0.89	0.79	0.74	0.62	0.52
High school and above educated husband	0.99	0.95	0.89	0.79	0.69	0.58	0.50
High school and above educated women + Survival of index child	0.99	0.98	0.95	0.91	0.86	0.80	0.75
High school and above educated women + High school and above educated husband	0.99	0.98	0.95	0.91	0.86	0.80	0.76
BREASTFEEDING (16–21 MONTHS)							
Average	0.98	0.93	0.83	0.70	0.57	0.44	0.35
Primary educated women	0.98	0.94	0.85	0.74	0.62	0.49	0.41
Middle educated women	0.98	0.93	0.85	0.73	0.60	0.47	0.39
High school and above educated women	0.99	0.97	0.93	0.87	0.80	0.72	0.66
Survival of index child	0.98	0.93	0.83	0.71	0.57	0.44	0.36
Employed women	0.98	0.93	0.84	0.73	0.60	0.48	0.40
High school and above educated husband	0.98	0.93	0.83	0.71	0.58	0.45	0.37
High school and above educated women + Survival of index child	0.99	0.97	0.93	0.87	0.80	0.72	0.67
High school and above educated women + High school and above educated husband	0.99	0.97	0.97	0.88	0.81	0.74	0.68
BREASTFEEDING (22–27 MONTHS)							
Average	0.99	0.96	0.90	0.81	0.71	0.62	0.54
Primary educated women	0.99	0.96	0.91	0.84	0.75	0.65	0.59
Middle educated women	0.99	0.96	0.91	0.83	0.74	0.64	0.57
High school and above women	0.99	0.98	0.96	0.92	0.87	0.82	0.78
Survival of index child	0.99	0.96	0.90	0.81	0.72	0.62	0.54
Employed women	0.99	0.96	0.90	0.82	0.73	0.65	0.57
High school and above educated husband	0.99	0.96	0.90	0.82	0.73	0.63	0.56

Table 5.2. Continued

High school and above educated women + Survival of index child	1.00	0.98	0.96	0.92	0.88	0.83	0.79
High school and above educated women + High school and above educated husband	1.00	0.98	0.96	0.93	0.88	0.83	0.79
BREASTFEEDING (28–33 MONTHS)							
Average	0.98	0.94	0.86	0.75	0.63	0.51	0.43
Primary educated women	0.99	0.95	0.88	0.78	0.67	0.56	0.48
Middle educated women	0.98	0.95	0.87	0.77	0.66	0.54	0.47
High school and above educated women	0.99	0.98	0.94	0.89	0.83	0.76	0.71
Survival of index child	0.98	0.94	0.86	0.75	0.63	0.51	0.43
Employed women	0.98	0.94	0.87	0.77	0.66	0.55	0.47
High school and above educated husband	0.98	0.95	0.87	0.77	0.65	0.53	0.46
High school and above educated women + Survival of index child	0.99	0.98	0.94	0.90	0.84	0.77	0.72
High school and above educated women + High school and above educated husband	0.99	0.98	0.95	0.90	0.84	0.78	0.73
BREASTFEEDING (≥34 MONTHS)							
Average	0.99	0.95	0.89	0.80	0.69	0.58	0.51
Primary educated women	0.99	0.95	0.88	0.78	0.67	0.56	0.48
Middle educated women	0.99	0.96	0.90	0.81	0.72	0.62	0.54
High school and above educated women	0.99	0.98	0.95	0.91	0.86	0.81	0.76
Survival of index child	0.99	0.95	0.89	0.80	0.70	0.59	0.52
Employed women	0.99	0.96	0.91	0.84	0.75	0.66	0.59
High school and above educated husband	0.99	0.96	0.89	0.81	0.71	0.61	0.53
High school and above educated women + Survival of index child	0.99	0.98	0.95	0.92	0.87	0.81	0.77
High school and above educated women + High school and above educated husband	0.99	0.98	0.96	0.92	0.87	0.82	0.78

Table 5.3. Estimated probabilities of not having fourth live birth at specific months after third live birth, by selected characteristics, according to model (third birth spacing)

Characteristics	Probability of not having births at months						
	12	18	24	30	36	42	48
BREASTFEEDING (0–15 MONTHS)							
Average	0.98	0.94	0.88	0.79	0.68	0.59	0.51
Primary educated women	0.98	0.93	0.86	0.78	0.65	0.56	0.47
Middle educated women	0.99	0.96	0.92	0.86	0.78	0.71	0.65
High school and above educated women	0.99	0.98	0.96	0.93	0.90	0.85	0.82
Contraceptive use	0.99	0.95	0.90	0.84	0.74	0.66	0.59
Survival of index child	0.99	0.94	0.88	0.80	0.68	0.59	0.51
Employed women	0.99	0.95	0.90	0.83	0.73	0.66	0.58
Media exposure	0.98	0.95	0.89	0.82	0.71	0.62	0.55
High school and above educated women+ Survival of index child	0.99	0.98	0.96	0.94	0.89	0.86	0.82
High school and above educated women+ Media exposure	1.00	0.98	0.97	0.94	0.90	0.87	0.84
BREASTFEEDING (16–21 MONTHS)							
Average	0.99	0.95	0.92	0.86	0.77	0.70	0.64
Primary educated women	0.99	0.96	0.91	0.85	0.75	0.68	0.61
Middle educated women	1.00	0.97	0.95	0.91	0.85	0.80	0.75
High school and above women	1.00	0.99	0.97	0.96	0.93	0.90	0.88
Contraceptive use	0.99	0.97	0.93	0.89	0.82	0.76	0.71
Survival of index child	0.99	0.96	0.92	0.86	0.78	0.71	0.64
Employed women	0.99	0.98	0.93	0.89	0.81	0.76	0.70
Media exposure	0.99	0.96	0.92	0.87	0.79	0.73	0.67
High school and above educated women+ Survival of index child	1.00	0.99	0.97	0.96	0.93	0.90	0.88
High school and above educated women+ Media exposure	1.00	0.99	0.98	0.96	0.93	0.91	0.89
BREASTFEEDING (22–27 MONTHS)							
Average	0.97	0.91	0.82	0.71	0.56	0.45	0.36
Primary educated women	0.97	0.90	0.80	0.69	0.53	0.42	0.33
Middle educated women	0.98	0.94	0.88	0.80	0.69	0.60	0.52
High school and above educated women	0.99	0.97	0.94	0.90	0.84	0.79	0.74
Contraceptive use	0.98	0.93	0.86	0.77	0.64	0.54	0.46

Table 5.3. Continued

Survival of index child	0.97	0.91	0.82	0.72	0.57	0.46	0.37
Employed women	0.98	0.93	0.86	0.76	0.63	0.54	0.45
Media exposure	0.98	0.92	0.84	0.74	0.60	0.50	0.41
High school and above educated women+ Survival of index child	0.99	0.97	0.94	0.91	0.85	0.80	0.75
High school and above educated women+ Media exposure	0.99	0.98	0.95	0.91	0.86	0.81	0.77
BREASTFEEDING (28–33 MONTHS)							
Average	0.99	0.96	0.92	0.86	0.77	0.70	0.64
Primary educated women	0.99	0.96	0.91	0.85	0.75	0.68	0.61
Middle educated women	0.99	0.97	0.95	0.91	0.85	0.80	0.75
High school and above women	1.00	0.99	0.97	0.97	0.93	0.90	0.88
Contraceptive use	0.99	0.97	0.93	0.89	0.82	0.76	0.71
Survival of index child	0.99	0.96	0.92	0.86	0.78	0.71	0.65
Employed women	0.99	0.97	0.93	0.89	0.82	0.76	0.70
Media exposure	0.99	0.96	0.93	0.87	0.80	0.73	0.67
High school and above educated women+ Survival of index child	1.00	0.99	0.98	0.96	0.93	0.90	0.88
High school and above educated women+ Media exposure	1.00	0.99	0.98	0.96	0.94	0.91	0.89
BREASTFEEDING (≥34 MONTHS)							
Average	0.98	0.94	0.87	0.79	0.66	0.57	0.50
Primary educated women	0.98	0.93	0.86	0.77	0.64	0.54	0.46
Middle educated women	0.99	0.96	0.91	0.86	0.77	0.70	0.63
High school and above women	0.99	0.98	0.96	0.93	0.89	0.85	0.81
Contraceptive use	0.99	0.95	0.90	0.83	0.73	0.65	0.58
Survival of index child	0.98	0.94	0.87	0.79	0.67	0.58	0.50
Employed women	0.99	0.95	0.90	0.83	0.73	0.64	0.57
Media exposure	0.98	0.94	0.88	0.81	0.70	0.61	0.53
High school and above educated women+ Survival of index child	0.99	0.98	0.96	0.93	0.89	0.85	0.81
High school and above educated women+ Media exposure	1.00	0.98	0.96	0.94	0.90	0.86	0.83

Table 5.4. Estimated probabilities of not having fifth live birth at specific months after fourth live birth, by selected characteristics, according to model (fourth birth spacing).

Characteristics	Probability of not having births at months						
	12	18	24	30	36	42	48
BREASTFEEDING (0–15 MONTHS)							
Average	0.99	0.95	0.88	0.80	0.70	0.58	0.52
Contraceptive use	0.99	0.96	0.91	0.84	0.76	0.66	0.60
Employed women	0.99	0.96	0.90	0.84	0.74	0.64	0.59
High school and above	0.99	0.95	0.89	0.82	0.73	0.62	0.56
Educated husband + employed women	1.00	0.98	0.95	0.92	0.87	0.82	0.78
BREASTFEEDING (16–21 MONTHS)							
Average	0.99	0.95	0.89	0.81	0.71	0.60	0.54
Contraceptive use	0.99	0.96	0.91	0.85	0.77	0.67	0.62
Employed women	0.99	0.96	0.91	0.84	0.76	0.66	0.60
High school and above	0.99	0.86	0.90	0.83	0.74	0.64	0.58
Educated husband + employed women	1.00	0.98	0.96	0.92	0.88	0.85	0.79
BREASTFEEDING (22–27 MONTHS)							
Average	0.96	0.81	0.60	0.42	0.24	0.12	0.08
Contraceptive use	0.97	0.85	0.68	0.51	0.33	0.19	0.13
Employed women	0.96	0.84	0.66	0.49	0.31	0.17	0.22
High school and above	0.96	0.83	0.64	0.46	0.28	0.15	0.10
Educated husband + employed women	0.98	0.92	0.83	0.72	0.45	0,45	0.38
BREASTFEEDING (28–33 MONTHS)							
Average	0.99	0.96	0.90	0.83	0.74	0.64	0.59
Contraceptive use	0.99	0.97	0.92	0.87	0.79	0.71	0.66
Employed women	0.99	0.96	0.92	0.86	0.78	0.70	0.65
High school and above	0.99	0.96	0.91	0.85	0.77	0.68	0.62
Educated husband + employed women	1.00	0.98	0.96	0.93	0.85	0.85	0.82
BREASTFEEDING (≥34 MONTHS)							
Average	0.99	0.94	0.86	0.78	0.66	0.54	0.48
Contraceptive use	0.99	0.95	0.89	0.82	0.73	0.62	0.56
Employed women	0.99	0.95	0.89	0.81	0.71	0.60	0.54
High school and above	0.99	0.95	0.88	0.80	0.69	0.58	0.52
Educated husband + employed women	1.00	0.98	0.95	0.91	0.79	0.79	0.76

Table 5.5. Estimated probabilities of not having sixth live birth at specific months after fifth live birth, by selected characteristics, according to model (fifth birth spacing)

Characteristics	Probability of not having births at months						
	12	18	24	30	36	42	48
BREASTFEEDING (0–15 MONTHS)							
Average	0.99	0.96	0.91	0.85	0.77	0.68	0.65
Primary educated women	0.99	0.94	0.88	0.79	0.67	0.57	0.53
Middle educated women	0.99	0.97	0.94	0.90	0.84	0.78	0.75
High school and above educated women	0.99	0.96	0.92	0.86	0.78	0.70	0.67
Media exposure	0.99	0.97	0.94	0.89	0.82	0.75	0.72
High school and above educated husband	0.99	0.97	0.94	0.89	0.82	0.75	0.72
High school and above educated women+ High school and above educated husband	0.99	0.97	0.94	0.90	0.83	0.77	0.74
High school and above educated women+ Media exposure	0.99	0.97	0.94	0.89	0.83	0.76	0.73
BREASTFEEDING (16–21 MONTHS)							
Average							
Primary educated women	0.99	0.95	0.90	0.82	0.71	0.62	0.58
Middle educated women	0.99	0.98	0.95	0.91	0.86	0.80	0.78
High school and above educated women	0.99	0.97	0.93	0.88	0.81	0.74	0.71
Media exposure	0.99	0.98	0.95	0.90	0.84	0.78	0.75
High school and above educated husband	0.99	0.98	0.95	0.90	0.84	0.79	0.76
High school and above educated women+ High school and above educated husband	0.99	0.98	0.95	0.91	0.85	0.80	0.77
High school and above educated women+ Media exposure	0.99	0.98	0.95	0.91	0.85	0.79	0.77
BREASTFEEDING (22–27 MONTHS)							
Average	0.97	0.89	0.76	0.61	0.43	0.31	0.26
Primary educated women	0.96	0.84	0.67	0.48	0.29	0.17	0.14
Middle educated women	0.98	0.92	0.84	0.72	0.57	0.45	0.40
High school and above educated women	0.97	0.89	0.78	0.63	0.46	0.33	0.28
Media exposure	0.98	0.91	0.82	0.69	0.53	0.41	0.36
High school and above educated husband	0.98	0.94	0.87	0.77	0.64	0.54	0.49
High school and above educated women+ High school and above educated husband	0.98	0.92	0.83	0.71	0.56	0.44	0.39
High school and above educated women+ Media exposure	0.98	0.92	0.83	0.70	0.55	0.43	0.38

BREASTFEEDING (28–33 MONTHS)							
Average	0.96	0.86	0.72	0.54	0.35	0.23	0.19
Primary educated women	0.95	0.80	0.61	0.40	0.22	0.11	0.08
Middle educated women	0.98	0.91	0.80	0.66	0.50	0.37	0.32
High school and above educated women	0.97	0.87	0.73	0.56	0.38	0.25	0.21
Media exposure	0.97	0.89	0.78	0.63	0.46	0.33	0.28
High school and above educated husband	0.97	0.90	0.78	0.63	0.46	0.34	0.29
High school and above educated women+ High school and above educated husband	0.98	0.90	0.79	0.65	0.49	0.36	0.31
High school and above educated women+ Media exposure	0.97	0.90	0.79	0.65	0.50	0.35	0.30
BREASTFEEDING (≥34 MONTHS)							
Average	0.98	0.92	0.83	0.71	0.56	0.44	0.39
Primary educated women	0.97	0.88	0.76	0.60	0.43	0.30	0.25
Middle educated women	0.99	0.99	0.88	0.80	0.68	0.58	0.53
High school and above educated women	0.98	0.93	0.84	0.73	0.58	0.46	0.41
Media exposure	0.98	0.94	0.87	0.77	0.65	0.54	0.49
High school and above educated husband	0.99	0.94	0.87	0.78	0.65	0.54	0.50
High school and above educated women+ High school and above educated husband	0.99	0.94	0.88	0.79	0.67	0.57	0.52
High school and above educated women+ Media exposure	0.99	0.94	0.88	0.78	0.66	0.56	0.51

Discussion

On account of indices reported regarding validity of each developed model (calibration curve, shrinkage coefficient, and Somer's Dxy rank correlation), it is clear that each of the parity-specific hazards models that were developed describe the respective birth spacing. To our knowledge, there is no study on birth spacing in which an exercise related to the validity of the developed Cox hazards models has been carried out. Therefore, there is no scope to compare the developed models in the present study with those reported under other studies.

Age and parity have long been regarded as factors that influence lactational infertility and breastfeeding behaviour, since the period of lactational amenorrhea tends to be longer for older and multiparous than for younger and primiparous women (Saadeh and Benbouzid 1990). Further, the World Health Organization (WHO) recommends an interval of at least 24 months to reduce the risk of adverse maternal, perinatal and neonatal outcomes (WHO 2006). Some studies have also suggested adverse outcomes in birth intervals of more than 59 months (Conde-Agudelo and Belizàn 2000). Thus, age was forced into the model; however, it did not emerge a significant factor.

Breastfeeding was the only covariate found to be a significant protective factor associated with each birth spacing. When analyzing the data on birth spacing in the Philippines, Malaysia and Indonesia, Trussell et al. (1985) also considered breastfeeding as a time-varying covariate with time-dependent effect. They did not carry out a parity-specific analysis, but they included parity as one of the covariates in data analyses. Results obtained in relation to breastfeeding in UP did not coincide

with the findings of the Trussell et al. (1985) study. Also, observations made in UP, especially in relation to third and higher birth orders, were supported by the observations made by Trussell et al. (1985) in Indonesia. Anderson and Bean (1985) considered breastfeeding in the form of any breastfeeding as well as exclusive breastfeeding at the beginning of birth spacing, and reported breastfeeding as a significant protective factor related to the most recent birth spacing. Considering breastfeeding as a time-varying covariate with a fixed effect, they observed that breastfeeding was a significant protective factor in addition to other covariates considered in their data analysis.

The education of women emerged as another important variable that protected against birth spacing in the present study, especially for first to third and fifth birth intervals. Women's education was consistently related to the likelihood of another birth at each birth spacing, with high school (and above) educated women experiencing a significantly lower probability of a subsequent birth. This finding is supported by results of other studies (Gandotra et al. 1998; Ojha 1998; Rahman and Davanzo 1993; Rajaram 1994; Swenson and Thang 1993; Teachman and Heckert 1985) and suggests that women's education is a prime determinant of fertility and that increasing the educational attainment of women is one of the most beneficial measures to reduce fertility. In contrast, Rodriguez et al. (1983) discovered that education of women had relatively little effect on birth spacing except at the higher parities. Surprisingly, more recent analyses of birth spacing carried out by Ojha (1998) and Richter et al. (1994) did not reveal a significant association between the education of women and birth spacing.

Religion/caste was significantly associated with only the first birth spacing. Ojha (1998) considered this variable in the form of non-Hindu and Hindu religion and concluded that non-Hindu women had a higher risk of having the next live birth in comparison to Hindu women in relation to first to fifth birth intervals in UP. In the present study, this variable was included jointly with caste, and Hindu religion was further subdivided in a Scheduled Caste/Scheduled Tribe category. This may account for the difference in results obtained under the present analysis.

This study showed that place of residence was significantly associated with second, fourth and fifth birth intervals. Swenson and Thang (1993) also suggested that urban–rural differences persisted at most birth orders, and urban–rural differentials are the primary source of variations in fertility between different areas of a country. Similar findings were reported by Trussell et al. (1985).

Occupation of women has been assessed as a risk/protective factor in relation to birth spacing in a few studies. This study has clearly indicated that working status of women, not occupation, was a significant protective factor specifically for second and third birth intervals. Trussell et al. (1985) assessed the role of employment status of women (away from home) and found no significant impact on birth spacing, whereas Richter et al. (1994) assessed the impact of occupation of women, considering various categories. Interestingly, they noticed that women employed as salesgirls and manufacturing workers, and those who were self-employed, were significantly less likely to go for the next birth.

Various studies (Blanchard and Bogaert 1997; Bogaert 2000; Greenberg and White 1967; Wyshak 1969) have reported that birth intervals are comparatively longer following the birth of a male in comparison to a female child. However, sex of index child did not emerge as a significant associated factor in each of three country data analyses, namely Philippines, Malaysia and Indonesia (Trussell et al. 1985). But Swenson and Thang (1993) reported male index child as a protective factor for birth spacing of women's first and second parities. The present study also indicated the likelihood of male index child being a protective factor only for first birth spacing in UP. In contrast, Ojha (1998) reported that sex of the index child played a significant role in first to fifth birth intervals.

Survival of index child emerged as a significant protective factor for second and third birth spacing. The role of survival of index child for birth spacing has also been documented by many other studies (Marino-Navarro 1987; Oheneba-Sakyi and Heaton 1993; Ojha 1998; Palloni and Rafalimanana 1999; Rahman and Davanzo 1993; Rajaram et al. 1994; Suchindran and Adlakha, 1984).

Many studies have reported on the significant role of contraceptive use in extending birth spacing (Moreno-Navarro 1987; Rajaram et al. 1994; Islam and Mahmud 1995). However, data on parity-

specific contraceptive use were not available for the present study. On account of its theoretical importance, as reported in earlier studies, information on (ever) contraceptive use was considered in the analysis for each birth spacing. This was done in view of the possibility that couples who have used modern contraceptives once might use them again when they feel the need. Contraceptive use was a significant protective factor for higher-order birth spacing.

Similarly, media exposure had a protective impact on higher-order birth spacing. The latter finding was supported by Gandotra (1998). This is similar to Gebreselassie et al. (2008) who, in a multivariate analysis of data from four countries, found that exposure to mass media had a significant positive association with adoption of contraceptive methods.

Ever fetal loss extended birth spacing significantly. Chapple (2009) found that birth spacing interval corresponding to the lowest odds of an adverse outcome varied, based on timing of previous fetal death. While early fetal death was associated with a low risk of perinatal outcome for any interval longer than six months, no interval was associated with a late fetal death. Also, no interval was identified as the appropriate interval that offered protection against adverse maternal outcomes. In our study, we did not have access to fetal loss at each birth interval and therefore cannot extend the analysis to say how much it affected birth spacing.

Education of husband was a significant factor. This is supported by a study in Mozambique by RamaRao et al. (2006). De la Paz (2010) also found that husband's education had an effect at each birth spacing.

Studies (Davanzo and Starbird 1991; Miller et al. 1992; Rodriguez et al. 1983; Swenson and Thang 1993; Trussell et al. 1985) have documented the importance of previous birth interval in extending succeeding birth spacing. The results of the present study did not support the existing literature with regard to this finding.

Conclusion

Socio-economic factors are potential confounders of birth spacing and adverse maternal outcomes. This study utilizes information from NFHS 92–93 data to see the effects of socio-economic factors on breastfeeding and its impact on birth spacing. Breastfeeding has been known to affect lactational amenorrhea, leading to an increase in birth spacing. This study is a first in terms of developing models that optimize the NFHS-I data to validate and predict. In summary, in terms of policy implications, this study has revealed the importance of a region-specific epidemiological understanding of public health issues such as birth spacing. Within a region, sub-grouping according to parity/birth order of birth spacing data may be helpful in planning and in showing more specific strategies. Further, the study has clearly emphasized the need for education programs, including not only formal education of woman/mother or husband/father, but also effective messages (media exposure) regarding the importance of issues like contraceptive use and breastfeeding, especially in UP.

Limitations

A major limitation of the present study lies in the type of data collected on maternity history of women in NFHS-I. The age of the data is also a limitation, although the findings are still relevant to the present, since no such study has been conducted previously. The data on some important covariates like income, post-partum amenorrhea and behavioural aspects were not available. Further, data on modern contraceptive use and fetal loss at each birth interval were also not available. In absence of these data, under strong assumptions, ever contraceptive use and ever experience of fetal loss were considered in the analyses.

Notes

[1] **Pucca House:** A pucca house is one, which has walls and roof made of the following material: burnt bricks, stones (packed with lime or cement), cement concrete, timber, ekra, tiles, GCI (Galvanised Corrugated Iron) sheets, asbestos cement sheet, RBC,(Reinforced Brick Concrete), RCC (Reinforced Cement Concrete) and timber etc.

Kutcha House: The walls and/or roof of this type of house are made of material other than those mentioned above, such as un-burnt bricks, bamboos, mud, grass, reeds, thatch, loosely packed stones, etc.

Semi -Pucca house: A house that has fixed walls made up of pucca material but roof is made up of the material other than those used for pucca house.

Reference: Government of India. 2005. Instructions to Enumerators /Supervisors for Conduct of Fifth Economic Census. Author. Retrieved March 24, 2012. <www.mospi.gov.in/ecs_Ins_Manual_part_I_two.htm>.

[2] This part of the data was previously published: Dwivedi, S.N. and R. Singh. 2003. "On Assessing the Child Spacing Effect of Breastfeeding Using Cox Proportional Hazards Model with NFHS data." *Demography India* 32(2): 215–24. It is here quoted and included for purposes of comparison and further analysis, validation and prediction.

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The Saudi Healthcare System: A View from the Minaret

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Abstract

This review article provides information about the origins, history, evolution and current status of the Saudi healthcare system, which is currently being transformed from a publicly financed and managed welfare system to a market-oriented, employment-based, insurance-driven system. Since its inception in the 1920s, the system has provided free healthcare to all Saudi nationals at publicly owned facilities run by government-employed administrators and healthcare providers. For millions of foreign workers in the country, healthcare at privately owned for-profit facilities has been paid for either by the employer or by the individual. At the completion of the three-stage transition, everyone in the country, whether employed in the public or private sector, is expected to have insurance coverage provided by the employer. All Ministry of Health–owned hospitals will be divested to the private sector, whereas primary health centres are likely to be retained by the government. Many of the operational details of the transition are unclear at this stage and will be worked out in the coming years. This paper provides a context for these changes and highlights some of the existing issues and weaknesses. The article also points to some of the future challenges and cautions against pitfalls involved in the complete transformation of the system.

Country Profile[1]

In the past 50 years, Saudi Arabia, the largest of the Middle Eastern countries, with a land mass of 2.0 million square kilometres (Table 1), has been transformed from a nation with a relatively small nomadic, rural population of less than four million to one of the most urbanized societies in the Middle East. Saudi Arabia's total population is now about 26 million, of which more than 85% reside in a few urban centres. In 2009, the capital city of Riyadh and its surrounding areas alone accounted for more than 6.2 million people (United Nations Development Program [UNDP] 2010; United Nations Children's Fund [UNICEF] 2011; World Bank 2010; World Health Organization [WHO] 2010a). The current estimate of population growth is about 2.2% per year, and, by 2020, the population is expected to reach 31.6 million (UNDP 2010; World Bank 2010). In 1960, only 1.6% (63,400) of the population comprised non-Saudis (Metz 1992; UNDP 2009), but in 2005, fully 26.8% (6.33 million) consisted of non-Saudis, of which a vast majority (69.9%) were men (Ministry of Health [MOH] 2009).

Table 1. Demographic, economic and health related data for Saudi Arabia and five other countries in the region[a]

	Saudi Arabia	Kuwait	Egypt	Jordan	Libya	Oman
Area in square kilometres	2.0 m	17,818	1.0 m	91,880	1.76 m	309,500
Total population in millions	25.4	2.4	82.0	5.3	5.3	2.5
Population growth rate	2.2%	3.3%	2.0%	2.5%	1.8%	2.2%
Population under 15 years of age	35%	23.7%	37.4%	37.1%	32.0%	38.9%
Adult literacy rate	88%	90.9%	69.4%	90.9%	86%	78%
GDP per capita (current $)	$18,603	$15,984	$1,036	$2,103	$5,128	$12,239
Expenditure on health as % of GDP	3.3%	3.8%	3.7%	10.4%	3.3%	2.8%
Health expenditure per capita	$621	$552	$192	$188	$222	$340
Out-of-pocket spending as % of total health expenditure	–	–	61%	9%	23%	9.1%
% of population with access to safe drinking water	97%	100%	91.3%	95.1%	98.45	75%
Life expectance at birth (in years)	73.4	78.7	70.1	71.4	69.0	74.3
Infant mortality per 1000 live births	17.4	9.4	20.5	22	24	10.3
Maternal mortality 100,000 births	14	9.1	63	40	51	15.4
Total fertility rate per woman	3.0	2.2	2.97	3.7	2.96	3.1
% of one-year-old children vaccinated for measles	83%	–	96%	95%	96%	98%
Married women using some form of contraception	–	–	59.2%	56%	53.7%	–
No. of hospital beds per 1000 population	2.2	2.0	2.0	1.8	3.7	1.8
No. of physicians per 1000 population	2.1	1.9	0.6	2.3	1.2	1.6
No. of nurses and midwives per 1000 population	4.1	4	1.3	3.0	4.8	3.7

GDP = gross domestic product.

[a]The data reported in this table cover years 2003–2009 and are not for the same year in each of the columns or the rows. These data are reported only to provide a comparative context for Saudi Arabia.

Most recent estimates indicate that 32% of the population is under 15 years of age, and half of the population is younger than 25.3 years. Only 2.8% of the population is 65 or older (WHO 2010a; MOH 2009). Life expectancy at birth increased from 53.9 years in 1970–1975 to 73.4 years in 2008. Infant mortality decreased from a high of 118 deaths per 1,000 live births in 1985 to 19.1 in 2000. In 2009 Saudi Arabia experienced 19.3 births and 3.3 deaths per 1,000 population.

In 2008, 37% of men and 6% of women above age 15 were smokers (UNDP 2010; WHO – Regional Health Systems Observatory: Eastern Mediterranean Region Office [EMRO] 2006; WHO 2010a, 2011; World Bank 2010). The average daily caloric intake of a Saudi in 1995 was 3,128 calories or more (Madani et al. 2000). The inactivity rate among men and women is estimated at 43.3% and 99.5%, respectively (Al-Hazzaa 2004). These lifestyles have led to obesity rates of 29.5% in men and 43.5% in women (WHO 2010b).

Ranking on Various Development Indicators

The World Health Organization's comparative assessment of healthcare systems in its 191 member states ranked Saudi Arabia 26th on overall performance, 61st on goal attainment, 58th on the basis of Disability Adjusted Life Expectancy and 63rd in health expenditures per capita in international dollars in 1997 (WHO 2000). With a life expectancy at birth of 72.7 years in 2007, Saudi Arabia was ranked 75th in the world by the UNDP (2009), and with an estimated adult literacy rate of 85% in the same year the country ranked 88th. The female literacy rate in 2007 was 79.4%, compared with 89.1% for males. In the same year, Saudi Arabia ranked 68th on the proportion of population having access to improved water sources (90%) and 75th for the percentage of children under five years of age who were underweight for age (14%).

Out of 182 countries with comparable data, Saudi Arabia was ranked 59th on the composite Human Development Index (HDI) (UNDP 2009), a comparative measure of human well-being based on life expectancy, adult literacy and standard of living. Saudi Arabia's score on the HDI rose by 1% per year from 0.556 in 1980 to 0.752 in 2010. The country ranked 128th on the Gender Inequality Index and 63rd on the Corruption Perception Index in 2008.

Origins, History and Evolution

The origins of the Saudi healthcare system can be traced to 1926, with the establishment of a Health Directorate in Jeddah and the opening of Ajyad hospital in Mecca and Bab Shareef hospital in Jeddah. Prior to these developments, there was no organized healthcare system in the country. A year later, the Directorate was renamed the Directorate of General Health and Ambulances, and in 1951 the Directorate finally became the Ministry of Health (WHO–EMRO 2006). By this time, the Ministry operated 11 hospitals and 25 dispensaries in various parts of the country. For the next decade, however, the Ministry was strapped for resources, including an acute shortage of healthcare professionals. But in the ten years between 1966 and 1976, a remarkable 40-fold increase in oil revenues led to much greater capital investment in healthcare infrastructure. By 1970 the country had 74 hospitals with a total of 9,039 beds, and by 2002 there were 331 hospitals with 47,242 beds (Metz 1992; MOH 1999; WHO–EMRO 2006).

Progress in workforce development, however, remained slow. The first Saudi physician graduated in 1951 from a medical school in Egypt. As recently as 1970, there were only 1,172 physicians and 3,267 nurses in the country – almost all of them foreigners. In the last two decades, serious efforts have been made to rapidly increase the supply of Saudi healthcare workers. Consequently, by 1997, close to 2500 Saudi students were enrolled in medical schools at home or overseas (Metz 1992; MOH 1999; WHO–EMRO 2006).

Planning for a countrywide healthcare system began in 1971 with the development of successive five-year national health plans. The real expansion of the healthcare system, however, occurred between 1980 and 1990, when a large number of hospitals and primary health centres (PHCs) were built. For example, in the three-year period between 1985 and 1987, 65 new hospitals and 312 new PHCs were established. The rate of growth slowed in the 1990s because of a relatively flat MOH budget that resulted in the suspension of plans for some large projects such as the King Fahad Medical City in Riyadh. The 1990s also saw notable growth in the private health sector which, by the end of the decade, accounted for approximately 15% to 20% of all healthcare visits and 19% of all hospital beds, and employed 28% of physicians and 19% of nurses in the country (MOH 1999; WHO–EMRO 2006).

In the twenty-first century, the number of healthcare facilities has continued to grow. According to MOH data for 2009, altogether there were 408 hospitals in the country (with a total of 55,932 beds); 244 belonged to the Ministry, 39 belonged to other governmental entities, and the remaining 125 were in the private sector. Currently, the Ministry operates 63% of all hospitals in the country. Of the remaining 37%, the private sector operates 13%, the Ministry of Defense and Aviation 8%, the Ministry of Education 7%, the National Guard 3% and all other governmental entities combined 6%.

In the wake of the 1978 Alam Ata conference, the Saudi government bought into the concept of a three-tiered healthcare system in which community-based PHCs serve as a vehicle to achieve universal access (Al-Ahmadi and Roland 2005). As a result, the process of integrating the fragmented healthcare system was begun in 1980 (Al-Yousuf et al. 2002). Since then, significant progress has been made by the Saudi government to provide universal health coverage. The role of rural PHCs has been critical in this regard though services in some remote corners of the Kingdom are still quite limited. Expansion of the primary care system continued at a fast pace in the first decade of the twenty-first century. In 2009 the MOH operated 1925 PHCs in the 13 geographic regions of the country.

The PHCs vary in size and allocation of resources as well as the number of people served which can range from 500 to 25,000 individuals. These gender-separated clinics account for more than 80% of visits to public sector facilities. The average catchment population for a PHC in 2002 was about 11,889 (MOH 2003). Many PHCs, however, are overburdened and serve a population of as many as 100,000. Also, there is considerable regional variation in the number of facilities per 100,000 population as well as the spectrum of services offered in each PHC.

Components of the Healthcare System

Conceptually, the publicly financed healthcare system is modelled after the National Health Service in the United Kingdom. Though a robust private sector has emerged over the years, the defining feature of the Saudi health system remains its oil-revenue-funded public sector and centralized planning (Al-Yousuf et al. 2002). For administrative purposes, the 13 geographic regions of the country are divided into 19 health regions, each with its own Regional Directorate of Health (Al-Yousuf et al. 2002). The Ministry of Health (MOH) is responsible for planning, implementation and regulation of health services, with considerable operational autonomy afforded to the 19 health regions. Aside from the financing and delivery of care, the MOH exercises considerable regulatory authority, including price control for services rendered in the private sector as well as the price of medical devices and pharmaceutical products (Walston et al. 2008; Al-Yousuf et al. 2002).

The MOH is the pre-eminent provider of all ambulatory and inpatient care. Services including emergency care, elective care, dialysis, organ transplants, open-heart surgery and all forms of cancer treatment are available to Saudi nationals largely free of charge (Metz 1992; WHO–EMRO 2006). The situation, however, is more complicated for the 6.3 million foreign workers and their dependents. With the exception of those employed in the public sector, a vast majority of foreign workers and their dependents are expected to receive care in the private sector through employment-based insurance, self-paid insurance or as an entirely out-of-pocket expense (Oxford Business Group 2010).

The private sector with its 11,833 beds in 125 hospitals, 217 clinics, and 17,148 physicians (MOH 2009) is almost entirely for-profit and operates on the basis of fee for service, whether paid for by the employer, insurer, or out of pocket. Some components of the healthcare system are part of various other ministries (Walston et al. 2008; WHO–EMRO 2006). For example, the Saudi Arabian National Guard operates 60 primary or secondary health centres and four hospitals, with more than 1,400 beds in different parts of the country. The Ministry of Defense and Aviation operates another ten hospitals with approximately 3,500 beds. Services at these establishments are available only to employees of these ministries and their families.

Additionally, there are four autonomous or semi-autonomous, government-owned, large specialty hospitals in Riyadh and Jeddah. These facilities include the King Khalid University Hospital, King Faisal Specialist Hospital and Research Centre, and King Khalid Eye Specialist Hospital (Al-Yousuf et al. 2002; Walston et al. 2008). Some of the private hospitals such as Soliman Fakeeh Hospital in Jeddah and the ARAMCO hospital in Dahran are among the largest in the country and serve the employees and dependents of mostly non-Saudi workers in the private sector.

In 1993, the Saudi Commission for Health Specialties was created to supervise, regulate and accredit all health-related training programs in Saudi Arabia. The Commission is also authorized to issue and renew licences for various cadres of healthcare professionals.

Trends in Healthcare Financing

Some summary statistics on healthcare financing in Saudi Arabia are shown in Table 2. As mentioned earlier, the public sector, which owns most of the facilities and provides the bulk of services in the country, is funded through oil revenues. WHO statistics for 2008 indicate that the country spent US$621 per person on healthcare, of which 77.6% was paid for by the government and 16.3% was an out-of-pocket expenditure (WHO 2010a). The Ministry of Health estimates that of the total private sector spending on health, 68% is paid for by the employer in the form of health insurance premiums, direct payments to providers or cost of services provided at company-owned facilities. In 2010, Saudi Arabia allocated US$16.3 billion (11.3% of the national budget) for health and social services. This translated into a 51% increase over the previous year's allocation of US$10.7 billion (8.5% of the national budget) (Saudi Gazette 2010).

Table 2. National spending on healthcare[2]

	1997[a]	2000	2006	2007	2008
Health expenditure as % of GDP	3.5%	4.3%	3.3%	3.4%	3.6%
Government spending on health as % of total health spending	80.2%	71.6%	77%	79.5%	68.2%
Private sector spending on health as % of total health spending	19.8%	28.4%	23%	20.5%	31.8%
Government spending on health as % of total government spending	9.4%	9.2%	8.7%	8.4%	8.4%
Per capita government spending on health in US$	–	276	379	422	461
Per capita government spending on health in PPP$	297	520	559	610	567
Per capita total spending on health in US$	260	386	492	531	676
Per capita total spending on health in PPP$	332	726	720	768	831

GDP = gross domestic product; PPP = purchasing power parity.
[a]From World Health Report 2000, WHO.

There has also been a rapid growth in the health insurance business, which increased by 57% in 2008 to a total of US$1.2 billion, compared with US$826 million in 2007 (Saudi Gazette 2010). In terms of market share, health insurance represented 44% of the insurance market in 2008 (Alkahtani 2008; Saudi Gazette 2010).

Workforce Growth and Development

As with all other sectors of the economy, most healthcare workers, including physicians, nurses and pharmacists, are expatriates from Egypt, the Philippines, Pakistan, India, Bangladesh and many other countries. A significant number of Europeans, Australians, Canadians and Americans are also among the vast array of healthcare providers. Altogether, there were 55,284 physicians and 110,858 nurses in the country in 2009, of which 70% and 79% worked in the public sector. In the same year, only 23.1% of physicians and 32.3% of nurses in the country were Saudi nationals. The total number of physicians employed by the MOH was 25,832, and of those only 22.6% were Saudi nationals, whereas a total of 63,297 nurses were employed by the MOH, and of those 50.3% were Saudi nationals. Interestingly, of the 17,148 physicians and 23, 308 nurses in the private sector, only 4.9% and 4.8% respectively were Saudi nationals (MOH 2009).

Continuing efforts have been made since the late 1950s to provide training opportunities locally and abroad for Saudi nationals to become healthcare professionals. Training for male nurses' aides began at the first Health Institute in 1958. Currently there are many Health Institutes and Junior Colleges operated by the MOH for high school graduates to receive a diploma in nursing.

Concurrently, the Ministry of Higher Education operates a number of Bachelor of Science in Nursing (BSN) and Master of Science in Nursing (MSN) programs. Recent data indicate that 67% of Saudi nurses were trained at a Health Institute and 30% graduated from a Junior College. Only 3% of Saudi nurses graduated from BSN programs (Aldossary et al. 2008). A number of private schools of nursing have emerged in the last 10 to 15 years.

Whereas just ten years ago there were only five medical schools in the country, now there are 21, with six more in various stages of development. Five of the medical schools are private and sixteen are government owned (MOH 2009). Despite their average tuition of US$15,000 per year, the number of private medical schools is likely to increase in the coming years. Additionally, hundreds of Saudi men and women are enrolled on government scholarships in medical schools in more than a dozen countries in Europe, Asia and North America. A number of programs in Saudi universities and vocational institutions also offer training and education in health-related professions, including a Master's degree in Health Administration.

Quality of Care

Since 1993 there has been a concerted effort to improve the quality of healthcare by developing appropriate referral systems, improving healthcare-provider training, accrediting facilities and emphasizing evidence-based medicine (EBM). However, there continues to be wide variation in access, effectiveness and outcomes of care in various settings (Al-Ahmadi and Roland 2005). Previous studies have raised questions about the quality of care for common conditions such as acute respiratory disorders, diabetes, hypertension, mental disorders and asthma (Al-Khaldi et al. 2002; Al-Khaldi and Al-Sharif 2002; Al-Mustafa and Abularhi 2003; Siddiqui et al. 2001). There are also reports of overprescribing by physicians – a practice attributed to the availability of medicines free of charge to all Saudi nationals (Dashash and Mukhtar 2003; El-Gilany 2000; Mahfouz et al. 1997).

According to one study, 85% of patients visiting PHCs received 1.4 drugs per prescription, and 87% of prescriptions for acute respiratory disorders included antibiotics (El-Gilany 2000). Generally, care provided at public sector facilities and particularly at hospitals and PHCs owned by the MOH is perceived as inferior to private sector care. Consequently, 80% of care provided in the private sector is to Saudi nationals (Walston et al. 2008). Since most studies on the quality of care have been conducted in MOH facilities, little information is available regarding the quality of care in the private sector.

There is an expressed desire in the higher echelons of the establishment to implement EBM. Guidelines for some common conditions have been established, but their implementation remains sporadic because of a lack of dissemination of information and limited interest or access to medical journals. Consequently, management of conditions for which standardized guidelines and protocols are available continues to show a wide variation (Al-Khashman 2001; Al-Faris and Al-Taweel 1999; Dashash and Mukhtar 2003). Surveys of patients and providers point to high levels of dissatisfaction in both groups. It appears that some of the dissatisfaction stems from language barriers and communication problems between patients and providers, 80% of whom in primary care settings are non-Saudi (Al-Khaldi et al. 2002; Al-Yousuf et al. 2002; Mansour and Al-Osimy 1993).

Other factors such as high staff turnover rates, lack of communication and coordination among healthcare facilities, and stressful work environment also contribute to high levels of dissatisfaction. Studies on this subject have also noted problems related to a lack of management training and post-graduate qualifications among technical supervisors and mid-level regional managers (Jarallah and Khoja 1998). In turn, managers point toward a lack of decision-making authority, inadequate information and confusion regarding the chain of command as the sources of managerial deficiencies. Overall, efforts to improve quality of care remain fragmented and uncoordinated (Al-Ahmadi and Roland 2005).

Recent Developments

Since the inception of the healthcare system in the second quarter of the twentieth century, the financial burden of meeting the healthcare needs of all Saudis and many foreign workers had been shouldered almost entirely by the government. Historically, the government neither levied taxes nor

user fees for primary, secondary or even tertiary care, with the exception of some non-binding user fees at specialty hospitals (Metz 1992; WHO–EMRO 2006; Walston et al. 2008).

Over time, policy makers came to realize that the existing model of healthcare financing and delivery was neither efficient nor sustainable. Regardless of the question whether Saudi oil reserves will be depleted in 50, 100 or 200 years, the need to introduce third-party payment mechanisms and some form of cost shifting to influence both consumer and provider behaviour was seen as independently compelling. Consequently, far-reaching policy changes have been introduced in the last ten years. The most important of these has been the introduction of nationwide health insurance. This has also led to a major shift in the role of the government and particularly that of the MOH, from a provider and payer of services to that of a regulator and overseer.

To make a transition from a welfare-oriented National Health Service model to a National Health Insurance model, the government has adopted a phased approach. The first step was the passage of the Cooperative Health Insurance Act of 2003 (promulgated in the Royal Decree # M/10 issued on August 1999). The seeds of the Act, however, were sown in the 1991 recommendation of a steering committee to have all employers insure their employees (Alkahtani 2008). In phase one, which was started on July 15, 2006, the Act required, in three stages, all employers in the private sector to purchase comprehensive health insurance for their Saudi and foreign employees and their dependents for the full duration of their employment prior to the issuance of travel documents or residence permit by the government (Alkahtani 2008; Saudi Gazette 2010). According to the 4th annual report of the Council of Cooperative Health Insurance (CCHI), considerable progress has been made in implementation of the Cooperative Health Insurance Act, with 26 registered health insurance companies and 8.4 million insured individuals, of whom 6.47 million are expatriates and 1.87 million are Saudi nationals (CCHI 2010).

In phase two of the mandate, health insurance is to be extended to all public sector employees. The proposed changes in the system also require a change in the role of the MOH from healthcare delivery to mostly prevention, standardization and supervision. The new model requires divesting most of the public sector hospitals to the private sector through sale or rental (Walston et al. 2008). Details of these arrangements are still being worked out, and the picture remains quite murky at this stage. Consequently, the future of all PHCs as well as the timeline for divesting publicly owned hospitals remains unclear. At the completion of the process it is anticipated that, with few exceptions such as the armed forces, everyone in the country will have employer-sponsored health insurance. It should be noted that there have been many challenges in the implementation of the Cooperative Health Insurance Act, and progress has been slower than anticipated. Most of the challenges in implementation are attributed to a weak infrastructure, rising insurance premiums and insurance fraud (Alkahtani 2008).

Strengths of the System

In the last 50 years, Saudi Arabia has made impressive strides in developing the healthcare infrastructure. For a country that had no schools until 1937, no school for girls until 1961, and no medical school until 1969, it is quite remarkable that Saudi Arabia had more than 36,000 university students by 1978. The country now boasts a large number of facilities with advanced technologies and highly trained professionals with the ability to provide sophisticated services such as open heart surgery and organ transplants. A Royal Decree issued in 2002 (the National Health Law of 2003) requires "provision of comprehensive health services to all inhabitants in Saudi Arabia in an equitable, affordable and organized manner" (WHO–EMRO 2006).

The emphasis on PHCs to ensure universal access, adoption of the essential drugs formulary, development of a referral system from primary- to secondary- and tertiary-level facilities, better record keeping, and implementation of accreditation and licensing requirements has allowed demonstrable improvements in efficiency and quality of care. Over the last three or four decades, there has also been a steady improvement in population health indicators such as life expectancy at birth, immunization rates, incidence of infectious diseases and infant and maternal mortality rates (MOH 2009; WHO 2000, 2010a; WHO–EMRO 2006).

Under the regulatory authority of the Saudi Commission for Health Specialties (SCHS), which was created in 1992, a number of advanced training programs in clinical disciplines such as surgery, medicine, pediatrics, obstetrics and gynecology, and cardiology are available. Twenty-eight specialty boards and 97 different training programs including fellowship, certification and diploma programs are accredited by the Commission. With 21 medical schools – 16 governmental and five private (MOH 2009) – and many more students enjoying training opportunities overseas, there is an emerging critical mass of highly trained clinicians and scientists to reduce the country's dependence on foreign physicians. Likewise, the number of locally trained nurses, although smaller than locally trained physicians, will grow to significant proportions by the end of this decade. Training opportunities at many institutions for other cadres of health-related professions such as pharmacists, physical therapists, and lab technicians are also available.

In the last two decades, clinical and basic science research has gained a lot of momentum, and more than a dozen medical journals are being published. Despite considerable variation across the journals in the quality and regularity of publication, many first-rate articles are contributed by Saudi biomedical researchers. A cursory examination of these journals indicates that many articles are based on descriptive analysis of survey data on satisfaction, opinion polls of various patient and provider groups, or quality, delivery, and distribution of services. Blind clinical trials and basic science research is still very scant among the array of articles published every year. The *Annals of Saudi Medicine* and the *Saudi Medical Journal* are the most regular and widely circulated.

Saudi Arabia has also developed a strong biotechnology research infrastructure, which includes business ventures such as Jeddah BioCity. A story printed on July 8, 2002, in the newspaper *USA Today* reported plans to establish a research centre for stem cell research, including therapeutic cloning research, at King Faisal Specialist Hospital and Research Center (Friend 2002). Another example is the King Abdul Aziz City for Science and Technology, which spent 185.9 million Saudi Riyals (~US$ 60 million) on 430 medical research projects between 1979 and 2004 (Alabdula'aly 2004). The foremost example of vast financial investments in scientific and technological research is the King Abdulla University of Science and Technology (KAUST), established in 2009 with an initial endowment of US$10 billion. In recent years there has also been a lot of push for investment in health informatics and electronic medical records (Altuwaijri 2010).

Issues and Concerns

Like several of its neighbours (see Table 1 for comparative data) and middle-income developing countries worldwide, Saudi Arabia is in the middle of transitioning from a society that had high birth and mortality rates, a relatively short life expectancy and high prevalence of communicable disease to a society characterized by low mortality rates, longer life expectancy and high prevalence of chronic disorders (Al-Yousuf et al. 2002). Typically, in this stage of the epidemiologic transition most countries experience rapid population growth due to the continuation of high birth rates, while mortality rates decline more quickly and life expectancy increases by several years. In the transitional period such countries also experience the dual impact of communicable diseases and rising levels of chronic conditions such as heart and lung disorders, diabetes, cancer, obesity and arthritic problems. Already, as a result of a sedentary lifestyle among 43.3% of men and 99.5% of women, obesity rates of 29.5% in men and 43.5% in women, and smoking rates of 37% in men and 6% among women (WHO 2010a), cardiovascular problems have risen to epidemic proportions. These demographic, lifestyle and morbidity changes translate into a burgeoning demand for health services (Al-Yousuf et al. 2002).

Traffic injuries are among the most common causes of death in Saudi Arabia. According to the WHO, Saudi Arabia has one of the highest road-accident mortality rates in the world, with 29 deaths per 100,000 population (WHO 2010a). Ansari et al. (2000) have reported that 81% of deaths and 20% of bed occupancy in MOH hospitals are due to traffic accidents. The Saudi General Directorate of Traffic has reported that with more than 36,000 injuries and a death toll of 6,485 in 2008–2009, about 17 people die in road accidents every day (Rasooldeen 2010). Traffic injuries

are now the principal cause of death for Saudi men between the ages of 16 and 36. Another media report suggested that one third of all hospital beds in the county are occupied by victims of road accidents, with an estimated annual cost of SR26 billion (US$ 7 billion) (Baxter 2010). Since high levels of injury and death from automobile accidents are likely to continue in the foreseeable future, the need for high-cost emergency and trauma services will also continue to increase at a fast pace.

The pharmaceutical industry in Saudi Arabia grew by 9% in 2009 and is one of the fastest growing sectors of the economy, with annual sales approaching US$1.3 billion (Saudi Gazette 2010). Previous reports have suggested that Saudi Arabia represents US$1.7 billion (65%) of the US$2.7 billion pharmaceutical market comprising the Gulf Cooperation Council (GCC) member countries (Hawarey 2008). More than 82% of drugs used in the GCC market are imported from other countries (Bains 2009). Generic drugs reportedly constitute only about 20% of this market. Other estimates suggest that the generic drug market is only around 5.8% of the total pharmaceutical market (Bains 2009).

The regulatory mechanisms governing pharmacies and pharmaceutical products are minimally implemented and were largely designed to put Saudi nationals in control of the retail and wholesale distributive channels (Issa et al. 2009). In practice, pharmacies are largely unregulated. With the exception of narcotics, almost all other medicinal products, whether traditional, herbal or allopathic, are sold over the counter with or without a doctor's prescription. Many pharmaceutical products, including antibiotics, are counterfeits produced in China, India, Pakistan and many other countries including Saudi Arabia itself. Some estimates suggest that "30-40% of the pharmaceuticals sold at pharmacies and hospitals in Saudi Arabia are counterfeit" (Al-Iryani and Ba-Swaid 2008).

Because of the widely perceived religious prohibitions against contraception and the political ramifications of such policy decisions, there is no department of family planning. Pills and condoms are available over the counter in most pharmacies, but the frequency of their use, in the absence of reliable data, is a matter of conjecture. According to the WHO (2010a), the contraceptive use rate by any method among married women between the ages of 15 and 49 in the 1990–2008 period was only 23.8%. Contraceptive measures such as intrauterine devices and tubal ligations are not commonly provided upon request in the public sector. Abortions are strictly prohibited unless indicated to save the life of a pregnant woman. Due to the perceptions of men regarding masculinity and virility as well as concerns about the irreversibility of the procedure, vasectomies are practically unheard of. Since the locus of control regarding important decisions including contraception and family size resides mostly with men, population growth is likely to continue at a relatively fast rate in the foreseeable future. Allegedly, Saudi Arabia has one of the highest in vitro fertilization birth rates in the world, with about 4% of births every year resulting through this technology compared with 1% of births in the United States (Friend 2002).

Because of a lack of inter-agency and inter-sectoral cooperation, there are widespread economic and operational inefficiencies. Duplication, waste and bureaucratic hurdles are directly linked to various branches of the government vying for greater influence and flagship status. In the past, salary differentials of 200% to 300% among employees of various agencies were not uncommon. For example, physicians and nurses working for the MOH earned salaries that were often half or one third of the salaries of their counterparts at the National Guard (Walston et al. 2008). More importantly, salary inequities within the same agency based on the employees' country of origin have been a common source of discontent for foreign workers. A Royal Decree of limited scope issued in May 2010 attempted to address the issue of salary inequity by seeking to standardize public sector salaries. However, in the absence of comprehensive reforms, widespread inequities are likely to continue in the foreseeable future.

Despite the establishment of thousands of PHCs throughout the country, the system is heavily slanted in favour of resource-intensive episodic care provided at secondary- and tertiary-level medical centres. Though a referral system has existed since 1986 and guidelines for quality assurance in primary care have been in place since 1993 (Al-Ahmadi and Roland 2005), referrals from PHCs to general and specialty hospitals remain low, and the exchange of information between primary

and higher-level facilities takes place for only about one quarter to one third of patients (Khattab et al. 1999; Khoja et al. 1997). Further, healthcare facilities in urban centres such as Riyadh, Jeddah and Dammam attract most of the economic and human resources. As such, with the availability of secondary and tertiary hospitals in the same vicinity, patients in these densely populated urban centres tend to bypass the primary care centre in favour of a secondary- or tertiary-level hospital. The impact of such utilization patterns is not only an excessive burden on the hospital emergency departments and underutilization of PHCs but also significantly greater cost of care.

Similar to the policies officially or unofficially adopted in the neighbouring countries (e.g., "Kuwaitization," "Omanization" and "Emiratization"), Saudi Arabia officially adopted the policy of "Saudization" in the 2004 development plan. Unofficially, the policy had been in practice for many years. Regrettably, this policy has had many unintended and undesirable effects. For example, the policy often results in the appointment and promotion of Saudi nationals without sufficient qualifications or experience to key positions. Since the number of trained Saudi health administrators is a miniscule in proportion to the number of available positions, most senior administrative positions are filled by physician or non-physician Saudi nationals with little or no management experience. Another example stems from Saudi women's unwillingness to work evening and night shifts. Consequently, many foreign workers are scheduled in an openly discriminatory fashion to "graveyard" shifts. Not surprisingly, high levels of stress, dissatisfaction and low self-esteem linked to a perceived lack of appreciation, patient overload, cultural differences and discriminatory practices have been reported among primary care physicians of foreign origins (Al-Shammari et al. 1995).

Future Direction

The Cooperative Health Insurance initiative designed to address concerns about the long-term financing and sustainability of the health care system has been outlined above. Suffice it to say that the UK-style National Health Service model in Saudi Arabia is rapidly giving way to a US-style free market system in which employment-based insurance will be the dominant financing mechanism, with the bulk of services provided in the private sector. These changes indicate a 180-degree turn in the philosophic and structural principles of the healthcare system.

In the transitional period, the Saudi system will simultaneously have elements of both a welfare system and a free market enterprise. Before the divestiture of facilities owned by the MOH and the implementation of health insurance for the public sector employees and their dependents, a large number of people will continue to enjoy the benefits of a National Health Service model. Those in the private sector, however, will be diverted to privately delivered care through employment-based insurance.

With the shift in the mechanisms of healthcare financing and delivery, the Saudi system is likely to not only acquire many of the features of the US healthcare system but encounter similar difficulties as well. If market forces exert similar pressures in Saudi Arabia as they have in the US, it would not be surprising to see rising costs and reduced access becoming serious problems in the coming years. On the positive side, third-party payers will likely exercise financial leverage in demanding operational efficiencies and superior quality of care from the private healthcare providers. On the negative side, however, insurance companies may also resort in the coming years to risk reduction strategies such as denial of coverage to patients with pre-existing conditions, high co-pays and deductibles, and requirement of preauthorization for expensive tests and procedures.

In the event such practices become common, many patients will experience reduced access to adequate services in a timely fashion. Such a scenario would inevitably result in a call for greater regulation and governmental intervention. Already, financial indicators such as steadily increasing insurance premiums in the tune of 5% to 10% are becoming a source of concern (Alkahtani 2008). To avoid the possibility of such threats becoming a reality, the Saudi government can learn from the US experience. The development of robust regulatory mechanisms and a vigorous exercise of the regulatory authority of the Council of Cooperative Health Insurance would go a long way in forestalling these problems.

In addition to restructuring the healthcare financing and delivery mechanisms, the problem of

population growth will have to be addressed. Despite the spectre of a confrontation with the religious orthodoxy, the country simply cannot avoid having to deal with the challenge of a ballooning population. The current hands-off approach in the public sector, which does not allow active promotion of contraception, will have to be reconsidered. Some family planning services and contraception education will be necessary under the auspices of the MOH in the foreseeable future.

The prospects and implications of the "Saudization" policy must also be carefully examined in the context of demand and supply of health workers. With the projected growth of the population to 30 million by 2016 and an increase in the number of "old" people from 1 million to 2.5 million by 2020 (Booz & Company Inc. 2007), the country will need an additional 15,000 to 20,000 hospital beds and nearly 15,000 more physicians. At the projected production levels of Saudi doctors and nurses, the prospects of meeting that demand without importing foreign workers is virtually zero.

It is important to note that most Saudi health workers are currently employed in the public sector. With the planned divestiture of publicly owned facilities, the Saudis presently employed in the public sector will have to compete with non-Saudis in the rapidly growing private sector. In a competitive market place, it seems likely that many of the new jobs in the private sector will be filled by non-Saudi health workers who are willing to work at lower salaries.

Conclusions

Given that until about the middle of the twentieth century little existed in the way of an organized healthcare system, it must be acknowledged that Saudi Arabia has made impressive strides in developing the healthcare infrastructure. In the span of half a century a number of universities and research institutions, hundreds of hospitals, and thousands of primary care centres have been established. Dozens of training programs are in place to train various cadres of healthcare workers. The Saudi experience as well as that of other Gulf States such as Kuwait, Qatar, Oman and UAE demonstrates that, with generous financial support, it is not difficult to erect modern facilities and fill them with internationally recruited personnel capable of providing first-rate clinical care. The challenge, however, is to make the system efficient and sustainable.

The transition from a welfare-oriented National Health Service model to an employer-financed private delivery model is fraught with uncertainty and challenges. Saudi Arabia, therefore, would be wise to learn some lessons from the escalating cost crises and lack of access to healthcare for millions in the US. There are already indications that the Saudi government plans to maintain a strong regulatory function, including mechanisms for price control.

Despite the availability of a number of public and private training programs, self-sufficiency in the supply of physicians, nurses and allied health professionals will not occur in the foreseeable future. Given the projected reliance on foreign workers to meet the healthcare needs of its citizens, the country will need to reconsider the policy of "Saudization." To successfully make the transition to a twenty-first century meritocratic society, it is important to offer the promise of assimilation and a long-term future. Finally, the challenges Saudi Arabia faces are neither unique nor insurmountable. With careful planning, implementation and adjustment of policies, there is plenty of reason for optimism and hope for the future.

Notes

[1] The data reported on demographic, socio-economic and health status indicators in this and other sections of the paper were obtained from a number of different sources including the Saudi Ministry of Health, the United Nations Development Program and the World Health Organization. For many of the indicators, there is variation in the data reported for the same period by different agencies. Therefore, these data should be used with caution.

[2] Most of the data in this table were obtained from the World Health Statistics reports issued by the WHO. As pointed out in the first note, there is variation in the data reported in various documents by the same or different agencies for the same year. For example, in World Health Statistics 2010, the "Total expenditure on health as % of gross domestic product" in 2000 for Saudi Arabia is reported as 3.7%, while in World Health Statistics 2011 the number reported for the same year is 4.3%. In this table and the text, data from the 2011 report have been used. In using data from other sources at various places in the article, the author selected data from more recent sources in those instances where discrepancies between two or more sources were noted.

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Commentary

"The Saudi Healthcare System: A View from the Minaret": More Similarities than Differences

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The article by Khaliq (2012) reminds us that healthcare systems around the world are in a state of tremendous change and evolution. Driven by a complex web of social, ecological, political and economic factors, the global healthcare landscape is transforming at a remarkable pace. On the one hand, a large proportion of structural adjustments to health systems are undoubtedly the result of careful and thoughtful planning based on explicit policy decision-making frameworks. On the other hand, a proportion of recent policy decisions are being implemented with an appreciation that these global economic factors are driving a pragmatic approach to healthcare restructuring. There appears to be a need to do more with less across the spectrum of high-, middle- and low-income countries. A cursory review of the massive and sweeping cuts (the largest since World War II) in workforce and public-sector spending within the United Kingdom's National Health Service, or within Greece's planned 40% cut in hospital expenses and 45% cut in mental health services, sheds new light on the health restructuring process. In the last decade, the proverbial "carrot" may have been used at the local, national and international levels as incentive to stimulate change, but given the fairly consistent, pessimistic economic growth projections, the carrot may be replaced with a stick as the stimulus for health reform.

While not all countries are experiencing sweeping austerity measures, the mere fact that some nations are undergoing particularly difficult economic times has created an incentive (or possibly an opportunity) to examine and implement profound reforms. In his paper, Khaliq (2012) provides a unique perspective on the sequence of events that underpin the evolution of the health system in Saudi Arabia and highlights two critical reform strategies: first, an increased focus or adoption of primary care; and second, a shift away from a publicly funded health system modelled after the National Health Service in Britain and toward a free-market employer-based financing system similar to that in the United States. We will briefly examine each separately.

The rapid development of the publicly-funded Primary Care Centers across Saudi Arabia is not unique to the region (Al- Kubaisi et al. 2010). Primary care has been touted globally as a partial solution to healthcare challenges including (but not limited to) inappropriate usage of expensive emergency departments as the locus of access to the health system (McCusket et al. 2012), and poor management of chronic diseases that can lead to multiple hospital re-admissions (Dean 2012). Khaliq reveals that it is not yet clear which sector would finance an evolving primary care infrastructure, but in either case, a shift towards a healthcare delivery model built on primary care signals a positive reform direction. However, effectively emphasizing primary care requires a strong inter-disciplinary health care team, beyond simply nurses and physicians, who can function as a collective to meet the needs of patients within a patient-focused approach. Although most stakeholders would likely agree in concept with a team-based care approach, the reality is that there are significant challenges in implementing this concept. Barriers range from understanding the scope of practice of each discipline, issues that surround possible licensure and regulation, and even the unwillingness to relinquish what is perceived to be power and control over patient care. Although Khaliq did not address the extent to which inter-disciplinary teams practicing within a patient-centered approach is part of the future Saudi health system, we are skeptical given our experience in the region that this concept will figure prominently.

Khaliq also reports that Saudi health reform includes a transition to private free market employer-based financing, and that this process began close to a decade ago under the government's divestment plan. Whether driven strategically by internal approaches, or externally under the auspices of global health reform, it appears that Saudi Arabia will aggressively adopt a US-style healthcare financing model. This structure would be unlike its neighbors in the Gulf region. For instance, the countries of Kuwait and Qatar do not appear to have adopted this policy direction, nor have they exerted an overt attempt to sell off public institutions. Given their influence in the region, it would be plausible that when Saudi's planned shift from public to private financing is complete, other countries may also move in a similar policy direction. The experimentation with 'privatization' of healthcare financing and delivery that is being contemplated by Saudi Arabia has been controversial, and there are agents on both side of the debate (Devereaux et al. 2004; Oh et al. 2011). The published peer-reviewed literature appears to be heavily weighed in opposition to this policy direction; however, given the global fiscal trends, it may not be a question of 'to privatize' or 'not to privatize' but rather how to blend the positive aspects of both approaches to meet growing healthcare demands.

There may be a middle ground in this privatization debate, and in Khaliq's (2012) article on the Saudi health reform approach, we gain perspective on a unique country's approach to aligning supply and demand in the healthcare arena. Saudi is not alone in adopting primary care or in shifting towards private markets. In fact, countries such as Romania (Bunduc 2012), Georgia (West et al. 2011) and even Sweden (Arnell 2011) are to some extent migrating towards a US-style healthcare system. It is ironic that while many countries are moving towards more private involvement, the United States is attempting to implement policy measures, such as the 2010 Patient Protection and Accountable Care Act (PPACA – also referred to as 'Obamacare') that will address the shortcomings of their system. Health reform such as the one being undertaken by Saudi Arabia does not necessarily solve problems, rather it creates new ones – and the test of success is the extent to which one prefers the new problems over the old ones. Whether the Kingdom of Saudi Arabia and its residents will prefer the new problems created by adopting primary care as a model along side an employer-

based financing strategy remains to be seen. There is much to be learned from the Saudi approach and experimentation with health reform, and only time will tell if their approach has created more socially desirable problems that then ones they have now.

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Reprint

Perceptions and Utilization of Primary Healthcare Services in Iraq: Findings from a National Household Survey*

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Abstract

Background: After many years of sanctions and conflict, Iraq is rebuilding its health system, with a strong emphasis on the traditional hospital-based services. A network exists of public sector hospitals and clinics, as well as private clinics and a few private hospitals. Little data are available about the approximately 1400 Primary Health Care clinics (PHCCs) staffed with doctors. How do Iraqis utilize primary health care services? What are their preferences and perceptions of public primary health care clinics and private primary care services in general? How does household wealth affect choice of services?
Methods: A 1256 household national survey was conducted in the catchment areas of randomly selected PHCCs in Iraq. A cluster of 10 households, beginning with a randomly selected start household, were interviewed in the service areas of seven public sector PHCC facilities in each of 17 of Iraq's 18 governorates. A questionnaire was developed using key informants. Teams of interviewers, including both males and females, were recruited and provided a week of training which included field practice. Teams then gathered data from households in the service areas of randomly selected clinics.
Results: Iraqi participants are generally satisfied with the quality of primary care services available both in the public and private sector. Private clinics are generally the most popular source of primary care, however the PHCCs are utilized more by poorer households. In spite of free services available at PHCCs many households expressed difficulty in affording health care, especially in the purchase of medications. There is no evidence of informal payments to secure health services in the public sector.
Conclusions: There is widespread satisfaction reported with primary health care services, and levels did not differ appreciably between public and private sectors. The public sector PHCCs are preferentially used by poorer populations where they are important providers. PHCC services are indeed free, with little evidence of informal payments to providers.

Background

The 2003 US-led invasion occurred when the Iraq health system was already weakened from 23 years of dictatorship, the 1980-88 Iran-Iraq war, the 1990-91 Gulf War, and 12 years of embargos and sanctions [1]. The well-developed, hospital-centered health system, existing from before Saddam Hussein, had badly deteriorated by 1997, with a substantial decrease in services it could provide [2-4]. Following liberalizing of restrictions on drugs and supplies by the UN Security Council in 1996, there was some improvement in services and a slow start to reorientation toward primary health care services.

Soon after the invasion, substantial damage to the health sector occurred from widespread looting and destruction of facilities [5]. Early efforts to strengthen health services by US-led response were paralyzed by a mixture of inter-agency conflicts and political agendas [6]. By 2007, perceptions were that health services were continuing to deteriorate in physical condition and to be short of medicines [7]. As the conflict stretched on from 2003, medical doctors began migrating within Iraq as well as leaving Iraq for neighboring countries [8,9]. Both the ongoing violence and the construction of barriers limiting travel in violence-affected areas have restricted patient access, especially in Baghdad. During the worst violence, doctors minimized their exposure in health facilities, remaining in the relative safety of their homes for much of the time [10] Patients feared to venture out for treatment, and were often unable to secure critical drugs such as insulin [11]. With the migration of experienced doctors from Iraq, there have been concerns about the quality of health services, and the ability of training facilities to replace those migrating, especially those with advanced specialty training [12,13]. Those doctors remaining work in a health system that is heavily centralized, politicized and functioning in a nontransparent, non-accountable manner [14].

Most donor attention concerned with rebuilding health services in Iraq has focused on problems of hospitals. The interest in primary health care services has come about mainly in the past two years [15]. In Iraq there are about 2200 Primary Health Care Clinics (PHCCs), most located in population centers, but some in rural and peri-urban areas. Slightly more than 1400 PHCCs are staffed by doctors. Previously, some, though not many clinics were managed by nurses. Given the acute shortage of nurses in Iraq, subsequent to this study, almost all remaining nurses were reassigned to hospitals, leaving staffing of many facilities entirely in the hands of medical auxiliaries [16]. In some

PHCCs doctors work alone, while other facilities may have up to 20 doctors. The number of doctors present is not necessarily based on workload or need, but more commonly on where doctors wish to live and the proximity of the PHCC to their house or their own private clinic. The difficulty with transportation, curfews, and numerous check points exacerbates this practice.

To understand how primary health care is perceived and utilized by Iraqis, we carried out a national cluster survey involving 1256 households. Questions focused on perceptions of quality, trust, costs of services, accessibility, utilization, and satisfaction with services received.

Since our concern was generating information to assist the Iraqi Ministry of Health in responding to patient perceived needs at PHCCs, this survey was carried out in the catchment or service area of public sector clinics across Iraq. As health systems reconstruction efforts expand to include primary health services, it is important that efforts also consider the perceptions of health care seeking behaviors of the clients, rather than focusing primarily on structural issues.

Methods

To specifically understand the perceptions and experiences of households with their local PHCC facilities, a cluster of 10 households were surveyed in the catchment areas of 126 clinics randomly selected from the national list of all doctor-staffed PHCs in Iraq. Seven facilities were selected per governorate regardless of number of facilities in each governorate. Three random back-up facilities were selected in case initially selected facilities proved to be inaccessible or in an insecure area. Field work was done by the International Medical Corps (IMC) with assistance from Al Kindi College of Medicine and the Iraqi Red Crescent Society. Assistance with study design and analysis of data was provided by the Johns Hopkins Bloomberg School of Public Health. Ethical approval was given by the Al-Kindi College of Medicine, Baghdad, and the Institutional Review Board of Johns Hopkins Bloomberg School of Public Health declared the analysis of data as exempt.

The catchment or service area of a PHCC facility was defined as the households within two km of the PHCC. In almost all areas, streets were laid out in a grid pattern. GPS units are still not acceptable in Iraq, so a house selection process was used that first selected a random direction from the health facility. Using a three-digit randomly generated number ranging from 0 to 359, a direction from the PHCC was chosen. If the direction selected did not lead toward a residential area, the step was repeated. As the next stage, a two-digit number was randomly generated, with the first digit taken as the number of the crossroads to pass in the indicated direction, and the second digit as the number of households on the selected crossroad to pass in order to reach the start house. Once selected, the start house and the nine nearest consenting households were visited. At the household, the husband, wife, (or female head of household) mother-in-law or other resident adult was interviewed. If present, the husband would almost always be the household respondent. Expenditure data on health were collected only from the head of household. Where none of these were present or participation declined, the survey team continued to the nearest adjacent house until 10 households had been selected. Information was recorded on paper and sent to Baghdad for data entry and preliminary analysis. Subsequent analysis was completed in Baltimore using Stata statistical software version 11 (StataCorp LP, College Station, TX.) Statistical methods for complex survey data were applied to account for cluster sampling. To adjust for unequal selection probabilities, data were weighted by the number of health facilities per governorate.

Questions asked of households included household characteristics, details on any pregnancies, recent illnesses, where care was sought, satisfaction with services, costs and affordability of services, and household expenditure on health. Issues of health services trust were approached by asking households what services they would recommend to others for various childhood and adult conditions. Other questions concerned trust in the skills of the providers. As a proxy for wealth, the presence of specific household assets were queried, based on information from formative work. Among these were television, mobile phone, automobile, motorcycle, computer, generator, air conditioner and refrigerator. In the analysis, the presence of these were graded into three categories. Numbers of rooms and house construction were also recorded. The questions in this survey built

on previous work with household surveys in Afghanistan, and among Iraqi households in Jordan and Syria [17,18]. The studies among Iraqis in Jordan and Syria looked at access, utilization and affordability of health services to refugee households, as well as illness patterns. For this current PHCC catchment area survey, the sample size was calculated on estimated childhood illness in the past two weeks. Allowing for a design effect of two and for refusal rates of 5% a sample size of 900 was judged adequate, using a power of 95% and precision of 80%.

Results

Demographic findings

In all, 1256 households, representing 7273 persons, were surveyed during May 2010. The survey was completed in 17 of 18 governorates, the 18th (Erbil) being dropped for logistical problems. Refusal rate was less than 5% of households. Of respondents, 65.3% were male. The mean age of household informants was 44.6 years. The average respondent had 10.3 years of education. The average household size was 5.8 persons. Some 86% of households sampled stated that a PHCC facility was the closest health facility to their household. Although many households used other services than the PHCC for health care, the average travel time to the PHCC for all households surveyed was about 12 minutes. Of household members in the survey, 66.4% had been patients at the PHCC closest to their house, and an additional 7.3% were familiar with that PHCC, though household members themselves had not gone there for care.

Household data showed that one out of six households had moved in the past five years, with moving for security was the leading single reason. When these household data were further analyzed, households that have moved in the past five years had no difference in utilization of health services, levels of satisfaction or costs paid for care than those which have been longer term residents of the community.

Births

In about 17% of households there had been a birth in the past year, but only 3.4% occurred in the PHCC, the majority being in public hospitals. This is not surprising as only a small number of PHCCs have delivery facilities. Median cost of delivery was US$68.46. Private clinics were preferred for antenatal visits, followed by PHCCs and public hospitals. In all, 63% of women giving birth in the past year had attended antenatal clinics more than three times. After birth, 55.2% of infants had received care at the PHCC. Of children under five in the households visited, about 75% had immunization cards available. Review of cards showed 308 of 374 (82.4%) of children under 24 months to be fully immunized for age. Among children under 12 months, 112 of 159 (70.4%) were fully immunized for age.

Health services received during last illness (all sources)

Among children under five, 31.3% had been sick in the past two weeks. Of the 88.6% of children under age five who had received treatment outside the home, 40.5% were treated in a PHCC and 52.6% at a private doctor's clinic. The most common complaints were diarrhea (21.2%), sore throat (22.3%) cough or difficulty breathing (17.6%) and fever (14.5%). Among children over age five, 91.9% received treatment outside the home for the last illness, and somewhat less than half (44.8%) were treated at the PHCC. Among children over age five the most common complaints were flu-like symptoms, sore throat, and fever. Adults who were ill in the past 2 weeks sought treatment outside the home in about 86% of cases. Among adults, 20.8% utilized the PHCC, with the private doctor's clinic the preferred site by most (60.1%). The median cost of a patient visit (all types of facilities) was approximately US$20, but there were a number of large costs for visits reported which raised the mean cost to around $60.00 per visit. For around half of visits (all ages) the cost of medical treatment was thought reasonable by the head of household. More agreed that treatment of children was more reasonable (< 5 yrs: 52.2%; > 5 yrs: 52.8%) than was the costs of adult treatment (43.6%).

Satisfaction

In general there was satisfaction with health care whatever the type of facility utilized (Table 1), and this was for all age groups. About three-quarters of patients or caregivers happy with the services received during the last illness. Levels of satisfaction showed little difference between the reports for all PHC services combined (Table 1) and reports for PHCCs (Table 2). When indicators of satisfaction were compared between PHCCs and private facilities, there was little difference found.

The PHCCs remained highly recommended for a number of conditions (Figure 1). The education level of the head of household had no affect on levels of satisfaction with services at various types of health facilities.

Table 1. Satisfaction with health care services (all sources) provided to adults or children (caretakers responding)

	Treated with courtesy	Waiting time too long	HW explained diagnosis clearly	Treatment not explained in a way we could understand	Full trust in skill of health worker treating us	Not told when to bring child back to clinic	Getting medicines was easy	Health unit not kept clean	Did not feel security was good at clinic	Over all satisfied with services we received
Child under 5 yrs*										
Strongly agree	144 (75.1)	46 (32.7)	87 (57.1)	21 (13.8)	81 (52.3)	50 (36.8)	75 (50.9)	31 (22.8)	23 (17.9)	71 (47.45)
Somewhat agree	26 (17.1)	68 (42.0)	29 (19.3)	29 (17.6)	38 (26.2)	22 (13.4)	27 (16.4)	49 (29.7)	25 (18.0)	42 (27.7)
Somewhat disagree	9 (6.7)	21 (13.8)	25 (16.7)	44 (30.7)	16 (10.6)	26 (19.5)	32 (21.6)	19 (14.8)	9 (6.9)	19 (13.2)
Disagree	2 (1.1)	15 (11.5)	9 (6.9)	55 (37.9)	15 (10.8)	44 (30.3)	17 (11.2)	50 (32.7)	74 (57.3)	17 (11.6)
Child 5-10 years*										
Strongly agree	96 (67.4)	47 (38.2)	63 (44.2)	17 (11.8)	71 (51.6)	62 (44.6)	56 (45.2)	20 (14.2)	16 (11.7)	57 (44.1)
Somewhat agree	36 (27.7)	63 (41.3)	40 (29.5)	34 (26.0)	36 (26.4)	26 (17.0)	36 (24.3)	46 (30.1)	17 (12.5)	37 (28.6)
Somewhat disagree	3 (2.1)	18 (12.8)	25 (19.8)	51 (36.7)	19 (14.9)	27 (22.1)	20 (14.8)	29 (24.2)	24 (19.9)	20 (14.8)
Disagree	3 (2.8)	10 (7.8)	8 (6.5)	34 (25.5)	10 (7.2)	21 (16.4)	22 (15.7)	42 (31.5)	75 (55.9)	16 (12.5)
Adults										
Strongly agree	226 (75.0)	104 (38.6)	159 (55.6)	57 (19.2)	168 (55.9)		132 (46.6)	73 (26.1)	65 (22.2)	147 (50.5)
Somewhat agree	58 (19.7)	107 (35.2)	67 (23.0)	66 (21.7)	71 (25.9)		69 (24.7)	63 (21.0)	44 (15.0)	83 (29.2)
Somewhat disagree	10 (4.3)	57 (18.8)	40 (15.4)	82 (28.6)	42 (14.0)		45 (15.5)	61 (21.5)	38 (12.9)	30 (10.3)
Disagree	4 (1.0)	25 (7.5)	18 (6.0)	93 (30.6)	12 (4.2)		39 (13.2)	90 (31.4)	146 (49.9)	30 (10.0)

*Only responses of caretakers who were present when services provided are included.

Local PHCC

Those respondents who had used their local PHCC or were familiar with its services by reputation, were asked about services provided there (Table 2). Trust in the skills of the doctors and nurses at the PHCC was high, with 77.8% saying they had some or full trust in the clinical staff. At the same time, about 64% felt clinic staff were too rushed to give their medical problems adequate attention. More than half reported waiting time was too long; this was a similar pattern of response for all health facilities, public and private. At the closest PHCC, 86.6% of persons responded that patients were treated with courtesy by the staff. For convenience of clinic hours, about 74% were somewhat or very satisfied. Medicines were felt to be generally available at the PHCC by only 37% of respondents. Almost all persons agreed that services provided in the PHCCs were free. There were 30.7% of patients who felt some degree of insecurity visiting the PHCC. There were 57.9% of respondents who observed there were not enough female health workers at that clinic, of those making this observation, 68.5% were males. Nearly half observed that needed medical equipment at PHCCs was not always present or in working order. The PHCC was not thought to be kept clean by 43.7% of respondents.

Cost of care

When households were analyzed by their asset levels, poorer households chose PHCCs for treatment more frequently than other sources both for children ($p = 0.043$) and adults ($p = 0.044$). Asset levels for larger families were no different from those for smaller families. The amount of money spent on health related costs by the household in the previous month was a median of 99,000 Dinars (US$77.02). Little of this was reported to have been spent at public sector facilities. Respondents stated that health services were free or that costs could be met out-of-pocket in 75.7% of households, but 16.9% had to borrow money in the last month to meet health costs, and 7.4% of households had to sell assets or still owed money for the most recent visit. There were no statistical differences in the amount spent for health in the past month between rich and poor households. As noted in Table 3, poor households more commonly reported that health care was too expensive ($p = 0.001$), and stated they had difficulty buying medicines ($p = < 0.001$). Persons with more education were more likely to say they could afford medicines ($p < 0.001$). Among women delivering in the past year, the number reporting more than three antenatal visits was related to higher household wealth status ($p = 0.037$).

In addition to household assets, the number of rooms present in a household were queried and the house construction noted by interviewers. On analysis, responses from people living in houses with fewer rooms, and with more basic house construction generally responded in the same way as seen with the asset scale. Analysis by asset grouping showed a greater correlation with healthseeking behavior than with the room or construction scales.

Table 2. Perception of respondents concerning the PHCC nearest to them I have trust in skill of doctors and nurses (%)

	I have trust in skill of doctors and nurses (%)	Waiting time is too long	The doctors and nurses treat people with courtesy	Medicines frequently not available	All treatments are free	Health workers are too rushed to understand your problem
Strongly agree	373 (53.7)	181 (26.4)	472 (67.6)	237 (34.1)	568 (84.2)	199 (30.2)
Somewhat agree	170 (24.1)	267 (38.2)	124 (19.0)	201 (29.1)	59 (7.9)	232 (33.8)
Somewhat disagree	79 (12.0)	139 (20.7)	63 (8.7)	154 (23.2)	40 (5.5)	136 (19.4)
Disagree	67 (10.1)	99 (14.7)	30 (4.8)	95 (13.7)	20 (2.4)	114 (16.7)

	The needed medical equipment is present and working when needed	The health unit is not kept clean	People in my neighborhood are satisfied with the care received at this clinic	People do not feel the security is good around the clinic	The hours the clinic is open are convenient	There are not enough female health workers to provide treatment for women
Strongly agree	156 (23.67)	166 (25.5)	294 (46.0)	124 (18.9)	394 (59.1)	258 (38.0)
Somewhat agree	201 (29.9)	130 (18.2)	183 (27.3)	76 (11.9)	110 (15.0)	131 (19.9)
Somewhat disagree	172 (24.9)	117 (18.1)	90 (13.6)	101 (15.0)	82 (12.6)	98 (15.9)
Disagree	148 (21.4)	271 (38.3)	89 (13.1)	369 (54.3)	91 (13.3)	181 (26.1)

This is restricted to users or those familiar with the PHCC.

Table 3. Perceived household access to care by wealth levels, measured by household assets

	Wealth level	Strongly agree	Somewhat agree	Disagree	Strongly disagree	Not sure	Totals	*P* value
We are able to get medical care whenever we need it	low	75 (35.4)	61 (26.1)	61 (27.1)	22 (9.7)	5 (1.8)	224	
	med	125 (34.6)	125 (34.5)	71 (20.2)	32 (9.4)	5 (1.3)	358	
	high	234 (38.4)	216 (31.4)	123 (17.9)	72 (10.4)	13 (2.0)	658	
	totals	434	402	255	126	23	1,240	0.2973
We cannot see medical specialists as often as is necessary	low	102 (45.9)	59 (24.1)	45 (21.7)	15 (7.3)	3 (1.0)	224	
	med	158 (44.9)	106 (29.3)	54 (16.3)	30 (7.9)	7 (1.6)	355	
	high	267 (41.2)	184 (28.1)	122 (20.0)	68 (9.7)	9 (1.0)	650	
	totals	527	349	221	113	19	1,229	0.6412
We can always afford to buy the medicine that we need	low	43 (19.0)	50 (21.2)	78 (36.0)	48 (21.8)	5 (2.0)	224	
	med	101 (29.3)	86 (22.5)	90 (24.7)	75 (22.2)	5 (1.1)	357	
	high	224 (36.0)	164 (24.9)	165 (24.5)	92 (13.6)	8 (1.0)	653	
	totals	368	300	333	215	18	1,234	0.0001
Medical care in the clinics is too expensive for us to afford	low	156 (72.0)	36 (15.9)	11 (4.8)	12 (5.5)	5 (1.8)	220	
	med	225 (65.5)	81 (23.7)	18 (4.6)	22 (5.9)	2 (0.3)	348	
	high	396 (62.3)	123 (20.7)	76 (11.9)	27 (3.8)	11 (1.3)	633	
	totals	777	240	105	61	18	1,201	0.0014

Table 3. Continued

If someone from the family needs to be hospitalized, this will not produce financial difficulty for your household	low	145 (66.3)	42 (17.4)	17 (8.0)	13 (6.9)	4 (1.5)	221	
	med	220 (63.9)	78 (22.3)	32 (9.0)	9 (2.7)	7 (2.0)	346	
	high	393 (60.0)	138 (21.1)	70 (11.5)	33 (5.2)	15 (2.2)	649	
	totals	758	258	119	55	26	1,216	0.4359
Asset classes for household wealth levels	low	Electric fan, kerosene heater, television, mobile phone						
	med	Plus air conditioner, generator, sewing machine, motorcycle, refrigerator						
	high	Plus automobile, computer						

Preferred treatment sites

Respondents were asked which facilities they would recommend for friends or relatives seeking care for a variety of common conditions (Figure 1). For all suggested conditions poorer households were more likely to choose the PHCC over other facilities, and this difference was significant for childhood diarrhea, child with an injured leg, adult hypertension, and an adult with a skin rash. However, for deliveries the more wealthy families still would recommend a public hospital (58.9%) over a private hospital (23.5%). The level of education of the head of household seemed to make no significant differences in the types of services recommended.

Discussion

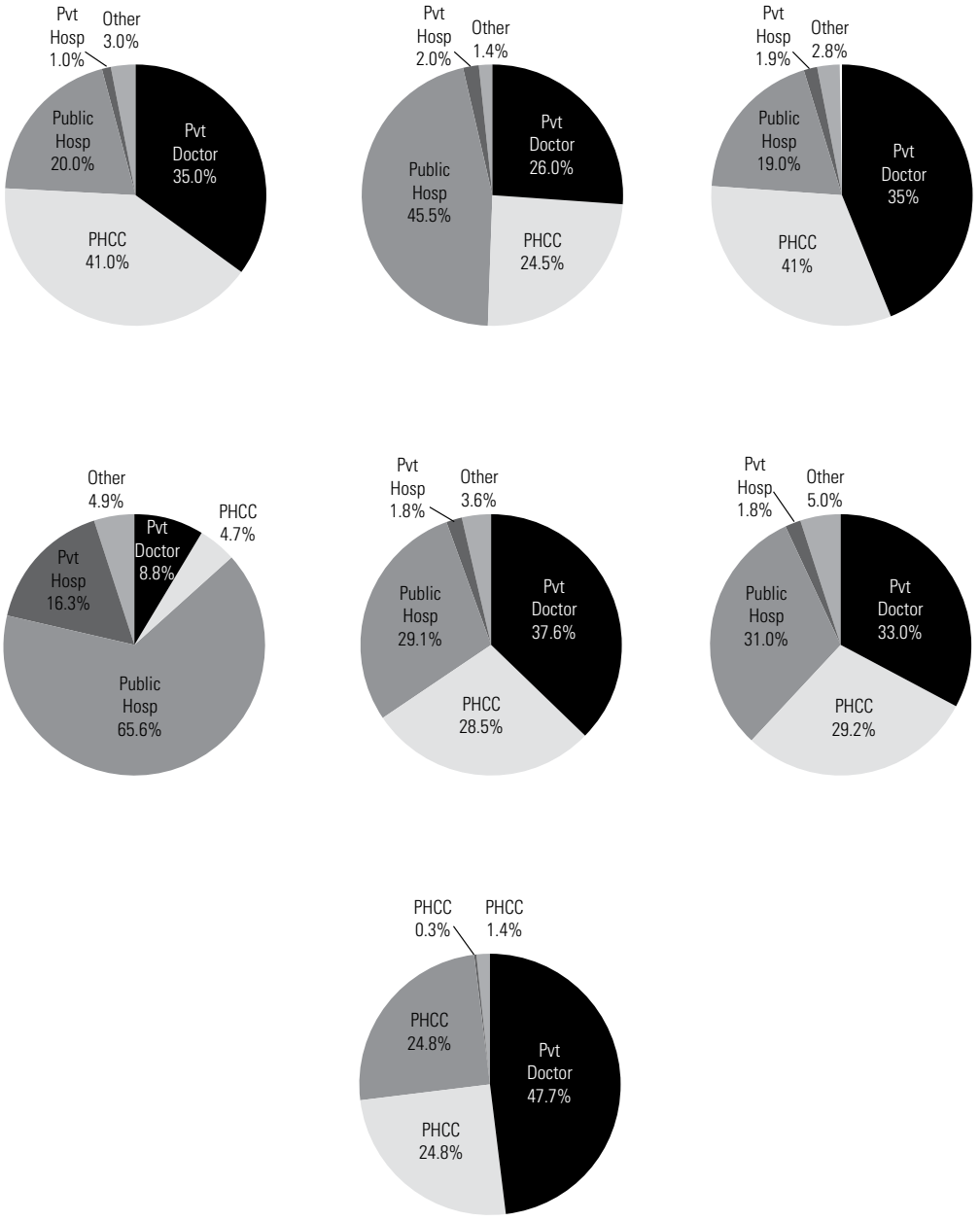
This household survey found there were few barriers to seeking health care outside the household in the Iraq. The large majority of Iraqi children and adults sick in the past two weeks had received care outside the household (86.0-91.9%). The high utilization is consistent with Articles 30 and 31 of the Iraqi constitution guaranteeing the right of all citizens to health care [19]. Respondents were generally satisfied with primary health care services available from public and private sources, and reported trust in health workers is high.

The majority of respondents felt patients were treated with courtesy. Around a third of persons expressed some concern about the security situation when seeking health care services. When analyzed separately from all services combined, the pattern of satisfactions with public sector PHCC and other sources of primary care were generally similar. However, high satisfaction may in reality reflect low expectations from health services. In clinic exit interviews (IMC, unpublished) patients stated they did not expect doctors to communicate instructions for taking medicines, potential adverse effects, or information about their illness as "doctors have no time for this." Almost all of those interviewed were aware of the services of the public sector PHCCs. These clinics were the site of treatment for the last illness in about 40% of children but in only 21% of adults. The remainder used private clinics and to a lesser extent public hospitals.

Women delivering in the past year preferred private clinics for antenatal services, but most delivered in public hospitals. Only about 5% of the surveyed households had deliveries which occurred outside the formal health sector. This is far less than earlier national data have reported. [20] Many Iraqis feel that delivery in a private hospital frequently results in delivery by cesarean section. Few PHCCs have delivery services, which accounts for the three percent of pregnancies that were delivered here. Of children born in the past year, 55%, received their initial care in PHCC clinics.

Immunization coverage was found to be complete for age for measles in 69% of children 23 months and under and 65% for DPT3 by immunization card. While this is lower than reported values for Syria, Iran and Jordan, it does suggest that immunization has been relatively effective, despite on-going conflict [21].

Figure 1. Treatment locations recommended by householders for various conditions suggested



Respondents were asked what type of services they would recommend to others for a variety of childhood and adult conditions. Although many would recommend the PHCCs for most of conditions suggested, for no conditions would more than half of respondents recommend PHCCs. Private doctors' offices would be recommended for 26-48% of outpatient conditions.

Of respondents who reported that they used or knew their local PHCC well, 63% reported that medicines were frequently not available. At their local PHCC, 64% felt health workers were too rushed, perhaps reflecting the general loss of Iraqi doctors from death and immigration.

A shortage of female health workers at the local facilities was noted by 60%. In general, residents of PHCC service areas were satisfied with services, and felt they were treated courteously by competent health workers. The data suggest that PHCC facilities were well respected in the community. Traditionally, the health services in Iraq have been very hospital focused, with limited investment in primary health care. However, recent efforts have been made by the Ministry of Health and USAID to improve the quality of primary health care in Iraq [22]. Using household asset indicators it becomes evident that poorer households utilize PHCC services more than richer households. This emphasizes the role of PHCCs in providing the guaranteed right to health for all Iraqis, as set out in the Iraqi constitution. The PHCC services were in fact free, with few costs being reported for direct services. Poor households were no more likely to feel that hospitalization would produce financial difficulties than rich households. This also suggests that informal payments were not being extracted for hospital care. When free medications were not available from public facilities, as appears to be common in PHCCs, 57.8% of poorer households felt that they would have difficulty affording medicines, compared with 38.1% of richer households. The survey found expenditure on health in the past month was equivalent to $US77.20 which compares with $US50 found four years earlier in the large Iraq Family Health Service (IFHS) [20]. While our data would include some inflationary cost, it is likely that access and wealth of our catchment area population differed significantly for national values recorded four years earlier, perhaps being more urban than the IFHS sample. A slightly smaller percent of the 2010 study population could meet outpatient costs out of pocket than in 2006/7 (75.7% vs 86.1% in 2010), the significance of this is not clearly, though the 2010 study population being almost entirely urban or peri-urban, with the previous study having a greater rural population.

Overall, 15% of Iraqi population was thought to have been displaced within Iraq by 2008, using the International Organization for Migration estimates [23]. These estimates are very similar to the 14.2% of the population in this study (2010) who reported moving in the past five years. Not surprisingly, the majority of these moves were because of insecurity. Our 2010 migration findings could be an underestimate, as Erbil, a common destination for displaced Iraqi minorities, was not included in this survey for logistical reasons. Displaced populations are often marginalized from health care services, so it is reassuring to find no differences in utilization among the displaced living in the service area. Neither were there any differences in household assets from people who had moved into the area within five years. Measuring the community perceptions of health services as reported here has an advantage over the commonly used health facilities exit interviews, which can suffer from a "gratitude bias" where patient satisfaction perceived health worker performance may be overstated [24,25]. While this household survey approach may allow a more settled reflection on the most recent consultation and incorporation of individual outcome indicators, there is a risk that recall bias may blur some details of the most recent visit. However, an advantage of the survey approach can be the capture of overall impressions, potentially based on multiple visits.

Limitations

A survey of this nature has a number of limitations. Only households less than 2 km from the PHCC were included. Persons living further away from the health facilities may have different perceptions and utilization patterns than those living closer. Further, we included only those PHCCs staffed by medical doctors, excluding the large numbers managed by nurses and medical auxiliaries.

Participants may also over-rate the value of services for fear of losing access to services, either individually or through health policy changes. In the analysis we included recent users with those having an acquaintance with conditions at the health facilities, though not recent users. This could dilute the results, but when analyzed separately there seemed to be little difference in the perceptions between these two groups.

This survey has the potential biases of cluster surveys, collecting information from similar households and with insufficient cluster size to make comparisons among clinics and within governorates. However, population data were not available for a simple random sample. In the absence of objective

PHCC performance data and interviews with professional staff, the user perceptions we recorded provides only part of the picture of primary care in Iraq. Nevertheless, user and community perceptions are key drivers of utilization practices, and are important for the planning of health services. Selecting from the catchment areas of PHCCs may have meant that low and middle income households are over-represented in the study, as public sector facilities are typically not sited in high income neighborhoods. Further studies to examine quality of Primary Health Care services from among a sample of various care sources could validate some of the observations reported here against objective criteria.

Conclusion

The key themes from this survey are that PHCC facilities play a very important role in access to primary care health services in Iraq, and in general, user satisfaction is high, with little differences between public and private facilities. However, for many conditions, especially in adults and older children, the private medical clinics are more popular, especially as household income rises. The PHCC facilities are main sources of health services for poorer households and thus are a very mportant health asset in Iraq. There is a perception by users that health workers in the PHCCs are rushed, sometimes lack medicines, and working equipment. In spite of these concerns, communities adjacent to PHCCs have a high degree of satisfaction and trust for services provided. Their ostensibly free services indeed appear to be free, with few costs reported for direct clinic services. However, medications must be frequently purchased from outside pharmacies as they are not available at PHCCs.

This appears to be an important barrier to treatment in poorer households. These clinics represent an important point of treatment in the otherwise hospital-focused Iraqi health system. These facilities can serve as a base for extension of primary health care coverage and community services in Iraq. Further investment in PHCC services could improve efficiency and effectiveness of the overall Iraqi health system.

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Authors' contributions

GB and TH developed the study design with assistance from AF, AD and TAH; TH, RA and YH oversaw data collection; CH led the data analysis; GB, TH and RA prepared the manuscript. All authors reviewed the final version of the manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests. Received: 25 July 2011 Accepted: 16 December 2011 Published: 16 December 2011

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