

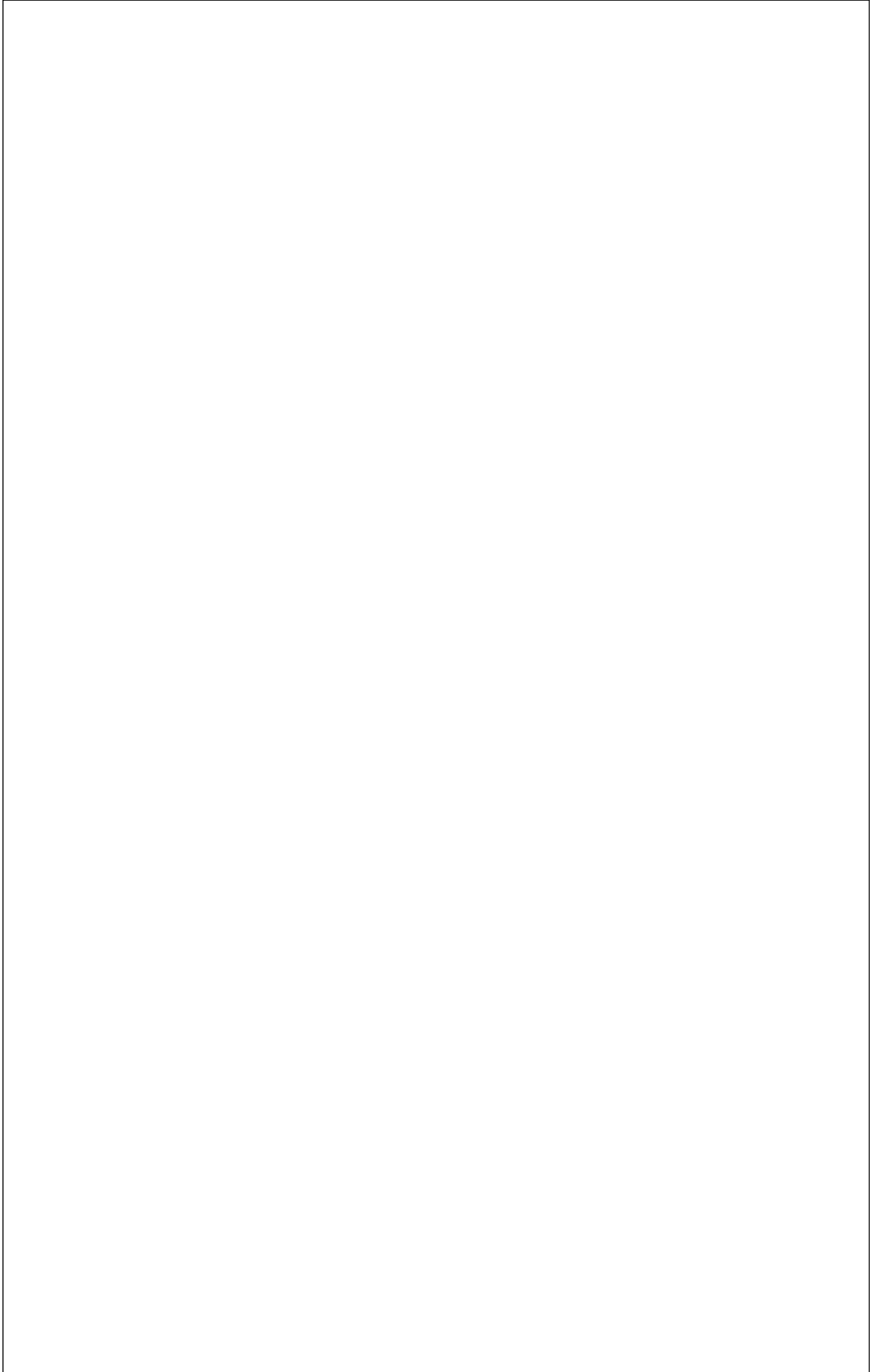
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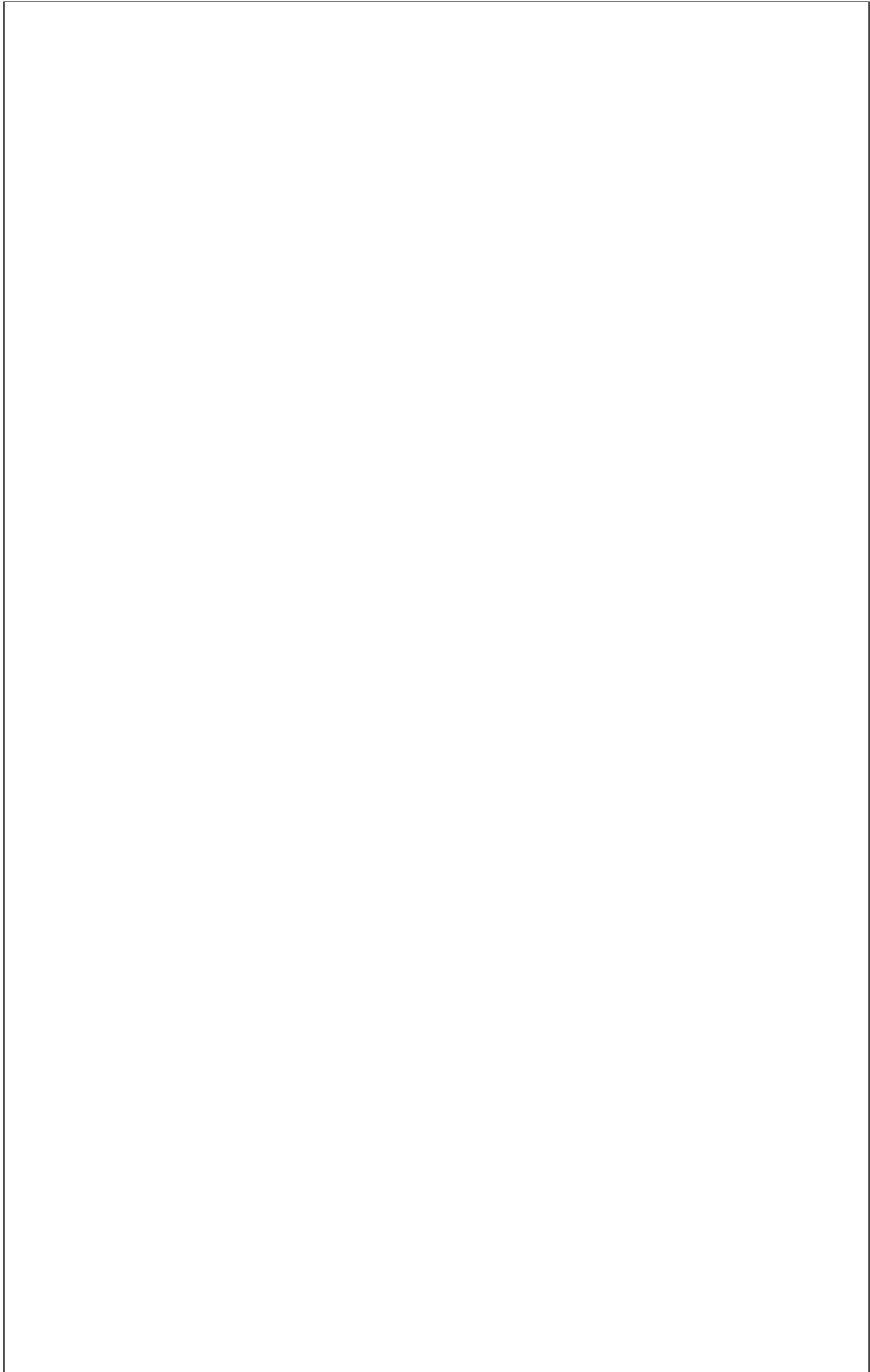
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Status, Decision-Making Role and Expectations of Older Persons in Rural Maharashtra, India 3

In traditional Indian society, older persons were key decision makers while younger generations would tend to comply with their decisions. This tradition has changed in the context of modernization and urbanization. This paper focuses on the status of older persons, their role, their decision-making power and the expectations they have of their children, society and the government. Data for this paper was collected from the rural areas of Amravati district in Maharashtra, using semi-structured interview schedules. A total of 600 respondents, both males and females, were interviewed. A systematic sampling technique was used for data collection. In addition to the issues cited above, the impact of various socio-economic characteristics on decision-making power and status is discussed.

Marriage and Fertility Dynamics in India 21

It is widely acknowledged that age at marriage has a significant influence on fertility, particularly in the countries where childbearing occurs within marriage. However, the complexities of marriage/fertility relationship are poorly understood, especially during fertility transitions. This paper investigates the complex relationship between marriage and fertility by examining age at marriage, marital fertility and birth interval dynamics in India, using data collected in nationally representative surveys in 1992/1993 and 2005/2006. The decline in fertility during this period could be attributed to changes in marital fertility rather than to changes in marriage age. Women marrying late tend to have shorter first birth interval than women marrying at a younger age. However, the second and higher birth intervals are longer among those marrying late.

The Effect of Maternal Nutrition and Reproductive Morbidity on Waiting time to Next Conception in Rural Karnataka, India 39

This paper is an attempt to understand the role of maternal nutrition and reproductive morbidity on waiting time to next conception among rural women in northern Karnataka, India. The study is based on the births that occurred from July 2003 to June 2004 in 54 villages and a series of follow-up visits to the women who bore these births. The

education of the woman and husband, occupation of husband, religion/ caste, age at effective marriage of woman, age of woman at child birth and order of birth, haemoglobin level, body mass index and waist-hip ratio and reported RTI/STI symptoms are all significantly related to waiting time to next conception. Based on the data there does not seem to be a relationship with nutritional status and reproductive morbidity on the incidence of spontaneous abortion (safe and unsafe) and still births. Overall, maternal nutrition and reproductive morbidity factors appear to only have a marginal effect on waiting time to next conception in the area of study.

Health-care Decisions of Older Persons in India 65

Many older persons in India cannot afford the high cost of health-care and consequently have to forego treatment for their illness. We compared the incidence of illness and health-care decisions of rural and urban persons as well as the outcomes for older persons and younger persons. One of the main findings was that rural persons had a higher incidence of illness and a higher incidence of non-treatment than those in urban areas. The higher incidence of non-treatment in rural areas was mainly due to the shortage of health-care facilities and concerns about the high cost of treatment, reflecting lower income in those areas. Second, analysis for two rural locations indicated that older persons do not always choose the same provider of treatment as younger persons even if it is for the same type of illness. Third, in looking at one urban centre, the study found that older persons had a higher incidence of non-treatment than younger persons. This was mainly because older persons had greater concerns about the costs of treatment, reflecting again their lower levels of income.

Status, Decision-Making Role and Expectations of Older Persons in Rural Maharashtra, India

In traditional Indian society, older persons were key decision makers while younger generations would tend to comply with their decisions. This tradition has changed in the context of modernization and urbanization. This paper focuses on the status of older persons, their role, their decision-making power and the expectations they have of their children, society and the government. Data for this paper was collected from the rural areas of Amravati district in Maharashtra, using semi-structured interview schedules. A total of 600 respondents, both males and females, were interviewed. A systematic sampling technique was used for data collection. In addition to the issues cited above, the impact of various socio-economic characteristics on decision-making power and status is discussed.

By Dhananjay W. Bansod*

The concepts of status and role are closely related to the extent that the two words are sometimes used interchangeably. However, the two concepts are different and each represents an indispensable aspect of our social structure. While "status" is a position in the social structure and relates to what a person is (for example, head of the household) in terms of rights and duties or the relative superiority determined by traditional social norms which can be examined in the form of prestige, honour and respect a person receives at home (Seligman, 1959), "role" refers to a set of expected behaviours that a person, holding a specific status, follows.

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In all societies, there are indeed socially assigned statuses and roles for all members of a family. However, such statuses and roles differ across cultures, depending on economic and social conditions. A study by Asharaf (2000) in Kerala found that older persons generally believe that younger generations tend to be disrespectful to the elderly, considering them a burden or hindrance and not according much importance to their feelings. A majority of older persons, in particular those without financial/religious engagements, perceive ageing as a problem. The likelihood of perceiving ageing as a problem is found to be higher among older persons who do not have frequent contacts with relatives or friends, those who do not enjoy the status of head of household and those who are not consulted in any decision-making process related to the family (Asharaf, 2000).

In traditional Indian society, it was the older person who took decisions relating to family matters, which the younger generation was expected to honour at every stage of life. However, this tradition is fast disappearing in the context of modernization. Decisions are now generally imposed on elders in their twilight years. Elder status tends to depend upon the economic contribution they make to the family. If they contribute financially to the family, older persons enjoy a relatively better status; otherwise, their status deteriorates after they turn 60 (Madhu, Varmani and Darshan, 2003). In Indian society, the majority of older persons depend upon their families for their needs and therefore require a good family and social support system to lead a comfortable life. In the past, older persons usually had strong family and community support due to the prevalence of the extended family system and traditional role assigned to the elders as heads of households. But presently, with loosening of the extended family ties and the younger generation's greater occupational differentiation and spatial mobility, older persons are increasingly becoming more isolated from both the family and the community.

In the existing literature there seems to be a lack of studies on the social issues facing older persons in India, in particular pertaining to their role, status, and decision-making power. The present study therefore tries to explore the above-cited issues as well as assess older persons' expectations of their children, society and the government.

Objectives

The objectives of the paper are as follows:

1. To understand the situation of older persons in rural Maharashtra with regard to their status, role and decision-making power.

2. To assess older persons' expectations of support from their children, the society and the government.

Data and methods

Study area

In Maharashtra, a number of older persons, which represented five per cent of the total population in 1961, increased to nine per cent in 2001. This increase underscores the need for an overall improvement of public health care in India. Rural-urban population distribution also shows that a greater proportion of older persons live in rural areas as opposed to urban areas. According to the 2001 census, older persons (defined as people aged 60 years and older) represent ten per cent of the population in rural areas while they only account for 6.8 per cent of the population in urban areas (For statistical information from other countries and the reasons for the rural-urban population differences, see Mujahid (2006) and Mujahid and Siddhisena (2009)).

Based upon the 2001 census, the majority of older persons in the State of Maharashtra lived in rural areas, including the 11 per cent in the district of Amravati.

Sampling procedure

Amravati district was selected as an example and a three-stage sampling design was adopted, with the first stage relating to the selection of blocks, the second to that of villages, while households were selected for the third stage. The survey collected information from 600 respondents in 15 villages of Amravati district. In the first stage of sampling design one block was selected at random out of 14 blocks in the district; all the villages in the selected block were then stratified into three groups/categories on the basis of population size i.e., less than 500; 500 to 1,000; and more than 1,000. Fifteen villages were selected in the final stage from the three categories, proportionally to the total number of villages in that particular category. A sampling frame for people in the age group of 60 years and above was prepared for selected villages based on house listing, followed by a selection of elderly respondents using a systematic random sampling method. The data was collected based on pre-tested and semi-structured interview schedules. Detailed information was collected on basic socio-economic variables relating to respondents; their status in the family and society; their decision-making power; expectations they had of their children, society and the government; and their knowledge of pension schemes. A simple bivariate analysis was carried out and Chi-square test was used to establish associations.

Status of older persons in the family and community

Understanding older persons' perception of their status in the family and family members' attitude to them is a matter of great interest to researchers. Respondents were asked whether they felt their status in the family and community had declined, improved or remained unchanged upon reaching the age of 60. A majority of respondents (around 75 per cent) said they had perceived no change in their status within the family or community, while 16 per cent reported their status had declined. Economic dependency and abject poverty are the most important factors leading to a decline in the respect accorded to older persons and their status in the family (Madhu, Varmani and Darshan, 2003). A significantly higher proportion of males perceived a decline in familial status (21 per cent) as compared to females (10 per cent). This might be due to the fact that females do not experience a major role change even during old age as they generally continue to be involved in household activities, whereas males may not be as active as they might have been because they used to work outside homes and may not feel useful within the household (table 1). Furthermore, it should be noted that older females outnumbered males (83 per cent and 70 per cent, respectively) in reporting that their status in the community had remained unchanged.

Table 1. Distribution of older persons by perception of their status in the family and community

(Percentage)

Status of elderly	Sex of the respondent		
	Male	Female	Total
Status in the family			
Declined	21.0	10.2	16.0
Improved	9.3	11.3	10.3
Unchanged	69.7	78.5	74.0
Status in the community			
Declined	18.9	8.1	14.0
Improved	10.7	9.3	10.0
Unchanged	70.4	82.6	76.0
Total	100.0 (315)	100.0 (285)	100.0 (600)

The paper also examined whether other family members sought the opinion of older persons on various family matters, taking into account that they would naturally be considered a reliable source of information

and advice to the younger generation. The paper discovered that generally older persons were consulted on all matters relating to the household, but the tendency declined over time as families aged. Older persons might still be informed of the decisions taken in the household by other family members though this was likely done to ensure that older persons did not feel entirely left out of the decision-making process.

Role of older persons

One of the questions asked during interviews was: “Considering your age, what do you think your role in the family should be?” More than half of respondents (58 per cent) said that their role in the family was to provide advice to other family members based on their life experience. About 23 per cent of respondents said that their role in the family was to look after the house, as they felt they might not be capable of doing any other type of work. Making adjustments to living with other family members, such as, for example, a new daughter-in-law following a son’s marriage is a typical issue arising during old age. About 14 per cent of older persons reported that adjusting to other family members was one of their major duties during old age. A few others (five per cent) felt that caring for children and babies was one of the most important roles they would have to play in the family (table 2). Differentials in older persons’ roles in households are presented by age and gender in table 2a, since the roles tend to change with age differently for males and females. It was noted, for example, that a large number of men thought that their role in the family was to provide advice to other family members, irrespective of age groups. By contrast, a large number of elderly women reported that their role in the family was to look after their homes and younger children and that this was the most important role they had to perform.

Table 2. Percentage distribution of older persons according to their role in a household by gender

Role in a household	Male	Female	Total
Provide advice to family members	70.8	44.9	58.5
Look after the home	14.9	30.9	22.5
Take care of young children	2.9	8.1	5.3
Adjust to family members	11.4	16.1	13.7
Total	(315) 100.0	(285) 100.0	100.0 (600)

Table 2a: Percentage distribution of older persons according to their role in a household by age and gender

Age-group	Sex of the elderly	Role in a household				Total
		Give advice to family members	Look after the home	Provide baby care	Adjust to family members	
60-69	Male	73.4	12.4	2.3	11.9	177
	Female	48.4	30.3	5.9	15.4	188
70-79	Male	69.8	15.5	4.3	10.3	116
	Female	40.5	31.6	11.4	16.5	79
80+	Male	54.5	31.8	0.0	13.6	22
	Female	27.8	33.3	16.7	22.2	18

“Head of household” is one of the indicators which reflect the status of older persons in the family. In traditional Indian families, parents have been playing the role of head of household, making decisions that others had to follow or comply with. The study explores how older persons’ status as key decision makers has changed over time. Table 3 presents gender differentials of older persons by headship. The authors’ analysis shows that 69 per cent of older persons reported that they were heads of households, whereas 31 per cent reported that their [adult] children were heads of households. A fair number of males were reported as heads of households as compared to females in elderly-headed households, whereas a large number of females were considered as heads of households in non-elderly headed households. The headship non-elderly/elderly ratio was 44 to 100.

Table 3. Gender differentials of older persons by headship

Head of household	Male	Female	Percentage	No.
Elderly	86.3	50.9	69.5	417
Non-elderly	13.7	49.1	30.5	183
Total	315 (100.0)	285 (100.0)	600 (100.0)	600

Decision-making role

The decision-making role of older persons with regard to family matters, such as son’s/daughter’s marriage, buying and selling property, buying other important items, children’s education and arrangement of

social events were examined and are presented in table 4. The analysis shows that the role of older persons in the decision-making process has changed over time. With regard to buying and selling property or taking similarly important decisions, older persons decision-making power has decreased from 66 percent and 65.7 percent, to 60 percent and 55 percent, respectively, over time.

Table 4. Decision-making role on important family matters

(in percentages)

Family matters*	Self		Spouse		Children	
	Now	Earlier	Now	Earlier	Now	Earlier
Son's/daughter's marriage	61.3	65.3	30.0	33.3	8.3	1.3
Buying and selling properties	59.7	66.0	28.8	32.7	11.5	1.3
Buying other important things	55.0	65.7	27.0	32.7	18.0	1.7
Children's education	51.3	67.0	23.7	31.2	25.0	1.8
Making arrangements for social events at home	52.2	66.7	25.3	31.2	22.5	2.2

Note: * Multiple answers

A similar pattern was found with matters relating to children's education and arranging social events at home. Grown-up children tend to make such decisions as they become the main breadwinners in the household. A total of 25 per cent of older persons reported that their adult children were the ones taking decisions regarding their children's education, while 23 per cent of respondents said that their adult children were making arrangements on their own for social events at home. The main reason behind this changing scenario is the fact that older persons are becoming increasingly dependent on their children and the decisions they make.

The changing role of decision makers

Table 5 shows the percentage distribution of changes relating to older persons' role as decision makers by selected background characteristics. Out of all respondents, 35 per cent reported that their role in decision-making had changed, while 65 per cent said they remained key decision makers in the family. No significant difference was found among different age groups regarding the changes in decision-making roles in the

family. A large number of elderly women and widowed persons (40 per cent and 47 per cent, respectively) reported that their role as decision makers had changed as compared to elderly men and married persons categories.

Table 5. Distribution of older persons according to their perception of change in decision-making roles by selected background characteristics

(in percentages)

Background characteristics	Decision-making role has changed		Total
	Yes	No	
Age group			
60-69 years	35.8	64.2	352
70-79 years	35.5	64.5	186
80 years and over	31.4	68.6	35
Sex**			
Male	31.7	68.3	309
Female	40.1	59.9	262
Education***			
Illiterate	39.1	60.9	358
Primary	37.9	62.1	140
Completed middle school	12.9	87.1	31
High school and above	14.3	85.7	42
Marital Status***			
Married	27.8	72.2	345
Widowed	47.3	52.7	226
Type of family***			
Single	38.6	61.4	70
Nuclear	44.9	55.1	236
Joint	26.4	73.6	265
Standard of Living Index (SLI)			
Low	29.1	70.9	199
Medium	38.1	61.9	223
High	39.7	60.3	151
Economic status***			
Independent	27.1	72.9	328
Dependent	46.9	53.1	243
Total	35.4 (203)	64.6 (370)	100.0 (571)

Note: Chi-square: *** P < 0.01, ** P < 0.05

A fair percentage of older persons living in nuclear families (45 per cent) reported that their decision-making role had changed compared with those living in joint families. The changes could have occurred because of a decline in numbers of joint families as people increasingly prefer to live in nuclear families. However, a large and statistically significant proportion of older persons living in joint families still enjoy a share of decision-making power (74 per cent).

Are the elderly perceived as an asset or a burden?

People in their early 60s generally retire from work. They often become dependent on their children, who, in turn, become the main breadwinners and decision-makers in the household. Some adult children may start perceiving their elderly parents as a burden for the family, in particular if they have young children to take care of. The study attempted to elicit the views of older persons on their relationship with their children and whether they feel they are being perceived as an asset or a burden.

Older persons' perceptions about what their children thought of them are presented in table 6. About 80 per cent of older persons reported that they felt their children considered them an asset for the family, whereas 20 per cent of respondents said that they felt that their children viewed them as a burden. However in the "oldest old" category a large number of persons said that their children considered them as a burden. By contrast, a very large number of older persons living in joint families (90 per cent) and those who are financially independent (83 per cent) reported that their children thought they were an asset for the family, because they could take care of grandchildren and keep a watch on the house. In addition, older persons could help their children with household chores and, if they are still working, could contribute financially to the family. A large proportion of older persons living alone, having low incomes and being financially dependent, felt that their children perceived them as a burden for the family.

Says a 65-year old respondent (in Marathi): *"Doghe pati patni rahatat, mulga - sun aahe pan sambhalat nahi, mulga manto 'malach purat nahi tar tumhala kai khayla ghalu', aata marnachi vat pahat aahe"*.

"My son and daughter-in-law are just not bothered.... If I ask for any financial support, my son replies 'How can I support you or help you when I am not earning enough to support myself?' I am simply waiting to die..."

Table 6. Percentage distribution of older persons according to their children's perception on whether older persons are viewed as an asset or a burden

Background characteristics	Older persons and how they are perceived by the family		Total
	Asset	Burden	
Age group			
60-69 years	81.3	18.7	347
70-79 years	76.2	23.8	189
80 years and over	91.4	8.6	35
Sex			
Male	82.0	18.0	305
Female	78.2	21.8	266
Education**			
Illiterate	78.1	21.9	366
Primary	78.5	21.5	135
Completed middle school	93.5	6.5	31
High school and above	94.9	5.1	39
Marital status***			
Married	84.0	16.0	344
Widowed	74.4	25.6	227
Type of family***			
Single	60.8	39.2	51
Nuclear	74.5	25.5	259
Joint	89.7	10.3	261
Standard of Living Index**			
Low	74.7	25.3	198
Medium	83.9	16.1	224
High	81.9	18.1	149
Economic status			
Independent	82.5	17.5	325
Dependent	77.2	22.8	246
Total	80.2 (458)	19.8 (113)	100.0 (571)

Note: Chi-square: *** P < 0.01, ** P < 0.05

In households with low standards of living, older persons generally do not own any property or any asset and their children may not be earning enough to support both the parents and the immediate family. Parents may not be able to contribute to the household financially and can only perform minor household chores, limiting their participation in family life.

Older persons' expectations

In the wake of industrialization and modernization, family structure and moral values have changed. The study makes an attempt to assess older persons' expectations of their children, society and the government.

Older persons' expectations are presented in table 7. More than 90 per cent of older persons said they expected love and respect from their children, while 67 per cent said they had already received such expressions of love. This left about 25 per cent of older persons feeling deprived of love and respect from their children. It should be noted that a large proportion of older persons (more than 80 per cent) expected from their children psychological and financial support, as well as food and shelter. Among those, around 60 per cent said that they had received such support from their children.

Table 7. Distribution of older persons by type of expectation

(in percentages)

Type of expectation	Expects		Are you getting what you expect?	
	Yes	No	Yes	No
Love	92.5	4.5	67.7	24.8
Respect	92.0	3.7	67.0	25.0
Companionship	82.5	2.8	59.0	26.0
Psychological support	82.0	2.8	59.8	24.8
Financial support	82.0	2.8	57.8	26.5
Food	81.8	2.3	57.8	26.0
Shelter	81.0	2.2	58.2	24.8

Responsibility for the elderly care

The question of who should take care of ageing parents becomes critical especially when the children do not have enough resources to cover their own expenses. An overwhelming proportion of respondents (85 per cent) thought that the son(s) should take care of ageing parents (see table 8). Only 6 per cent stated that it was the Government's responsibility to help older persons. By contrast, only seven per cent of older persons felt that they were responsible for their own well-being and care, while two per cent said that it was either their daughter's or other members' of the family responsibility.

Table 8. Distribution of older persons (by gender) according to their opinion on who is responsible in caring for the elderly

(in percentages)

Who should take care of older persons?	Sex		Total
	Male	Female	
Older persons themselves	7.4	7.9	7.6
Son(s)	84.6	84.5	84.6
Daughter(s)	0.7	1.9	1.2
Government	6.4	4.9	5.7
Others	1.0	0.8	0.9
Total	100.0 (299)	100.0 (265)	564 (100.0)

Are children supportive of their parents in old age?

It is a common belief in India that children should provide support for parents in old age. When elderly participants were asked the above question; "Should children be supportive of their parents in old age" about 83 per cent responded "yes", whereas 15 per cent responded "no" while two per cent chose not to respond. Among the respondents, 21 per cent said that their views on this matter had changed over time.

A 78-year old male respondent said in Marathi: "*Aadhi vataiche ki mule hi matarpanachi kathi hotil/sahara detil pan te sarva khote aahe. Te aaplya bapalachi noukara sarkhe vagavtat*"

"Initially I thought that my children would take care of me in old age and would also provide me with shelter, but I was mistaken. I am ashamed to say that, but they now treat me as a servant..."

He added: "*Jasjashi disha badalte tase badaltat sarva lok / mula*", meaning: "As time passes, changes occur in the behaviour of individuals/ children".

When the elderly were asked, "How many sons should a person have to support them in their old age?" most reported that one or two was enough. Below is an interesting reply given in the Marathi language:

“Mule apekshit aadhar det nahi, tyanchavar avalambun rahayla nako, chagla asel tar ekach pure 4-5 chi aavshakta nahi”

“What is the point of having four or five children if they are not helping? Number doesn't matter much. Even if we have only one child, if he/she is responsible and helpful, that's better than many.”

“It is better to have only one child who is helpful and responsible than having many irresponsible sons.”

Older persons expectations of the government

As part of welfare measures designed for the well-being of older persons, especially the poor, most state governments in India have initiated old-age pension schemes. Although the pension amount is small, it does help reduce the financial burden to a certain extent. Findings from research studies carried out in four countries in Asia reveal that older people highly value the social pension they receive, however meagre it may be, because of the regular support and benefits it provides them and, in many cases, by extension, their households (Mujahid, Pannirselvam and Dodge, 2008). As awareness of such schemes is very important for their effective utilization, respondents were also asked whether they were aware of such schemes.

The fact that only 47 per cent of older persons were aware of the schemes indicates that a large segment of the elderly population in rural areas remains ignorant of the government pension schemes which are in place for their welfare (table 9). Awareness of old-age pension schemes was found to be higher among males than among females. Half of the respondents had never heard about the old-age pension schemes although a large majority (96 per cent) of older persons expected the government to do more for them.

Respondents were asked what type of support they thought older persons needed the most in old age (see table 10). Most respondents (66 per cent) reported that financial support was critical, followed by love/companionship (20 per cent) and health care (10 per cent). A larger percentage of female respondents indicated more need for financial and health-care-related support than did male respondents, whereas a slightly larger percentage of male respondents highlighted the need for love/ companionship in old age compared with female respondents.

Table 9. Distribution of older persons according to their awareness of old-age pension schemes and perception of help provided by the government (by gender)

(in percentages)

Awareness of old-age pension schemes	Sex		Total
	Male	Female	
Yes	50.5	42.5	46.8
No	49.5	57.5	53.2
Total	281 (100.0)	247 (100.0)	100.0 (528)

Government should do more for older persons	Sex		Total
	Male	Female	
Yes	94.7	97.0	95.8
No	5.3	3.0	4.2
Total	303 (100.0)	266 (100.0)	100.0 (569)

Table 10. Distribution of older persons according to their opinion on the type of support required in old age (by gender)

(Percentage)

Type of support required	Sex		Total
	Male	Female	
Financial support	65.1	67.4	66.2
Material support	5.1	3.5	4.3
Health care	9.2	10.2	9.7
Love/companionship	20.6	18.9	19.8
Total	315 (100.0)	285 (100.0)	100.0 (600)

Discussion and conclusion

This study deals with the status of older persons, their role, decision-making power and the expectations they have of their children, society and the government. The analysis shows that around 15 per cent of older persons felt that their status in the family and in community had changed. A higher proportion of male respondents felt that their status in the family and community had changed as compared to female respondents. This might be due to the fact that females do not undergo a

major role change even in old age and generally continue to be involved in household activities, whereas males no longer perform their traditional roles. Indeed, a large proportion of elderly females felt that their status in the community had remained unchanged.

Decision-making is an important dimension which reflects the status and role of an individual. The decision-making role of older persons concerning family matters has changed over time (Madhu, Varmani and Darshan, 2003). In the past, parents used to make decisions relating to various family matters, whereas now children are the main decision makers. A large proportion of older persons living in nuclear families with high standards of living (though such older persons might still be financially dependent on others) felt that their role as decision makers had changed as opposed to those older persons living in joint/single families with low or medium standards of living.

A large proportion of married, financially independent elderly living in joint families reported that their children thought they were an asset for the family as they could take care of the grandchildren, keep a watch on the house and help with various household chores. Older persons with low standards of living residing alone and those who were financially dependent were often viewed as a burden for the family.

The study found out that a majority of respondents thought that their children would be the main source of support during old age. Almost all older persons talked about their need for their children's support. A large proportion of respondents felt that the son(s) should take care of older parents. Furthermore, a majority of older persons felt that the best thing for them to do during old age was living together with their children.

In traditional Indian society, decisions made by older persons were generally final and binding on younger generations. These days the tradition has been changing. The status of older persons in the family depends upon economic contribution and household help they can provide; if older persons can contribute financially, they tend to enjoy better status; otherwise, their status deteriorates over time, especially if they cease to be financially independent.

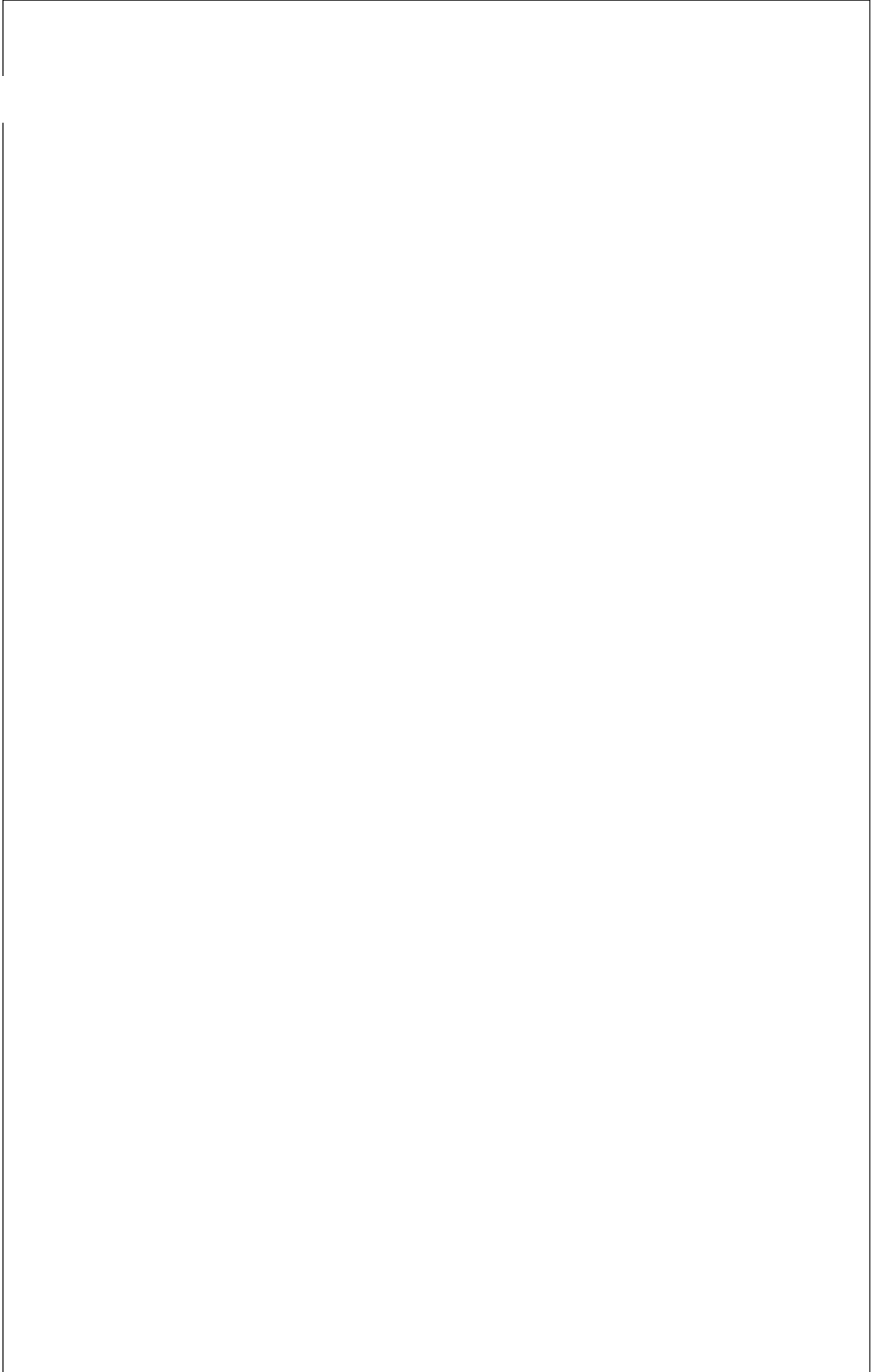
The present study on older persons in rural Maharashtra clearly highlights the need for greater understanding in the support of older persons in order to improve their overall status and well-being (NPOP, 1998). Traditional support systems have deteriorated and government intervention is therefore needed to bridge this gap in order to provide stronger support to elderly citizens. The research found out that support systems can play a vital role in providing care and support for older persons. Government policy then needs to balance the state and family support systems, particularly the joint family support system and involve communities in addressing the issues related to ageing population.

Endnote

- * It would have been useful to find the opinions of the younger generation on the status and role of the elderly. However, the survey could not provide such information.

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Marriage and Fertility Dynamics in India

It is widely acknowledged that age at marriage has a significant influence on fertility, particularly in the countries where child-bearing occurs within marriage. However, the complexities of marriage/fertility relationship are poorly understood, especially during fertility transitions. This paper investigates the complex relationship between marriage and fertility by examining age at marriage, marital fertility and birth interval dynamics in India, using data collected in nationally representative surveys in 1992/1993 and 2005/2006. The decline in fertility during this period could be attributed to changes in marital fertility rather than to changes in marriage age. Women marrying late tend to have shorter first birth interval than women marrying at a younger age. However, the second and higher birth intervals are longer among those marrying late.

By Premchand Dommaraju*

Malthus in his essay on the Principle of Population advocated “moral restraint” as an effective measure to control population growth. By moral restraint he meant marrying late and remaining celibate before marriage. Ever since this early formulation on the potential of marriage delay in bringing about fertility decline, demographers have investigated the role of marriage on fertility transition in various contexts, including in Europe and Asia. The important role played by late marriage and non-marriage (spinsterhood) in the pre-transition European fertility decline is well documented (Coale, 1973). Similarly, a change in marriage patterns was a significant factor in the transition to low fertility in much of East and South-East Asia (Cho and Retherford, 1974). More recently, Jones (2007) has emphasized the important role played by

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marriage decline and marriage delay in the transition to very low fertility in East Asia. Thus, it is clear that changes in nuptiality have played a significant role in reducing fertility in many contexts.

It is likely that the influence of delayed marriage or non-marriage will be particularly important where non-marital fertility is low or negligible. This paper examines the relationship between marriage and fertility in India, a country where non-marital childbirths are rare and marriage continues to be universal and relatively early. This paper considers the effect of change in nuptiality on fertility decline for India as a whole as well as for major states. It also examines the influence of marriage age on family-building process by investigating the birth interval dynamics.

Overview of nuptiality and fertility in India

The institution of marriage has been remarkably stable in India with universal marriage continuing to be the norm. In 2005/2006, less than one per cent of women and about two per cent of men aged 40 to 44 were never married (International Institute for Population Sciences, IIPS], and Macro International, 2007). Age at marriage has undergone a gradual but steady increase at the national level: Singulate Mean Age at Marriage (SMAM) increased from 16.8 to 20.2 years for women between 1961 and 2001 (Registrar General, India, 2001). However, there are significant regional variations with early marriages continuing to be prevalent in some areas. SMAM for women in 2001 varied from as low as 18.5 years in Bihar and Rajasthan to as high as 24 years in Goa (ibid.).

In parts of India where early marriages are prevalent, cohabitation of the couple after marriage is often delayed. Usually, in such situations, women stay in their natal home and go to their marital home after a second ceremony known as *gauna* (Basu, 1993). An analysis of the National Family Health Survey-3 (NFHS) data from 2005/2006 indicates that for about 75 per cent of women age at cohabitation and marriage were the same and for the rest 13 per cent of women cohabitation occurred within a year of the marriage. A longer waiting time between marriage and cohabitation is common among women, who married early, with nearly 73 per cent of women who married before the age of 17 having two or more years waiting time after marriage.

One of the defining features of the Indian marriage system is arranged marriage. Traditionally a marriage in India was arranged by parents, with a bride having a little say regarding her marriage. Free-choice marriages are still uncommon in India. Recent data indicates that less than five per cent of women selected their spouses (IHDS, 2005). However, it appears that jointly arranged marriages and marriages with the bride's consent are gaining prominence (ibid.). Research from other settings

indicates that free-choice marriages or marriage in which women have a substantial say tend to occur at a later age than traditional marriages (Hong, 2006). Thus, marriage age and marriage type are closely linked. This paper considers the role of marriage age on fertility behaviour irrespective of the type of marriage.

Fertility rates in India have been declining since the 1960s, though the pace of the decline has been gradual and spatially uneven. The total fertility rate (TFR) declined from about 5.8 in 1960-1965 to about 2.76 in the 2005-2010 periods (United Nations, 2009). The national average conceals substantial regional variations. While in the southern states, TFR ranged from 1.79 to 2.13, in many of the northern states TFR was well above 3.0 in 2003-2005 (IIPS and Macro International, 2007). A number of competing explanations have been put forward to explain this remarkable fertility decline in the southern states and the lack of progress in the northern states. These include the effective implementation of family planning policies in the south, diffusion processes, status/autonomy of women and the political and social landscape (Dommaraju and Agadjanian, 2009).

The influence of marriage age on fertility has been investigated using Bongaart's (1978) proximate determinants of fertility framework. Visaria (1999) using data from 1992/1993 noted that the effect of not marrying (or delayed marriage) on total fertility was lower than that of contraceptive use. This may be because, as Basu (1993) argues, while marriage may occur at an early age, cohabitation of the spouses is often delayed until later. This delay in cohabitation, along with a lower level of fecundity at younger ages, means that younger age at marriage does not necessarily lead to an early first birth (Dommaraju, 2009). Besides marriage age, several other factors could determine the length of first and higher-order birth intervals. In the Indian context, as there is a preference for sons in some regions, it has been noted that sex composition of children has an important influence on spacing and stopping behaviour (Clark, 2000). As in other developing settings, the mother's educational level has also played a key role in determining fertility in India (Dreze and Murthi, 2001).

A remarkable feature of fertility decline in India is its over-reliance on sterilization (mainly of women) as a primary contraceptive method. Though targets for sterilization were discontinued, and a target-free approach was adopted in the early 1990s, sterilization still constitutes two-thirds of the total contraceptive use (about 56 per cent of women were using contraceptives, out of which 36 per cent represented sterilizations (IIPS and Macro International, 2007)). In some of the southern states where fertility decline has been rapid, women were typically sterilized immediately after reaching their desired parity of one or two children. In the southern state of Andhra Pradesh, Padmadas et al.

(2004) show that women have births faster and in quicker succession after marriage before going for sterilization at a relatively young age (the median age for sterilization in Andhra Pradesh was 23.6 years). Stopping and spacing behaviour is discussed in more detail in the following sections.

Marriage and fertility process

The presentation so far mentions both delayed marriage and non-marriage. It would be useful to separate them when it comes to their influence on fertility, especially in the context of low non-marital fertility. In the context of low non-marital fertility, the role of non-marriage on fertility reduction is straightforward. However, this is not the case for delayed marriage. Intuitively one could think that marrying late would reduce the reproductive span and thus reduce fertility. While this might be one possibility, the picture is complicated, particularly in the context of India where even though marriage age has increased, it is, nevertheless, early and unlikely to have significantly shortened the reproductive span. In the remaining part of this section, some of the complexities of the relationship between marriage age and fertility are discussed.

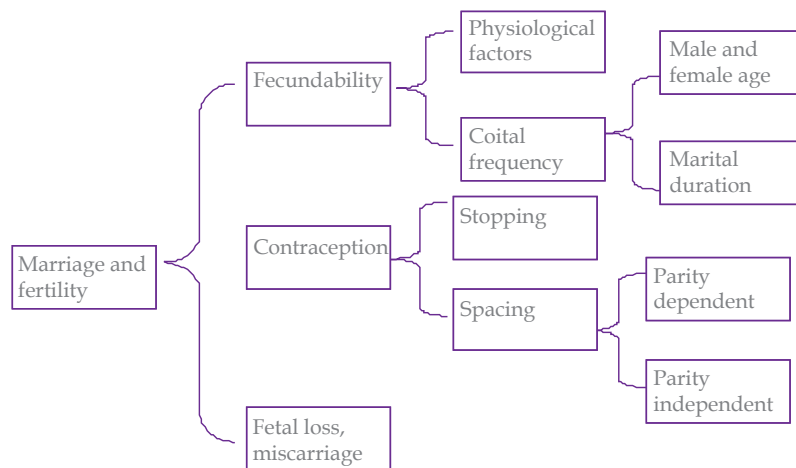
There are two components in the relationship between marriage and fertility: marriage age and marital fertility. Declines in fertility rates could be seen as a function of increases in marriage age or as a result of change in marital fertility. The change in marital fertility should not be related just to marriage age. Marital fertility may have been decreasing for secular reasons that are not necessarily linked to changes in marriage age. Thus, the first task in analyzing the relationship between marriage and fertility is to find the mutual influence of marriage age and marital fertility. This task is carried out later in the paper using a simple decomposition technique.

Though the influence of marriage age and marital fertility can be decomposed analytically, it should be noted that they are independent of each other. Marriage age, for instance, could influence marital fertility. Coale (1992) mentions that the main reason for lower fertility among populations marrying late is their higher level of control of marital fertility. This means that the family-building process differs based on marriage age. The second task of this paper is to determine if the family-building process varies by marriage age in the Indian context, and if so, what the characteristics of these variations are.

The relationship between marriage age and the family-building process could be conceptualized using the framework presented in figure 1. This simple drawing demonstrates the possible pathways; however, not all these pathways are examined in the paper. Some of the elements in

figure 1, like physiological factors, are related to biological age. Sub-fecundity is high at young age and again in old age (Wood, 1994). If marriage occurs during these time periods it could lower the chances of childbirth. Other factors, such as contraception, are not related to biology. In the case of contraception, it could be used either for spacing or stopping further births. The decision to use contraception may also be based on parity (number of children) or be independent of parity. All these factors (stopping versus spacing, parity dependent versus parity independent) could be influenced by marriage age. To illustrate this, women marrying early may have different stopping and spacing patterns than women marrying late. The birth interval dynamics may be different for different marriage age cohorts.

Figure 1. Pathways linking marriage and fertility



The paper focuses on two aspects related to marriage and fertility. First, it examines whether shifts in marriage patterns have had any effect on fertility at both the national and regional (state) level. Second, the paper examines at the microlevel if marriage age has an influence on the family-building process by focusing on the influence marriage age has on birth interval dynamics.

Data and Methods

Data

Data from the two rounds of the National Family Health Survey (NFHS) were used for the analysis. For the decomposition methods, described

in detail in the next subsection, data from NFHS-1 conducted in 1992/1993 and NFHS-3 conducted in 2005/2006 were used. For more detailed analysis of birth intervals, data from NFHS-3, which surveyed 124,385 Indian women aged 15-49, were used. From the dataset, only currently married women who married in the 20 years preceding the survey (1987-2006), were included in the analysis. This choice of women married in the last 20 years instead of considering the entire sample was designed to minimize selection bias. As Rindfuss et al. (1982) note, considering all women from cross-sectional data biases a sample "toward younger ages at initiation, toward the experience of older birth cohorts, and toward the experience of most recent time periods".

The main independent variable in the present analysis is marriage age. Marriage age here means age at effective marriage (i.e. age at which guana is performed or age at which cohabitation starts with the husband), as discussed earlier. Age at which guana is performed or

Table 1. Descriptive statistics by marriage age cohort, India, 2005-06

	Marriage age (years)		
	13-16	17-19	20-30
Education			
No education	58.1	37.9	17.9
Primary	17.3	16.0	9.7
Secondary	24.2	42.9	47.9
Higher	0.4	3.2	24.5
Wealth Index			
Poorest	28.1	17.2	6.8
Poorer	26.3	18.8	9.5
Middle	22.0	20.6	14.7
Richer	15.9	23.9	23.7
Richest	7.6	19.5	45.2
Current residence			
Urban	20.0	31.2	49.7
Rural	80.0	68.9	50.3
Religion			
Hindu	82.1	80.7	79.2
Muslim	14.7	14.7	9.9
Other	3.2	4.6	10.9
Caste			
Scheduled caste	23.1	18.5	13.3
Scheduled tribe	10.5	8.3	5.7
Other backward	43.5	41.3	36.2
None	22.9	31.9	44.8
N	25 965	23 048	15 930

cohabitation begins is used in the analysis. This means that about 0.6 per cent of married respondents who have not yet started cohabitation with their husbands at the time of the survey are excluded from the analysis.

Marriage age could be considered as a continuous variable or as a series of categories. In this analysis, it is treated as a three level categorical variable: women who married between ages 12 and 16; those who married when they were aged 17-19; and those who married between ages 20 and 30. Based on NFHS-3, the percentage distribution of women in each of the above categories is as follows: 39 per cent married between ages 13 and 16; 36 per cent married between 17 and 19; and 25 per cent married between 20 and 30. Of course, any categorization of a continuous variable is bound to be somewhat arbitrary.

Other variables, used in the analysis, are self-explanatory and include education, wealth index (incorporated in the dataset), current residence, region, religion, caste and a number of living sons (for second and higher order birth intervals). Sample data is presented in table 1.

Methods

Three methods have been used in the analysis. First, a decomposition method is used to categorize the changes in fertility according to two factors: marriage age; and marital fertility. Second, Poisson model is used to test the influence of marriage age on total fertility, net of controls. Third, Cox proportional hazard model, a survival analysis technique, is used to examine the influence of marriage age on birth intervals.

To categorize the change in fertility rate between 1992/1993 and 2005/2006, a method described in Retherford and Rele (1989) and in Retherford and Ogawa (1978) papers is used. In this method the change in total fertility rate is “decomposed into two components: changes in nuptiality (age-specific proportions of currently married) and changes in marital fertility (age-specific marital fertility rates)” (Retherford and Thapa, 2004: 725), using age-specific fertility rates, proportion of currently married by 5-year age group and age-specific marital birth rate. The equation could be expressed as:

$$\Delta TFR = 5 \sum \bar{F}_{mx} \Delta P_x + 5 \sum \bar{P}_x \Delta F_{mx}$$

Where Δ represents the change between 1992/1993 and 2005/2006; F_{mx} is the age-specific marital fertility rate; P_x is the proportion currently married in each age group; \bar{F}_{mx} and \bar{P}_x are the averages obtained by summing up the values for 1992-3 and 2005-6 and dividing the sum by 2. Retherford and Thapa (2004) noted that doing so “avoids the presence of residual terms in the decomposition”.

Between 1992/1993 and 2005/2006 when the two surveys were conducted three states in India were divided. The 2005/2006 data for the divided states were combined to match the 1992/1993 boundaries.

Next, Poisson model was used to analyze the influence of marriage age on fertility. Here, fertility was measured as children ever born (CEB). A logarithmic offset was used to control for the variation in exposure time. Exposure time is the time elapsed in years from age at marriage to age at the time of the survey. The model could be expressed as follows:

$$\mu_{iti} = \exp(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p + \ln t_i)$$

Where μ_{iti} is the mean number of children over a period of length t_i ; t_i is the amount of time a woman is at risk; $\ln t_i$ is the logarithmic offset; X_1 to X_p are explanatory variables in the model.

Next, birth interval dynamics are summarized using survival curves. Progression from marriage to first birth and from first birth to $i+1$ birth, with a maximum i of 4 are examined. Survival curves offer an elegant way of visualizing the parity-specific birth interval dynamics. Such curves provide information about both the quantum and time trends of the transition to the next birth.

A detailed multivariate analysis of the influence of marriage age on birth intervals was carried out using discrete-time survival technique. Discrete-time techniques are described in Allison (1982, 1995). The key feature of the discrete-time approach is that each person contributes multiple observations based on the amount of time at risk. For analysis of first birth, time is measured in months and for analysis of higher-order births time is measured in years. The general statistical model can be expressed as follows:

$$\text{logit}(p_{it}/1-p_{it}) = a_t + b_1 X_{it} + \dots + b_k X_{ik}$$

In the case of first birth: p_{it} is the probability that first birth occurs to an individual i at time t , given that she has not had first birth yet; a_t is the function of time t that is to be estimated; $X_{it} \dots X_{ik}$ are a set of covariates; and $b_1 \dots b_k$ are vectors of the coefficients to be estimated.

Results

Marriage and fertility

During the time period under consideration in this paper (between 1992/1993 and 2005/2006) fertility in India declined by 0.71 (or by about 21 per cent) at the national level (see Table 2). However, the pace of

Table 2. Decomposition of the change in total fertility rate between 1992/1993 and 2005/2006, India and major States

(Estimates and percentage)

	TFR			Attributable to change in			
	1992/1993	2005/2006	Change	Marriage	Marital fertility		
India	3.39	2.68	-0.71	-0.21	(29.9)	-0.50	(70.8)
Urban	2.70	2.06	-0.64	-0.21	(33.2)	-0.43	(66.8)
Rural	3.67	2.98	-0.69	-0.18	(26.2)	-0.52	(75.2)
Andhra Pradesh	2.59	1.79	-0.80	-0.40	(50.3)	-0.40	(50.4)
Assam	3.53	2.42	-1.11	-0.06	(5.4)	-1.04	(93.7)
Bihar	4.00	3.83	-0.17	-0.05	(28.3)	-0.13	(74.3)
Gujarat	2.99	2.42	-0.57	-0.01	(2.5)	-0.56	(97.5)
Haryana	3.99	2.69	-1.30	-0.50	(38.1)	-0.80	(61.5)
Karnataka	2.85	2.07	-0.78	-0.25	(32.1)	-0.52	(66.6)
Kerala	2.00	1.93	-0.07	0.08	-(11.5)	-0.15	(215.0)
Madhya Pradesh	3.90	3.00	-0.90	-0.59	(65.6)	-0.31	(35.0)
Maharashtra	2.86	2.11	-0.75	-0.40	(53.3)	-0.35	(46.0)
Orissa	2.92	2.37	-0.55	-0.16	(29.2)	-0.38	(69.9)
Punjab	2.92	1.99	-0.93	-0.23	(24.7)	-0.69	(74.2)
Rajasthan	3.63	3.21	-0.42	0.00	(0.8)	-0.42	(100.4)
Tamil Nadu	2.48	1.80	-0.68	-0.42	(61.9)	-0.26	(38.8)
Uttar Pradesh	4.82	3.77	-1.05	-0.28	(26.2)	-0.78	(74.7)
West Bengal	2.92	2.27	-0.65	0.01	-(1.0)	-0.65	(99.5)

decline varied between states. In states such as Kerala where fertility was low in 1992/1993, the fertility decline was small, as expected. For states that had high fertility in 1992/1993, fertility declined by about 20-30 per cent. However, the major exceptions to this trend were Bihar and Rajasthan, two states that had high fertility in 1992/1993 and a modest (4 and 11 per cent, respectively) decline.

The changes in fertility rates were due to the following two factors: changes in marriage patterns and changes in marital fertility. These are presented in the last two columns of table 2. At the national level, about 30 per cent of the decline is explained by changes in marriage patterns (proportion married) and the rest 70 per cent is explained by changes in marital fertility. In Andhra Pradesh, declines in both the number of marriages and marital fertility contributed equally to the decline in total fertility. In other states, changes in marital fertility played an important role in fertility decline. As can be seen from table 2, in many states decline in marital fertility played a dominant role, accounting for more than 90 per cent decline in fertility. It appears that in West Bengal and Kerala changes in marriage patterns contributed to an increase in fertility, though the increase was small.

Estimates from the analysis of the individual level data, using the Poisson model, are presented in table 3. The Poisson model is estimating the mean number of children. Unadjusted estimates show that the later a woman marries the fewer children she will have. Compared to women who married between the ages 13 and 16, women who married between the ages 20 and 30 will have 19 per cent fewer children. When controls are introduced in the model, marriage age declines in importance. The adjusted estimates show that the fertility is slightly higher (by 2 per cent) for women married between the ages 17 and 19 and slightly lower (by 3 per cent) for women married between the ages 20 and 30.

Table 3. Incidence Rate Ratios (exponentiated Poisson estimates) of children ever born by marriage age cohort

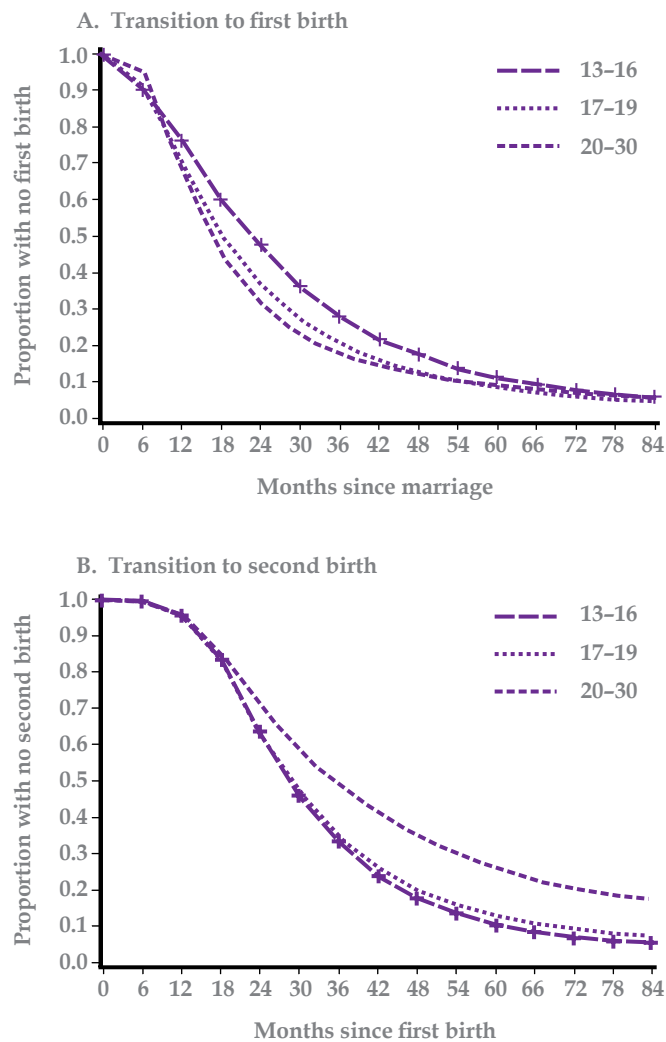
	Unadjusted	Adjusted
Marriage age		
17-19	0.96 **	1.02 **
20-30	0.81 **	0.97 **
(13-16)	1	1
N	59 151	59 151

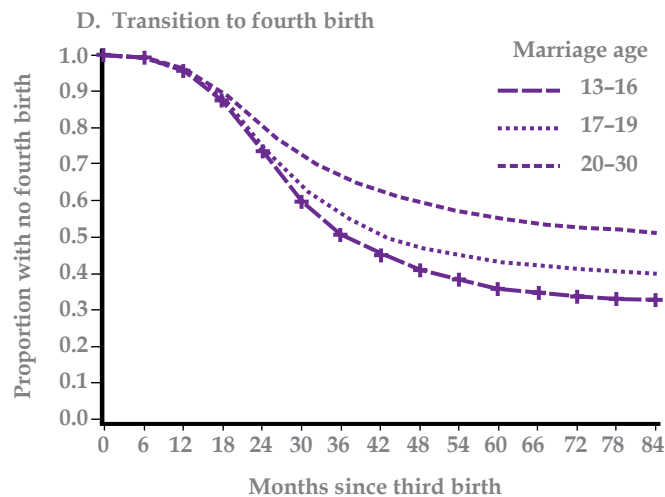
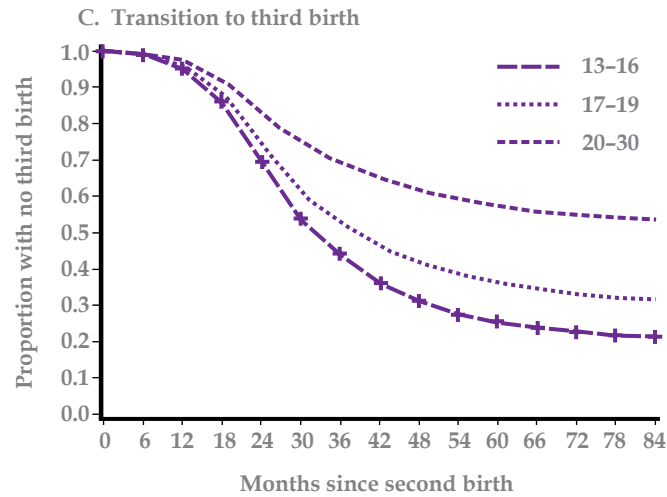
Note: Estimates in the adjusted model are net of the following variables: education; wealth index; residence; region; religion; and caste.

Nuptiality and birth intervals

Life table estimates of birth intervals for the three marriage cohorts are presented in the form of survival curves in figure 2. The curves clearly show that women marrying early delay their first birth but have shorter intervals for subsequent births, and this difference widens for higher parities. In the case of first birth, only 30 per cent of women who married between the ages 20 and 30 had no first birth at the end of two years of

Figure 2. Transition to births by marriage age cohort, survival estimates, India 2005-2006





marriage, while 46 per cent of those married between the ages of 13 and 16 had no first birth at the end of the second year of marriage. Five years after second birth, 56 per cent of those married between the ages of 20 and 30 had no third birth compared to about 27 per cent of those who married between the ages of 13 and 16. Overall, survival estimates show that although those marrying early delay entry into childbearing, after the first birth they transition more rapidly to higher order births.

Table 4 presents adjusted odds of transition to next birth for nulliparous women and women at parity one, two, and three (i.e. first, second, third, and fourth birth interval, respectively). The first column presents

Table 4. Transition to next birth for nulliparous women and women at parity one, two and three

	First birth	Second birth	Third birth	Fourth birth
Marriage age				
17-19	1.21**	1.004	0.88**	0.95 *
20-30	1.24**	0.79**	0.69**	0.88**
(13-16)	1	1	1	1
Education				
Primary	1.01	0.99	0.76**	0.68**
Secondary	1.02	0.84**	0.57**	0.57**
Higher	0.91**	0.53**	0.29**	0.3**
(No education)	1	1	1	1
Wealth Index				
Poorer	1.04 *	0.98	0.99	0.9**
Middle	1.04 *	0.95 *	0.93**	0.81**
Richer	1.06**	0.99	0.83**	0.68**
Richest	1.08**	0.77**	0.56**	0.44**
(Poorest)	1	1	1	1
Current residence				
Urban	1.04**	0.92**	1.03	1.05+
(Rural)	1	1	1	1
Region				
North	0.92**	1.28**	2.44**	2.58**
East	1.01	0.85**	1.74**	2**
West	0.96**	1.18**	2.01**	1.66**
(South)	1	1	1	1
Religion				
Hindu	0.86**	0.8**	0.63**	0.56**
Other	1.03	0.91**	0.65**	0.57**
(Muslim)	1	1	1	1
Caste				
Scheduled tribe	0.98	0.98	1.06 *	1.05
Other backward	0.95**	1.001	0.96 +	1.01
None: forward	0.97 *	0.89**	0.75**	0.8**
(Scheduled caste)	1	1	1	1
Number of sons				
1		0.91**	0.65**	0.63**
2			0.53**	0.39**
3				0.47**
(0)		1	1	1
Time (in years)	1.04**	5.23**	5.32**	6**
Time square	1**	0.84**	0.81**	0.79**
N	1 392 255	180 657	176 661	104 271

Note: N- person months for first birth and person years for second, third and fourth births.

estimates for first birth interval. The estimates show that older marriage cohorts have higher odds of having first birth (i.e. shorter birth intervals) than younger marriage cohorts. For instance, women married between the age of 17 and 19 are 21 per cent more likely to have a first child than those married between the age of 13 and 16 years. A similar difference, 24 per cent, can be seen between women married between the ages of 20 and 30 and those married between the ages of 13 and 16, net of other factors in the model. This pattern is consistent with survival graphs presented earlier. It is clear that those marrying at a younger age have a longer first birth interval.

The next three columns present the estimates for second, third and fourth birth interval. In contrast with the first birth interval, the estimates for higher-order birth interval show that older marriage cohorts have lower odds for a transition to the next birth (i.e. a longer second, third or fourth birth interval) than younger marriage cohorts. For instance, those married at ages 20-30 years are 21 per cent less likely to transition to the second birth than those who married at ages 13-16 years. Third and fourth birth models reveal a pattern similar to second birth interval, i.e. longer birth intervals (or lower odds of having a next birth) among older marriage cohorts. The odds for a transition to third and fourth birth for women married between the ages of 20 and 30 are 31 and 12 per cent lower, respectively, than the odds for those married between the ages of 13 and 16.

Though the focus of the paper is on the age of marriage, some interesting findings that are not directly related to marriage age are worth noting. All three models indicate that a higher number of living sons at each parity reduces the odds of a next birth (i.e. lengthens the birth interval). For instance, having two sons at parity two decreases the odds of having a third birth by nearly half, and having two sons at parity three decreases the odds of a fourth birth by nearly three-fifths. Also, there is the expected effect of education whereby with increasing education levels the odds for a transition to a next birth decreases at all parities. However the influence of wealth is not consistent across all parities. Although the difference between the richest and poorest households is evident for all parities, differences among other groups are only present at higher parities. There are also regional differences in birth interval. Southern women have longer birth intervals than women in other regions, except for the second birth interval, for which women in the eastern region have the longest birth interval.

Discussion

Nuptiality and fertility are closely interlinked, especially in societies where out-of-marriage childbearing is not socially acceptable. Even in societies where non-marital childbirth does not carry any stigma, getting

married is still considered a step towards motherhood. The decision to get married may, of course, depend on a variety of factors besides those directly related to childbearing. However, as seen in some low-fertility countries in East Asia and the Pacific where fertility has fallen dramatically, marriage is increasingly delayed and non-marriage has gained prominence, suggesting that marriage, if not causally related, nevertheless has a strong influence on fertility.

Evidence from India, presented in this paper, demonstrates a mixed picture. Changes in marriage patterns have contributed to declines in fertility at the national level. However, changes in marital fertility have had a far more significant effect on the fertility decline, ranging from 70 per cent at the national level to more than 90 per cent in some States. Furthermore, analysis using individual data shows that the influence of marriage age is indeed very small when other factors are adjusted for. Thus, at least in the Indian context, it appears that marriage age has had a less influential role in reducing fertility.

Compared to substantial influence of marital fertility, marriage age seems to have had limited influence. One reason for this may be the Indian population policies' emphasis on stopping behaviour (mainly female sterilization) rather than spacing. Marriage delay as a mechanism to reduce fertility has not been promoted vigorously in India. This is in contrast with the Chinese population policy, which explicitly includes marriage delay in the later-longer-fewer policy (later stands for marrying late, longer stands for longer birth intervals, fewer stands for fewer children). It appears that the potential for delay in marriage age, as an effective tool for fertility control, has not been realized in India.

In addition to fertility, the paper also examined the marriage and birth interval dynamics. When it comes to the first birth interval, women who marry early wait longer than those marrying late. As Dommaraju (2010) has noted, this could be due to social and cultural factors that regulate sexual behaviour and the consummation of marriage. For the second and higher-order birth intervals the pattern is reversed with women marrying later having longer birth intervals than those marrying early. The current analysis makes it difficult to understand whether this pattern reflects spacing or stopping behaviour and, given the popularity of sterilization, it is likely that it occurs because of stopping behaviour.

There are two policy implications that stem from the findings. One is the need for population policy in India to acknowledge and promote late marriage age as a tool for fertility reduction. Such a policy would be effective in curbing population growth. The current population policy, which focuses on sterilization, pushes up the period of fertility, among other pitfalls (Matthews et al., 2009). A policy that promotes later marriage and spacing of births would contribute to a reduction in popula-

tion growth. The second implication relates to reproductive and maternal health. A recent study by Raj et al. (2009) mentions the many health issues faced by those marrying young. Although women who marry at a younger age delay their first birth, they have shorter subsequent birth intervals, putting them at a higher risk of maternal and reproductive morbidity. Thus a policy, promoting later marriage, could achieve the goal of population stabilization along with the benefit of better reproductive, maternal and child health.

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The Effect of Maternal Nutrition and Reproductive Morbidity on Waiting time to Next Conception in Rural Karnataka, India

This paper is an attempt to understand the role of maternal nutrition and reproductive morbidity on waiting time to next conception among rural women in northern Karnataka, India. The study is based on the births that occurred from July 2003 to June 2004 in 54 villages and on a series of follow-up visits to the women who bore these births. The education of the woman and husband, occupation of the husband, religion/caste, age at effective marriage of the woman, age of the woman at child birth and order of birth, haemoglobin level, body mass index and waist-hip ratio and reported RTI/STI symptoms are all significantly related to waiting time to next conception. Based on the data there does not seem to be a relationship between nutritional status and reproductive morbidity in the incidence of spontaneous abortion (safe and unsafe) and still births. Overall, maternal nutrition and reproductive morbidity factors appear to only have a marginal effect on waiting time to next conception in the area of study.

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The second and third National Family Health Surveys, conducted during 1998/1999 and 2005/2006 respectively, have estimated that the

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median closed birth interval in India was 31 months and it varied only between 29 and 35 months in different states (IIPS and ORG Macro, 2000; IIPS and ORG International, 2007). For the state of Karnataka, it was around 30 months and it had not changed substantially between the two surveys conducted seven years apart. In the rural areas of the Dharwad district of Karnataka, the mean interval between two successive live births was estimated to be 32 months for the late 1990s (Hutter and others, 2006). By considering a gestation period of nine months for a live birth, the waiting time to next conception (the interval between a live birth and the next conception) is 23 months or about 2 years. The postpartum amenorrhea (the period in which a woman does not menstruate following child birth) accounted for only nine months (Hutter and others, 2006). Therefore, the waiting time to next conception after allowing for the duration of postpartum amenorrhea is about 14 months or a little over a year.

Two other important components of waiting time to next conception are postpartum sexual abstinence and postpartum contraception. Studies have shown that very few women (two to five per cent only) in rural areas of India and also in the Dharwad district use spacing methods with a view to delaying their next child birth (Rajaretnam and others, 2006; Hutter and others, 2006; IIPS and ORG Macro, 2000; IIPS and ORG International, 2007; Zavier and Padmadas 2000). Further, the period of postpartum sexual abstinence in most cases is shorter than the period of postpartum amenorrhea. So these two factors are not expected to explain any significant part of the duration of waiting time to next conception over and above the contribution made by postpartum amenorrhea.

The question now is: "Why do women take such a long time (more than one year on the average) before conceiving their next child even if they are fully exposed to opportunities for conception?" One possible explanation is the low fecundity (capacity to conceive) of rural women. The majority of rural women are mal-or-under-nourished and have reproductive morbidity problems that contribute to their low fecundity, and, hence a longer interval between child birth and the next conception. However, specific studies on the effect of maternal nutrition and reproductive morbidity on the waiting time to the next conception are rare. Poor nutritional status may affect birth/conception intervals in two ways: by lengthening the postpartum amenorrhea and by reducing the fecundity of the woman (Peng and others, 1998; Aguirre, 2008; Lunn and others, 1984; Prema, 1980; Tracer, 1996; Lunn and others, 1981; Ford and Huffman, 1988). However, some studies have shown that poor nutrition lengthens birth/conception interval only by very little and/or only in extreme cases of under-nutrition (Bongaarts, 1980; Awang, 2000; Menken and others, 1981).

Socioeconomic and demographic factors can influence waiting time to the next conception or birth only through such factors as postpartum

amenorrhoea, abstinence, contraceptive use, maternal nutrition and reproductive morbidity. More studies are therefore required to understand the effect of maternal nutrition and reproductive morbidity on waiting time to the next conception, taking into account postpartum amenorrhoea, postpartum abstinence and postpartum contraception, and demographic and socioeconomic factors. Thus, the objective of this paper is to investigate the determinants of waiting time to the next conception with particular reference to nutritional status and the reproductive morbidity of women.

Theoretical considerations

Back in the mid-1950s, Davis and Black (1956) provided a comprehensive framework for the analysis of the determinants of fertility. They classified the reproductive process in three stages, namely, exposure to intercourse, exposure to conception, and gestation and successful parturition. They also identified 11 factors called 'intermediate variables' under these three stages. As we are concerned with waiting time to the next conception among married women, the first two stages only, "exposure to intercourse" and "exposure to conception", are applicable and the intermediate variables that are relevant to our issue from the list of Davis and Black (with the serial numbers) are: (4) Voluntary abstinence, (5) Involuntary abstinence (from impotence, illness, unavoidable but temporary separations), (6) Coital frequency (excluding periods of abstinence), (7) Fecundity or infecundity, as affected by involuntary causes, (8) Use or non-use of contraception, and (9) Fecundity and infecundity, as affected by voluntary causes (sterilization, subincision, medical treatment, etc).

Technically, the waiting time to conception depends on whether the woman is menstruating (regularly or irregularly), whether the menstrual cycle is ovulatory (fecundity), whether coitus (intercourse) takes place during the fertile period of the ovulatory menstrual cycle, whether the ovum is fertilized once coitus has taken place, and whether conception is recognizable (use or non-use of contraception) given that fertilization occurred (Becker, 1993). Only the factors 'coitus' and 'contraceptive use' are voluntary and most of the other factors are biological in nature and largely dependent on the nutritional and reproductive morbidity condition of the woman. For example, the probability that a menstrual cycle is ovulatory is determined to a large extent by the age of the woman and the regularity of her menstrual cycle (Spira and others, 1993). The probability that coitus leads to fertilization depends on the frequency of intercourse and use of contraception. It is to be noted that as sterilization prevents all further conceptions, it is not considered in this exercise.

Data and method

The paper makes use of data collected in a prospective study conducted in rural areas in the Dharwad district of Karnataka, India. The study was launched in 54 villages and comprises data from 17,000 households. The study included enumeration of all births that occurred during the one-year reference period which was from July 2003 to June 2004 as well as a series of follow-up visits to the women who gave birth. The enumeration cum baseline survey commenced in July 2004 and continued for about three months. Altogether 1,866 live births were reported during the reference period (irrespective of place of delivery) in the 54 villages and 1,750 (94 per cent) women were interviewed with a baseline questionnaire. As we are dealing with children born to these women earlier and also later, the children born to these women during the reference period (from July 2003 to June 2004) are often referred to as 'index children' and their mothers are referred to as 'target women' in this paper.

The first follow-up visit started in October 2004 and continued for about four months. For the subsequent follow-up visits, women who were sterilized, widowed, divorced or separated were not included, and as a result the duration of subsequent follow-up visits reduced slowly. In total, seven rounds of follow-up visits were made until June 2007. The maximum period of observation was 48 months or four years (July 2003 to June 2007). Among the 1,750 women interviewed with the baseline questionnaire, 1,665 (95 per cent) received at least one follow-up visit.

Anthropometric and haemoglobin measurements were made twice, during the first and second rounds of follow-up visits. During the second round, if a woman was found pregnant for more than 3 months her measurements were discarded and only the first-round measurements were used. However, for the few women who were pregnant during the first round, the measurements were used with appropriate adjustments. Similarly, for the few women who already had the next pregnancy terminated, their measurements were used. For women with only one valid measurement that was used and for women with two valid measurements, the average of the two measurements was taken. With respect to reproductive morbidity, due to difficulties in having detailed medical assessments, it was decided to confine enquiries to symptoms of reproductive tract infections (RTI) and sexually transmitted infections (STI) only. Following the National Family Health Survey-2 questions on RTI/STI symptoms (IIPS and ORC Macro, 2000), the reproductive morbidity related symptoms enquired in this study included burning sensation, pain or difficulty while urinating, pain in lower abdomen or vagina during intercourse, any abnormal vaginal discharge, whether the vaginal discharge was associated with itching or ulcers and any severe lower abdominal pain or fever. The questions were asked during each visit starting from the baseline survey.

The other major components of waiting time to next conception considered are postpartum amenorrhea, postpartum sexual abstinence and postpartum contraceptive use. As these variables are time-dependent, a life table technique for censored data was used to estimate the proportion continuing event (amenorrhea, abstinence and contraception) at different duration intervals as well as the mean and median duration of the events. The indices were derived separately for all women and for non-sterilized (and non-widowed) women who received at least one follow-up visit (since anthropometric measurements were made from the first follow-up visit only). With the objective of estimating these durations after adjusting for background variables (standardization process) across different groups of women, a proportional hazards model was applied. Accordingly, separate proportional hazards models were fitted for postpartum amenorrhea, postpartum abstinence and waiting time to the next conception, incorporating selected background variables.

A note on the application of proportional hazards model

The proportional hazards model estimation procedure adopted in this paper is briefly explained below. The proportional hazards model assumes that the time to event (say, birth-to-next-conception) and the covariates (nutritional status, reproductive morbidity and socioeconomic background) are related through the following equation.

$$\lambda_i(t) = \lambda_0(t) e^{b_0 + b_1 x_{i1} + b_2 x_{i2} + \dots + b_p x_{ip}}$$

Where $\lambda_i(t)$ is the hazard rate for the i^{th} case at time t

$\lambda_0(t)$ is the baseline hazard rate at time t
(Independent of covariates and common to all cases)

x_{ij} is the value of the i^{th} case of the j^{th} variable ($i=1$ to n cases)

b_j is the regression coefficient of the j^{th} variable ($j=1$ to p variables)

b_0 is the constant term in the regression model.

The hazard function $\lambda_i(t)$ is a measure of the potential for the event (birth-to-next-conception) to occur at a particular time t (since the previous child birth), given that the event has not yet occurred. A larger value of the hazard function is an indication of greater potential for the event (next conception) to occur. While the baseline hazard is dependent upon time and not covariates, the covariates effect is the same for all time

points. That is, the covariate effect on the hazard (the potential for the birth-to-next-conception) is independent of time. Hence the value of the hazard $\lambda_i(t)$ is equal to the product of the baseline hazard $\lambda_0(t)$ and the covariates' effect.

The ratio of the hazards for any two cases in any given time period is the ratio of their covariates' effects. This is the proportional hazards assumption. That is for two observations, say, i and k ,

$$\frac{\lambda_i(t)}{\lambda_k(t)} = \frac{\lambda_0(t)e^{b_0+b_1x_{i1}+b_2x_{i2}+\dots+b_px_{ip}}}{\lambda_0(t)e^{b_0+b_1x_{k1}+b_2x_{k2}+\dots+b_px_{kp}}} = \frac{e^{b_0+b_1x_{i1}+b_2x_{i2}+\dots+b_px_{ip}}}{e^{b_0+b_1x_{k1}+b_2x_{k2}+\dots+b_px_{kp}}}$$

Suppose the difference between i^{th} and k^{th} observations is only a difference of one unit for the x^{th} variable, that is $x_{ix} = x_{kx} + 1$, and no difference in all other variables, that is $x_{i1} = x_{k1}$, $x_{i2} = x_{k2}$, ..., $x_{ip} = x_{kp}$. Then

$$\frac{\lambda_i(t)}{\lambda_k(t)} = \frac{e^{b_x x_{ix}}}{e^{b_x x_{kx}}} = \frac{e^{b_x(x_{kx}+1)}}{e^{b_x(x_{kx})}} = e^{\{b_x(x_{kx}+1)\} - \{b_x(x_{kx})\}} = e^{b_x}$$

The quantity e^{b_x} or in general e^b (to mean the effect of one-unit change in a covariate) is called the *relative risk* of the corresponding covariate (variable). A positive value of b is an indication of a relatively higher risk for a one-unit increase in the covariate and a negative value of b is an indication of a relatively smaller risk for a one-unit increase in that covariate, on the occurrence of the event (next conception) at any given time interval.

The covariates included are a combination of a woman and her husband's educational level, the occupation of the husband, religion/caste, the woman's age at marriage, a combination of the age of the woman at child birth and the order of birth, the woman's haemoglobin level, body mass index, waist-hip ratio, and RTI/STI symptoms. The adjusted figures were derived from the proportional hazards model by keeping the independent variables (covariates) at their respective mean values. The list of variables included in the proportional hazards model is shown in Table 5. As far as the components of waiting time to next conception (amenorrhoea, abstinence and contraception) are concerned, the interest was not in analyzing the contribution of the background variables on these components but in estimating their durations after adjusting for the background variables. As such, a detailed analysis of the contribution of the covariates on the components of waiting time to next conception is not made.

Demographic Situation

As of the date of the last follow-up visit, the proportion of women sterilized was 31 per cent, among the non-sterilized women the proportion of women who had ever used a temporary contraceptive method was 12 per cent, the proportion of non-sterilized women who become pregnant

for the next time was 68 per cent, and the proportion of pregnant women terminating the pregnancy with a live birth was 59 per cent.

The crude birth rate for the one year reference period from July 2003 to June 2004 was 20.33 and the infant mortality rate per 1000 live births (estimated based on the life table technique) was 17.85. Both are considered very low as far as the region of study is concerned. The contraceptive prevalence rate (CPR) was 52.6 per cent, among which 52.0 per cent was due to the acceptance of permanent methods and 0.6 per cent due to the use of spacing methods. Among the women who had a live birth during the reference period, 8.3 per cent had used a temporary contraceptive method, including five women who used a temporary method before being sterilized. Based on the life table technique, the cumulative proportion of women sterilized was estimated at 17 per cent within a month of birth of the index children (reference period births), 26 per cent within three months, 28 per cent within six months, 29 per cent within a year, and 33 per cent within four years. This indicates that about 80 per cent of the sterilizations took place within three months following the child birth.

Among the target women (women who had a birth during the reference period), only 13 per cent were married by age 13 but by age 15 the proportion of married women increased to 50 per cent. The proportion of women married at age 18 (legal minimum age) or later was below 25 per cent and the proportion married at age 20 or later was just eight per cent. Among the index children (children born during the reference period), 52 per cent were male and 48 per cent were female. About one-third of the index children were first-born children (first order births), another one-third were second order births and the remaining one-third were third or higher order births. However, a large majority (63 per cent) of the index children of sterilized women were males and 68 per cent were third and higher order births. Among the 1,750 women who received at least one follow-up visit, 86 per cent were Hindus, 11 per cent were Muslims and less than three per cent were Jains including two Christians. With respect to education, 51 per cent of the target women and 38 per cent of their husbands were illiterate. With respect to occupations, nearly half of the women (48 per cent) were homemakers, 30 per cent were cultivators (working on family farms), another 18 per cent were agricultural labourers and the rest (four per cent) were in other occupations.

Nutritional status and reproductive morbidity

Table 1 gives nutritional status (Hb level, Body Mass Index and Waist-hip ratio) and reproductive morbidity (RTI/STI) indicators for all women and for women who were not sterilized and who received at least one follow-up visit. The women were classified based on their Hb level as severe/moderately anaemic (Hb level less than nine g/dl), mildly anaemic (Hb level nine g/dl to less than 11 g/dl) and not anaemic or normal (Hb level 11 g/dl or higher).

Among all women, 20 per cent were normal (or not anaemic), 65 per cent were mildly anaemic and 15 per cent were moderately or severely anaemic. Among non-sterilized women only 14 per cent were normal, 70 per cent were mildly anaemic and the remaining 15 per cent were moderately or severely anaemic. In general, most of the women in the study population were mildly or moderately anaemic. The proportion of obese women was below five per cent. On the other hand, chronic energy deficiency was found to be common (42 per cent). The proportion of women found to be normal as per the BMI index was 54 per cent. The pattern is the same for all women and for non-sterilized women who received at least one follow-up visit. Central obesity is measured in terms of the ratio of waist and hip circumferences. According to this measure, only 17 per cent of the women were in a state of central obesity. The proportion of central obesity was the same for all women and for non-sterilized women who received at least one follow-up visit.

Table 1. Nutritional status (Hb level, Body Mass Index and Waist-hip ratio) and reproductive morbidity (RTI/STI symptoms) for all women and for women followed up and not sterilized

Nutrition and morbidity particulars	All women *		Women not sterilized and at least one follow-up	
	Number	Percent	Number	Percent
Hb level (g/dl) of woman				
Severe/moderate Anaemia (<9)	240	14.7	169	15.3
Mild Anaemia (9.0-10.9)	1 070	65.6	776	70.4
Normal (11.0+)	321	19.7	158	14.3
Total	1 631	100.0	1 103	100.0
Body Mass Index (kg/m²)				
Chronic Energy Deficiency (<18.5)	677	41.5	471	42.7
Normal weight-for-Height (18.5-24.9)	883	54.1	587	53.2
Obesity (25.0+)	71	4.4	45	4.1
Total	1 631	100.0	1 103	100.0
Waist-Hip ratio (W/H)				
Normal/Low (<0.8)	1 360	83.4	918	83.2
Central obesity (0.8+)	271	16.6	185	16.8
Total	1 631	100.0	1 103	100.0
Any RTI/STI symptoms				
No	1 342	76.7	810	71.6
Yes	408	23.3	321	28.4
Total	1 750	100.0	1131	100.0

* Women for whom information was not available are excluded.

With respect to reproductive morbidity, overall 23 per cent of the women reported at least one symptom of RTI/STI during the time following the birth of the index child until sterilization, the next conception, or the last visit, whichever was first. The proportion of women who reported symptoms was higher at 28 per cent among non-sterilized women who received at least one follow-up visit. Among the symptoms reported, burning sensation, pain or difficulty during urinating were the problems mentioned most often, followed by abnormal vaginal discharge and discharge with pain in lower abdomen or fever (table not shown).

Components of waiting time to next conception

In this section we discuss the components of the waiting time to the next conception namely postpartum amenorrhea, postpartum sexual abstinence and postpartum contraception. Table 2 gives the unadjusted and adjusted percentage of women who were still in amenorrhea, practicing sexual abstinence and using contraception at different intervals since the index child birth as well as the mean and median durations, based on the life table analysis. It is to be noted that the adjusted figures are based on the proposal hazards model with selected socioeconomic and demographic variables as control variables.

Postpartum Amenorrhea

The life table analysis of the data showed that overall, irrespective of contraceptive use status and follow-up visit, 81 per cent were in amenorrhea (PPA) at the end of three months (of index child birth), 66 per cent at the end of six months and 51 per cent at the end of nine months. However, the proportion of women still in PPA at the end of 12 months was only 36 per cent. At the end of 18 months, the percentage dropped to below 10 per cent. The mean duration of PPA was 9.8 months and the median duration was 9.3 months. For women who were not sterilized and received at least one follow-up visit, the proportion still in amenorrhea at the end of three months was 78 per cent and at the end of 12 months was 32 per cent. The mean duration of PPA was 9.3 months and the median duration was 8.3 months. That is, as compared to all women, the mean duration of PPA was half-a-month less and median duration was one month less for non-sterilized women who received at least one follow-up visit. The adjusted mean duration of PPA was nine months, which is just 0.2 months less than the unadjusted mean duration. However, the median duration was 8.4 months which is 0.1 months higher than the unadjusted median duration.

Table 2. Unadjusted and adjusted percent of women still in amenorrhea, in abstinence and in contraception at different duration intervals since index child birth, and mean and median durations, based on life table analysis

Interval since index child birth (in months)	Postpartum amenorrhea (all women)	Non-sterilized women who received at least one follow up visit				
		Postpartum amenorrhea	Postpartum abstinence	Postpartum amenorrhea or abstinence	Temporary contraception*	Amenorrhea, abstinence, or contraception
Unadjusted						
3	80.5	78.1	87.8	96.1	85.5	96.6
6	65.7	62.1	22.0	68.7	74.7	72.3
9	51.2	46.8	9.2	50.2	60.7	55.1
12	35.7	31.6	3.9	33.6	48.9	38.4
18	9.7	8.6	0.7	9.2	35.2	72.3
24	2.6	2.9	0.3	3.0	21.8	55.1
36	1.1	1.1	0.2	1.3	11.8	2.6
Mean	9.76	9.27	5.41	10.29	15.80	11.38
Median	9.25	8.31	4.83	9.04	11.73	10.06
Adjusted **						
3	***	78.8	87.9	96.3	89.5	96.8
6	***	62.6	20.1	69.1	80.1	72.8
9	***	47.1	7.9	50.6	65.9	55.7
12	***	31.3	3.1	33.4	51.7	38.8
18	***	7.3	0.4	7.8	33.1	12.1
24	***	2.2	0.1	2.4	14.5	4.7
36	***	0.8	0.0	0.9	4.1	2.0
Mean	***	9.04	5.24	10.02	14.46	11.21
Median	***	8.42	4.80	9.11	13.28	10.19
Valid cases	1 665	1 103	1 103	1 103	131	1 103
Censored cases	43	30	4	32	23	55

* Taken as initiated at birth of the child though it might have been started at any time during postpartum amenorrhea, or abstinence, or even later.

** Adjusted by applying a proportional hazards model for the educational level of the woman and her husband (combined); occupation of husband; religion/ caste; effective age at marriage of woman; age of woman at child birth and order of birth combined; haemoglobin level, body mass index and waist-hip ratio; and RTI/STI symptoms reported.

*** Not applicable

Postpartum Sexual Abstinence

Though postpartum sexual abstinence is a factor in the waiting time until the next conception, it is the duration that is not interacting with postpartum amenorrhea that matters. So an estimate of total duration of postpartum sexual abstinence and the duration not interacting with postpartum amenorrhea is also obtained (discussed later). Among non-sterilized women who received at least one follow-up visit, only 12 per cent reportedly resumed sexual relations within three months (of index child birth), but by the end of six months nearly 78 per cent had resumed sexual relations. Only four per cent of women had not resumed sexual relations 12 months after birth of the child. The mean duration of postpartum sexual abstinence worked out to 5.4 months and the median duration 4.8 months. The adjusted mean duration of sexual abstinence was 5.2 months which is just 0.2 months less than the unadjusted mean duration. However, the median duration was 4.8 months which is the same as the unadjusted median duration.

Postpartum Contraception

Though acceptance and duration of use of a contraceptive method is a factor in the waiting time to the next conception, it is the duration that is not interacting with postpartum amenorrhea and postpartum sexual abstinence that matters. However, if contraception was not initiated before or soon after the cessation of amenorrhea and abstinence periods, there is a risk of the woman becoming pregnant and not initiating contraception at all. In our data on the use of temporary contraceptive methods, only 12 per cent initiated a method at least two months earlier to the cessation of amenorrhea and abstinence periods, 55 per cent initiated it at or just within/before a month of cessation of amenorrhea/abstinence, 23 per cent initiated it at two to four months after the cessation of amenorrhea/abstinence period and the remaining 10 per cent initiated it later. However, as our interest is on the waiting time to the next conception we have considered the interval since child birth. Accordingly for women who received at least one follow-up visit and initiated a temporary contraceptive method after child birth, the mean duration to discontinue the method since the birth of the index child was 15.8 months and the median duration was 11.7 months. However, the adjusted mean duration was 14.5 months, which was approximately 1.3 months shorter than the unadjusted duration. On the other hand, the median duration was 13.3 months, which was 1.6 months longer than the unadjusted median duration.

Overlap of amenorrhea, abstinence and contraception

Postpartum amenorrhea and postpartum sexual abstinence both start at child birth and end at different duration intervals but the one with the

longer duration is the one that matters as far as waiting time to the next conception is concerned. Among non-sterilized women who received at least one follow-up visit, the amenorrhea period was longer than the abstinence period for 63 per cent and shorter for 29 per cent of women. For the remaining eight 8 per cent of women both durations were the same including a few cases (0.3 per cent) of women who were still in amenorrhea and/or abstinence at the last follow-up visit (table not shown). The proportion of women still in amenorrhea or abstinence and the proportion of women still in amenorrhea or abstinence or contraception at different duration intervals, and mean and median durations are also presented in Table 2. The proportion of women still in amenorrhea or abstinence was 69 per cent at the end of six months, 34 per cent at the end of 12 months and just three per cent 24 months after child birth. The mean duration of postpartum amenorrhea and/or sexual abstinence was 10.3 months and the median duration was nine months. The adjusted figures do not differ from the unadjusted figures. Similarly, the postpartum amenorrhea, postpartum sexual abstinence and postpartum contraception overlap shows that the proportion of women still in amenorrhea or abstinence or contraception was 72 per cent six months after child birth, 38 per cent at 12 months, and just five per cent after 24 months. The mean duration was 11.4 months and the median duration was 10.1 months. The unadjusted and adjusted durations were almost the same.

Waiting time to the next conception

In this paper we consider three types of waiting times to the next conception. These are (a) gross; (b) effective; and (c) net waiting times. A 'gross' waiting time is defined as the interval between the birth of a child and the next conception, an 'effective' waiting time refers to the interval between resumption of menstruation (termination of amenorrhea) after a live birth and the next conception. Whereas 'net' waiting time is defined as the interval between termination of postpartum amenorrhea, abstinence and contraception (whichever is later) and the next conception.

Gross waiting time to next conception

Table 3 gives the percentage of women becoming pregnant at different duration intervals since the birth of the index child, as well as the mean and median durations of time before the next conception, based on the life table analysis. The analysis was done for all women, for non-sterilized (regardless of follow-up visit) and non-sterilized women who received at least one follow-up visit. The adjusted figures are based on the proportional hazards model by controlling selected background variables. For sterilized women, the duration of observation was taken as the longest duration of 48 months as they cannot become pregnant after sterilization.

Table 3. Percent of women becoming pregnant at different duration intervals since index child birth and mean and median durations of waiting time to next conception based on life table analysis

Interval since index child birth (in months)	Waiting time to next conception			
	All women (including sterilized women)	Non-sterilized women (irrespective of follow up visit)	Non-sterilized women who received at least one follow-up visit	Non-sterilized women who received at least one follow-up visit (Adjusted)*
3	0.3	0.4	0.4	0.4
6	1.5	2.2	2.3	2.1
9	4.4	6.5	6.6	5.9
12	9.8	14.5	14.7	13.6
18	26.3	39.1	39.3	38.1
24	39.0	58.3	58.4	58.2
36	49.1	75.3	75.4	76.7
48	50.1	78.3	78.4	79.7
Valid Cases	1 750	1 199	1 131	1 103
Mean	NA	25.42	25.37	24.94
Median	NA	21.12	21.07	21.28

* Adjusted as specified under Table 2.

Among women who were not sterilized, two per cent became pregnant within six months after the birth of the index child. The proportion of women who become pregnant within 12 months was 15 per cent and within 24 months was 58 per cent. However, the proportion of women who become pregnant within 36 months was 75 per cent and within 48 months was 78 per cent. The increase in the cumulative proportion of women becoming pregnant was much less until a period of one year since the previous child birth, substantial in the second year, less in the third year, much less in the fourth year, with the percentage being negligible thereafter. For all women in the study, the proportion of women becoming pregnant within 12 months of the previous child birth was ten per cent, within 24 months, 39 per cent and within 36 months, 49 per cent. The proportion of women becoming pregnant later was much less or negligible (approximately one per cent). Thus, the data shows that among women who gave birth to a child during the reference period, only about 50 per cent have had another child and about one-third have undergone a sterilization operation.

A supplementary survey was conducted during the second round of follow-up visits on various aspects of additional family size, and showed

that among women who did not become pregnant by the second round of follow-ups, only about two-thirds (or about 12 per cent of all women) wanted to have another child. The remaining one-third did not want to have another child or had not given it any thought (table not shown). This indicates that women who did not become pregnant four years after the birth of their first child were highly unlikely to have any more children.

Gross and net waiting times until the next conception

Table 4 provides information on the unadjusted and adjusted mean and median durations of amenorrhea, abstinence and contraception as well as the time before the next conception occurred, based on the proportional hazards model life table analysis of non-sterilized women who received at least one follow-up visit.

Table 4. Unadjusted and adjusted mean and median durations of amenorrhea, abstinence and contraception, and in combination, and time until the next conception occurred, based on proportional hazards life table analysis of non-sterilized women who received at least one follow up visit

Particulars	Unadjusted		Adjusted	
	Mean	Median	Mean	Median
Duration since live birth:				
Postpartum amenorrhea	9.27	8.31	9.04	8.42
Postpartum abstinence	5.41	4.83	5.24	4.80
Longer duration of postpartum amenorrhea and abstinence	10.29	9.04	10.02	9.11
Postpartum contraception	15.80	11.73	14.46	13.28
Longer duration of postpartum amenorrhea, abstinence and contraception	11.38	10.06	11.21	10.19
Waiting time to next conception:				
Total duration (gross duration)	25.37	21.07	24.94	21.28
After amenorrhea (effective duration)	16.10	12.76	15.90	12.86
After abstinence	19.96	16.24	19.70	16.48
After amenorrhea/abstinence	15.08	12.03	14.92	12.17
After amenorrhea/abstinence/contraception (Net duration)	13.99	11.01	13.72	11.09

Note: Strictly speaking, the use of subtractions to obtain effective and net durations is not valid. Rather, they should be obtained through a multiple discriminant life table approach which is not attempted here. As such the figures should be taken only as approximate estimations.

From the table it can be seen that the mean gross time between birth and next conception was 24.9 months and the mean effective time was 15.9 months. That means that in the population studied, if a woman was not sterilized, she was likely to wait for an average of 25 months before her next conception. Even after the resumption of menstruation, women were likely to wait for an average of 16 months. Further, even with the practice of sexual abstinence and the use of contraceptives, a woman is likely to wait for a mean duration (net waiting time) of about 14 months before her next conception. That means that postpartum sexual abstinence and contraceptive use beyond the amenorrhea period has contributed to a delay of only two months before the next conception. Furthermore, it is clear from the data that even while the women are fully exposed to opportunities for conception to occur, they take 14 months on average before their next conception. This is an indication of prevalence of sub-fecundity among women in the study population, in particular, and among rural women in general.

It is important to note that the mean waiting time before the next conception is estimated based on the assumption that all non-sterilized women will eventually become pregnant within 48 months of their previous child birth. However, we have seen in Table 3 that about 22 per cent of the non-sterilized women were still waiting to conceive again, (if at all desired) at the end of 48 months (or four years) of their index child birth. Among them, a few may opt for sterilization sooner or later and a few might have already attained sterility, but we do not know to what extent. Further, we do not know how long the 'others' will wait for their next conception. We therefore have estimated the time to next conception in terms of median duration that does not have the above problem. However, addition and subtraction of the intervals (arithmetic operations) will only yield appropriate estimates. Accordingly, the median duration of gross time to next conception for non-sterilized women was about 21 months and the net median duration was about 11 months. In other words, in the absence of (or after) postpartum amenorrhea, sexual abstinence and contraception, 50 per cent of non-sterilized woman are likely to conceive again within a year, and the remaining 50 per cent have to wait for more than a year even though they are fully exposed to opportunities for conception to occur.

Nutrition and reproductive morbidity on waiting time to next conception

Unlike postpartum amenorrhea, sexual abstinence and temporary contraception, there is no direct way to decompose waiting time to conception that is attributable to maternal nutrition and reproductive morbidity. Alternatively, this paper has tried to assess the contribution of maternal nutrition and reproductive morbidity on time to next

conception using the proportional hazards model controlling socioeconomic and demographic factors. The socioeconomic and demographic variables in the proportional hazards model are the education of the woman and her husband, occupation of the husband, religion and/or caste, the woman's age at marriage, and the age of woman at child birth and the order of birth. The maternal nutrition and reproductive morbidity factors that were considered are the haemoglobin level, body mass index and waist-hip ratio as well as reported RTI/STI symptoms. Table 5 gives the percentage distribution of non-sterilized women, proportional hazards model based regression coefficients for the variables, their standard errors, Wald statistics and significant levels, as well as the exponent of the regression coefficients (e^B), called *relative risk factor* (see section 'Data and Method' for more explanation).

The table shows that all the variables in the proportional hazards model are significantly related to the hazards of time to next conception. Further, the variables on the education level of the woman and her husband, the woman's age at marriage, her age at child birth and the order of birth, haemoglobin level and RTI/STI symptoms are significantly related at 0.1 per cent level of significance.

Socioeconomic and demographic factors

With respect to the education of the woman and her husband and in comparison to when both are illiterate, the relative risk of a woman becoming pregnant was 50 to 70 per cent higher if either or both were literate. However, if both had education above the primary level, then the relative risk was only five to 25 per cent higher as compared to both being illiterate. This may be because they were making some voluntary efforts to delay conceiving again in order to offset their higher fecundity status. With respect to occupation, as compared to cultivators, husbands who were in 'other' occupations (labourer, businessman, salaried employee, and so on) have shown a lower risk of becoming fathers. The other group 'no work' has only 0.7 per cent of cases and hence their relative risk may not be taken seriously. As far as religion/caste is concerned, as compared to SC/STs, Lingayats, other backward class (OBC)/other Hindus and also Jains/Christians have a relatively lower risk of becoming pregnant but Marathas and Muslims showed a higher risk as that of SC/STs.

Compared with women who got married at the age of 15 or less, those who got married at the age of 16 or 17 have shown a higher risk (of about 60 per cent) of becoming pregnant at any given point in time. However, women married at the age of 18 or later were only 40 per cent more likely to become pregnant. It is to be noted that women who married at age 18 or later usually represent a relatively better socio-economic group and hence their fecundity (the chances of becoming pregnant)

Table 5. Proportional Hazards Model based on waiting time to conception for non-sterilized women

Variables and categories	% cases#	B coef	SE	Wald	df	Sig.	Exp (B)
Educational level				29.89	5	.000	
Both Illiterate *	24.0						
Husband only literate	24.2	0.408	0.11	14.29	1	.000	1.50
Woman only literate	12.7	0.517	0.13	16.76	1	.000	1.68
Both literate but not both 5+std	8.2	0.544	0.15	13.84	1	.000	1.72
Both 5+ but not both 10+std	22.1	0.235	0.12	3.69	1	.055	1.26
Both completed 10+std	8.8	0.047	0.18	.07	1	.791	1.05
Occupation of husband				7.96	3	.047	
Cultivator *	43.7						
Agriculture/ Non-Agriculture Labourer	29.1	-0.165	0.09	3.21	1	.073	0.85
Other (Business/Salaried/etc)	26.5	-0.071	0.10	.55	1	.458	0.93
No work/House Wife	0.7	0.766	0.39	3.80	1	.051	2.15
Religion/caste				13.10	5	.022	
SC/ST *	17.8						
OBC/Other Hindus	12.3	-0.098	0.14	.49	1	.482	0.91
Lingayat	46.1	-0.044	0.11	.17	1	.682	0.96
Maratha	9.6	0.311	0.14	4.93	1	.026	1.37
Muslim	11.8	0.211	0.13	2.49	1	.115	1.23
Jain/Christian	2.4	-0.123	0.26	.22	1	.641	0.88
Age at marriage				20.68	4	.000	
11-13 *	11.4						
14-15	33.0	0.076	0.13	.37	1	.545	1.08
16-17	29.1	0.483	0.14	12.72	1	.000	1.62
18-19	18.8	0.366	0.16	5.32	1	.021	1.44
20+	7.7	0.343	0.21	2.64	1	.104	1.41
Age of women at birth and order of birth				32.50	7	.000	
Age 13-17, Order 1+ *	15.9						
Age 18-19, Order 1	15.4	-0.411	0.14	9.19	1	.002	0.66
Age 18-19, Order 2+	10.5	-0.040	0.13	.09	1	.769	0.96
Age 20-24, Order 1	15.4	-0.330	0.15	4.97	1	.026	0.72
Age 20-24, Order 2	18.5	-0.323	0.13	6.18	1	.013	0.72
Age 20-24, Order 3+	9.6	-0.403	0.15	7.19	1	.007	0.67
Age 25+, Order 1-2	6.1	-0.834	0.21	16.00	1	.000	0.43
Age 25+, Order 3+	8.6	-0.734	0.17	18.77	1	.000	0.48
Haemoglobin level				16.45	2	.000	
Severe/moderate Anaemia (Hb level<9) *	15.3						
Mild Anaemia (Hb level 9.0-10.9)	70.4	-0.217	0.10	4.57	1	.032	0.80
Normal (Hb level 11.0+)	14.3	0.166	0.13	1.63	1	.202	1.18
Body mass index				7.13	2	.028	
Chronic Energy Deficiency (BMI <18.5) *	42.7						
Normal weight-for-Height (BMI 18.5-24.9)	53.2	0.073	0.08	.90	1	.342	1.08
Obesity (BMI 25.0+)	4.1	-0.473	0.22	4.80	1	.028	0.62
Central obesity (waist-hip ratio 0.8+)	16.8	0.243	0.10	5.94	1	.015	1.27
Any RTI/STI symptom	28.4	-0.270	0.08	10.91	1	.001	0.76

* Reference category; # Total valid cases = 1103 and of them censored cases = 307.

is higher because of better health conditions. However, they tend to offset the chances of becoming pregnant by taking voluntary measures. The data reflects such a pattern. When compared to women age below 18 at previous child birth, irrespective of order of birth, women of higher ages and higher order births showed a lower risk of becoming pregnant at any time after the previous birth. For example, at any given time, women aged 25 and above are more than 50 per cent less likely to become pregnant than women under the age of eighteen. Order of birth as such does not appear to have had much effect on a woman's time to next conception.

Nutrition and morbidity factors

As far as anaemic level is concerned, women with mild anaemia are slightly less likely (by 20 per cent) and women who have a normal level are slightly more likely (by 18 per cent) to become pregnant as compared to women with severe or moderate anaemia. The pattern is not systematic but the differences are also significantly large. However, women suffering from obesity are about 40 per cent less likely to become pregnant than their counterparts. On the other hand, women with central obesity are slightly more likely to become pregnant (by 27 per cent) than average women. Women who reported having symptoms of RTI/STI are about 25 per cent less likely to become pregnant than women who did not report any reproductive morbidity problems.

Overall, nutrition and morbidity factors appear to only have a marginal effect on time to next conception. There may be two reasons for this. One reason may be that the nutrition and reproductive morbidity factors considered here are not strong predictors of time to next conception. Another reason may be that the study was confined to a small area where there was little individual variation in nutritional status and reproductive morbidity. As it was a prospective study, it could not be conducted in different parts of the state. It is likely that studies covering different areas and more detailed nutritional status, in addition to reproductive morbidity factors may throw more light on the relationship.

Nutrition, reproductive morbidity and spontaneous abortions (safe and unsafe) and still births

Often it is argued that low nutritional status and high reproductive morbidity result in a higher incidence of spontaneous abortions (safe and unsafe) and still births. In this study, the women were followed not only until their next conception, but until a live birth occurred, until the end of the field survey or until they were lost to follow-up. The outcome of the next conception is used here to assess if low nutritional status and

high reproductive morbidity resulted in a higher incidence of spontaneous abortions (safe and unsafe) and still births. It is to be noted that this study does not have representation of women who have not conceived or all of whose conceptions have ended in spontaneous abortion (safe and unsafe) and still birth. We do not know the numbers of such women, and it is hoped that this absence of data does not have any differential impact on the findings of the study.

For our investigation, reference is made to spontaneous abortions (safe and unsafe) and still births, not induced abortions. Table 6 gives the percentage of first conceptions (after the birth of the index child) that were live births, spontaneous abortions (safe and unsafe) and still births as well as the conceptions that were not yet terminated as the woman was still pregnant during the last follow-up visit. It can be seen from the table that overall approximately 3.3 per cent of the conceptions were terminated as involuntary foetal wastage (still births 1.2 per cent and spontaneous abortions 2.1 per cent) and another 1 per cent were induced abortions. It is to be noted that, not only was the absolute number of still births and spontaneous abortions low in the sample (just 27 cases), but the relatively higher 7.7 per cent of spontaneous abortions recorded in the waiting time of 36 to 47 months is based on just 13 conceptions. Apart from this there appears to be no systematic pattern connecting still births and spontaneous abortions to time until the next conception.

Table 6. Outcome of first conceptions after the birth of an index child by waiting time to next conception

Waiting time to next conception (months)	Women conceived	Outcome of conception				
		Live birth	Still Birth	Spontaneous Abortion	Induced abortion	Still pregnant
Total	820	85.5	1.2	2.1	1.0	10.2
1-11	166	97.0	1.2	0.6	0.6	0.6
12-23	484	90.1	0.8	2.3	0.8	6.0
24-35	157	65.0	2.5	2.5	1.9	28.0
36-47	13	15.4	0.0	7.7	0.0	76.9

With regards to the influence of nutritional status and reproductive morbidity on involuntary foetal wastage, Table 7 presents the nutritional status measured in terms of Hb level, body mass index and waist-hip ratio as well as reproductive morbidity measured in terms of RTI/STI symptoms. A comparison between the percentage of live births as well as spontaneous abortions (safe and unsafe) and still births by nutritional status indicators and reproductive morbidity factors, does not show any

higher incidence of involuntary foetal wastage for a low nutritional status and/or a high reproductive morbidity despite the fact that there are only a few involuntary foetal wastages in the analysis (26 cases). As such, the data do not support the view that lower nutritional status and higher reproductive morbidity contribute to a higher incidence of foetal wastage.

Table 7. Nutritional status and reproductive morbidity of women who had a conception after the index child birth by outcome of the conception

	Women Conceived	Live birth	Spontaneous abortion and still birth	Induced abortion and still pregnant
Valid cases (N)	797	682	26	89
Valid total (%)	100.0	100.0	100.0	100.0
Hb level (g/dl) of woman				
Severe/moderate Anaemia (<9)	15.3	16.0	19.2	9.0
Mild Anaemia (9.0-10.9)	69.0	66.9	69.2	85.4
Normal (11.0+)	15.7	17.2	11.5	5.6
Body Mass Index (kg/m²)				
Chronic Energy Deficiency (<18.5)	42.8	42.7	42.3	43.8
Normal weight-for- Height (18.5-24.9)	54.1	54.4	53.8	51.7
Obesity (25.0+)	3.1	2.9	3.8	4.5
Waist-hip ratio				
Normal/Low (<0.8)	82.7	82.7	96.2	78.7
Central obesity (0.8+)	17.3	17.3	3.8	21.3
Any RTI/STI symptom?				
No	73.3	75.0	66.7	62.0
Yes	26.7	25.0	33.3	38.0

Note: There are 23 cases for whom nutritional status was not measured.

Conclusion and policy implications

In this paper an attempt is made to understand the role of nutrition and reproductive morbidity on time before next conception among rural women with data from northern Karnataka, India. The study is based on the 1,866 live births that occurred during the reference period from July 2003 to June 2004 in 54 villages. Interviews and follow-up visits were done for 1,750 (94 percent) women who gave birth during the

reference period. As of the date of the last follow-up visit in June 2007, the proportion of women sterilized was 31 per cent, the proportion of non-sterilized women who had used a temporary contraceptive method was 12 per cent, and the proportion of non-sterilized women who become pregnant was 68 per cent.

With respect to the nutritional status of women, mild and moderate anaemia was common, but severe anaemia and obesity were rare. With respect to the reproductive morbidity, about one-fourth of the women reported symptoms of RTI/STI. The mean duration of postpartum amenorrhoea was reasonably long (about ten months), while the mean duration of postpartum sexual abstinence was a little more than five months and the mean duration to discontinue contraceptive methods since index child birth was about 16 months. Among non-sterilized women who received at least one follow-up visit, the amenorrhoea period was longer than the abstinence period for nearly two-thirds of the women and shorter for nearly 30 per cent of the women. The mean duration of postpartum amenorrhoea, postpartum sexual abstinence or postpartum contraception, whichever is later, was 11.4 months and the median duration was 10.1 months. Among all women, only about 50 per cent had another child and one-third had undergone a sterilization operation.

Among the women who were not sterilized, only 15 per cent became pregnant within 12 months, 58 per cent became pregnant within 24 months and 78 per cent became pregnant within 48 months. That is, the increase in proportion of women becoming pregnant during the first year since the index child birth was much lower, substantial during the second year, lower again during the third year, and much less thereafter. With respect to the time for the before the next conception, a non-sterilized woman was likely to wait for an average of 25 months for her next conception, 16 months since resumption of menstruation and 14 months after amenorrhoea, abstinence and contraception whichever was later. The postpartum abstinence and contraception beyond the amenorrhoea period contributed to a delay of only two months before the next conception.

Regarding the nutritional status, reproductive morbidity and socioeconomic correlates of the time until the next conception, all these factors are significantly related. Compared to women with severe or moderate anaemia, women who are average or not anaemic are only slightly more likely (by 18 per cent) to become pregnant. However, women suffering from obesity are about 40 per cent less likely and women suffering from central obesity are about 27 per cent more likely to become pregnant than their counterparts. Furthermore, women who reported symptoms of RTI/STI were about 25 per cent less likely to become pregnant than women who did not report any reproductive morbidity problems. Further, the data does not find any relationship between nutritional status and reproductive morbidity and incidence of foetal wastage.

The Indian family welfare (planning) program advocates a birth interval (inter-live-birth-interval) of 3 years and it is, to a great extent, achieved as the observed mean birth interval is around 30 months in different parts of India. However, the achievement is not due to any significant impact of the family planning program, as the use of temporary contraceptive methods is very low. It is due, rather, to other birth interval inhibiting factors such as amenorrhea, abstinence, low nutritional status of women, high reproductive morbidity factors and so on. Though severe under nutrition among women is very low, moderate and mild under nutrition is common and reproductive morbidity is prevalent especially in rural areas. A number of reproductive health and nutrition programs are being implemented by the government and it is expected that as the nutritional status of women improves and reproductive morbidity reduces, the duration of birth intervals will slowly reduce as has been observed in this study. In order to increase or at least to maintain the birth interval there is a need to give more impetus to the popularization of temporary contraceptive methods while making efforts to improve nutritional status and reduce reproductive morbidity among women.

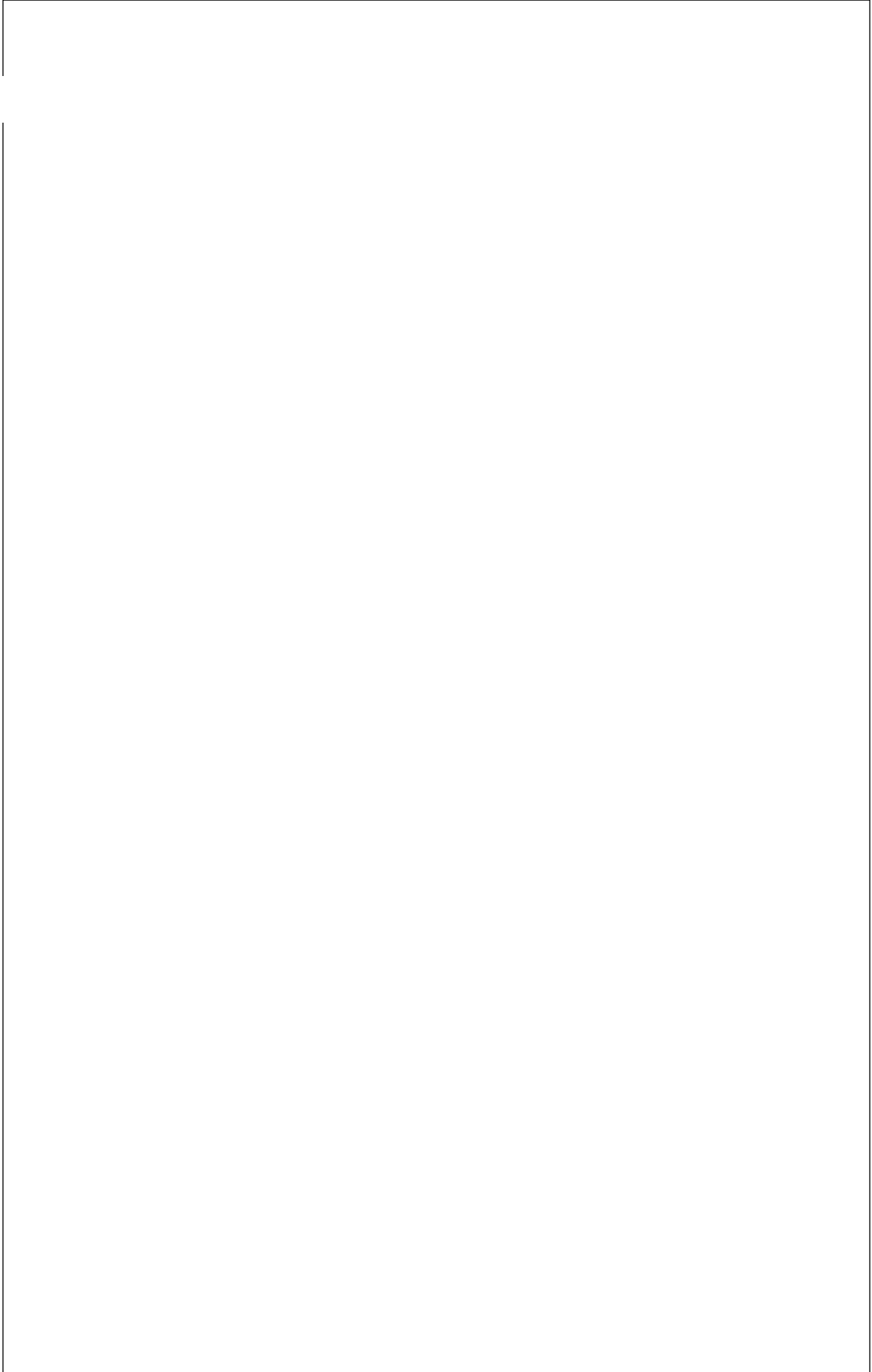
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Health-care decisions of older persons in India

Many older persons in India cannot afford the high cost of health-care and consequently have to forego medical treatment. We compared the incidence of illness and health-care decisions of rural and urban persons as well as the outcomes for older and younger persons. One of the main findings was that rural persons had a higher incidence of illness and a higher incidence of non-treatment than those in urban areas. The higher incidence of non-treatment in rural areas was mainly due to the shortage of health-care facilities and concerns regarding the high cost of treatment, reflecting lower income in those areas. Second, analysis for two rural locations indicated that older persons do not always choose the same provider of treatment as younger persons even if it is for the same type of illness. Third, in looking at one urban centre, the study found that older persons had a higher incidence of non-treatment than younger persons. This was mainly because older persons had greater concerns about the costs of treatment, reflecting again their lower levels of income.

By Homi Katrak*

The World Health Organization (2006) has estimated that the population of older persons in developing countries will increase from 400 million in 2000 to 1,700 million in 2050. This 'population ageing' raises some important concerns about the provision of affordable health care. Older persons are more vulnerable to various illnesses than younger persons and are therefore in greater need of health-care services; unfortunately they have low incomes and are often not able to afford proper health care.

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The need for affordable health care is for two broadly different types of illnesses. First, there are the illnesses that affect only (or mainly) older persons which include dementia and cataract blindness. Secondly, there are a range of “every day” illnesses that affect both older and younger persons (World Health Organization, 2006) and include non-communicable and chronic diseases.

This paper examines issues relating to “every day” illnesses faced by older persons in India. The analysis will, for the most part, define older persons as those individuals who are 60 years and above. This cut-off age is in line with the definition endorsed by the Second World Assembly on Ageing in 2002 and has also been used by many researchers in India.

Earlier research on older persons and health in India and in some other countries in Asia and the Pacific, including China, Thailand and Viet Nam, has pointed to the following main features¹ (Antia and others, 2004):

- The public health sector only has limited resources and cannot provide for all persons in need, and health insurance schemes have, so far, only had limited coverage.
- The private sector is now the main provider of health care; however, the services are not easily affordable for many low-income persons, which means that they have to borrow money to cover their health expenses.
- Most older persons live in rural areas where there is a marked shortage of affordable health care.
- Some older persons depend on their children but unfortunately, due to their own low income, children have limited resources to devote to their parents' health care.
- Many older persons have to either provide for themselves or forego treatment.

The situation of older persons in India is of great concern for a number of reasons. First of all, they account for about 7.7 per cent of the total population (2004) and the numbers are expected to increase from 77 million to 100 million by 2013. Secondly, many older persons have very low incomes and therefore need to work beyond the age of 60. Thirdly, about 80 per cent of older persons live in rural areas. This is of great concern as there is a significant shortage of public and private medical practitioners in these areas. Finally, the success of the Government's health insurance scheme has, so far, been rather limited, particularly in rural areas.

The third point mentioned above is worth elaboration. Whereas 80 per cent of older persons live in rural areas, only 72 per cent of the total population lives in those areas. This, in turn, indicates that the percentage of older persons that live in rural areas exceeds the corresponding percentage for urban areas.

In view of this background, we will undertake a quantitative analysis of the health care decisions made by older persons. The main concerns are the (a) incidence of illness, (b) choice of medical practitioners and (c) decisions about the non-treatment of illnesses.

The framework of the paper draws upon the Macao Plan of Action on Ageing for Asia and the Pacific (ESCAP, 1999). The Plan recognizes that issues relating to health care and other needs of older persons should be considered in the broad context of poverty and social and economic development.

Our analysis is presented in the wider context of poverty and health care in India. The analysis takes into account the aspects of poverty and health care that may particularly affect older persons.

First, we explore rural-urban differences in health care decisions. This aspect is important since the majority of older persons live in rural areas. Rural-urban differences in decisions regarding health care can arise because of the lower income in rural areas and/or the relative shortage of trained medical practitioners in those areas. Secondly, within each area, we compare the decisions of older and younger persons. Older persons may (a) be more vulnerable to some illness, (b) have different perceptions about their illness and (c) be less able to afford treatment.

The rest of the paper is organized into several sections. There is a brief discussion about the health care scenario in India and the health related aspects of poverty. The next section discusses the data and the main questions used for empirical analysis. The paper then looks at the differences between the older and younger persons who live in rural and urban areas. The final section summarizes the main results and discusses the need for new policy initiatives.

The health care scenario and the health aspects of poverty

The public health sector in India has been facing considerable financial constraints in recent years. Krupp and Madhivanan, 2009 noted that the provision of free or low-cost health care has greatly reduced. Currently, the private sector is now the main provider. However, the high cost of treatment and medicine is not easily affordable by many low-income

persons. Berman and others, 2010, reported that many low-income persons have had to borrow money for private treatment. Others have opted for either untrained doctors, attempted self-medication or have gone without treatment.

A further problem is the imbalance between rural and urban health care. The number of both public and private providers is disproportionately low in rural areas. Yadev and others, 2009 noted that although nearly three-fourths of the country's population live in rural areas, only one quarter of the country's trained doctors practice there. Deshpande and others, 2004 pointed out that, in some states, rural areas also have a shortage of other trained medical personnel.²

This rural shortage is of great concern in the present context since the majority of older persons live in rural areas. There are only a few trained doctors and hospitals and the distances one must travel to receive health care can be great. Consequently many sick persons have to travel substantial distances in order to obtain treatment. Older persons are less likely to go for treatment since they often do not have access to transportation.

These problems have prompted some training programmes for Rural Health Practitioners (RHP). Local midwives and other persons have been trained to provide treatment and prescribe medicine for a number of common illnesses. A local RHP may have greater empathy when treating local persons than would a trained doctor from an urban area. Moreover, the local presence could reduce travel costs and travel time for the sick. The achievements of one such programme have been detailed in a study on "developing an alternative strategy for achieving health for all" (Antia and others, 2004).

Questions for empirical analysis and data to be used

Our first set of questions addresses the health and health care decisions of rural and urban persons.

We consider the following three main questions:

- Is there a difference, in rural and urban areas, in the percentage of persons who are "not in good health" and have not sought treatment?
- Have the reasons for not seeking treatment differed between rural and urban areas? The main reasons may include financial factors, sick persons' perceptions that their illness is "not serious" and the lack of a nearby health facility.
- Have Rural Health Practitioners been able to provide low-cost treatment to older as well as younger persons?

The second set of questions addresses the differences between older and younger persons. We will focus on sick persons in both rural locations and in a metropolitan city.

There are three main questions as follows:

- Has the incidence of certain illnesses in rural locations differed between older and younger persons? And, if the two groups have the same illnesses, have both chosen the same type of treatment?
- Has the incidence of certain illnesses in metropolitan cities differed between older and younger persons? And, has there been a difference in the incidence of non-treatment as well as the reasons for non-treatment between the two groups?
- Could differences between the two groups, in any of the above aspects, be mainly due to the relatively lower income of older persons or could they be due to some other factors?

The data used in the empirical analysis is taken from the following sources:

- The rural-urban differences data is from Rajan (2006) and Mukherjee and Karmakar (2008). The former data was collected for an all-India study undertaken by the Centre for Enquiry into Health and Allied Themes, Mumbai and the latter is based on the sixtieth round of the National Sample Survey.
- For comparisons between older persons and younger persons in rural locations, the data for rural locations in Maharashtra is from Antia and others (2004) and is part of their project in the Parinche Taluka³ (Caffrey, 1992). The data for a rural location in Uttar Pradesh is taken from Ray and Bhaduri (2001). Their study was prepared for the Voluntary Health Association of India, Delhi.
- The comparisons between older persons and younger persons in a metropolitan city, Delhi, are based on data from Sunder and Sharma 2002. Their data was collected in a survey of 2,000 low-income households conducted by the National Council of Applied Economic Research, Delhi, India.

Comparisons between rural and urban areas

Our first test concerns rural and urban differences in India. Table 1 reports the percentage of persons that were “not in good health” in each of the two areas and also the percentage of those that had “unmet medical needs”. We see that rural persons are disadvantaged in both respects, as the percentage of those not in good health was (30.7/27.7) =

1.1 times greater than those in urban areas while those that had unmet medical needs was $(9.5/4.2) = 2.26$ times greater than those living in urban areas.

Table 1. Rural-urban differences in the state of health and un-met medical needs

	Not in good health	Unmet medical needs
Rural	30.7 percent	9.5 percent
Urban	27.7 percent	4.2 percent

Note: Calculations are based on data reported in Rajan (2006).

These differences make it important to examine the reasons for unmet medical needs in the two areas. This will be interpreted as the non-treatment of illnesses. We focus on the most significant reasons why sick persons do not seek treatment.

Table 2 lists three reasons for non-treatment.. "Financial constraints" was the most important reason given by 29 per cent of the sick in rural areas and by 22 per cent in urban areas. The percentage is 1.3 times higher for rural areas. Another reason was "Lack of medical facility" which was as much as 12 times greater in rural areas. A third reason, "Illness is not serious" was reported less as a reason for non-treatment in rural areas. The percentage of those that considered their illness to be serious was higher in rural areas.⁴

Table 2. Reasons for non-treatment of illness in rural and urban areas^a

	Financial constraint	Lack of medical facility	Illness not serious	Other
Rural areas	29 per cent	12 per cent	32 per cent	27 per cent
Urban areas	22 per cent	1 per cent	50 per cent	27 per cent

Notes: ^a Calculations are based on data in Mukherjee and Karmakar (2008).

The rural-urban difference in "illness is serious" warrants further discussion. In cases where older persons in rural and urban areas suffer from the same illness, the former may be less likely to consider the illness as serious and, as such, may wait for a higher threshold of feeling ill before seeking treatment. In some other cases, however, rural older

persons are more likely to suffer from certain serious illnesses, particularly those related to an unhealthy living environment (Deshpande and others, 2004). It may well be that the above results reflect this latter aspect.

These rural-urban differences underline the need to increase the number of health facilities and health care personnel in rural areas. This need is greater for older persons partly because their presence is relatively greater in those areas and also because older persons have greater difficulty in travelling great distances to reach health facilities.

Comparisons within rural areas

The rural scenario is now examined in greater detail. We compare the health-care decisions of older and younger persons in two separate rural locations; Maharashtra and Uttar Pradesh.

The Maharashtra data is used to examine whether the majority of older persons chose to be treated by Rural Health Practitioners rather than doctors, and also whether they differ from younger persons in this respect. The data allows us to distinguish between two groups: (a) 15 - 44 years and (b) 45 - 64 years. The former corresponds closely to women's reproductive years. Older persons here are defined by individuals who are 65 years old and above. This is slightly different from the cut-off age of 65 that is used throughout the rest of the paper.

Table 3 shows the age and gender profile of those who sought treatment from RHPs and those who went to qualified doctors. We see that only 48 per cent of older persons sought treatment from RHPs while more than two thirds of younger persons went to RHPs. However, as the lower row shows, these inter-age differences could be partly due to gender differences as the preference for treatment from RHPs was greater among women, particularly in the younger age groups.

These outcomes show that older persons have a preference for qualified doctors while younger persons prefer RHPs. One explanation for these preferences could be differences in the illness profiles. The illnesses of older persons are better treated by doctors, whereas the illnesses of younger persons are better treated by RHPs. This is likely since RHPs have been trained to deal with the specific health problems affecting younger women.

This point could be re-enforced by the likelihood that RHP may have a gender preferences (or discrimination) in their consultation costs as they may charge relatively lower costs for women, particularly younger ones.

Table 3: Percentage of sick persons that sought treatment from RHP in rural Maharashtra^a

Preference for RHP^b	15 - 44 years	45 - 64 years	65 years and over
RHP/Doctors ^c	67/33	66/34	48/52
Female/Male ^d	66/34	68/32	55/45

- Notes: ^a Calculations are based on data reported in Antia and others (2004).
^b RHP denotes Rural Health Practitioners.
^c The ratio (RHP/Doctors) shows the (percentage of sick persons who sought treatment from the RHP/ the corresponding percentage of those that went to Doctors).
^d The ratio (Females/Males) shows the (percentage of females who sought treatment from the RHP/the corresponding percentage of the males).

Our next rural analysis is of a location in Uttar Pradesh. We examine; (a) whether older and younger persons have the same illness profile and (b) whether the two groups decide on the same type of treatment, for similar types of illnesses.⁵

Both age groups reported a high occurrence of two illnesses; (a) colds and coughs and (b) fever. In addition, there was a miscellaneous "other illnesses" category. The treatment for colds and coughs was usually home treatment through the self-administering of medication, while those with fevers usually sought out private doctors. "Other illnesses" were sometimes treated within a miscellaneous category labelled "other treatment".

Table 4 shows the illness profiles of older persons and younger persons. We see that amongst those affected by colds and coughs as well as those affected by "other illnesses" the number of older persons was about 47 per cent of the number of younger persons. However, the number of older persons who suffered from fever was only 36 per cent of those of the younger persons. So the older persons had comparatively lower incidences of fever.

This inference may be checked in a further comparison. Among older persons, less reported having fever than colds and coughs. The former was 29 per cent of all sick older persons while the latter accounted for 34 per cent. In contrast, among younger persons there was a higher proportion with fever (35 per cent) than with colds and coughs (31 per cent). More concisely the ratio (fever/colds and coughs) is only (8.5/10) for older persons compared with (11.3/10) for younger persons. Older persons thus have a relatively lower incidence of fever (Dey and others, 2002).

Table 4. Illness profiles of older persons and younger persons in rural Uttar Pradesh^a

	Colds and coughs	Fever	Other illnesses ^b
Older persons	39	33	42
Younger persons ^c	83	92	89

Notes: ^a Calculations based on data reported in (Ray and Bhaduri, 2001)

^b The "Other" illnesses include stomach pains, skin diseases and breathing trouble.

^c The Younger persons include two groups "Youths" and "Adults"

These differences in the illness profile can also be used to compare differences in the types of treatments sought (or in the types of treatment provided). We will examine whether the number of older persons that sought a particular type of treatment for a particular illness, is equal to the corresponding number of younger persons. This comparison will help to demonstrate whether older and younger persons have made similar health-care related decisions.

The tests will pair three types of treatments (or service providers) with three types of illnesses:

- Self medication for the treatment of colds and coughs;
- Private doctor for the treatment of fever;
- Other types of treatments (or service providers)⁶ for other types of illnesses (ESCAP, 1999).

For each pair we will calculate a (Treatment/Illness) coefficient for older and younger persons. The calculation is illustrated for the case of a private doctor's treatment for fever. The number of older persons that went to private doctors was 49 while the number that had fever was only 33 so the coefficient for older persons is $(49/33) = 1.48$. Then, if the magnitude of the coefficient for older persons and younger persons turns out to be quite similar we can infer that in this respect, the two groups have made similar health-care related decisions.

Table 5 reports the results. We see that the outcomes differ markedly between the three pairs. In the case of self-medication for colds and coughs, the coefficients of older persons and younger persons have very similar magnitudes. However, in marked contrast, in the pairing of private doctors with fever the coefficient for older persons is higher than that for younger persons while in the third pairing, older persons have a lower coefficient than younger persons.

Table 5. Treatment/Illness coefficients in rural Uttar Pradesh^a

	Self medication and colds and coughs	Private doctors and fever ^b	Other treatments and other illnesses ^c
Older persons	1.38	1.48	0.26
Younger persons ^d	1.40	1.28	0.33

- Notes: ^a Calculations based on data reported in (Ray and Bhaduri, 2001).
^b Private doctors include those that prescribed either allopathic (conventional) or homeopathic (traditional) medicines.
^c "Other treatments" are provided mainly by hospitals, rather than doctors. The category "other illnesses" is defined in Table 4, note 2.
^d Younger persons include two groups "Youth" and "Adults".

The outcome for private doctors is of particular interest. It appears that, as in the Maharashtra study, older persons have a preference for treatment by doctors rather than by other service providers. This is of interest because in the present Uttar Pradesh context the "other" providers are mainly hospitals. Treatment by doctors may have been preferred because they are in the neighbourhood and/or charge lower fees for treatment than hospitals.

Comparisons within a metropolitan city

The next exercise focuses on the metropolitan city of Delhi India. We examine whether older persons and younger persons differ in (a) the incidence of different types of illnesses, (b) the overall incidence of non-treatment and (c) the main reasons for non-treatment, as reported by the sick persons.

Table 6 shows the percentage of sick persons that had particular illnesses. We see that there are significant differences between the two groups. Non-communicable illnesses affected 81.7 per cent of older persons compared with only 48.9 per cent of younger persons. Correspondingly the percentage with "other" illnesses was much lower among older persons.

These differences in the illness profiles mainly seem to be due to age differences. The category "other" illness includes illnesses that affect only younger persons such as gynaecological problems. However, the influence of some factors other than age cannot be ruled out.

The second comparison is with the percentage of sick persons that did not seek treatment for the above illnesses. The overall incidence of non-treatment⁷ was 16.7 per cent among older persons and 13.2 per cent

Table 6. Illness profiles of sick persons that did not seek treatment in Delhi^a

	Non-communicable illnesses	Other types of illnesses^b
Older persons ^c	81.7 per cent	18.3 per cent
Young persons ^d	48.9 per cent	51.1 per cent

Notes: ^a Calculations are based on data published in Sundar and Sharma (2002).
^b The “other” types include Infectious illnesses that were mentioned by older persons and younger persons, Accidents and injury that affected only younger persons and gynaecological problems faced by young women.
^c Aged 60 years and over.
^d Aged between 20 – 59 years.

among younger persons. So the incidence was $(16.7/13.2) = 1.27$ times greater amongst older persons. Conversely the incidence of those seeking treatment was much lower among older persons. The reason for these differences in non-treatment will now be examined.

Table 7 shows the percentage of sick persons that mentioned particular reasons for non-treatment. Each person was asked to report her/his most important reason. We see that financial constraints was the most frequently mentioned reason, among both age groups, though a sizeable minority also mentioned that they felt that the illness was not serious.

Table 7: Reasons for non-treatment mentioned by sick persons in Delhi^a

	Financial constraints^b	Illness not serious	Other reasons
Older persons ^c	70 per cent	20 per cent	10 per cent
Younger persons ^d	61.5 per cent	34.6 per cent	3.9 per cent

Notes: ^a Calculations based on data in Sundar and Sharma (2002).
^b Financial constraint was mainly the cost of treatment but also includes the time lost waiting for treatment.
^c Aged 60 years and over.
^d Aged between 20 – 59 years.

There are two important differences between the two age groups. First of all, financial constraints was reported as the main reason for non-treatment for 70 per cent of older persons, compared with only 61.5 per cent of younger persons. Secondly, the reason that the “Illness was not

Serious" was mentioned by a smaller percentage of older than younger persons. This difference is important as it also indicates that a relatively higher percentage of older persons considered their illness to be serious.

These differing outcomes could be due to two sets of factors. There may be differences in the illness profiles: the non-communicable diseases, which were more prevalent among older persons, may be more serious than "other" illnesses and/or may entail higher treatment costs. Secondly, there is the likely influence of income differences, as older persons may be less able to cover the costs⁸ of treatment for any of the illnesses.

Summary and policy initiatives

This paper has drawn upon data from various sources to help identify some factors that may have influenced health-care related decisions by older persons in India. Simple empirical procedures were employed to examine differences in health care decisions by persons in rural and urban areas as well as to identify the differences between older persons and younger persons within rural and urban areas.

The main findings were as follows. Rural persons have a relatively higher incidence of illness but at the same time they also have a relatively higher tendency of non-treatment of illness (or un-met medical needs). Secondly, comparisons between older persons and younger persons in rural locations indicated that the two age groups do not always opt for the same type of health care providers, even if they have the same types of illnesses. Thirdly, comparisons within a metropolitan city demonstrated that older persons have a higher tendency of non-treatment compared to younger persons.

These differences were due to three main factors. Rural-urban differences in non-treatment were attributed to the relative shortage of health-care facilities in rural areas. In addition, rural-urban differences in non-treatment and also differences between older persons and younger persons were due to the cost of treatment (reflecting perhaps the lower income of older persons). Finally, there were differences in the perception of illnesses. The percentage of persons that considered their illnesses to be "serious" was relatively higher in rural areas and among older persons.

Considering the overall findings, there is an urgent need for important policy initiatives. The government should train large numbers of "age friendly" health care personnel (AFHCP). The need for more AFHCP has earlier been suggested by the World Health Organization (2006), Mendis and others (2007) and Gillick (2010). These health care personnel could be engaged either in the government sector, the private sector or in non-government organizations.

The AFHCP could perform two important roles. Firstly, they would mitigate the shortage of health care workers, particularly in rural areas. This would help reduce the travel time and cost of going to distant health care facilities. Secondly, they could provide information and guidance. Older persons may need information about (a) the adverse consequences of non-treatment of illness, namely deterioration of health, and (b) the availability of low-cost generic medicines that can be good therapeutic substitutes for high priced brand-named items, often prescribed by doctors.

Endnotes

- 1 This paragraph draws on the following studies for India: Deshpande and others (2004), Dey and others (2004), Naryana (2010), Pal and Palacios (2008) and Rajan (2006). Studies for other countries in the Asia-Pacific region included: Junfang and others (2009) for China, Caffrey (1992) for Thailand and Giang and Pfau (2009) for Viet Nam.
- 2 This rural-urban imbalance turns out to be even more marked when differences in health risks are taken into account. Katrak (2008) estimated that the health risks due to certain environmental factors may be, at least, two times greater in rural areas than in urban areas.
- 3 A taluka is an administrative unit for revenue collection covering about 100,000 persons.
- 4 For instance, rural persons have a higher incidence of illnesses associated with a lack of proper sanitation and clean drinking water.
- 5 Ideally it would be desirable to compare also the severity and/or duration of illnesses of older persons and younger persons. Unfortunately, however, the data required for a direct comparison is not available.
- 6 The "Other" providers include mainly private and government hospitals.
- 7 We can only compare the overall incidence of non-treatment since the data does not distinguish between the diverse categories of illnesses.
- 8 Financial constraints were defined to include the cost of treatment and the time-costs of waiting for treatment.

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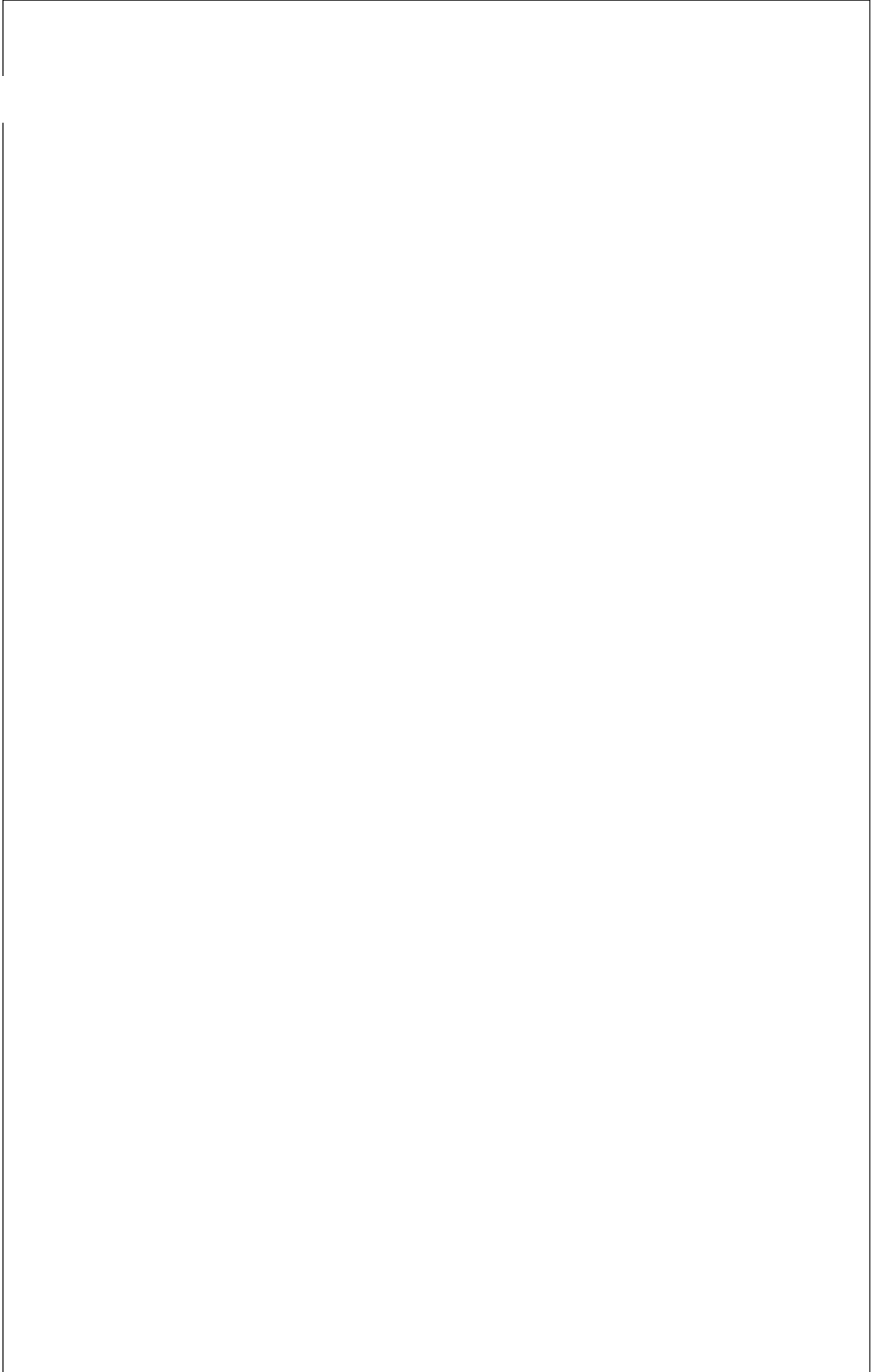
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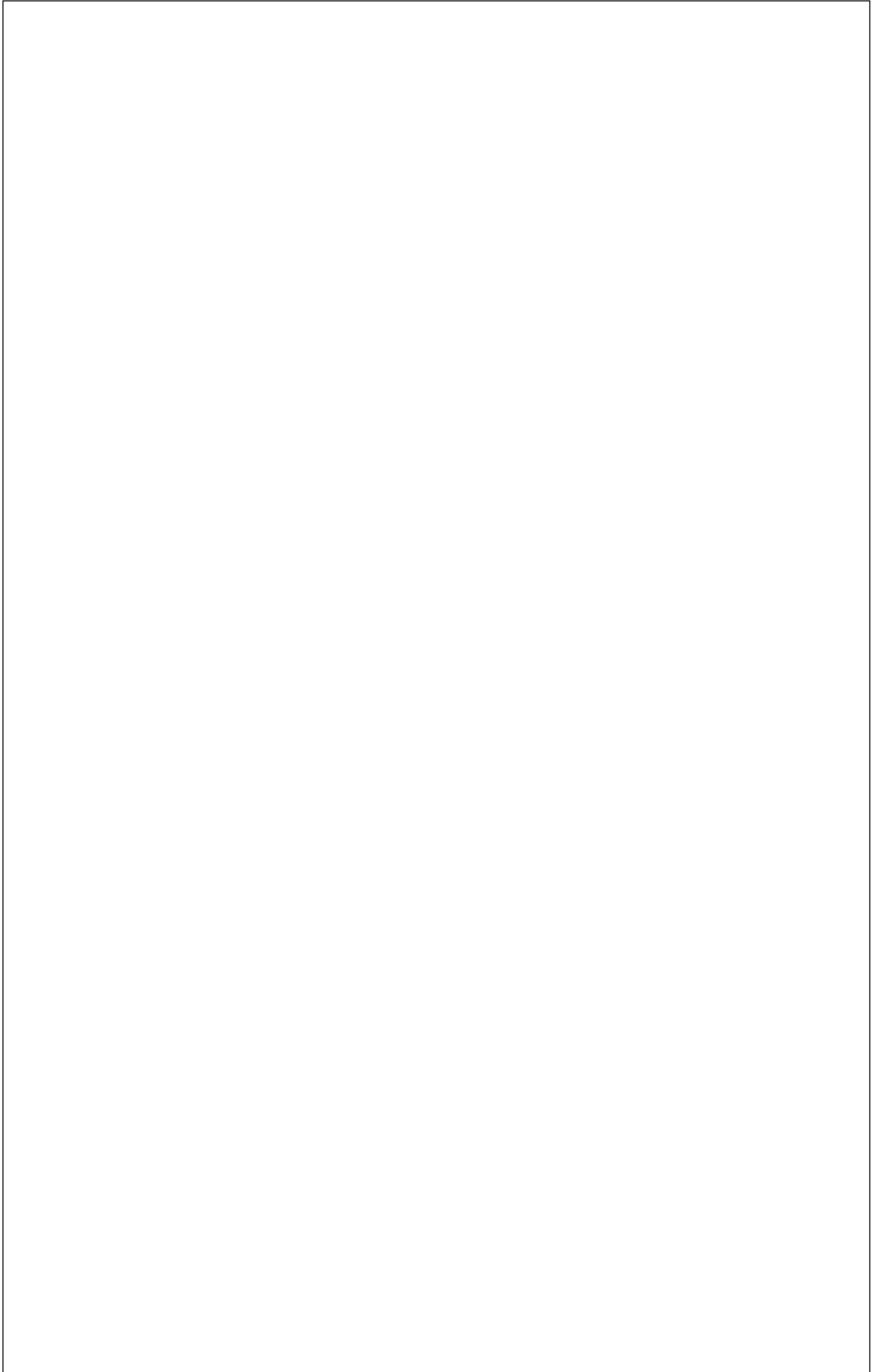
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