

LIVELIHOOD AND DEMOGRAPHIC PROFILES OF THE PEOPLE LIVING IN DELTAIC AND NON DELTAIC SUNDARBANS, WEST BENGAL: A COMPARATIVE STUDY

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ABSTRACT

We aimed to compare the livelihood patterns and demographic profiles of the people living in the villages of contrasting ecological settings, namely deltaic and non-deltaic Sundarbans, West Bengal, India. We hypothesized that the livelihood opportunities of the deltaic and non-deltaic villages would be different owing to contrasting ecological settings and this could make a difference in the demographic profiles of the inhabitants. Data on livelihood (socioeconomic) and demographic (life history and reproductive) profiles were collected from 194 households (96 deltaic and 98 non-deltaic). The result found differences in the livelihood and demographic profiles between the people living in deltaic and non-deltaic villages.

Key words: Ecology, Livelihood, Demographic profile

INTRODUCTION

Human beings adopt different livelihood patterns as survival strategies to cope with different ecological conditions (Dong, *et al.*, 2011; Rivera-Ferre and Lopez-i-Gelats, 2012; Lopez-i-Gelats, *et al.*, 2015). Physical environment, socio-economic conditions, education and so on may shape the livelihood of a community. Bebbington (1999) explained this livelihood diversity as the diversity in the use of natural capital. In fact, many scholars opined that diversity in livelihood patterns can play an effective role to mitigate vulnerability and to make resilience to deal with any ecological stress, shock, or change (Turner, *et al.*, 2003; Marschke, and Berkes, 2006).

Ecology not only promotes human beings to adopt particular livelihood pattern, but also encourages them to change their traditional livelihood patterns with the changing ecology (Rivera-Ferre and Lopez-i-Gelats, 2012; Lopez-i-Gelats, *et al.*,

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2015). For instance, studies among an agro-pastoral community of Himachal Pradesh showed the diversity and dynamism of agricultural or livestock husbandry practices as the key determinant for mitigating environmental risk (Mishra, 2001; Mishra, *et al.*, 2003). A shift in the occupational pattern is likely to affect population health. For example, a study on the African Hadza people showed that a shift in the livelihood pattern from hunting-gathering to agriculture eventually put a change in their dietary habit, and subsequently in the blood pressure level (Barnicot, *et al.*, 1972). Similarly, another study from Poland showed that the girls from the farmer families reach menarche earlier than the girls from non-farmer background (Laska-Mierzejewska, 1970). This is also true for the people of non-Western countries (Panter-Brick, *et al.*, 1993, Panter-Brick, 1996).

There are studies that reveal people's ecological success through differential response pattern in population size, mortality, longevity, nutritional status and life history (Powell, *et al.*, 1967; Frisancho, 1977; Schell, 1991; Bhan, *et al.*, 2001; Ruel, 2001; Gong, *et al.*, 2004; Barclay and Weaver, 2006). For example, food availability highly depends on ecological variation, which in turn regulates the energy balance of human body (Teresa Laska-Mierzejewska, 1970; Elias and Wilson, 1993; Panter-Brick, *et al.*, 1993; Leonard, 2002; Jasienska, 2003; Unger, 2007). Researchers opined that energy expenditure plays an important role in the adaptive response of human reproduction (Jasienska and Ellison, 1998; Ellison, 1994). Deficiencies in energy balance either due to the non availability of food or high intensity of workloads may affect fertility rate (Ellison, 1990; 1994; Jasienska and Ellison, 1998; 2004; Bentley, 1985). Low quality diets or nutritional deficiency also increases the mortality rate of a population. In fact, in many developing countries, this low quality diet is the major cause of high rates of child mortality (Leonard, 2002). In Indian context, Basu *et al.* (1984) showed that the population growth rates vary within the narrow range of 2-3% among the political/administrative units comprising the eastern Himalayas as well as the neighboring ones to the north, south, east, and west.

Under this backdrop, the present study aims to compare the livelihood and demographic profiles of the people belonging to an ethnic group who are living in two contrasting ecological settings (deltaic and non-deltaic villages) of Indian Sundarbans.

MATERIALS AND METHODS

Area of the study

We conducted this study in Indian Sundarbans, which falls in the district of South 24 Parganas, West Bengal. Two villages of Sundarbans were selected for the study, of which one is deltaic, and the other is non-deltaic.

The deltaic village, named Upendranagar, L-plot (under GP- Sridharnagar, Block-Patharpratima) is situated around 97 km away from the city of Kolkata, West Bengal. To reach this deltaic village one has to travel by rail to Lakshmikantapur railway

station and then further has to cross two rivers. The approximate time required to reach this village from the city of Kolkata is 7 hours. On the other hand, the non-deltaic village, named Ramganga (under GP- Ramganga, Block- Ramganga) is located about 86 km away from the city of Kolkata, and the time required to reach this non-deltaic village is around 3.30 hours by railways.

The deltaic village does not have electricity and the villagers depend solely on solar power, whereas the non-deltaic village has electricity. The deltaic village is devoid of metalled road (*pucca*). On the other hand, the non-deltaic village has metalled road. The non-deltaic village is connected with its adjacent villages and administrative blocks by road.

There is only one primary health sub-center in the delta village, and three primary health sub-centers in the villages adjacent to the studied deltaic village. There is also one community delivery center (*Matri Sadan*) situated under the jurisdiction of the *gram panchayat* where the studied deltaic village is located. However, the *Matri Sadan* cannot support for caesarian delivery because of the lack of power supply. On the contrary, the non-deltaic village has four primary health sub centers. The villagers have regular access to the nearest hospital (the distance is around 15 km). The inhabitants of both the villages often visit the Rural Medical Practitioners (RMP) or quack doctors for medical support.

There is one primary and one higher secondary school situated in the deltaic village, but there is no undergraduate college nearby. On the contrary, although there is also no undergraduate college situated in the non-deltaic village, yet people have an easy access to several colleges located in the nearest town by the virtue of road connectivity.

Both these areas were selected because of operational convenience.

Study population

Data on livelihood (socioeconomic) and demographic (life history and reproductive) profiles were collected from 194 households (96 deltaic and 98 non-deltaic).

The study populations represent Bengali Hindu communities. Data on reproductive history and practice of family planning method were collected from the women, aged between 17 and 48 years, who were still menstruating, living in wedlock, and volunteered to participate. The participants were identified with the help of village level health workers. The nature of work was explained to the participants and a written consent was taken from them.

Methods of Data Collection and Data types

Pre-tested structured schedules were used to collect the data on socio economic status, pregnancy history, and family planning and abortion history. Data on socioeconomic status include, the age of the participants at the time of interview, the educational levels of the participants and their husbands, the occupational types

of the participants and their husbands, family types, per capita monthly household expenditure of the participants (INR), frequency of livestock possessed, house types, types of cooking fuel used, provision of electric supply at household, and the area of possession of agricultural land.

Data on reproductive history have been collected by asking the participants about their age at marriage (years), age at menarche (years), age at conception (years), number of live births, number of their surviving and deceased children and also about the reproductive wastage (like miscarriage, abortion and still birth). Fertility and mortality estimates of the study population were estimated from the above data.

Data on family planning methods include desire for children, adoption of any family planning methods and its types, reasons for selecting the particular method, knowledge about family planning methods, sources of knowledge, and role of women in the decision making to adopt family planning method.

Data on abortion history of women include knowledge about legalization of abortion, experience of abortion (spontaneous and induced) if any, the specific pregnancy and the month of gestation the fetus was aborted, reason for abortion, who advised to go for abortion, person(s) involved in decision making, place of abortion, method used for the abortion, post abortion complications (if any), type(s) of post abortion complications, whether child birth took place subsequently after the incidence of abortion.

The entire data have been collected on the basis of the reporting of the participants. In case of information related to livelihood and socio-economic status, collected data have been cross-checked by using observation method. The data were collected during the period of April 2017 to June 2017.

Descriptive statistics were used to compare the socio-demographic variables, pregnancy history, family planning methods and abortion history between the participants of two regions (deltaic and non-deltaic). Inferential statistics, like t test and χ^2 test were used to compare for the same variables between the participants of deltaic and non-deltaic regions.

Study Design

To meet the objectives of the study, two groups of the participants, belonging to same community/ethnic groups (i.e. Bengali speaking Hindu people) were selected from two contrasting settings (i.e. deltaic and non-deltaic) to account for maximum ecological difference. The difference in the study variables, if found any, may be attributed to the contrasting ecological settings.

RESULTS

In the deltaic village, the frequency of male population was higher than the females in all the age categories, barring the categories 15-19 years and 20-24 years. The representation from 0-4 year category was appreciable for both males and females.

In the non deltaic village, the trend of numerical male dominance, as found in the deltaic village was not present. The representation of male and female population in the age category 0-4 years was low in the non-deltaic village compared to that of the deltaic village. The frequency of male children is higher in the deltaic village, but the trend is reverse in the non-delta village. The child sex ratios of deltaic and non-deltaic villages were 805.56 and 1250 respectively, indicating females were more in number than the males in the non-deltaic zone. (Table 1).

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Table 2 shows that majority of the populations of deltaic (65%) and non deltaic (74%) villages belonged to the general caste category, followed by that of SC category in deltaic and OBC category in non-deltaic villages. The frequency of non-literates was higher in non-deltaic compared to the deltaic, and the sex difference in this category was pronounced for the non-deltaic village. Among the literate category, majority of the populations in both the deltaic and non-deltaic villages achieved education above primary to secondary levels. Male- female differences were not pronounced in both the villages.

Majority of the female participants of both the villages were exclusively home makers; the frequency was more for the deltaic village than that of the non-deltaic village. Table 2 shows that the male population of delta region was more frequently engaged in occupational types, like farming, fishing, and service compared to those in the non-delta. It is interesting to note that the frequency of dependent family members was more in the non-deltaic village compared to the deltaic village.

Table 3 shows that the frequency of households under per capita monthly household expenditure category ≤ 1000 (INR) was more in the deltaic village compared to the non-deltaic village. The trend was reversed for the category 1100-2000 (INR). However, both the differences were not statistically significant ($p \geq 0.05$). More than half of the households of both the villages fall in the BPL category, but the frequency was higher for deltaic village. In both the villages, the pattern of household size distribution was similar, barring in the ≥ 7 household category. Majority of the households of both deltaic and non-deltaic villages fall under the category of household size 4-6 followed by the category ≤ 3 and $7 \geq$ respectively. The association of family size of deltaic and non-deltaic households was statistically not significant ($p \geq 0.05$). More than 40% of the households did not possess any agricultural land and the frequency was higher in the deltaic village compared to the non-deltaic village. Interestingly, higher quantity of landholding was found to be more in the deltaic village. The association of landless and land holding household of deltaic and non-deltaic village households was not statistically significant ($p \geq 0.05$). The median number of livestock was higher in deltaic village compared to the non-deltaic counterpart.

Table 4 shows that the mean ages at marriage and menarche were higher in the deltaic village than the non-deltaic village. The trend was reverse in case of mean age at first pregnancy and mean number of live birth. However, none of the differences were statistically significant ($p \geq 0.05$).

Table 5 shows that the child mortality rate was significantly ($p \leq 0.05$) higher (seven times) in the non-deltaic village than the deltaic village. Reproductive wastage was almost double in the non-deltaic village compared to the deltaic village; of which abortion was the most prevalent type of reproductive wastage. Among them majority of the mothers of both the villages experienced abortion only once.

Table 6 shows that an overwhelming majority of the women reported to have adopted family planning method. The number of multiple users of family planning was higher for the participants of delta region than that of the non-delta region. Among the contraception types, use of OCP was the most prevalent for both the villages.

DISCUSSION

Livelihood encompasses people's capabilities, assets, income and activities required to secure the necessities of life. A livelihood is sustainable when it enables people to cope with and recover from shocks and stresses (such as natural disaster and economic or social upheavals) and enhance their well-being and that of future generations without undermining the natural environment or resource base (Chambers and Conway, 1991).

In this descriptive study, an attempt was made to compare the livelihood and demographic profiles of the people living in two contrasting ecological regions. A livelihood is a means of making a living. At the beginning of the study, it was assumed that the livelihood opportunities of the people of the deltaic village will be different from that of the non deltaic village and this perhaps will have an effect on the demographic profile of these two groups. The study revealed that the inhabitants of the delta village adopted varied occupational pursuits (farming, fishing, kitchen garden) for their sustenance. And perhaps for this reason, the women of the deltaic village were not engaged in any occupational pursuit, unlike the women of non deltaic village. Furthermore, the possession of livestock in the deltaic households was also higher than their non deltaic counterpart. In terms of educational level, the frequency of non literates was also lower in the deltaic village compared to their non deltaic counterpart. The old age dependency level was more in the non deltaic village than the deltaic village. Furthermore, the access to health facilities was also lower for the deltaic village compared to the non deltaic village. Now, despite the differences in livelihood opportunities, the study did not find significant differences in the demographic profile between these two groups, barring the incidence of child mortality rate and abortion history.

Young and Lipton's study (2006) on Andean farmers and pastoralists showed that humans generally invent various strategies to get access to maximum ecological advantage. Many scholars also share similar opinions regarding the flexible adaptive

response of people (Mayer, 2002; Mishra, *et al.*, 2003; Hoffman, 2004; Arriaga-Jordon, *et al.*, 2005; Baker and Hoffman, 2006). The deltaic village of this study is endowed with natural resources, like fertile lands, water bodies; and the inhabitants of this area mostly exploit these natural resources for their livelihood. The cattle resource of this village is also very rich and so also is their dependence on it. However, the trend is different in case of the people living in the non-deltaic village. Here, majority of the people of both the villages are daily wage earners, perhaps to meet the cost of living.

Moreover, this study also reflects that the old age dependency rate is higher in the non-deltaic village compared to that of the deltaic village. This may have an indelible effect on their livelihood. The frequency of family size of the non-deltaic village in the category '7 and more' is greater than that of the delta. This could be another reason why it can be inferred that the delta people are economically better off than the non-delta people. In fact, the livelihood opportunities and subsistence activities are regulated by some ecological factors, which not only include natural environment, but also social, economic, political and educational systems (Young and Lipton, 2006; Postigo, *et al.*, 2008; Vuille, *et al.*, 2008; Mark, *et al.*, 2010; Verzijl and Guerreo Quispe, 2013; Lopez-i-Gelats, *et al.*, 2015).

Financial contribution may have the potential to uplift women's status in a family. No doubt there is a relation between women's financial independence with their empowerment and with decision making power. It is interesting to note that, during conversation with the village women, majority of the participants of the non-deltaic village told that OCP is hazardous for health and that's the reason they go for withdrawal. They also informed that this decision is solely taken by themselves; the spouses did not influence them to adopt any family planning method.

The constricted base of the population pyramid of the non-deltaic population compared to that of the deltaic population indicates either high rate of child mortality in the population and/or recent adoption of family planning method. Our study showed high child mortality rate in the non-deltaic village. A study on Jamaican children (McKenzie, *et al.*, 1976) proved that, not only the age of the mother, but the educational level of the parents also has effect on growth and development of children and even on the child mortality rate. The effect of low quality diets or nutritional deficiency increases the likelihood of mortality rate of a population. In fact, in many developing countries, this low quality diet is the major cause of high rates of child mortality (Leonard, 2002). In our study, it is observed that females are more engaged in jobs. This could lead to lower involvement in child care practices and thereby an increase in child mortality.

The rate of induced abortion is significantly lower in the deltaic village compared to the non-deltaic village. This phenomenon may be explained from the perspective of less developed transport system, less availability of and accessibility to medical care facilities in the delta village. For example, a woman from a deltaic village has to travel a long distance to reach a clinic for aborting the foetus, which is considered to be unwanted. So, in order to avoid such hassle involved in abortion, the people of

the deltaic village rely predominantly on oral contraceptives compared to rhythm and withdrawal methods to reduce the risk of unwanted pregnancy; this appeared from the conversations with the *Panchayat* officials and the local people.

Thus, the study opened up the opportunity to study why differential livelihood opportunity did not offer differential demographic profile.

CONCLUSIONS

The study only compared the livelihood and demographic profiles of the inhabitants of deltaic and non deltaic Sundarbans. It is true that there are some differences in the livelihood patterns between these two groups, but the reflection of the same was not observed when compared for most of the demographic traits, at least by using bivariate statistics. Perhaps application of multivariate statistics could have helped in predicting whether living in two contrasting ecological settings really works in determining the demographic profile. Furthermore, it is also felt that the use of other health variables, like child growth and body composition and serum proteins (like hemoglobin) could have been useful in estimating the effect of livelihood and health.

Table 1: Age-Sex Structure of the populations

Age groups (years)	Deltaic		Non-deltaic	
	Male Frequency (%)	Female Frequency (%)	Male Frequency (%)	Female Frequency (%)
0-4	31 (14.22)	21 (10.82)	13 (6.04)	16 (7.62)
5-9	17 (7.79)	15 (7.73)	12 (5.58)	19 (9.05)
10-14	28 (12.84)	18 (9.72)	22 (10.23)	20 (9.52)
15-19	12 (5.50)	26 (13.40)	24 (11.16)	24 (11.43)
20-24	14 (6.42)	35 (18.55)	15 (6.98)	26 (12.38)
25-29	31 (14.22)	19 (9.79)	22 (10.23)	20 (9.52)
30-34	21 (9.63)	19 (9.79)	20 (9.30)	13 (6.19)
35-39	20 (9.17)	9 (4.63)	13 (6.05)	24 (11.43)
40-44	15 (6.88)	9 (4.63)	19 (8.84)	9 (4.29)
45-49	2 (0.09)	6 (3.09)	18 (8.37)	12 (5.71)
50-54	7 (0.03)	3 (1.50)	6 (2.79)	8 (3.81)
55-59	4 (1.8)	6 (3.09)	10 (4.65)	4 (1.90)
60-64	9 (4.12)	2 (1.03)	7 (3.26)	3 (1.43)
65-69	4 (1.8)	1 (0.05)	6 (2.79)	3 (1.43)
70-74	0 (0.00)	1 (0.05)	3 (1.40)	5 (2.38)
75-79	1 (0.04)	4 (2.06)	3 (1.40)	3 (1.43)
80 and above	2 (0.09)	0 (0.00)	2 (0.94)	1 (0.48)
Child sex ratio	805.56		1250	

Table 2: Caste composition, education level, and occupation types of the study participants

	<i>Deltaic</i>		<i>Non-deltaic</i>	
Caste groups				
<i>Caste groups</i>	<i>Frequency (%)</i>		<i>Frequency (%)</i>	
General	59 (64.13)		70 (73.68)	
Scheduled caste (SC)	22 (23.91)		5 (5.26)	
Other backward castes (OBCs)	11 (11.96)		20 (21.05)	
Literacy levels				
<i>Literacy levels</i>	<i>Male (%)</i>		<i>Female (%)</i>	
Non-literate	10 (5.50)		9 (5.46)	
Can sign 13 (7.14)	16 (9.70)		24 (12.31)	
Primary or below	37 (20.33)		24 (14.55)	
Above Primary to Secondary	115 (63.19)		101 (61.21)	
Above secondary	7 (3.85)		15 (9.09)	
Occupational types				
<i>Occupational types</i>	<i>Male (%)</i>		<i>Female (%)</i>	
Farming	18 (9.89)		0 (0.00)	
Day labor	40 (21.98)		6 (3.61)	
Fishing	19 (10.44)		0 (0.00)	
Student	53 (29.12)		41 (24.70)	
Business	8 (4.40)		0 (0.00)	
Service	26 (14.29)		0 (0.00)	
Dependent	8 (4.40)		10 (6.02)	
Skilled work (boat man)	6 (3.30)		0 (0.00)	
Exclusively home maker	0 (0.00)		107 (64.46)	
Others *	4 (2.20)		2 (1.20)	

*Others include van driver, self-help worker, maid, NGO worker, private tutor

Table 3: Distribution of households on the basis of economic condition

	<i>Deltaic</i>	<i>Non-deltaic</i>	
Per capita monthly household expenditure (INR)			
<i>Expenditure (INR)</i>	<i>Frequency (%)</i>	<i>Frequency (%)</i>	<i>Chi²</i>
≤ 1000	66 (71.74)	58 (61.05)	3.1516 df=2
1100-2000	23 (25.00)	35 (36.84)	p>0.05
>2000	3 (3.26)	2 (2.11)	
Poverty level			
<i>Poverty Level</i>	<i>Frequency (%)</i>	<i>Frequency (%)</i>	<i>Chi²</i>
BPL*	58 (63.04)	53 (55.79)	1.0195 df=2
APL**	34 (36.96)	42 (44.21)	(p>0.05)
Household size			
<i>Household Size</i>	<i>Frequency (%)</i>	<i>Frequency (%)</i>	<i>Chi²</i>
≤ 3	18 (19.57)	19 (20.00)	1.6079df=2p>0.05
4-6	71 (77.17)	69 (72.63)	
≥ 7	3 (3.26)	7 (7.37)	
Possession of Agriculture Land (per household)			
<i>Possession of Agricultural Land</i>	<i>Frequency (%)</i>	<i>Frequency (%)</i>	<i>Chi²</i>
Landless	45 (48.91)	39 (41.05)	1.1672 df=1
≤ 2 Bigha	31 (33.70)	38 (40.00)	p>0.05
2.1-6 Bigha	9 (9.78)	16 (16.84)	
More than 6 Bigha	7 (7.61)	2 (2.11)	
Livestock			
Total number of livestock	677		564
Total number of households	92		95
Median number of livestock	5.0		1.0

*BPL stands for people from Below Poverty Level; **APL stands for people from Above Poverty Level

Table 4: Life history of the participants of deltaic and non deltaic villages

	<i>Deltaic</i>	<i>Non-deltaic</i>	<i>t-value, df, p</i>
Mean age at marriage (years)			
N	96	98	
Mean age (years)	17.36±2.00 (13-25)	17.16±2.58 (13-25)	0.63, df =192, p>0.05
Mean age at menarche			
N	96	98	
Mean age (yrs.)	12.90±1.33 (10-16)	12.78±1.32 (9-16)	0.64, df=192, p>0.05
Mean age at first pregnancy			
N	96	98	
Mean age (yrs.)	18.0±2.02 (13-24)	18.296±2.91 (13-27)	0.85, df= 192, p>0.05
Mean number of live birth			
Total no. of live birth	181	193	
Total no. of mother (ever married women)	96	98	
Mean number of live birth	1.88±1.09	1.96 ±1.00	0.56, df= 192, p>0.05

*Figures in the parentheses indicate age range

Table 5: Mortality History

	<i>Delta</i>	<i>Non-Delta</i>	
Child mortality rate			
	<i>Frequency</i>	<i>Frequency</i>	<i>t-test</i>
Total no. of deceased children	2	14	
Total no. of live birth	181	193	
Mortality Rate	1.10	7.25	3.075; df = 372 p<0.005
Reproductive wastage			
<i>Types of Reproductive Wastage</i>	<i>Frequency (%)</i>	<i>Frequency (%)</i>	<i>Chi²</i>
Miscarriage	8 (40.00)	14 (34.14)	1.3897
Still birth	3 (15.00)	3 (7.31)	df=2
Abortion	9 (45.00)	24 (58.53)	p>0.05
Frequency distribution of participants based on the number of abortions			
<i>No. of abortion (s)</i>	<i>Delta Frequency of Mother (%)</i>	<i>Non-delta Frequency of Mother (%)</i>	
0	87 (90.62)	78 (79.59)	
1	9 (9.38)	16 (16.32)	
2	0 (0.00)	4 (4.08)	
3 or above	0 (0.00)	0 (0.00)	

Table 6: Distribution of family planning methods among the participants

	<i>Deltaic</i>	<i>Non-deltaic</i>	<i>Chi²</i>
Adoption of family planning method			
	Frequency (%)	Frequency (%)	0.0516
Adopter	89 (92.70)	90 (91.83)	df=1
Non adopter	7 (7.29)	8 (8.16)	(p>0.05)
Frequency of the studied participants based on adoption of family planning type: Single/multiple			
	Frequency (%)	Frequency (%)	2.6937
Single user	73 (76.04)	64 (65.30)	df=1
Multiple user	23 (23.95)	34 (35.41)	(p>0.05)
Types of contraception used			
<i>Types of contraceptive methods used</i>	<i>Delta Frequency (%)</i>	<i>Non-delta Frequency (%)</i>	
Oral contraceptive pills	66 (68.75)	60 (61.22)	
IUD	3 (3.12)	11 (11.11)	
Female sterilization	19 (19.79)	18 (18.36)	
Condom	10 (10.41)	12 (12.24)	
Withdrawal	3 (3.12)	18 (18.36)	
Rhythm	9 (9.37)	25 (25.51)	
Male Sterilization	0 (0.00)	3 (3.06)	

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