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Determinants of reproductive health and related quality of life among Indian women in mining communities

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Abstract

Aim. This article is a report of a mixed method to examine the determinants of reproductive health and quality of life among Indian women.

Background. Reproductive health among married women in stressed regions of industrialized countries is an increasingly important consideration, but little is known about the important factors influencing reproductive health and quality of life.

Methods. A descriptive correlational research design was used between January and April 2006 with 145 randomly selected married women in a rural mining region of India. The instruments used were the Reproductive Health Index Questionnaire and Interview and Ferrans and Power's Quality of Life Index. Inferential statistics were done using ANOVA and MANOVA. Thematic content analysis was used to analyse qualitative data.

Results. Reproductive health and quality of life was low among Indian women in mining communities. Higher age groups, better economic status, higher age at menarche, fewer number of children, absence of long-term illness, reproductive illness and domestic violence were important determinants of reproductive health and quality of life among these women in mining communities.

Conclusion. The findings suggest that physical, psychological, sexual, family, socio-economic, energy level and cognitive domains of reproductive health and quality of life need to be assessed and are influenced by important determinants among women. These domains reflected in the theory of goal attainment should be an essential part of nursing process for providing women's reproductive health care in the mining community.

Keywords: determinants, Imogene King, mining communities, nursing assessment, quality of life, reproductive health, well-being, women's health

Introduction

In industrialized countries, developmental and economic activities such as urbanization and mining have different impacts (environmental, social, health, etc.) on vulnerable groups. Socio-economic and cultural factors (education, income, occupation, etc.) play a role in health and well-being, especially among women. Mining is one such important developmental activity predominant in rural areas which has an important impact on population dynamics, community development and environment. Vulnerable groups like women in rural mining households are victims of environmental degradation in gender specific ways, such as, dependence on nature for family sustenance, lack of autonomy over mobility, finance, decision-making and sensitively tuned health care (Visvanathan 1997, p. 605).

Several researches across the world have revealed that reproductive morbidity and general ill–health are, for the most part, silently endured by women due to a combination of forces (cultural restrictions, gender inequalities, low educational levels, etc.) which serves to keep women's suffering invisible (Bang et al. 1989, Wasser 1989, Bang & Bang 1991, Brabin & Brabin 1995, Bhatia & Cleland 1995, Oomman 1996, Bhatia et al. 1997, Bhatia & Cleland 2000). Although women's reproductive health has only recently gained social-scientific recognition in various countries, there is very little documented research. Equivocal findings report the centrality of social and cultural norms affecting quality of life (QOL) among women in India (Koeing et al. 1998, Sadana 1998, Bhatia 2000). This article examines the significance of the broader social, economic, psychological and emotional domains of QOL contexts of women's reproductive lives in the realm of mining activity in India. The relevance of the study is not restricted to developing countries or mining communities. It is applicable to international conditions the world-over in which women in vulnerable groups are constrained by poor environmental, social and gender circumstances (WHO 1992, Karlekar 2000).

Background

There is a growing amount of popular knowledge, attitudes, practices, social and health surveys (Ministry of Health and Family Welfare 1997, National Family Health Survey, Reproductive Health Survey 2000) in India demonstrating increasing rates of reproductive illness (Jejeebhoy & Rao 1992), violence and abuse among women. However, there is a general lack of an empirical research and any literature reviews to describe the determinants of reproductive health and the related QOL.

Women working in mines are susceptible to risks from several occupational illnesses like respiratory problems, silicosis, tuberculosis, leukaemia, arthritis or reproductive problems. Women employed in the mines or collieries are exposed to toxic and hazardous substances due to poor safety, controls and monitoring measures (WISE 2003). People living near coal and uranium mines in Bihar have succumbed to illnesses like malaria, typhoid and hepatitis. These diseases were not prevalent before the mining activities began. However, after the opening of the mines, high infant mortality and deteriorating reproductive health among women were common in this region (Bhanumathi 2002). There are very few health benefits or forms of compensation during pregnancy for women in mining (Tauli Corpuz 1997).

In India, women face discrimination and have limited choices about their health, safety and security. In the Orissan town of Chatisghar, the number of unwed mothers has increased with human trafficking, HIV/AIDs, infections, domestic and family violence, emotional and economic trauma, rape and prostitution. In Parej, Jharkhand State and in the Sukinda chromite mines of Orissa, local women and female miners are the most affected by mining as they complain of dampness in the mines and ore seeping into the river causing health problems due to ingestion (Singh & Rajyalakshmi 1993, p. 18). In seven villages near a tailing pond of Uranium mines, 47% of the women reported disrupted menstrual cycles, and 18% had miscarriages or stillbirths in the last 5 years. All of the women complained of fatigue, depression and other problems (http://www.antenna.nl 2003).

These reviews highlight fundamental issues that affect reproductive health and well-being among women in the mining community. This impinges on the QOL among married women, which varies in different settings, and is influenced by age, education, culture, social, economic and environmental changes in a particular community (Renwick et al. 1996). As large gaps still remain in our understanding; this study, therefore, examines the determinants of reproductive health and QOL among rural women in mining. From a nursing perspective, assessment and the measurement of reproductive health and QOL as dependent outcomes are central to the planning and implementation of nursing care designed to meet the health needs among women.

Conceptual framework

The conceptual framework that guided the study explains the relations between interacting systems, mutual goal setting and goal attainment based on Imogene King's System Theory of Goal Attainment (Figure 1). King (1997, 2001) proposed a
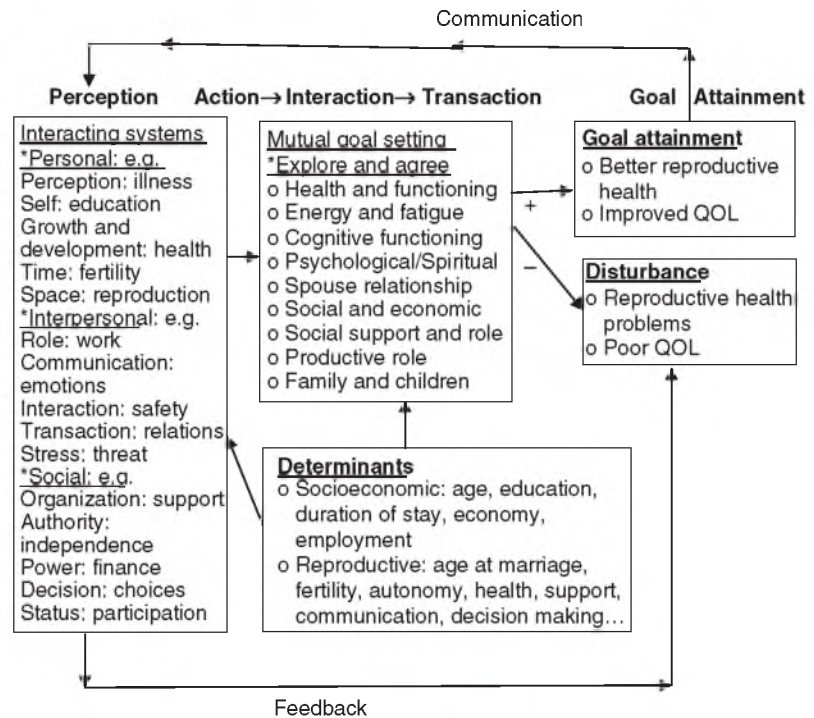
Figure 1 Conceptual model for 'Reproductive Health and Quality of Life (QOL) among Women in Mining' based on the theory of goal attainment.

structure of interrelated systems and concepts that define the physical and social environments in which human beings function.

Women have personal (e.g. illness, education, health, fertility, reproduction), interpersonal (e.g. work, emotions, safety, relations, threat) and social (e.g. support, independence, finance, choices, participation) systems which are dynamic and interacting with each other. Women's communication with her husband or family is to set goals in the domains of reproductive health and health-related aspects of well-being (Sadana 2002). They assess and plan activities, explore and agree to means for mutual goal setting (transaction). The interacting systems and goal setting are influenced by determinants of socio-economic and reproductive health (e.g. age, education, years of stay, economy, employment, age at marriage, fertility, health status and autonomy).

Women interact with family members for mutual goal setting (decision-making) in health and functioning, energy and fatigue, cognitive, psychological, social and family domains. When interaction increases among women and family, this reduces tension, enhances satisfaction and attains goals. Evaluation involves how outcomes or change in health status (QOL and reproductive health) are identified as goals to be attained among women. Any disturbance in mutual goal setting leads to poor reproductive health and QOL among women in mining communities.

The study

Aim

The aim of this study was to examine the determinants of reproductive health and QOL among Indian women in mining communities.

Design

In view of the objectives, purpose and hypotheses, a descriptive correlational design using a mixed method was adopted.

Sample/participants

This study was conducted in active iron ore mining communities in Goa, India, which have been in existence for more than 40 years. Simple random sampling was used to select the mining villages, the households and the women according to sample criteria. In the first phase of the random sampling, 13 mining villages in Goa which met the criteria of high population density and air pollution index (TERI 1997) formed the sampling framework; of which six villages were selected randomly for our study. In the second phase of the sampling, an electoral list of the households in the village was taken from the respective *local panchayats* (local body of

authority) for random selection. Married women who fulfilled the sample criteria in these households were inducted into the study.

Inclusion criteria included married women in the age group 15–45 years, who had borne at least one child and were not employed in mining activities. Women in high socio-economic groups, working in mines and immigrants were excluded. Sample size was determined using G*Power software with the intention to use linear multiple regression analysis (Faul *et al.* 2007). The sample size was calculated at a power of 0·9 with an effect size of 0·15 using 10 predictors (independent variables including women's social and health characteristics) with alpha = 0·05. The effect size was computed assuming a correlation coefficient of 0·3–0·4 between the number of years living in a mining community (metric/variable) with reproductive health and QOL. It was found that a minimum sample size of 147 would be needed with the above-mentioned input parameters (rounded to 150). Five women refused to participate, so the actual sample size reduced to 145.

Data collection

Development and testing the study instruments

Reproductive Health Index structured questionnaire
We reviewed various tools related to reproductive health issues (WHO 1997, Sadana 2001). These tools were not specific or appropriate for the study objectives, conceptual model and context. Hence, we developed the Reproductive Health Index questionnaire (50 items) based on the six domains of reproductive health and health-related aspects of well-being (Sadana 2000, 2002).
- Physical health and illness (14): personal health, reproductive health and menstruation.
- Psychological health and illness (10): safety, threats and violence, spousal support and communication.
- Physical functioning (2): personal life.
- Safe and satisfying sexual life (19): pregnancy, delivery, postpartum, contraceptives and sexual life.
- Energy and fatigue (2): nutrition.
- Cognitive functioning (3): decision-making.

This questionnaire measures satisfaction and importance in the six domains of reproductive health among women. It has two parts: satisfaction and importance areas measured on a visual six-point rating scale. The ratings are: very dissatisfied/unimportant (1), moderately dissatisfied/unimportant (2), slightly dissatisfied/unimportant (3), slightly satisfied/important (4), moderately satisfied/important (5) and very satisfied/important (6). The scoring technique and interpretation were taken from seven sets of scores calculated from the six domains and the total Reproductive Health Index. The possible scores of each item ranged from 1 to 6. For the overall Reproductive Health Index score, 50 items from each part were used to calculate the total score (30), which reflect the overall Reproductive Health Index.

Examples included, Your participation in decision-making with your husband about number of children.

Your ability to make choices in delaying the first pregnancy or subsequent pregnancies etc.

Reproductive health semi-structured interview
This was a brief open-ended interview (10 items) related to the concepts of the model and items used in the Reproductive Health Index structured questionnaire.

Examples included, During the last 12 months, have you been harmed or threatened by your husband?

How do the consequences of fights or arguments with your husband affect you, your children or your family?

Quality of Life Index standardized tool
A variety of valid and reliable generic tools for QOL were reviewed. We selected Ferrans and Powers Quality of Life Index (QLI) developed by Ferrans and Powers (1984) to measure QOL among women. This tool met the objectives, purpose, concepts of the model and needs of our study. Content validity of the QLI was supported by the variables related to QOL from an extensive literature, instrument review and validity reports of the instrument. Convergent validity of the Ferrans and Powers QLI was supported by a strong correlation between the overall (total) QLI score and the four measures of life satisfaction (r = 0·61, 0·65, 0·75, 0·77, 0·80), respectively (Ferrans 1984, Ferrans & Powers 1992).

The QLI tool measures the importance given to, and satisfaction with, health-related aspects of life valued by women. Each part (satisfaction and importance) of the scale consists of 31 items across the four main domains:
- Health and functioning (13): health, health care, pain, energy level, self care, control over life, longevity, sex life, family responsibilities, usefulness, worries and future.
- Social and economic (7): friends, emotional support, neighbourhood, home, job, education and financial needs.
- Psychological/spiritual (7): peace of mind, faith in god, personal goals, happiness, life satisfaction, personal appearance and self in general.
- Family (5): family health, children, family happiness, spouse and emotional support.

The QLI (a total of 62 items) was measured on a visual six-point rating scale: very dissatisfied/unimportant (1), moderately dissatisfied/unimportant (2), slightly dissatisfied/

unimportant (3), slightly satisfied/important (4), moderately satisfied/important (5) and very satisfied/important (6). There were five sets of scores calculated from the four domains and the total QLI. The possible scores of each item ranged from 1 to 6. For the total QOL score, 31 items from each part were used to calculate the total score (30), which reflect the overall QOL (Ferrans & Powers 1984, p. 10).

Examples included, How satisfied are you with the amount of energy you have for everyday activities?

How important to you is the amount of energy you have for everyday activities?

Social and health status tool

A structured questionnaire (20 items) consisting of women's demographic, socio-economic and health characteristics, like, age, religion, place, stay, family, education, employment, income, illness, etc. was used.

Procedure for data collection

During the final study, we selected and trained qualified data assistants for the field work. We interacted with the family members of the randomly selected households to build rapport, debrief and seek participation. Married women who met the inclusion criteria were informed about the nature and type of interviews. These interviews were carried out in two consecutive sessions (total 4–5 hours) in the privacy and comfortable setting in their homes between January and April 2006.

The responses were written verbatim and the oral interviews were recorded on mini-discs for later transcription with the written consent of each woman. After completing the data collection, the women were sincerely thanked for their participation and co-operation. The sensitivity of the data was discussed with the data assistants and the language expert. We completed the English translation of written and recorded responses (*Konkani*) and checked it with the language expert. Interview tapes and questionnaires were stored carefully and securely locked.

Ethical considerations

This study conformed to the ethical guidelines of the Indian Council of Medical Research (ICMR 2000). Permission and Research Ethics Committee approval to conduct the study were obtained from the institutional ethics committee. Written and oral information was given to the spouses and family members of the selected women. These women were informed about voluntary participation and their right to withdraw at any time without detriment. They were assured

of confidentiality, validation of results and use of aggregated data for dissemination. Written informed consent was obtained from all the selected women.

Validity and reliability/rigour

The Reproductive Health Index questionnaire and interview, QLI tool and Social and Health status instruments (English versions) were validated with the content blueprint and three-point evaluation criteria by fourteen subject experts. There was 100% strong agreement about the items in each domain among these subject experts. These tools were translated to the local vernacular language *Konkani*, back-translated, pretested and checked with monolingual testing. Any discrepancy between the original and translated versions of the instruments was resolved with consensus of opinions to prepare the final draft of the tools.

The instruments were administrated to 30 women in selected mining communities of India, with the specified sample criteria to test the internal reliability using the Cronbach-alpha method. The reliability coefficient for the QLI standardized tool was 0·85 (satisfaction scale) and 0·82 (importance scale) and for the Reproductive Health Index structured questionnaire was 0·92 (satisfaction scale) and 0·85 (importance scale).

The interview process was carefully planned in advance to elicit trustworthiness in the qualitative inquiry (Guba & Lincoln 1989, Polit & Beck 2004). Credibility was achieved using key informant checks with local doctors, woman leaders, teachers, representative women and social workers in the local villages (who had prior interaction with women in these mining communities). With our study findings and interpretations, follow-up questions were posed to the selected women for the purpose of clarification, prompt discussion and feedback. All of the women validated the findings and some were surprised at how accurately the findings reflected their perceptions. These interviews confirmed assumptions made during the analytical two-way translation process and added to the content validity of the findings of the quantitative tools.

A pilot study was conducted with 20 married women in a mining village to assess the feasibility and plan for the statistical analyses. This did not show any major problems and flaws in the design or instruments used in the study.

Data analysis

Descriptive and inferential statistics were calculated using the SPSS statistical package version 13·0 (SPSS Inc, Chicago, IL, USA). A normality test and multicollinearity checks were

performed. The determinants were assessed with ANOVA and a multivariate generalized linear model/MANOVA (Stevens 2002, Tabachnick & Fidell 2006, ANOVA 2007). Predictors were determined for MANOVA using important determinants from ANOVA.

For qualitative analysis, we read the semi-structured interviews, selectively coded and transcribed them. A thematic content analysis and tabular grid was used for cross-referencing and examining concepts (Silverman 2000) and inter-relationships between QOL and reproductive health.

Results

Socio-economic characteristics

The highest percentage of the married women ($N = 145$) in the age group 30–39 years (44·1%) had lived for more than 20 years (40·7%) in the mining community (Table 1). Most of these women lived with their spouses' (95·9%) in nuclear families (83·5%). Quarter percentage of the women had a secondary education (24·1%), while 24·8% were illiterate. Only 13·21% of the married women were working after marriage, compared with 35·2% of them before marriage. A low percentage of the women had poor economic status (12·4%) compared with the larger sample. Long time women settlers in the higher age groups had less education and economic participation but better family economic conditions (87·6%) in the mining community.

Education, employment and security

Woman 1: I wish I had studied. I would have been working and not a housewife. I would have been something in life.

Woman 2: First it was marriage but now my husband is not treating me well. He troubles me. He demands money from me and beats me. I had not thought of such treatment even in my wildest dreams. I have to work for low wages and sometimes there is no work.

Woman 3: My life has changed a lot. My husband is not bothered about us. I have to look after my children. I have no education or job. We are doomed to die in poverty.

Woman 4: I don't have any other work. I have lost my agricultural land for mining purpose.

Woman 5: We have lost our agricultural lands. Hence there are no fields. I don't go to work anywhere else as I have no education.

Table 1 Socio-economic and reproductive health characteristics among women $N = 145$

Socio-economic and reproductive health status	Frequency	Percentage
Age		
Less than 30 years	36	24·8
30–39 years	64	44·1
More than 40 years	45	31·0
Marital status		
Living with husband	139	95·9
Separated/divorced	6	4·1
Years of stay in mining		
Less than 10 years	53	36·6
10–20 years	33	22·8
More than 20 years	59	40·7
Family type		
Joint	24	16·6
Nuclear	121	83·5
Educational status		
No schooling	36	24·8
Elementary (up to 4 grade)	33	22·8
Middle school (up to 7 grade)	23	15·9
Secondary school (up to 10 grade)	35	24·1
Higher secondary (up to 12 grade)	14	9·7
University degree	4	2·8
Employment		
Before marriage	51	35·2
After marriage	19	13·2
Not working	75	51·7
Family economic status		
Good	90	62·1
Moderate	37	25·5
Poor	18	12·4
Age at menarche		
Less than 12 years	33	22·7
13–15 years	99	68·2
Less than 16 years	13	8·97
Age at marriage		
Less than 18 years	55	37·9
More than 19 years	90	62·1
Number of living children		
Three and less	117	80·7
Four and more	27	18·6
Number of pregnancies		
Three and less	83	57·2
Four and more	62	42·8
Methods used to avoid or delay conception		
Oral contraceptive pills	11	7·6
Copper T	14	9·7
Condom	8	5·6
Hysterectomy	3	2·0
Tubectomy	55	38·0
Abstinence/withdrawal	9	6·2
Not using any method	45	31
Reproductive health choices		
Avoiding conception	58	40

Table 1 (*Continued*)

Socio-economic and reproductive health status	Frequency	Percentage
Spacing of children	57	39·3
Number of children	57	39·3
Use of contraceptives	52	35·8
Permanent family planning	48	33·1
Reproductive health care	23	15·8
Illness		
Enduring illness	42	29·0
Reproductive illness	16	11·0
No illness	87	60·0
Domestic violence		
Wife beating	28	19·3
No assault	117	80·7

Woman 6: Our land is used for mining, because of which we cannot do agricultural work. We waste our time sitting at home.

Woman 7: When I was married there was greenery and fields all around. Slowly everything disappeared and withered away due to heavy dust pollution, vehicular movement, dumps, change in land use and silted fields.

Most women in the mining community perceive dependence and financial insecurity due to loss of agricultural fields, poor education and less work participation.

Reproductive health characteristics

In the mining community one-third of the women had been married before 18 years (37·9%), while some of them had reached menarche before 12 years (22·7%). Half percentage of them had more than four pregnancies (42·8%), while one-fifth of them had borne more than four children (18·6%). A major form of contraception was tubectomy (38%), while 31% of them did not use any family planning method. Some of the women reported long-term illness (29%), while few of them reported reproductive illness (11%) (Table 1).

Less than half of the spouses' made reproductive choices about avoiding conception (40%), spacing (39·3%), number of children (39·3%), use of contraceptives (35·8%) and permanent family planning (33·1%). More than two-thirds of the total number of women was not involved in any decisions about reproductive choices (Table 1). Women said their view that they could not openly use contraception on their own initiative – they either had to 'negotiate with their husbands or hide it'. Early marriage compounded with low awareness about contraception prevented them from using it, leading to high fertility (42·8%) and perceived illness (40%) among these women.

Relationship with husband, family and children

Woman 8: My in-laws used to tell me that certain things are not done here. If I do something wrong, they say that this is the first time it has happened in our family. This makes me feel sad and at times angry.

Woman 9: At home I have to look after everything independently, children, health and household responsibility. My husband has no work most of the times.

Woman 10: Initially my husband treated me well for a few months, but later he changed. I do not know how much he earns.

Woman 11: I never had a happy marriage. I did not receive much affection from my husband. My husband never gives us money; neither does he care for us. I live with my parent's and my mother supports us.

Woman 12: He drinks regularly and does not care for us. He has sold all our land and gold to pay off his debts. We are struggling to meet ends. I do not wish to live longer like this. My children are dependent on me.

Husband's support, interaction and safety

Woman 13: Not a single day I am happy. He is drunk every night. I don't know what makes him drink. I don't spend his money. What I earn, I save it for our needs.

Woman 14: Ours was a love marriage but before one year my husband changed completely. He is consuming alcohol. When I ask him why he drinks, he abuses me more.

Woman 15: My life is completely changed. I never thought I'd suffer like this. When he consumes alcohol, he is not in his sense. I can scarcely talk to him.

Woman 16: If he drinks heavily, he doesn't know what he does. He insults and beat me. Later he apologizes for his actions. On most of the days it is the same story. I am terrified of his anger and temper.

Woman 17: He demands money and never gives money for household expenses. He spends all money on alcohol. I cannot stop him. He barely listens to me. He takes his own decisions.

Woman 18: The children are sacred and frightened of him when he is drunk. They stay away from his wrath. He doesn't listen to anybody.

Woman 19: I do not want my children to be exposed to their father's drinking habits and eventual fights. I wish to lead a normal family life.

Woman 20: If I ask him why he drinks, he is infuriated and starts beating me. Once he broke a glass mirror on my head. I still have the scar.

One-fifth of the women were subjected to wife beating/assault and emotional abuse (19·35%) from husbands and

family members (Table 1). Some of these women reported neglect and abuse due to excessive monetary demands made by husbands. These women fear their husbands who are heavy drinkers, aggressive and abusive. Alcoholism among husbands leads to cognitive imbalance, emotional impairment and spousal conflict disrupting family processes. This leads to disharmony, poor psychological influence on their children and broken homes.

Major themes emerging from the interviews with women were feeling dejected, insecure and neglected due to low education, poor jobs and demand for money by husbands. Lack of spousal support, communication and freedom affect quality of relationship between spouses. Lack of bargaining, negotiating power and submissiveness prevent these women from resisting husbands' continuing dominance, authority and power.

Determinants of reproductive health and quality of life

Quality of life and reproductive health are interdependent variables. To examine the determinants of QOL and reproductive health, multivariate analysis ANOVA and MANOVA were used (Tables 2–4).

H0: There is no significant association between Quality of Life Index scores as well as the Reproductive Health Index scores with social and reproductive health characteristics among married women.

From the ANOVA tests (Table 2) higher age, fewer number of children, absence of domestic violence and enduring illness are important determinants of QLI and the Reproductive Health Index among married women. Family economic status, higher age at menarche and absence of reproductive illness were important determinants of QOL, while increased

Table 2 Determinants of quality of life and reproductive health index using ANOVA N = 145

Determinants	Quality of life index			Reproductive health index		
	Mean	Standard deviation	P	Mean	Standard deviation	P
Age (years)						
Less than 30	19·24	2·62	0·04*	19·99	2·59	0·02*
30–39	18·42	2·71		18·62	3·12	
More than 40	17·74	2·56		18·28	2·45	
Marital status						
Living with husband	18·53	2·65	0·01*	18·91	2·78	0·27
Separated/divorced	15·68	1·95		17·59	4·40	
Family economic status						
Good	18·64	2·31	0*	18·56	2·31	0·14
Moderate	18·86	3·08		19·65	3·56	
Difficult	16·34	2·75		18·71	3·54	
Years of stay in mining						
Less than 10	18·89	2·89	0·2	19·54	2·95	0·02*
10–20	18·44	2·83		19·15	3·08	
More than 20	17·97	2·35		18·08	2·48	
Enduring illness						
Present	17·83	2·61	0·09**	18·24	2·51	0·09**
Absent	18·65	2·69		19·11	2·96	
Age at menarche (years)						
Less than 12	18·89	2·73	0·05*	18·55	3·26	0·78
12–15	18·07	2·42		18·95	2·72	
16 or above	19·76	3·88		18·88	2·96	
Number of living children						
Less than 3	18·82	2·78	0·03*	19·27	3·06	0·04*
More than 3	17·84	2·45		18·27	2·45	
Domestic violence						
Present	16·39	2·53	0*	17·13	3·27	0*
Absent	18·90	2·49		19·27	2·60	
Reproductive illness						
Present	16·41	3·06	0·01*	18·25	3·29	0·49
Absent	18·56	2·60		18·90	2·83	

*P < 0·05; **P < 0·10.

Table 3 Overall model significance and tests of between-subjects effects using GLM

Dependent variable Source	d.f.	Quality of life index			Reproductive health index		
		Mean square	F	P	Mean square	F	P
Corrected model	9	26·56	4·50	0·00*	19·21	2·59	0·01*
Intercept	1	146·36	24·78	0·00*	167·48	22·55	0·00*
Age	1	11·49	1·95	0·17	3·10	0·42	0·52
Marital status	1	1·62	0·27	0·60	1·01	0·14	0·71
Family economic status	1	26·99	4·57	0·03*	14·27	1·92	0·17
Years of stay in mining	1	1·98	0·33	0·56	6·91	0·93	0·34
Enduring illness	1	6·15	1·04	0·31	7·39	1·00	0·32
Age at menarche	1	2·59	0·44	0·51	2·04	0·27	0·60
Number of living children	1	5·25	0·89	0·35	0·58	0·08	0·78
Domestic violence	1	76·30	12·92	0·00*	63·27	8·52	0·00*
Reproductive illness	1	17·57	2·97	0·09**	2·03	0·27	0·60

$*P < 0.05; **P < 0.10$.

Computed using alpha = 0·05. Quality of life index: $R^2 = 0.231$ (adjusted $R^2 = 0.179$). Reproductive health index: $R^2 = 0.147$ (adjusted $R^2 = 0.09$).

Table 4 Combined effect of predictors on quality of life and reproductive health index using Wilk's Lambda Multivariate Tests

Effect	Value	F	P
Intercept	0·81	15·71	0·00*
Age	0·99	1·00	0·37
Marital status	1·00	0·16	0·85
Family economic status	0·94	4·07	0·02*
Years of stay in mining	0·99	0·84	0·43
Enduring illness	0·99	0·79	0·45
Age at menarche	1·00	0·28	0·76
Number of living children	0·99	0·44	0·64
Domestic violence	0·89	8·41	0·00*
Reproductive illness	0·98	1·48	0·23

$*P < 0.05$.

Design: intercept + age + marital status + family economic status + years of stay in mining + enduring illness + age at menarche + number of children + domestic violence + reproductive illness.

stay in the mining community was important with Reproductive Health Index. These determinants are predictors of physical, psychological, sexual, family, socio-economic and energy level domains of QOL and reproductive health among women. They interact with woman's satisfaction and importance with domains/aspects valued in life.

The MANOVA models were used with important determinants emerging from the ANOVA tests as predictors of Reproductive Health and QOL (Table 2). The MANOVA results are explained with the test of overall model significance and test of individual effects of determinants overall. Even though R square values observed were low, these results were used as an indicative support of important determinants from ANOVA. Family economic status and absence of domestic violence are important with QLI and reproductive health

index. These determinants are linked to physical, psychological, sexual and socio-economic domains of QOL and reproductive health among women.

The test of overall model significance (Table 3) showed that the model is important for each dependent variable (QOL and reproductive health). The combined effect of predictors on QOL and reproductive health index using Wilk's Lambda Multivariate Tests (Table 4) shows, family economic status and domestic violence were important with this test.

The 'Tests of Between Subjects Effects' shown in Table 3 applies a F test of significance to the relation of each covariate (age, marital status, etc.) in relation to each of the dependent variables (QOL and Reproductive Health). Domestic violence was important with both the QLI and Reproductive Health Index. Family economic status was important with only QLI, while absence of reproductive illness was important with the Reproductive Health Index among women.

ANOVA showed the important determinants of QOL and reproductive health among women. Three driving forces, family economic status, absence of reproductive illness and domestic violence, were found to be important determinants of QLI and the Reproductive Health Index emerging from the MANOVA.

Discussion

Although the psychometric properties of the instruments used in the study were acceptable, it lacked cultural sensitivity. A large stratified sample according to ethnic and socio-cultural class would have enabled the research to explore further differences among women in the mining community.

What is already known about this topic

- Reproductive health is a state of complete physical, mental and social well-being and not merely an absence of disease and infirmity, in all matters relating to the reproductive system and to its functions and processes.
- Quality of life is a personal sense of well-being about satisfaction and importance with health and functioning, social and economic, psychological, spiritual and family domains of life.
- Theory of goal attainment states that the nurse and client communicate information, set goals mutually and then act to attain those goals.

What this paper adds

- Low educational status and early marriage among women lead to low economic participation, increased number of children and lack of decision-making which prevent them from resisting their husband's dominance and authority.
- Higher age groups, better economic status, higher age at menarche, fewer number of children, absence of long-term illness, reproductive illness and domestic violence were important determinants of reproductive health and quality of life among women.
- Mutual goal setting in physical health, psychological, sexual, energy level, family, socio-economic and cognitive domains influence reproductive health, and are crucial for a better quality of life among women in mining.

Implications for practice and/or policy

- Awareness and knowledge about reproductive health rights and choices among married women living in the mining communities should be improved.
- Determinants influencing women's reproductive health and well-being should be assessed and evaluated using the theory of goal attainment.
- Nurse-directed interventions for promoting women's autonomy and empowerment lead to enhanced reproductive health and quality of life in the mining communities.

In this study, a majority of the young rural women from mining communities begin household chores from an early age, and, as they grow, the sexual division of labour increases disproportionately. While men are employed in mining, married women are relegated to being nurturers and caretakers. They have no choice, as they are not seen as instruments of supporting family income. They are constrained by family and marital relationships which restrict their movement, behaviours and increase dependence on husbands. Gage et al. (2004, p. 198) stated that, likelihood of spousal communication and reproductive choices are significantly higher among women who exercise control over choice about 'husband and marriage' than among those who had an early arranged marriage.

Unemployment, low education, family pressure and social stigma related to separation among these women force them to bear domestic violence. This leads to loss of self-identity, self-esteem, financial dependence and restricted family networks among married women in mining. This reduces their independence, autonomy and control over reproductive health choices. This is supported by Youssef (1982), Sen (1990) and Mahmud et al. (1994). Women's status is related to low education, early age of marriage and high rates of reproductive morbidity (IIPS 2000).

According to King's (1996, 1999) communication and transaction in health, energy level, family, socio-economic, psychological and cognitive domains lead to better reproductive health among women. Their reproductive health status is an indicator of their autonomy, position, condition and decision-making power to control their own lives. The interdependent variables, QOL and reproductive health (e.g. family size, psychological support, husbands support) are influenced by social and reproductive health determinants. These findings are supported by Dyson and Mick (1983), Das (1987) and Jeffery and Basu (1996).

Many women have no voice and silently bear the unjust domestic violence, neglect and hardships due to patriarchy and socio-cultural norms. It is evident from the study that important determinants (age, economic status, age at menarche, number of children, enduring/reproductive illness and domestic violence) are inextricably linked to women's well-being, freedom and autonomy, especially in male-dominated families in the mining communities. The ability to make independent decisions influences the status of women's physical and social health (Defo 1997, Mishra et al. 1998). While good reproductive health status is influenced by women's education, age at marriage and desired family size (Ritzer 1992, Kishor et al. 2004).

Conclusion

Standardized instruments give information on health status associated with different reproductive morbidity, events or conditions (McVeigh 1997). Although such applications

quantify individual experiences, none explicitly refers to a conceptual definition of reproductive health as the basis for the selection of domains or indicators (Sadana 2002). We recommend the assessment of determinants and domains/indices for evaluations to explain variability in QOL and reproductive health among women in mining. The instruments used here give a potentially useful tool for nurses' in assessing the perceptions of women and have implications for a nurse's involvement in improving women's reproductive health care in the mining communities.

An analysis of King's (1990) reveals that this model can be used in the nursing process to help nurses organize elements in the process of nurse–woman transactions that result in goals attained, i.e. outcomes (reproductive health and QOL). It emphasizes the importance of mutual goal setting between women and family or nurses for interpretation of quantitative and qualitative aspects of reproductive health and QOL that serve to quantify and express their concerns.

This paper recommends nurses to be knowledgeable and skillful in understanding the reproductive health needs among women to be self advocates of their health and direct them to achieve their goals. As the significance of the domains of reproductive health and QOL has taken a prominent place among women, nurses have to move away from the disease–treatment model and move towards mutual goal setting leading to 'goal attainment'. Since women place high value on satisfaction and importance of domains, they need to be proactive and empowered in seeking nurse-directed interventions, which increase their probability for a healthy reproductive life.

There are several issues raised by the study for healthcare policy makers that have wide relevance to woman and nurses in the international community. Nursing interventions to encourage health promotion and behavioural change need to be based on an understanding of the interacting systems (personal, interpersonal and social), mutual goal setting and determinants which affect reproductive health and QOL. This study highlights the need to have better healthcare services with effective nurse-directed interventions based on King's model for protecting women's reproductive health rights and improved practices wherever applicable world-wide.

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Conflict of interest

No conflict of interest has been declared by the authors.

Author contributions

MSD, GS and KSN were responsible for the study conception and design. MSD and KSN performed the data collection. MSD, GS and KSN performed the data analysis. MSD and GS were responsible for the drafting of the manuscript. MSD, GS and KSN made critical revisions to the paper for important intellectual content. MSD and KSN contributed statistical expertise. MSD and KSN obtained funding. MSD and GS gave administrative, technical or material support. MSD and GS supervised the study. MSD, GS and KSN arranged ethics clearing and sampling.

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