

RESEARCH COMMUNICATION

Impact of Socio-economic Factors in Delayed Reporting and Late-stage Presentation among Patients with Cervix Cancer in a Major Cancer Hospital in South India

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Abstract

The impact of socio-economic and demographic status (SEDS) factors on the stage of cervical cancer at diagnosis, symptom duration and delay-time from diagnosis to registration was determined by analysing data for the year 2006 from the Regional Cancer Centre (RCC), Trivandrum, Kerala, India. Patients (n=349) were included if they were from the states of Kerala or Tamil Nadu. SEDS factors included age, residing district, religion, marital status, income, education and occupation. Associations between SEDS factors by stage at diagnosis and symptom duration were tested using chi-square statistics with odds ratios (OR) estimated through logistic regression modeling. Elevated risks for late stage reporting among cervical cancer patients were observed for women who were widowed/divorced (OR=2.08; 95%CI: 1.24-3.50) and had a lower education (OR=2.62; 95%CI:1.29-5.31 for women with primary school education only). Patients who had symptoms of bleeding/bleeding with other symptoms (77%) were more likely to seek treatment within one month, compared to patients with other symptoms only (23%) (p=0.016). This analysis helped to identify populations at increased risk of diagnosis at later stages of cancer with the ultimate intent of providing health education and detecting cancer at earlier stages.

Key Words: Cervix cancer - socio-economic factors - stage at diagnosis - symptoms duration

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Introduction

Incidence and mortality rates for cervical cancer have steadily declined in developed countries such as the United States since the mid-1950's. This has been attributed to the wide-scale implementation of cytological screening programs utilizing the Papanicolaou (PAP) smear test which helps to detect early pre-cancerous lesions (Ries et al., 2006). In addition to effective screening programs, the availability of advanced technologies in surgery/radiotherapy in developed countries has greatly increased survival rates for patients diagnosed with cervical cancer.

India, on the other hand, has a high-incidence of cervical cancer with roughly 87,500 newly diagnosed patients each year, 16% of the world's total cases (Tatsuzaki and Levin, 2001). Cervical cancer is one of the most common cancers among women in India, constituting between one-tenth to one-quarter of all female cancers with age-adjusted incidence rates ranging from 17.3 to 28.0 per 100,000 in the population-based cancer registries in the country, with the exception of 9.4 in Trivandrum, a city in the South of India (Curado et al., 2007).

Although control of cervical cancer by early detection and treatment is a priority of the National Cancer Control Programme of India, there currently exists no organized

nationwide or statewide cytology screening programs due to lack of facilities and financial resources. Because of these apparent obstacles, alternative strategies have been suggested in order to control disease including clinical down staging of cervix cancer through a single life time screening as well as educating the public on contributing factors such as age at marriage, monogamy, attention to personal hygiene and the use of barrier contraceptives (Murthy and Mathew, 1999). The lack of radiotherapy facilities including radiation equipments, support technology and trained personnel contribute to the time delays in treatment and increased mortality apart from the late stage at diagnosis. For example, while in developed countries there are roughly 2-3 radiation oncologists per 1000 cancer patients and radiation resources exceed what is necessary, the corresponding figures in Bangladesh report only 0.76 radiation oncologists (Tatsuzaki and Levin, 2001). This pattern is seen in India as well.

Cervical cancer continues to be a disease related to socio-economic and demographic (SEDS) disparities in both developing as well as developed countries. In the U.S., despite the overall downward trend in cervix cancer there still exists a disparity in mortality rates for cancer-related deaths among certain ages as well as racial, geographic and socio-economic groups. It has been found

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that race, ethnicity, age greater than 65 years, lower education, lack of health coverage, and rural location are associated with inadequate preventative cervical cancer screening (Nelson et al., 2003; Coughlin et al., 2006). Analyses of the USA cancer data have shown that mortality due to cervical cancer increases with poverty and decreasing education. In addition, a negative correlation exists between socio-economic groups and stage at diagnosis (Singh et al., 2004).

Studies have shown that late stage at diagnosis is correlated with lower survival rates in cervical cancer patients (Vinh-Hung et al., 2007). It has also been reported that increased duration of symptoms among cervix cancer patients as well as treatment prolongation negatively affect survival (Chen et al., 2002; Choan et al., 2005). These two factors can therefore be useful predictors for the severity of illness and likelihood of survival.

Few studies have investigated SEDS factors in early detection of cervical cancer in India. The present study was therefore conducted focusing on symptom duration and the time to report to a cancer hospital for treatment.

Materials and Methods

Data were abstracted from the Hospital Based Cancer Registry of the Regional Cancer Centre (RCC) in Trivandrum, Kerala, South India, for patients were from the State of Kerala or the neighboring State of Tamil Nadu in the year 2006. Patients were excluded if they lived outside of India, or if they had undergone any cancer directed treatment elsewhere prior to reporting at the RCC.

Data were retrospectively abstracted and analyzed from the Patient Information Form and SEDS factors,

including the residing district, education level (based on grade completed), income level (low, medium and high: income was assessed by social workers based on a variety of factors such as patient's occupation, husband's occupation and whether they own or rent their land etc.), occupation (housewife, white collar, or blue collar), religion (Hindu, Muslim or Christian), marital status (married, single, divorced or widowed) and age (below 50 years vs. 50 and above) were recorded. Other background variables included the menopausal status (pre, peri and post menopausal), parity (number of live births), "listed symptoms" (listed symptoms: bleeding, discharge, abdominal pain, back pain, incontinence, loss of appetite, nausea, vomiting, abdominal distension, dysuria, prolapse uterus) with duration in months, stage at diagnosis (FIGO) and group staging (stages I & II identified as 'early' and III & IV as 'late'). The date of first diagnosis, which was defined as the date that a clinician reported as "suspicion of malignancy" and the date of registration at the RCC for treatment, was noted. Registration delay time was calculated from date of diagnosis to date of registration.

Cross tabulation was performed by stage at diagnosis, duration of symptoms (months) and registration delay time (weeks) vs. all SEDS factors. Statistical association between SEDS factors by stage at diagnosis, duration of symptoms and registration delay time was tested using chi-square statistic. Fisher's exact test was used if the expected value in a cell in the cross tabulation was less than five (Armitage and Berry, 1994). The odds ratios (OR) for late-stage reporting and their 95% confidence intervals (CI) according to SEDS factors were estimated through unconditional logistic regression models (Breslow and Day, 1980). The ORs were modeled using a linear

Table 1. Distribution and Association of Socioeconomic and Demographic Factors by Stage at Diagnosis: Multivariate Analysis

Factor	Category	Stage		UK	Total	Logistic regression analysis**		
		Early	Late			OR	95% CI	P- value
Age	< 50 years	34.4	22.7	30.8	99	1.00	--	0.24
	> 50 years	65.6	77.3	69.2	250	1.39	0.80-2.40	
District	Trivandrum	37.5	35.2	53.8	129	1.00	--	0.12
	Kollam	17.5	26.7	15.4	77	1.38	0.73-2.63	
	Others	45.0	38.1	30.8	143	0.92	0.54-1.56	
Religion	Hindu	70.6	72.2	61.5	248	1.00	--	0.85
	Muslim	11.3	10.2	7.7	37	0.85	0.39-1.82	
	Christian	18.1	17.6	30.8	64	1.10	0.59-2.05	
Marital status	Unmarried	1.3	1.7	--	5	2.31	0.32-16.4	0.02*
	Married	75.0	51.7	76.9	221	1.00	--	
	Widowed /divorced	23.8	46.6	23.1	123	2.08	1.24-3.50	
Income	Lowest	53.1	67.6	61.5	212	1.00	--	0.35
	Medium	22.5	19.3	38.5	75	0.85	0.45-1.59	
	Highest	24.4	13.1	--	62	0.59	0.29-1.21	
Education	Illiterate	18.8	25.0	30.8	78	1.91	0.86-4.28	0.09*
	Literate & Primary	25.0	39.2	38.5	114	2.62	1.29-5.31	
	Middle	23.8	21.6	23.1	79	1.78	0.87-3.67	
	> Secondary	30.6	13.1	7.7	73	1.00	--	
	Unknown	1.9	1.1	--	5	--	--	
Occupation	Blue collar	30.6	13.1	7.7	73	1.15	0.43-1.51	0.79
	White collar	1.3	2.4	--	6	0.80	0.18-7.44	
	Housewife	81.1	77.6	92.3	273	1.00	--	

*Statistically significant at the 10% level; ^sunknown; **ORs are adjusted ORs for all other confounding factors and excluding all the subjects corresponding to the unknown categories in the multivariate analysis

Table 2. Distribution of Parity, Menopausal Status and Symptoms

		Number	Frequency %
Parity	0	10	2.9
	1	36	10.3
	2	90	25.8
	3	101	28.9
	4	42	12.0
	5	32	9.2
	6 +	37	10.6
Status	Unknown	1	0.3
	Pre-menopausal	45	12.9
	Peri-menopausal	5	1.4
	Post-menopausal	232	66.5
Symptoms	Unknown	67	19.2
	Bleeding	117	33.5
	Bleeding + others*	151	43.3
	Others only*	81	23.2

*Others include discharge, abdominal pain, back pain, incontinence, loss of appetite, nausea /vomiting, abdominal distension, dysuria, pain, or prolapse uterus

Table 3. Distribution and Association of Socioeconomic and Demographic Factors and Symptoms by Duration of Symptoms

Factor Category	Symptom Duration (months)				Total	P value
	1	2-3	4-6	≥7		
Age (yrs)						0.004*
< 50 years	13.3	38.7	35.6	21.4	99	
>50 years	86.7	61.3	64.4	78.6	250	
District						0.231
Trivandrum	28.9	44.3	38.9	32.9	129	
Kollam	24.1	17.9	18.9	30.0	77	
Others	47.0	37.7	42.2	37.1	143	
Religion						0.707
Hindu	75.9	69.8	72.2	65.7	248	
Muslim	9.6	13.2	7.8	11.4	37	
Christian	14.5	17.0	20.0	22.9	64	
Marital Status						0.457
Unmarried	1.2	0.9		4.3	5	
Married	63.9	62.3	65.6	61.4	221	
Widowed	32.5	31.1	33.3	28.6	110	
Divorced	2.4	5.7	1.1	5.7	13	
Education						0.31
Illiterate	24.1	24.5	18.9	21.4	78	
Primary	21.7	36.8	34.4	37.1	114	
Middle	30.1	18.9	18.9	24.3	79	
Secondary+	22.9	18.9	25.6	15.7	73	
Unknown	1.2	0.9	2.2	1.4	5	
Income Category						0.296
Lowest	59.0	67.0	53.3	62.9	212	
Medium	18.1	17.0	28.9	22.9	75	
Highest	22.9	16.0	17.8	14.3	62	
Occupation						0.339
Blue collar	16.0	20.6	14.6	22.9	63	
White collar	1.2	3.9	--	1.4	6	
Housewife	82.7	75.5	85.4	75.7	273	
Symptoms						0.016*
Bleeding	44.6	33.0	30.0	25.7	117	
Bleeding+**	36.1	40.6	51.1	45.7	151	
Others**	19.3	26.4	18.9	28.6	81	

*Significant at the 5% level; ** Others include discharge, abdominal pain, back pain, incontinence, loss of appetite, nausea/vomiting, abdominal distension, dysuria, pain, or prolapse uterus

relationship between the SEDS factors and the log odds of disease. All the analysis were done using the statistical package SPSS.

Results

A total of 473 cervical cancer patients registered at the RCC during the calendar year 2006. One hundred and seven patients who had undergone partial treatment before reporting to the RCC, 5 patients from the Maldives and 12 patients whose case records were missing were excluded from the present analysis. The total number of patients analyzed was 349 (340 from Kerala and 9 from Tamilnadu). Patient age ranged from 30 to 93 years with a mean age of 56 years (SD=12 years). Seventy two percent of patients were 50 years of age or older. Thirty seven percent of patients resided in Trivandrum and 22% in nearby Kollam district. Patients belonging to Hindu religion constituted 71%, Muslims 11 % and Christians 18%. Sixty three percent of patients were married, 31% widowed and 4% divorced. Patients in the lowest income category comprised 61%, medium comprised 21% and high 18%. Twenty two percent of patients were illiterate, 33% literate or upto primary school level, 23% middle school, and 21% secondary school and higher education. Seventy eight percent of patients identified their occupation as 'housewife', 1.7% had 'white collar' jobs such as teachers, government employer, etc., and 18.5% had 'blue collar' jobs labeled as laborers and factory workers (Table 1).

Table 1 describes the various SEDS factors and their relationship to the stage at diagnosis. Forty-six percent were diagnosed at an "early" stage of cervix cancer and 50.4% were diagnosed at a "late" stage (3.7% unknown). In the univariate analysis it was observed that patients were more likely diagnosed in later stages if they were aged 50 years or older (p=0.021), in a lower income bracket (p=0.011), with lower education (p=0.001) or widowed/ divorced (p=0.0001). However, in the multivariate analysis, elevated risks for late stage reporting were observed for women who were widowed/divorced (OR=2.08; 95% CI: 1.24-3.50) and women with lower education (OR=2.62; 95% CI: 1.29-5.31 for women with only primary school education and OR=1.91; 95% CI: 0.86-4.28 for illiterate women) (Table 1).

Table 2 summarizes data for the distribution of parity (number of live births), menopausal status, "listed symptoms" and duration. Two-thirds of patients had more than two children. Sixty seven percent were post-menopausal, 14% were pre/peri-menopausal (19% the status was unknown). Bleeding per vagina was the most common symptom which was seen in 77% of patients and 23% had other symptoms which included discharge, abdominal pain, back pain, incontinence, loss of appetite, nausea/vomiting, abdominal distension, dysuria, pain, or prolapsed uterus.

Table 3 describes SEDS factors and their relationship to symptom duration. Symptom duration was divided into four groups, less than or equal to 1 month, 2-3 months, 4-6 months, and more than 6 months. Patients who had symptoms of "bleeding" or "bleeding with other

Table 4. Type of Symptoms According to Menopausal Status

Menopausal Status	Bleeding*	Other symptoms only [#]	Total	p-value
Pre & peri	31 (62.0)	19 (38.0)	50 (100)	
Post-	186 (80.2)	46 (19.8)	232 (100)	
Unknown	51 (76.1)	16 (23.9)	67 (100)	
Total	268 (76.8)	81 (23.2)	349 (100)	0.022*

*, with or without other symptoms, significant at the 5% level, [#] including discharge, abdominal pain, back pain, incontinence, loss of appetite, nausea/vomiting, abdominal distension, dysuria, pain, or prolapse uterus symptoms” were more likely to seek treatment within one month, whereas those with “other symptoms only” were more likely to delay seeking treatment (p=0.016). Duration of symptom was shorter in patients with 50 years or older (p=0.005) (Table 3). Table 4 shows menopausal status (pre/peri vs. post) related to the type of symptoms (“bleeding or bleeding with other symptoms” vs. “other symptoms only”). Higher proportion of pre/peri-menopausal women reported “other symptoms only” (38%) than the corresponding proportion of post-menopausal women (20%) (p=0.022).

Table 5. Association of Socio-economic and Demographic Factors According to Time from Diagnosis to Registration ('delay time')

Factor Category	Time in weeks			Total	P-value
	≤1	1-2	≥2		
Age < 50 years	26.3	30.9	33.9	99	0.42
> 50 years	73.7	69.1	66.1	250	
District					0.001*
Trivandrum	42.7	25.5	25.8	129	
Kollam	25.0	16.4	16.1	77	
Others	32.3	58.2	58.1	143	
Religion					0.51
Hindu	69.4	72.7	75.8	248	
Muslim	9.9	10.9	12.9	37	
Christian	20.7	16.4	11.3	64	
Marital Status					0.87
Unmarried	1.7	--	1.6	5	
Married	61.6	67.3	66.1	221	
Widowed	31.9	30.9	30.6	110	
Divorced	26.3	10.9	17.7	78	
Education					0.11
Illiterate	26.3	10.9	17.7	78	
Primary	31.0	34.5	37.1	114	
Middle	19.4	34.5	24.2	79	
Secondary+	21.6	20.0	19.4	73	
Unknown**	1.7	--	1.6	5	
Income Category					0.28
Lowest	60.8	54.5	66.1	212	
Medium	21.1	20.0	24.2	75	
Highest	18.1	25.5	9.7	62	
Occupation					0.50
Blue collar	19.7	12.7	18.6	63	
White collar	1.3	3.6	1.7	6	
House wife	78.9	83.6	79.7	273	
Stage at diagnosis					0.09*
Early	42.7	58.2	46.8	160	
Late	53.9	40.0	46.8	176	
Unknown**	3.4	1.8	6.5	13	

*Significant at 10% level; **excluded for statistical analysis

Patients residing in the district of Trivandrum (near to the RCC) were more likely to have a shorter registration delay time than those living in other districts, further away from Trivandrum, with a delay of typically more than 2 weeks. Although results were not significant, patients diagnosed in later stages had a shorter registration delay time than those patients diagnosed in earlier stages (Table 5).

Discussion

The present study analyzed the impact of SEDS factors among cervical cancer patients and compared these factors to the stage at diagnosis, symptom duration and the time to report to a major cancer hospital in South India. Patients were more likely diagnosed as having a later stage of cancer if they were widowed/divorced or had lower education. This trend exists because no support from the family may discourage patients from seeking treatment, and those with little to no education do not understand the implications of cancer or other serious diseases or are not able to take serious notice of the common symptoms of the disease. Women may also be less inclined to seek treatment due to pre-existing notions about body image and modesty inherent in the culture. Lower rates of cervical cancer screening in Indian women have also been attributed to cultural barriers (Brotto et al., 2008) and may even discourage women from seeking modern medical care for gynecological problems.

Even though no data with regard to SEDS factors in late stage reporting is available in the literature for comparison, the impact of such factors on attending screening is noteworthy. The present study results echo observations from the U.S. where people with lower education are less likely to actively seek preventative screening measures (Nelson et al., 2003; Coughlin et al., 2006). More specifically, studies have shown that people who are less educated and have lower health literacy are less likely to practice preventative health behaviors such as routine cancer screenings (Lindau et al., 2001; 2002). The crucial difference remains that no organized screening or cancer awareness program currently exists in India. It is interesting to note that the incidence rate of cervical cancer in Trivandrum is the lowest in the country (9.4 compared to a range of 17.3 to 28 per 100,000 women in the other states). This reflects the literacy rate of women in Kerala, which is the highest in the country at 88% (Census of Kerala, 2001). Higher educational levels as measured by literacy rates may improve cancer awareness and decrease cervical cancer incidence.

In the present analysis, elevated risks for late stage reporting among cervical cancer patients were observed for women who were widowed/divorced. One reason for this may be that emotional support attributed to a husband may enable and even promote women to seek treatment early on. Since treatment of cancers in the earlier stages produce better results (Vinh-Hung et al., 2007) it is important that disparities in reporting according to SEDS factors to be narrowed.

The religion distribution in the present analysis among cervical cancer patients was approximately 71% Hindus,

11% Muslims and 18% Christians. The religion-wise population proportion in Kerala is 56% Hindus, 25% Muslims and 19% Christians (Census of Kerala, 2001). Circumcision has been shown to decrease the risk of HPV infection, including oncogenic HPV, which may lead to spread of HPV in the female (Hernandez, et. al., 2008). Because Muslim men are typically circumcised and Hindus and Christians are generally not, this decreases the risk for HPV and hence cervical cancer among the Muslim women.

In the present study, most of the patients in the district of Trivandrum (where the RCC is located) were likely to be registered at the RCC within the first week of diagnosis. Those patients living elsewhere in the state of Kerala were more likely to have a registration delay time of more than 2 weeks. This delay time could be vital to patient survival if treatment is not given relatively soon after diagnosis. Transportation has been shown to be a significant barrier to cancer treatment in United States particularly among minorities who may forgo treatment in the absence of transportation facilities to a treatment center (Guidry et.al 1997). In the present study, longer distances to travel to the RCC may inhibit women seeking immediate care. This trend suggests that either more facilities are needed to accommodate a greater geographic diameter or that patients need adequate modes of transportation to the treatment center so that average registration delay time is not postponed.

In the present study, registration delay time was shorter among patients with late stages. Severity of the symptoms may be higher in late stages of women than early stages and the reason for early reporting. Further the duration of symptom was shorter in patients with 50 years or older. Accuracy of the reporting may be better in young age women, and older women might have underestimated the duration of symptoms.

In the present study income was not emerged as a significant factor for late stage reporting in the multivariate analysis. Even though income was assessed based on a variety of factors such as patient occupation, husband's occupation and whether they own or rent their house/land, it may have been consistently underestimated since patients are reluctant to report higher income amounts so as to avoid making payments for treatment and other services in the hospital and which might be the reason for insignificance.

This study has several limitations being a retrospective analysis. First, the duration of symptoms were described by the patient during their first hospital visit as a part of the patient history record. Patients may have recalled duration of symptoms incorrectly. The present study relied heavily on the medical records hand written by the medical professionals who would not have envisaged great vigil at recording. Medical records might have contained incorrect information as they are all subject to human error. Secondly, 19% of patients had menopausal status "unknown", as it was not strictly recorded in the patient file. Prospective studies are required to assess the pattern of symptoms along with duration and to correlate these factors with menopausal status.

In conclusion, this analysis has helped to identify the

target population group to receive health education for early stage reporting of cervix cancer. Specific educational approaches should be tailored to the target group in order to achieve the greatest amount of efficiency towards screening. The results of this analysis can similarly be applied to countries where no organized screening programs are available and will hopefully help to target appropriate groups so that the disease can be detected in early stages with greater chances of survival.

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