

**ECONOMIC IMPACT OF HEAD AND NECK CANCER IN INDIA AT AN INDIVIDUAL
LEVEL AND THE FACTORS AFFECTING IT****Manvee Tomar*¹, Priyank Rathod², Shashank J. Pandya³, Mohommad Mithi⁴**

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ABSTRACT

Head and neck cancer is a significant public health concern in India and globally, with substantial social and economic consequences for affected individuals and their families. The study aimed to assess the socioeconomic impact of head and neck cancer. This paper presents the results of a questionnaire-based study involving 178 head and neck cancer patients who were evaluated at least two years post-completion of their treatment. The questionnaire data collected data on various factors, including site of cancer, treatment modality, speech and diet impairment, changes in earning capacity, occupation, and salary. This was collected from all patients visiting our tertiary cancer care center outpatient department in Ahmedabad, India, between January 2021 and August 2021. The findings highlight the diverse and profound socioeconomic consequences of head and neck cancer. The findings emphasize the need for comprehensive support systems for affected individuals and their families.

KEYWORDS: Head neck cancer, Economics, Social morbidity.**INTRODUCTION**

Head and neck cancer represents a significant challenge in India and worldwide, with diverse etiological factors and varying clinical presentations. It is associated with a substantial societal burden, including financial implications for patients and their families. India, with its diverse population and healthcare disparities, faces unique challenges in addressing the socioeconomic impact of head and neck cancer.^[1,2] Socioeconomic factors play a pivotal role in the management and recovery of cancer patients. Previous research has shown that cancer survivors often face challenges related to income loss, employment status, and changes in earning capacity.^[3] This study aims to shed light on the socioeconomic consequences of head and neck cancer in India, focusing on income, occupation, and salary changes.

METHODS

This prospective questionnaire-based analysis was done at the Gujarat cancer hospital in Ahmedabad, India.

All patients coming for follow up at least 2 years post treatment for cancer of the oral cavity, larynx or pharynx

were included in the survey. The survey was conducted between the first of January to the thirty first of August. The study included a total of 178 patients.

The survey included questions regarding income, employment, speech, diet, and treatment-related changes in earning capacity. The data was analyzed based on various factors.

We performed rigorous data preprocessing, statistical analysis, and visualization of patient data using Microsoft Excel. This involved data cleansing, exploratory data analysis, and the application of relevant statistical tests to extract and interpret key findings, contributing to the robustness of our study.

We also ran an ordinary least squares regression using STATA to see if the changes in income were statistically significant and how each of the different variables affect the change in income.

RESULTS

A total of 178 patients who filled in the survey were included in the analysis. The range of follow up was 2–15 years.

Descriptive Data Analysis

1. Income Impact Based on Site

Participants were grouped based on the site of their cancer. The study found that 158 patients with oral cavity cancer experienced a 14.6% decrease in income, while 16 larynx cancer patients had a 12.6% income decrease. Additionally, 4 pharynx cancer patients reported a substantial 26.7% decrease in income.

2. Income Impact Based on Treatment

Income impact was also analyzed based on the treatment modality. The results revealed that patients who underwent surgery alone (34 patients) experienced a 9.9% decrease in income. In contrast, those who received surgery followed by adjuvant radiation (111 patients) reported a 10.2% decrease. Patients treated with surgery and adjuvant chemoradiation (19 patients) experienced the most significant income decrease at 36.6%. Patients who underwent curative chemoradiation alone (14 patients) reported a 32.4% income decrease.

3. Income Impact Based on Speech

Patients' speech intelligibility was assessed, and those with understandable speech (164 patients) experienced a 13.3% decrease in income. In contrast, patients with speech difficulties (14 patients) reported a more substantial income decrease of 30.7%.

4. Income Impact Based on Diet

Dietary habits were examined, with patients grouped into solid, semi-solid/liquid, and Ryles tube feeding categories. Patients on a solid diet (135 patients) experienced an 8.8% decrease in income, while those on a semi-solid/liquid diet (41 patients) reported a 32.1% income decrease. Patients reliant on Ryles tube feeding (2 patients) reported a 100% decrease in income.

5. Treatment-Related Change in Earning Capacity

A significant finding was that 78% of patients were primary breadwinners in their families before diagnosis. Post-treatment, this number decreased to 56%, indicating a substantial change in the earning capacity of affected individuals.

6. Income Impact Based on Occupation

Participants' occupations were examined, and income changes were categorized as no change, employed with occupation change, or employed to unemployed. Among patients with no occupation change (131 patients), income increased by an average of 8%. In contrast, patients who experienced an occupation change (15 patients) reported a substantial decrease in income, with a mean decrease of 36.3%. Patients who transitioned from employed to unemployed status (32 patients)

experienced the most severe income decline, with an average decrease of 97.2%.

7. Income Impact Based on Salary

Income changes were further analyzed based on salary fluctuations. Among patients, 32 reported an increase in salary with an average increase of 75.1%. In contrast, 67 patients reported a salary decrease, with an average decrease of 68.6%. A total of 79 patients experienced no change in salary.

Regression Results

We use the equation below to estimate the effect of cancer treatment related factors on the income of the patient before the treatment and dependents they have. We could not control for sex and age because of missing data for certain patients.

$$y = \beta_0 + \beta_1 * s_{ifit} + \beta_2 * t_{irea} + \beta_3 * s_{picech} + \beta_4 * d_{iieit} + \beta_5 * i_{nidio} + \beta_6 * f_{ioire} + \beta_6 * d_{ieipieindie} + \epsilon$$

- We are interested in measuring the change in incomes of the patient after the treatment, thus our dependent variable (y) is income of the patient after the treatment
- Site represents the site of the surgery (Oral cavity, Pharynx, Larynx)
- Treatment represents the kind of treatment provided (Surgery only, Surgery and Adjuvant Radiation, Surgery and Adjuvant Chemoradiation, Only Chemoradiation)
- Speech represents speech intelligibility (Understandable or Not Understandable)
- Diet represents the kind of diet consumed by the patient after the surgery (Solid, Liquid or Ryles Tube)
- Income_before is the income of the patient before the treatment began
- Dependent represents if the patient has dependents or not (Yes or No)

Table 1 shows the regression result.

Table 1: Regression results of cancer treatment related factors with change in income.

Income After	
site_oral	-3410.406 (4227.559)
site_larynx	-1261.812 (4001.482)
site_pharynx	0.000 (.)
treat_surg	3478.355 (3278.816)
treat_surg_rt	4215.731 (3066.913)
treat_surg_ctr	1394.661 (3504.568)
treat_ctr	0.000 (.)
speech_dummy	-180.031 (2099.886)
diet_solid	2021.635 (1381.778)
diet_semi	0.000 (.)
diet_tube	-691.108 (5167.733)
income_before	0.893*** (0.069)
Dependent	-3718.467*** (1286.400)
_cons	-1130.324 (4240.688)
N	177

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

We interpret the table keeping one of the categories in each of the variables set as a base value. For site the base value is pharynx. Thus, for a patient who has the site as oral, their income reduces by 3410 more than a patient whose cancer site is the pharynx, keep all else constant. We can interpret the rest of the variables in a similar manner.

DISCUSSION

The socioeconomic impact of head and neck cancer, as evidenced by the findings of this study, is substantial and multifaceted. Income loss is a prevalent issue, with varying degrees of impact based on cancer site and treatment modality. Notably, patients undergoing aggressive treatments such as surgery and adjuvant chemoradiation or curative chemoradiation alone experienced the most significant income decreases.

Speech and diet impairment also played a role in income reduction, with patients facing communication difficulties and dietary restrictions reporting higher income declines. Additionally, the study revealed a change in earning capacity, with a notable decrease in the number of patients serving as primary bread winners

post-treatment, highlighting the broader impact on families.

Occupation changes, including transitions from employment to unemployment, had a profound impact on income. This underscores the importance of supportive vocational and rehabilitation services for cancer survivors. It is noteworthy that patients who experienced no occupation change reported an increase in income, suggesting the resilience of some individuals in adapting to their condition.

The salary component of income changes showed a substantial discrepancy, with some patients experiencing significant increases while others faced substantial decreases. This variance may be attributed to factors such as job changes, promotions, or demotions following cancer treatment.

While none of the regression analysis results are statistically significant and we cannot draw strong conclusions from them, we can see that the site of the cancer, speech impairment, tube diet and having dependents certainly reduces the income of the patient.

Given the limited dataset it would be difficult to make other conclusions. However, along with the descriptive results there is reason to believe that some of these factors correlate with a reduction in incomes of the patient.

The limitations of this study besides being an observational one is that the survey had the option to be anonymous which led to a gap in the data on gender and age which can have an effect on the interpretation of the data.

The socioeconomic consequences of head and neck cancer are not limited to individual patients but extend to their families and communities. Comprehensive support systems, including rehabilitation services, vocational counseling, and financial assistance, are imperative to address the multifaceted challenges faced by head and neck cancer survivors and their families.

CONCLUSION

Head and neck cancer has a significant socioeconomic impact on patients, affecting income, occupation, speech, diet, and earning capacity. Site-specific factors, treatment modalities, and individual circumstances all contribute to these socioeconomic challenges. Healthcare providers and policymakers should consider these factors when developing support programs and interventions to mitigate the financial burden faced by head and neck cancer survivors.

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Conflict of Interest

All authors declare no conflict of interest.

Consent

Written informed consent was obtained from all patients regarding publishing data.

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