DOES DISCRIMINIATION DRIVE THE GENDER DIFFERENCES IN HEALTH EXPENDITURES ON ADULTS: EVIDENCE FROM CANCER PATIENTS IN RURAL INDIA

1. INTRODUCTION:

Health is a basic human right that is guaranteed in several human rights treaties. However, health inequities abound, especially, in the case of developing countries, with high levels of poverty. Research shows that there is substantial variation in the population in terms of current health status, health investments undertaken, access and utilization of healthcare services in India. The literature around the social determinants of health stresses the social gradient in health, and explains how psychological and social influences affect physical health and longevity (Wilkinson & Marmot, 2003). One such factor is gender, and as noted by the WHO, gender-based discrimination can fetter the attainment of health goals (such as those laid out as a part of the Millennium Development Goals). Analogous to other inequities, gender discrimination manifests itself in both lower health investments as well as worse health status of women relative to men. With its deeply patriarchal society, many parts of India are no exception to such gender discrimination. Thus the Indian context is especially relevant to study the effect of discrimination on health.

A large part of the literature on gender discrimination focuses on children and shows preferential treatment is given to boys, especially when resources are very tight (for example, Behrman, 1988). Asfaw et. al., (2008) show evidence of gender discrimination in health care financing among children in the same household, even in providing medical care before death among children (Asfaw, et. al. 2007). A comprehensive overview of the issues can be gleaned from a variety of sources (Sekher and Hatti)[1], There is also evidence of gender discrimination in immunization and nutrition (Pande, 2003;V, Roy, & Retherford, 2004; Borooah, 2004; Jayachandran, & Pande 2012)). For example, Borooah (2004),shows that girls between ages 1 and 2 years are neglected in two respects: nutritious diet and being

[1] http://www.unfpa.org/gender/docs/sexselection/indiapublishedpapers/UNFPA_Publication-39865.pdf

fully immunised. Indeed, instances of such discrimination have been reflected in excess female mortality (Rose, 1999) and declining sex ratios (Mayer, 1999)

While much of the literature has focused on children, recent research (Anderson & Ray 2009, 2012)has shown that females face the risk of excess mortality at each stage of their lives. The authors speculate poor treatment and care at home may be an important factor for such excess mortality. Gender differences in treatment-seeking behavior within households is relatively less discussed and analysed. While Pandey, et. al., (2002) finds gender discrimination in treatment in rural West Bengal for treatment of diseases like diarrhea, Gantara & Hirve (1994) finds a male bias in health care utilization for under-fives in a rural community in Western India. Gosoniu, et. al., 2008 examine the delay in diagnosis for Tuberculosis and find that the delay is greater for females. These differences in treatment seeking behaviour often results in worse outcomes for poor females (Sen, Iyer, & George, 2007), and this is more prominent in rural areas (Rajeshwari, 1996).

In this paper, we take this theme forward and focus on gender differences in health expenditures and treatment seeking behavior across adults and especially for the elderly. We focus on, cancer, a disease which is perceived as life threatening by all households. Hence health seeking is subject less to differing perceptions on the seriousness of the malaise. Moreover, given the larger incidence of Non Communicable diseases (NCDs) among adults (Anderson & Ray 2009), the evidence on health seeking behavior for cancer can shed light on health inequities for adults.

In this study, we study discrimination using a longitudinal survey of adult cancer patients residing in rural parts of the Indian state Odisha. In particular, we try to understand the presence and magnitude of differences in health expenditure between males and females and the likely determinants of such differences in a multivariate framework.. Using longitudinal and retrospective data on 204 cancer patients, and controlling for other demographic and economic covariates, we find that gender discrimination accounts for 73 percent of the gender difference in cumulative total expenditure. Moreover 64 percent of the difference is on account of gender discrimination in cumulative medical expenditure. Further we show that

this is largely on account of differences in expenditures before coming to the tertiary centre. Moreover, women are 20 percentage points less likely to get treatment for cancer before coming to the tertiary centre. Further, we show that the results are heterogeneous and gender discrimination is higher among the elderly, among the poor and among those who live in joint families.

Our study contributes to three disparate strands of literature. First, this paper contributes to the growing evidence of gender discrimination in health-seeking behaviour. While evidence in the literature has largely looked at outcomes for children, this paper contributes to the relatively smaller literature on the effect of disparities in adult health.

Second, we contribute to the literature on the effect of cancer. There is increasing evidence globally and in India that the incidence of cancer is showing an alarming rise. Cancer is the leading cause of adult deaths worldwide, and in India 6 percent of all deaths is due to cancer. Around 635,000 people died from cancer in 2008 in India as reported by International Agency for Research on Cancer in their ongoing Million Death Study (MDS)[2]. Approximately one million newly diagnosed cancer patients are seen in India each year[3] and there are very few estimates of cost to patients. The Global Economic Cost of Cancer report (American Cancer Society, 2011), estimates that cancer has the greatest economic impact from pre-mature death and disability of all causes worldwide. In India, estimated rate of cancer mortality for men in rural areas is 95.6 per 100,000 and for rural females is 96.6 per 100,000 (Dikshit, et. al., 2012) . A previous study (Mohanti et. al., 2011) found that cost of cancer treatment in a public hospital in Delhi was about $244 (Rs 14,597). Focusing on a relatively poor state of India-Odisha–helps also to bring out the possible economic hardships faced by patients suffering from an expensive disease like cancer.

[2] MDS is the study conducted by Centre for Global Health Research, to study the premature mortality in the world, it includes the study of cause of death of uncertified cause as well using verbal autopsy.

[3]Note : Based on cancer incidence data (2006-08) and actual growth rate(2001-2011) observed in India. Source: Indiastathttp://www.indiastat.com/health/16/diseases/77/cancer/17811/stats.aspx

The third contribution of this paper is to add to the growing evidence around Non Communicable Diseases (NCDs) and their effect on households in India. The Global Burden of Diseases, Injuries, and Risk Factors Study (2010) indicates that, overall, the three risk factors that account for the most disease burden in India are dietary risks, household air pollution from solid fuels and tobacco smoking. Non-communicable diseases (NCDs) are rising in India and communicable, maternal, neonatal and nutritional causes of disability-adjusted life years (DALY) are declining, consistent with global trends.
These two points together justify studying cancer as a case of a chronic disease.

The economic burden of chronic diseases begins with the arrival of the symptoms of the disease, as considerable amount is spent on the diagnostic tests and symptomatic care. Moreover, long treatment duration and expensive healthcare services add to the stress. While there is considerable literature around the economic impact of diseases like HIV/AIDS, there is comparatively very little evidence on economic hardships households undergo from NCDs like cancer. Among NCDs, now cardiovascular diseases and diabetes is getting a lot of attention, but cancer is yet to catch the focus of researchers and policymakers in any serious way.

.Section 2 provides details on the data set and methodology. Section 3 reports our main results of our analysis. In section 4, to show that our results may be more general, we present additional evidence on possible gender disparity from a brief analysis of cross sectional data collected by the National Sample Survey (NSS) in 2004. Section 5presents the conclusions and policy implications of the study.

2.. Data and methods

The data set used in the study is based on a primary longitudinal survey of 204 cancer patients residing in rural Odisha. Odisha is one of the poorest states in India. In 2004-05, 37.58 percent of rural residents had a per capita monthly consumption below the poverty line (Rs. 407). The survey was conducted at a

public tertiary hospital in the city of Cuttack.[4]The baseline survey was conducted over 5 months in 2007.[5]

The patients were surveyed are at various stages of cancer (Appendix Table 1A). The baseline survey was done at the hospital[6] and information was collected from them on their cancer treatment and expenditures at the hospital. The expenditures include money spent on various medical items like drugs and diagnostics, as well as on non-medical expenditure items related to treatment (transport, food and lodging of the patient as well those of the accompanying care-givers from the household). Further, detailed information was obtained on the treatment and expenditures (medical as well as non- medical) before coming to the hospital. In addition to medical history, detailed household demographic and asset information were recorded for each patient, both current as well as for the period before symptoms of cancer were first observed.[7]A subsequent survey on patients was done after one year.[8],[9] Information on expenditures, analogous to those collected for other reference periods, were collected for the last one year since baseline. This reference period includes - among other things - the cost of treatment at the tertiary centre.

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[4] The hospital is listed under the National Cancer Repository Program in India. Necessary ethics committee approval was taken and participation was voluntary. Patients were approached through doctors at the hospital. To the best of our knowledge, no patient refused to be surveyed at the baseline.

[5] The baseline survey was done at the hospital.

[6]Staging information was formally recorded in medical files for only a subset of participants. In the case of patients at advanced stage of cancer, questions were asked to accompanying care-givers. We excluded terminal stage cancer patients seeking palliative care from our survey on humanitarian grounds.

[7] In many cases, patients were unable to pin point when the first symptom related to cancer appeared. For these patients, household information was obtained for the period before first diagnosis. This was done to collect retrospective data for the household before cancer started affecting household composition and assets.

[8] This was done at their household residences.

[9] 47 patients (23.5 percent) died before our second survey and information was collected from the household for the period they were alive over the last year and sought additional medical care.

In Table 1, we summarize the characteristics of our sample. Women account for 71 percent of the sample. The average age of patientsboth males as well as females, is around 49 (not in the table). Our sample covers patients with most of the common cancers seen in India. We define three kinds of cancer: those specific to females (*female cancer*: breast cancer & cervical cancer;97 patients),those specific to males (*male cancer*: penile cancer;4 patients) and those cancers which occur for both men and women (*common cancer*: head and neck,brain, bone, urinary, Gastro-intestinal, liver and lungs; 101 patients). Stratifying the sample by gender, we find 53 percent of males suffer from head and neck cancer whereas around 50 percent of females suffer from cervical cancer.

The average education among the patients is relatively high. Around 25 percent of patients have at least secondary schooling, though the proportion of males with this education level (44 percent) is much higher than females (18 percent).The proportion of men in the richest quartile is 26 percent (*rich*) where as proportion of female is 21%. These quartiles are based on a recall of assets owned by the household before first symptom/diagnosis of cancer.[10] The households of male and female patients are also similar in terms of the average education of the household head (7 years). Moreover, 28 percent women patients report that the household had taken some loan before the first symptom of cancer (*debt*). While this is slightly lower for males (27 percent),the difference is not statistically significant. Thus, the households that men and women patients come from are very similar in terms of economic characteristics.

The patients also belong to households which are demographically similar. The household sizes across gender are similar (6-7 members per household). While 73

[10]Within the Odisha sample, we created a wealth index based on assets owned by the households before first diagnosis: (radio, TV, Refrigerator, Bi-cycle, Motor-cycle, car, Telephone, Mobile phone, tractor, livestock, house ownership, *Pucca* House, acres of land owned). Using principal component analysis, an asset index was calculated, based on which households were put in wealth quartiles..

percent of males come form joint family, 68 percent of females come from such families[11]. However, as pointed out later in the paper, the implications of being in joint families may be different depending on the gender of the patient.

Given the relative scarcity of tertiary centers in rural Odisha, people come from far away places to seek treatment. The average distance (*distance)* of a cancer patient from his place of residence is 58 Kms. [12] Females come from slightly further off (60 kms) relative to males (52 kms).

A tertiary cancer centre is usually not the first point of contact for individuals in rural areas. Usually the first diagnosis is made outside the hospital, though it is always re-confirmed at the tertiary centre.[13] This would create a problem especially if the patients reach the tertiary hospitals only at an advanced stage. However, the mean duration from first diagnosis to being registered at the cancer centre is less than half a year.[14],[15] The difference between males and females in terms of duration is insignificant (not statistically but in absolute terms so we can say negligible). Hence, it does not seem to be the case that females reach the cancer centre earlier than males. We do not rule out any potential selection taking place (many women do not reach the cancer centre at all) , but that would only strengthen the argument about discrimination stronger.

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[11] Joint family is defined as household that has more members than just the patient, his/her spouse and his/her children.

[12]The distance used is the distance between Cuttack railway station and the railway station of the district the patient resides in. This was calculated using GIS location of the stations and calculating the distance between them using their lat-longs (the software on http://www.meridianworlddata.com/Distance-Calculation-demo.asp was used). Moreover, we add the local distance from hospital to the railway station.

[13] First diagnosis refers to an initial provisional diagnosis.

[14] The median duration is even lower at 83 days.

[15] We have also discussed above that many patients reach the hospital in early stages of cancer.

Moving on to expenditure, we classify expenditures in two ways. First in terms of when they were made; we calculate the expenditure before registering at the tertiary centre (*outside centre*), and post the baseline survey, which includes the treatment at the tertiary centre (*post survey*).

The mean cumulative expenditure including medical as well as non-medical expenditures over the period of our survey is Rs. 93,010. The mean cumulative expenditure in female patients is lower at Rs.83,626 as compared to Rs. 116,073 spent on male patients. Thus the difference of cumulative expenditure between male and female patients is Rs. 32,446 and is statistically significant. More than 70 percent of this difference comes from the difference in the cumulative medical expenditure. Classifying expenditures based on where they were made, we find that 85 percent of it comes from expenditures incurred before coming to the centre[16].

The greater medical expenditure on men, relative to women, is complemented by higher non-medical expenditures (transport, food and lodging while getting care and other miscellaneous items) by men and analogous to what was reported above, most of this difference is due to pre-visit expenses.
Disaggregating further the difference in medical expenditures outside the centre, we find that most of the difference is accounted for by differences in symptomatic medical treatment (38 percent). Twenty nine percent of the difference is account for by expenditures on investigations and a further, 33 percent of it is because of the difference in expenditure on cancer treatment.

Crucial to the analysis of expenditure is to account for the fact that some of the expenditures may be subsidized by the government. Moreover, governments also provide insurance to their employees and their families members. Indeed, 34

[16] The difference between males and females in expenditures incurred before coming to the tertiary centre are slightly higher than the cumulative total expenditure difference across gender. This is primarily because the cumulative total expenditure takes into account that more money is spent of women when they are at the tertiary centre, though the difference between the expenditures between men and women, at this stage is statistically insignificant.

percent of the households of male patients come from households that have some member in the family working in the government. While this is lower at 27 percent for females, the difference is not statistically significant.

3. Empirical Model & Estimation Technique

In this section, we lay out a model to investigate if there are gender differences in cancer expenditures, after controlling for other covariates. We also separate the gender difference in expenditures owing to the kind of cancers that are specific to females from gender discrimination for cancers that occur in both male and female patients.

To formalize the model somewhat, supposet_0 is the date on which a patient i registers at the tertiary centre. At some point in the past, the patient had the first symptom of cancer. In this analysis, we consider month of first symptom at $t_0 - \tau_i$ as the reference point from when the expenditures for cancer are undertaken.[17]According to this time line, cumulative expenditures are a function of *duration*τ_i. While *outside the centre* expenditure is clearly a function of *duration,* for all subsequent expenditures (*at the centre* and *post survey*), *duration* can be interpreted as an imperfect measure of the delay in treatment.

The expenditures on the patient may depend on the kind of cancers. As mentioned above, in line with our research question, we include *Female Cancers and Male cancers* as explanatory variables (with cancers not specific to females as the omitted group). Expenditures are moreover a function of individual, household as well as geographic characteristics. At the individual level we control for age), gender and education of the individual. However, since we already control for male and female cancers, , the dummy variable for gender (female) captures the gender differential

[17]In some cases, where the patient is not able to pin point first symptom, we use date of initial tentative diagnosis (not necessarily of cancer but linked to its symptoms) as the reference point. To minimize imperfect recall, we have already restricted the analysis to patients whose date of symptom or initial diagnosis is within the last 5 years.

among cancers that occur to both men and women. Hence the variable *Female* is the measure of gender discrimination in our model.

At the household level, we control for the initial asset wealth of the household (before first symptom: *rich*) and the outstanding debt before first symptom (*Debt*). These measure the amount of money that can be potentially spent on healthcare when the illness manifests. Moreover we control for other demographic characteristics like household size, average education of the household head, whether the patient belongs to a joint family and whether anyone in the patient's family works in the government sector.

We control for household's geographic access to the tertiary hospital by inclusion of the variable *distance* (distance to tertiary centre).[18]

The following equation is estimated:

$$EXP_i^{cum} = \alpha + \beta Female_i + \gamma Female\ Cancer_i + \delta Male\ Cancer + \theta' Z_i + \varepsilon_i$$

where EXP_i^{cum} is the cumulative expenditure and Z is a vector of all the other individual, household and geographic characteristics.[19]

In the data, cumulative expenditure is skewed (skewness is around 2). Hence an OLS regression with EXP_i^{cum} is not recommended (Manning & Mullahy, 2001). Moreover, in the presence of heteroskedasticity and where variances of the log scale residuals are less than 1, Generalized Linear Models (GLM) are recommended.[20] Hence we

[18] While we know the district of residence of the patient, inclusion of district level dummy variables would decrease the degrees of freedom. Hence we avoid using such dummies.

[19] 23 percent of patients die within 1 year of our baseline survey. We have however, collected cancer related expenditures on them (from their households). We do not include the dead/alive status as a control variable since it is endogenous. A summary of cumulative total expenditure by survival status yields no significant difference between those who are alive and those who die.

[20] The log model is a special case of this more general model.

estimate a GLM, with the appropriate tests for choice of functional forms of the link function and the distribution form We also estimate robust standard errors.

Since the cumulative medical costs form a significant part of the total cumulative expenditure (around 64 percent), we also use the total cumulative medical expenditure M_i^{cum}as a dependent variable.

As indicated in the previous section, a large part of the difference between expenditure on males and female is because of the medical expenditures *outside the centre*. Hence, in an additional exercise, we model the joint decision of seeking no treatment for cancer as well as the expenditure on medical treatment outside the centre. We posit that, controlling for other covariates, females have both lower medical expenditure before reaching the tertiary centre as well as a lower probability of being treated. To estimate this bivariate model, we run a Seemingly Unrelated Regression (SUR) model. We use the square root of the medical expenditure outside the centre$\sqrt{(M^{Outside})}$ to reduce the skewness of data as well as to retain values of zeros in our dataset. The second dependent variable is $Treat$, which takes the value 1 if there has been any cancer treatment and zero otherwise.

4. Results:

While the focus of our analysis is gender differences in expenditures, it is important to understand how the other covariates affect cumulative expenditures (Table 5, column 1) as well as cumulative medical expenditures.

As expected, we find that *duration* has a significant positive impact on both dependent variables. If a patient reaches a tertiary centre a month later (relative to it's mean value of 171 days), the cumulative expenditure is higher by around Rs. 1217 (Rs. 40.59 X 30 days). This is largely driven by the increase in the cumulative medical expenditure of around Rs 1045 (Rs 34.84 X 30). These calculations have important implications for the impact of outreach of cancer centres. While distance

is conventionally used to measure outreach, our results show that it is an insignificant (though positive) predictor of the cumulative expenditure. Surprisingly, it negatively affects cumulative medical expenditures which may be due to the lower availability and accessibility of health facilities in remote places.[21],[22]

We also find that educated individuals have higher cumulative total as well as medical expenditures. Moreover, the rich as well as the less indebted spend more. Among other results, household size significantly and positively impact medical expenditures, but not total expenditure, which is insignificant.

Our main empirical question is whether discrimination drives the differences in expenditure between males and females. We find that, if a patient is female, the mean cumulative expenditure is less by Rs. 23,698. Therefore, 73 percent of overall difference in cumulative expenditures (Rs. 32,446) is explained by gender difference in expenditures among patients suffering from *common cancers*. Moreover, the results indicate that expenditures on cancers that afflict only females are not significantly different from expenditures on *common cancers*. In a similar vein, the gender difference in cumulative medical expenditure is Rs. 14,578, which is around 64 percent of the total difference in cumulative medical expenditure.

We interpret the gender difference as discrimination since we have controlled for all other possible covariates and for similar cancers. We discuss additional evidence on discrimination in the next section.

Next, in Table 6, we present results of a joint estimation of medical expenditures and the probability of treatment *outside the centre*. Recall, that our dependent variable is the square root of medical expenditures. Controlling for other covariates, we find

[21] These results are not driven by selection. If one expects those coming from remote places to be at more advanced stage, then medical expenditures should be higher not lower. A bivariate regression of the probability of a patient being in an advance stage of cancer on distance yields an insignificant coefficient.

[22] It is also possible that health care is cheaper in remote places. We do not take into account the price of health care.

that the expenditure on female patients is significantly lesser than that for males. Moreover, the expenditures on *female cancers* are lesser than that spent on cancers that can also affect men. As pointed out above, the actual cost of treating cancer can vary depending on types of cancer. However, as column (2) shows, the probability of being treated for cancer, before coming to the tertiary centre, is lesser for females by 0.2 as compared to males, even for similar cancers. While this probability is equally lower (by 0.19) for *female cancers*, this result could be driven by the inherent difficulty of detecting cervical and breast cancer (given no regular screening). However, the evidence with respect to *common cancers* before coming to the tertiary centre leads us to suggest that there is gender discrimination in cancer treatment and expenditures and that this takes place largely before coming to the public tertiary centre. It is pertinent to point out here that, our analysis, perhaps provides a lower bound on the discrimination since we study patients at a public hospital. In the case of private tertiary centres, which are more expensive, the discrimination might even be larger.[23]

We also provide some additional results in Table 7 that support our claims. One may still be concerned that the health status of men relative to women drives our results. In particular, if women in our sample were healthier than men, then it is likely that less money would be spent on them. Information on the severity of the disease is not possible to get through individual primary surveys. The first credible staging information we have is at the tertiary centre. In column (1), we investigate if women are more likely to be at less advanced stages of cancer than men.[24]Due to imperfect record keeping at the tertiary centre, staging information is available for only 158 patients in our sample. Controlling for all other covariates (same as above), we find that, among common cancers, there is no significant gender difference in the

[23]Moreover, it might be the case that richer men go to private hospitals. However, in our sample, men and women in public hospitals are equally rich.

[24] Cancer staging is usually recorded from 1 to 4, with higher stages reflecting severity. We choose patients with stage 3 and above as advanced cancer patients.

probability of being an advanced cancer patient.[25] Hence, among common cancers, it suggests that it is not the better health of women, relative to men, that drives the gender differences. Alternatively, in column (2), we also report ordered probit results with KPS, an indicator of functional health recorded by doctors at the time of first registration.[26]The results show no difference in KPS between males and females for *common cancers;* in fact, the results seem to indicate that the females are slightly more unhealthy.[27]

Given these results, we explore, next, if the gender differences among *common cancers* vary by different demographic and economic characteristics. For this, we introduce interaction terms of the form: *female * characteristic*, in the empirical model for total cumulative expenditures.[28] As before, we estimate this by GLM and report marginal effects.

We find that gender differences in expenditure increases with age. While the difference between males and females is around Rs 16,185 at the age of 40, the difference, at the median age (almost 50), is Rs. 20,232. This implies that discrimination worsens with age. Households are more likely to invest in woman's health if she is in the reproductive age group, when she also takes care of other young children. While our results indicate that households discriminate less when a woman is younger, it is important to recall that cancer is a disease that affects people at relative older ages. Hence, while consistent with the idea that discrimination is less at the reproductive age group, it is also plausible that the

[25]On the other hand, a woman is more likely to be in an advanced stage if she suffers from breast or cervical cancer. This is perhaps due to the problems of detection.

[26] KPS (Karnofsky Performance Status) is an index from 0 to 100, with higher values indicating better health.

[27] KPS scores are slightly higher for *female cancers* and much higher for *male cancers*. Staging and KPS scores do not need to correlate positively for all cases, since they measure different aspects of health. While staging measures the growth of cells and how many nodes are affected, KPS scores are used to score patients on functional aspects of health, for example, a score of 70 indicates that a patient can take care for self even though he/she is unable to carry on normal activity or to do active work. (http://www.hospicepatients.org/karnofsky.html)

[28] We introduce interactions one at a time, so as not to reduce the degrees of freedom too much.

explanation to our result is that older men have control over their life time savings while older women don't.[29] Further, in Table 9, we find that gender discrimination is larger in households which are joint families. Recall that this is over and above the effect of household size. The impact of joint structure of a family has been found to play a significant role in explaining sex differences in survival and health outcomes in rural India, among girls and boys (Jain, 2013). Our analysis indicates that the structure of household is important in determining discrimination even among older adults.

Further, we find that the discrimination is relatively more in poor households compared to the richest households. The poorer households are credit-constrained and are, therefore, likely to allocate more resources to the necessities. By the same logic, these households may attach more value to the income-generating male members compared to females.

5. Results from a Nationally Representative Survey

To test if our small-sample results can be validated, we use the NSS data pertaining to rural India, which is a nationally representative data set. We conduct a regression analysis using individual level information on ailments and health expenditures collected by the NSS in 2004[30], for hospitalizations to capture the more serious of illnesses. It is important to emphasize that the two exercises are slightly different. While our analysis of cancer considers the stream of expenditures for the disease from first symptom till one year after registering at the tertiary centre, the NSS survey covers the hospital expenses spent on particular spells of ailment for which the patient was hospitalized. The expenditure on the same ailment before arriving at the hospital is not registered, if the spell is longer than one year.

[29] Almost 85 % of female patients report that they only did domestic work before they had their first symptom of cancer. Hence it is not possible to estimate if occupation and income earned before cancer set in matters for discrimination.

[30] We use the survey on "Utilization of Medical Facilities" collected as a part of the 60th round by the National Sample Survey organization.

As before, we model the expenditures as a function of individual characteristics (age, gender, education, occupation status and marital status), household characteristics (household size, religion, caste and land ownership) as well as types of diseases (those that affect only females, those that affect only males as well as those that affect both sexes).[31],[32] We control for geographic heterogeneity by including district fixed effects. We estimate the model using GLM and cluster standard errors by village identifiers. [33]

Results in Table 10 show that controlling for other covariates, the expenditure on medical treatment on female patients, for diseases that both gender can suffer from, is Rs. 1074 less as compared to men. [34] Hence gender differences in expenditure exist even at the all India level and for other disease groups. We explore this further by interacting the female dummy with communicable (CD) and Non Communicable disease groups (NCD). Results in Table 11, show that the gender differences in expenditure on NCDs is larger than the gender differences among CDs.

6. **Conclusion:**

NCDs are increasingly becoming a major part of the total disease burden in India. While significant attention has been paid in the recent past to CVD and diabetes, relatively less is known and researched on the impact of cancer in households. The question posed in this paper was whether women are at a disadvantage in the treatment of cancer, emanating from social – rather than – biological factors. While there is enough evidence of women being discriminated against in India from birth in

[31] We consider more variables here since there is greater heterogeneity in the all India data. On the other hand, we do not have an index for assets in the survey and thus use land ownership as a proxy for wealth.

[32] We also consider ailment fixed effects. Results are similar.

[33] It is possible, that unlike cancer, many diseases that we have considered in this all India analysis are endogenous to household and individual behavior. Hence it is harder here to claim that we find causal relationships.

[34] It also shows that expenditures on ailments specific to females and males are more expensive than those that affect both gender.

a variety of ways, there is almost no literature that looks into the possibility of discrimination in emerging epidemics like cancer.

This paper fills this gap and finds that discrimination against women for cancer treatment does exist within households in terms of who seeks care and how much is incurred by way of total expenses. Also poorer households are more likely to discriminate. The Odisha sample-based results are backed up by results from the NSS that finds that there seems to be more discrimination for NCDs than communicable diseases, which makes logical sense, since it is in the interest of the households to treat members for diseases that impose negative externalities on other members.

What are the policy implications of this? First of all, all kinds of discrimination is bad, and should concern us, irrespective of the disease. The fact that in a rapidly spreading disease, there is discrimination in treatment is worrying because it is likely to increase inequalities in health outcomes between the genders, and also impose a higher economic impact from untreated or less-treated cancers by way of health life years lost. The repercussion of not treating or not treating optimally any cancer is serious as it is a fatal disease. Besides imposing economic burden of lives lost in the economy and deepening inequities, it is also likely to have serious implications on households with children, with many cancer-struck households facing the loss of female members, many of whom would be married with children. The loss of a primary caregiver for small or growing children would have inter-generational implications for welfare of such individuals.

Intra-household discrimination is hard to tackle from outside. Values and norms are difficult to change with policies. Nevertheless, increasing awareness about cancers and making information available on early diagnosis, as well as how and where to treat such cases may help in reducing this somewhat. Women need to be targeted with messages to help themselves in understanding symptoms and the need to seek care. Finally, making cancer treatment available and accessible at public hospitals where the costs are relatively much lower might bring down the incidence of

discrimination considerably.

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Figure1: Age-wise marginal effects of females on cumulative expenditures

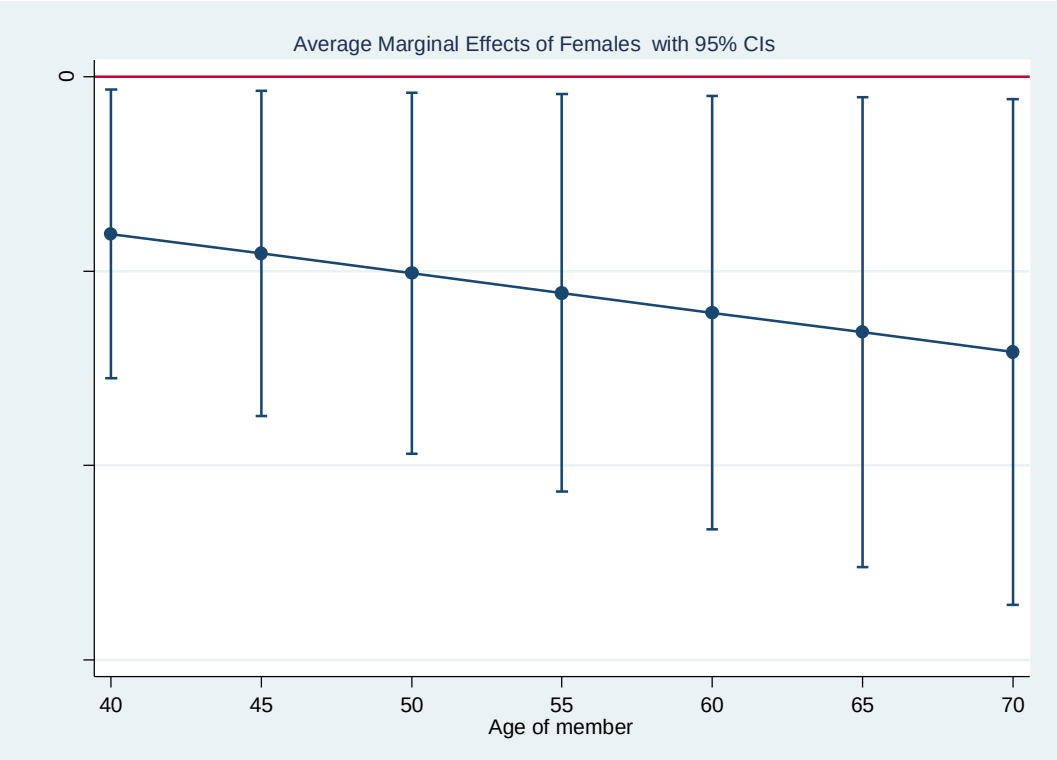

Table1: Summary Statistics of patients and their household level characteristics

Summary statistics		*Male*	*Female*	*Total*
Gender		29%	71%	
Cancer sites:				
Female cancers	Breast		17%	13%
	Cervix		50%	35%
Male Cancers	Penile	7%		2%
Common Cancers	Head neck	53%	23%	31%
	Others	40%	10%	19%
Educated		44%	18%	25%
Richest quartile		26%	21%	23%
Education of head (years)		7	8	7
Loan before diagnosis		27%	28%	28%
Joint family		73%	68%	69%
Household size		7	6	7
Family member in govt		34%	27%	29%
Distancefrom patients district railway station to the tertiary centre		52Kms	60Kms	58Kms
Duration (days)		182	167	171

Table 2: Health care expenditures differences by gender both total and medical expenses at different points

	Male	*Female*	*Total*	*Difference*
Cumulative total expenses	116073	83626	93010	32446*
Cumulative medical expenses	75243	52530	59099	22712*
Total expenses outside centre	49976	22514	30456	27461*
Medical expenses outside centre	33388	16322	21258	17065*
Total expenses post survey	66097	61112	62553	4985
Medical expenses post survey	41855	36208	37841	5649

Table 3: Break-up of medical expenditures

	Male	*Female*	*Total*	*Difference*
Medical expenses outside centre				
Symptomatic care outside centre	14918	8385	10275	6533*
Investigations outside centre	10435	5491	6921	4944*
Cancer Treatment outside centre	8033	2446	4062	5587*
Medical expenses post survey				

Treatment expenses	27716	26825	27083	890
Diagnosis expenses	14139	9382	10758	4756*

Table 4: Break-up of non-medical expenditures

	Male	Female	Total	Difference
Non-medical expenses outside centre				
Food and Lodging	8613	3093	4689	5520*
Transport	6361	2714	3769	3646*
Other Miscellaneous	1612	383	738	1229
Non-medical expenses post survey				
Food and Lodging	7942	8020	7997	-77
Transport	16299	16883	16714	-584

Table 5: Marginal effects from expenditure models (glm): cumulative expenses

VARIABLES	(1) total	(2) medical
Female	-23,698**	-14,578**
	(10,490)	(6,860)
Female cancers	8,299	6,752
	(9,327)	(6,285)
Male cancers	3,092	11,134
	(38,113)	(25,674)
Age	-20.73	-146.2
	(278.4)	(178.9)
Educated	26,048*	20,142**
	(14,210)	(9,290)
Duration	40.59***	34.84***
	(13.50)	(11.29)
Joint Family	-5,420	-7,653
	(9,443)	(6,451)
Education of head	1,073	547.5
	(1,041)	(650.2)
Household size	2,374	2,011*
	(1,666)	(1,062)
Loan	-19,836**	-10,726*
	(8,992)	(5,818)
Rich	31,129**	23,259***
	(12,312)	(7,949)
Family member in govt	5,252	-4,353
	(10,906)	(7,123)

Distance	35.44	-140.7**
	(108.6)	(66.94)
Link	Log	Log
Family	Gamma	Gamma
Observations	204	204

Note: Robust Standard errors in parentheses.
* significant at 1%; ** significant at 5%; *** significant at 10%

Table 6: Marginal effects from expenditure models (SUR): Outside the centre medical expenses

VARIABLES	(1) Square root of medical expenses	(2) Treatment
Female	-26.91*	-0.196**
	(14.77)	(0.0931)
Female cancers	-13.80	0.00705
	(12.99)	(0.0819)
Male cancers	-78.31**	-0.128
	(38.70)	(0.244)
Age	-0.713*	-0.00902***
	(0.409)	(0.00258)
Educated	36.82**	0.151
	(15.57)	(0.0982)
Duration	0.0717***	8.49e-05
	(0.0195)	(0.000123)
Joint family	-4.784	-0.0231
	(13.15)	(0.0829)
Education of head	0.489	0.00145
	(1.258)	(0.00793)
Household size	1.722	0.0176
	(2.121)	(0.0134)
Loan	-7.362	0.0455
	(11.54)	(0.0728)
Rich	36.10***	0.216**
	(13.73)	(0.0865)
Family Govt.	-8.312	-0.0398
	(13.51)	(0.0852)
Distance	-0.0641	0.000668
	(0.115)	(0.000725)
Constant	149.7***	0.845***

	(25.06)	(0.158)
Observations	204	204
R-squared	0.215	0.174

Note:
* significant at 1%; ** significant at 5%; *** significant at 10%

Table 7: Estimates from Probit models of Advanced stage and KPS

	(1)	(2)
VARIABLES	Advanced Stage	KPS
Female	0.0914	-0.451
	(0.429)	(0.100)
Female cancers	0.158*	0.509**
	(0.0834)	(0.0350)
Observations	158	195

Note: Robust Standard errors in parentheses.
* significant at 1%; ** significant at 5%; *** significant at 10%

Table 9: Marginal Effects by Type of family

Dependent variable : Cumulative Total expenditures

	(2)
VARIABLES	Female
Nuclear	-22,041
	(16,117)
Joint Family	-19,634*
	(11,181)
Link	Log
Family	Gamma
Observations	204

Note: Robust Standard errors in parentheses.
* significant at 1%; ** significant at 5%; *** significant at 10%

Table 10: Marginal effects from Individual level regression (GLM) with NSS data: on Inpatient Medical Expenses

	(1)
VARIABLES	Marginal Effects

Female	-1,074***
	(213.1)
Female diseases	5,399***
	(458.5)
Male diseases	4,477***
	(1,452)
Age	23.13***
	(7.136)
Currently Married	1,106***
	(320.6)
Separated	-1,406***
	(495.3)
Education Greater than secondary education	4,600***
	(630.2)
Not working	906.4***
	(212.7)
Household size	174.4***
	(31.41)
Land hectare >=1	1,752***
	(214.0)
Islam	-1,424***
	(309.3)
Others	-333.2
	(336.3)
OBC	1,665***
	(223.7)
General	2,358***
	(250.8)
Observations	18,471

Note: Standard errors in parentheses.
* significant at 1%; ** significant at 5%; *** significant at 10%

Table 11:Gender differential in inpatient expenses by type of disease

	(2)
VARIABLES	Female
Communicable	-928.7***
	(325.4)
Non-communicable	-1,395***
	(293.5)
Observations	18,099

Note: Robust Standard errors in parentheses.
* significant at 1%; ** significant at 5%; *** significant at 10%

Appendix:

Table A: Staging of cancer patients

Cancer stage	*Male*	*Female*	*Total*
Stage 0	50%	24%	31%
Stage I	9%	11%	11%
Stage II	16%	28%	25%
Stage III	5%	29%	23%
Stage IV	9%	4%	5%
Post operative	11%	4%	5%