Household Catastrophic Health Expenditure Due to Tuberculosis: Analysis from Particularly Vulnerable Tribal Group, Central India

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Abstract

Tuberculosis (TB) is disproportionately affects the most economically disadvantaged strata of society. Many studies have assessed the association between poverty and TB, but only a few have assessed the direct financial burden TB treatment and care can place on households. Patient costs can be catastrophic health expenditure for TB affected households in Particularly Vulnerable Tribal Groups (PVTGs). A survey of pulmonary tuberculosis (PTB) was carried out in Saharia dominated Pohri Block of Shivpuri district of Madhya Pradesh state in central India during the period 2013 to 2014. Of 9964 surveyed, 280 PTB cases identified formed the study population for the present study. Among 280 TB patients identified, 220 (79

Index terms— tuberculosis, economic impact, catastrophic health expenditure, poverty, vulnerable population, tribal group, india.

1 I. Introduction

ealth is one of the most important components of an effective poverty reduction strategy. Since health can increase productivity and household income, while poor health is likely to reduce output. Health improvements can provide poor households with the opportunity to escape poverty. However, use of health services is critical with a view to out-of-pocket (OOP) payments and it is the primary means of financing healthcare in many low-income Asian countries. OOP payments can results in households facing catastrophic health spending, lead to impoverishment, and financial risk protection measures are missing. Globally it is estimated that 150 million people suffer financial catastrophe each year due to health care payments and about 100 million are pushed into poverty because of OOP payments (Xu et al. 2007). Protecting households from catastrophic health care costs is a desirable objective of health systems worldwide. The WHO call for universal health coverage emphasized the need to protect households from catastrophic medical expenses and impoverishment arising from seeking health care.

TB is an airborne infectious disease thought to infect almost one-third of the world's population. It commonly manifests as an infection of the lungs, usually with symptoms of coughing, weight loss and other constitutional symptoms. Individuals suffering from TB are often in their economically most productive age, which poses a significant economic burden on the household. Poor people have longer pathways to care and costs of accessing care are generally higher before than after diagnosis (Nhlema et al. 2003;Rajeswari et al. 1999). Evidence indicates that the damaging effects of TB are catastrophic to those who were relatively poor or marginalized before being infected with TB and subsequently pushes the income insolvent into poverty (Croft et al. 1998;Jackson et al. 2006;Zhang et al. 2007). TB is a chronic disease requiring long duration (6-8 months) of treatment make the poor patients vulnerable, deprived and locks them in the poverty stricken condition (Nhlema et al. 2003;Hossain et al. 2012). Thus poverty and TB are locked in a vicious cycle, as one triggers the other. The Directly Observed Treatment Short course (DOTS) strategy is cost-effective strategy both from provider and patient point of view against historical controls (Burman et al. 1997;Dholakia 1997;Floyd et al. 1997;Sawert

et al. 1997; . Key components of the DOTS is that patient is VIP, programme's responsibility to cure them, each dose of anti-tuberculosis drugs should be administered to patients under the supervision of a DOT provider, either from the community or the health system, according to patient's convenience, so that patients do not lose wages or incur transportation charges for treatment under the programme **??**Khatri et al. 2002). This strategy has been successful in reducing costs to patients, death rates 38/100000/per year in 1990 to 22/100000/per year in 2012 and increasing cure rates (Central TB Division 2014).

TB disproportionately affects the poor people and TB control programs therefore need to ensure that the economically and socially disadvantaged groups do not face barriers that keep them from seeking treatment. It was estimated that on an average, 3-4 months of work time are lost if an adult has TB, resulting in a loss of about 20-30% of annual household income (Rajeswari et al. 1999). Relative costs for poor people as a percentage of their income is much higher than for nonpoor patients, although aggregate real costs may be smaller (Nhlema et al. 2003). India has a high concentration of indigenous tribal population constitutes 8.6% of the total population of the country (Census 2011). As many as 705 groups are identified as tribal across 30 states, 75 have been identified as Particularly Vulnerable Tribal Groups (PVTGs) and Saharia population in Madhya Pradesh is one among them. It was reported that high magnitude of TB among Saharia tribe (1518/100000) (Chakma et al. 1996;Rao et al. 2010). Any development programme initiated by government of India will take time to reach this segment with limited access to health care services due to isolation, low social status and weaker economic position. TB programme therefore need to ensure that the economically and socially disadvantaged groups do not face barriers that keep them from seeking treatment. Hence, studies on patient costs towards costs of accessing care before than after diagnosis are needed particularly among most vulnerable population. Therefore, we undertook a study to estimate the OOP expenditure (diagnosis and treatment) to Saharia PVTG on account of TB in India. In this paper, we present the results of our study in terms catastrophic health spending through direct medical, direct non-medical, indirect and total costs.

2 II. Methodology a) Setting

The areas of habitation of Saharia population in Madhya Pradesh are Gwalior, Datia, Morena, Sheopur, Bhind, Shivpuri, Ashoknagar and Guna. This study was carried out in Shivpuri, district considering the operational feasibility, rapport with community and willingness to support by district authorities. Community survey done among Saharias in these areas by National Institute for Research in Tribal Health (NIRT) showed most of them were labourers and annual family income of Rs <10000. Majority was illiterate and they resided in Kachcha houses/huts with no separate kitchen in houses.

3 b) Study area

A survey of pulmonary tuberculosis (PTB) was carried out in f Saharia dominated Pohri Block of Shivpuri district in Chambal Division of Madhya Pradesh during the period 2013 to 2014. The same area was selected for this study.

4 c) Study population

All individuals aged 15 years and above were screened for PTB by chest symptoms such as persistent cough for two weeks or more; chest pain for one month or more; fever for one month or more; and haemoptysis anytime in last 6 months. All symptomatics were investigated by sputum smear and culture examinations. All the bacillary cases detected from the survey formed the study population.

5 d) Data collection

Semi-structured, pre-coded, pre-tested questionnaire was used for data collection. The interviews were conducted at home in their local language (Hindi) by trained field investigators. The interview included household identification, demographic and socio-economic characteristics of respondents. In addition, data on various costs such as direct medical (fess, investigations, drugs); non-medical costs like travel and special food for patient and escort; and indirect costs due to work absenteeism and loss of income were also collected. The interview team was supervised by trained supervisors during data collection. Costs data were validated throughout the interview by repeated questioning and cross checked with the prevailing rates of doctor's consultation fees, costs for investigations, and market price of drugs, medical bills wherever possible. All the filled forms sent to NIRTH to check for correctness and completeness, any incomplete forms sent back to field for corrections within 15 days.

6 e) Definitions used

Information about the costs was ascertain for full course of treatment of newly diagnosed pulmonary TB patients, classified as category one as per Revised National Tuberculosis Control Programme (RNTCP) guidelines. All costs were calculated period starting from the moment of onset of symptoms up to the completion of treatment which included cost for diagnosis and treatment. Total cost covered expenditure incurred under direct and indirect costs (The Tuberculosis Coalition for Technical Assistance) for 6-8 months of treatment. All these patients had taken treatment in government hospitals where the investigations and the medicines were offered free of costs

for TB treatment. However they had to spend for travel etc., the distribution of costs is uneven and we are of the opinion that this variation is expected from all economic data such as income and expenditure. Further we classified the costs into nil cost, those who spent and mean, Standard Deviation, median, range was calculated among those who incurred expenditures. The cost was calculated in terms of Indian rupees and US dollars (exchange rate at the time of writing: $1 US =Rs. 60).

7 i. Direct patient costs

Direct patient costs included all OOP expenditures of patients that were attributable to their illness. Consultation fees and money spent on investigations and drugs were classified as medical costs. Money spent for transportation to health facilities and costs of food bought during waiting time at the health facility. These costs were assessed both the patient as well as persons accompanying the patient. These costs classified as non-medical costs.

ii. Indirect patient costs Indirect patient costs refer to the costs associated with work absenteeism and loss of wages due to illness. These costs included visits to the health facilities and hospitalization as well as other work absenteeism and loss of wages due to the inability to work as a result of the illness. In order to quantify the magnitude of loss of income, the number of days absent for work was multiplied by the estimated income of the patient and escort.

iii. Total cost Total cost includes the expenditure incurred pre treatment and during treatment under direct and indirect costs.

iv. Catastrophic spending There is no single accepted definition of catastrophic spending. Some studies assess payments in relation to the budget share (Russell et al. 2004;Pradhan et al. 2002), while others argue that catastrophic spending should be measured in relation to capacity to pay (i.e. household expenditure net of food spending) ((Xu et al. 2006). Nonetheless, all measures suggest that when households spend a large proportion of their budget on health care, they often forego other goods and services, which can have negative implications for living standards (O'Donnell et al. 2008). Often, the choice of the threshold is arbitrary but two commonly used ones are 10% of total income or 40% of non-food income (referred to as capacity to pay) (Jane et al. 2012). To capture the burden on these households, a measure of the depth of poverty is needed (Saksena et al. 2014).

v. Data management and analysis Data entry was done by using the Census and Survey Processing System (CSPro) software package version 5.0. Data entry format was developed with logical expressions and conditional statements used to minimize the errors in data entry. Data were analysed using Statistical Package for Social Sciences (SPSS/PC version 20.0; SPSS Inc., Chicago, IL, USA) package. In univariate analysis, average (mean) costs were compared and independent t-test was used to compare their demographic and socioeconomic characteristics and tested for statistical significance. A p-value of <0.05 was considered as statistically significant. We reported mean values to allow comparison with other published cost estimates.

8 vi. Human subject protection

This study was approved by the technical advisory committee and Institutional Ethics Committee of NIRTH, ICMR. We interviewed respondents after obtaining voluntary, written informed consent.

9 III. Results

10 a) Source of intake and coverage of study population

During the period 2013 to 2014, all individuals aged 15 years and above were screened for PTB by chest symptoms such as persistent cough for two weeks or more; chest pain for one month or more; fever for one month or more; and haemoptysis anytime in last 6 months. All symptomatics were investigated by sputum smear and culture examinations. Saharia tribal population surveyed was 9964 and 280 TB cases identified was the source for the present study. Among 280 TB patients identified, 60 (21%) could not be interviewed, 42 moved temporarily, and 18 had expired. The remaining 220 (79%) cases interviewed at their residence (Figure **??**1).

11 b) Profile of study population

Majority of the patients (81%) belonged to the more than 35 years age group and the study group included 178 (81%) males and females 42 (19%). Most of the patients 185 (84%) were illiterates and 204 (93%) were working as a labour. Based on monthly per-capita income (definition of Planning Commission, Government of India; those per capita income Rs. <660), patients were grouped into below poverty line and above poverty line. It was found that majority of patients were living below the poverty line. With reference to their living standards, 201 (91%) living in katcha houses, 196 (89%) were single room houses; 212 (96%) don't have separate kitchen and cooking in sleeping room (Table-1). The life style characteristics of patients were 58% smokers and 36% alcohol consumers.

12 c) Overall patient costs

The overall average direct, indirect and total costs to patient with TB are given in Table-2. It was estimated that direct, indirect and total costs were averaged Rs. 1642 (US$ 27.4), Rs. 1882 (US$ 31.4), and Rs. 2466 (US$

41.1 respectively. Overall direct and indirect costs were almost similar. Proportion of patients incurred indirect costs was slightly higher than the proportion of patients incurred direct costs in both before and after diagnosis of TB. Figure-3 describes the different components of costs. Overall, patients spent more medical costs during shopping for diagnosis like medicines (35%) followed by investigations (15%), and fees (8%). Non-medical costs major portion incurred was due to wage lose (16%).

13 d) Costs for diagnosis

This was a community survey to find out the TB cases (active case finding), so around 86% of patients dint spent any costs for diagnosis and treatment (Overall 45% of TB cases in this community detected through active case finding; they didn't take any action for their symptoms. Remaining 46% approached government health facilities and 9% approached local healers (Table-3). It was also measured the patients perception about the accessing health facilities, majority 40% find difficult to reach health facilities and 31% felt lack of money to approach health facility for diagnosis.

14 e) Costs for treatment

During the treatment none of the patient incurred any direct medical costs. The average direct non-medical cost was incurred only 11% of patients and it was mean Rs. 579 (US$ 9.65). Indirect costs was incurred only 5% of patients, it was estimated to be mean Rs. 1718 (US$ 28.6). Total treatment costs were also incurred only 11% and it was mean Rs. 1335 (US$ 22.25). It was observed that indirect treatment costs were higher than the direct costs (Rs. 579 vs rs. 1718).

Those patients didn't not spent any costs during treatment reported that majority (61%) of patients taken treatment under the community DOT providers; 65% of patients DOT providers are living in the same village; 46% perceived that DOT is convenient to them; and 50% reported that they are satisfied with their DOT providers. However, 34% of patients returned from DOT centre more than once without medicine due to non-availability of DOT providers.

15 f) Catastrophic expenditure

In our sample, majority getting treatment free of costs and those who incurred costs, they faced catastrophic TB care expenditure amounted to 10%, which is the proportion of various costs in relation to annual family income (Figure -3). The intensity of catastrophic health payments are shown on Figure -4. Results showed among 33 patients, six households reported that share of OOP payments are much more than their income (Figure -4).

16 IV. Discussion

This study demonstrates the economic burden in terms of direct, indirect costs and total costs for both diagnosis and treatment that Saharia tribe, one among the PVTGs living in central India face during their TB disease. Because of the profound connection between poverty and TB, our study confirms that TB patients are from vulnerable groups, having poor living conditions, depending on primitive agriculture, low cost closed economy based on low level of technology, working as a daily wage labourer and not having regular incomes before their disease. Average incomes are substantially lower due to the informal economy and there is a higher prevalence of impoverished employees working in the informal sector. It is very clear that majority of TB patients didn't incurred any costs due to active case finding. Very small proportion incurred OOP payments due to shopping for diagnosis and non-medical costs during treatment was considerably high, since Saharia's are already economically poor and socially vulnerable becoming poor and many more are being trapped further into poorer due to the various costs of TB diagnosis and treatment. There is an urgent need; the Government of India should consider alternative health financing mechanisms that offer financial risk protection to the PVTGs in general and Saharia's in particular.

RNTCP in India is the largest national TB control programme in the world and also financing to improve outcomes in tribal areas. It has addressed many challenges and special provision was given in tribal areas on reducing financial burden to the TB patients throughout the course of treatment. Travel costs as bus fares for patients and one attendant is provided for follow-up and treatment. To cover these costs the patients are given an aggregate amount of Rs.250 (US$ 4.2) on completion of treatment. Volunteers are encouraged for sputum collection and transportation and provided Rs.100 to Rs.200 (US$ 1.7 to 3.3) per month per volunteer based on number of visits to DMC to hand over collected sputum. An amount of Rs.100 (US$ 1.7) per month if there is a minimum of one visit to the health center per week with collected samples (Surender et al. 2013). There is a need to ensure the implementation of these schemes, and its functions and impact in these areas. Since the Saharia's poor have less income higher proportion of their expenditure must go towards food than TB treatment.

There was evidence from India that direct OOP payments could push 2.2% of all healthcare users and one-fourth of all hospitalized patients, into poverty in a year (Peters et al. 2002). According to the NSSO data 55 th Round, households spend about 5-6% of their total consumption expenditure on health (National Sample Survey Organization 2001). As per RNTCP the case findings are passive, chest symptomatic expected to go to hospital on their own. Finding from the current series, patients are diagnosed through active case finding, majority (85%) did not incurred any costs. On the other hand, it could also mean that households do not seek care if they cannot

afford it or non-availability of services. This emphasizes the earlier point that it is also important to explore the extent to which households do not use services because of inability to pay. It was report The availability of services proved to be significantly positively correlated with catastrophic spending in low and middle income countries but not in high income countries (Xu et al. 2003;Chuma et al. 2007). In many other European countries health insurance coverage is very comprehensive and OOP payments are either absent or do not differ across provider alternatives (Marco et al. 2010). In low and middle income countries, supply constraints limit the use of services, so countries with greater supply show higher levels of use and more financial catastrophe. Increasing the availability of services in poor countries is important to improving health.

It was also observed from this study that small proportion of patients' need to spent costs when they go for DOT in health facility based DOT centre or noncommunity based DOT provider. Also need to spent for follow-up examinations and these costs are seems to be very high ie 10% of annual family income. Our study finding corroborate with the study done in other countries Malawi and Kenya reported that patient and household costs of TB diagnosis are prohibitively high where services are provided free of charge **??**Kemp et In tribal areas most of the places there are only mud roads and travel facilities are poor. Health centres are not always easily accessible due to poor travel facilities. A sick person may have to travel 25 km to reach the nearest PHC and patients may have to spend more for travel to attend these centres. The main occupation is agriculture mostly daily wages; if daily wage labourer going to faraway health centre may result in work absenteeism and loss of income. These costs made him to borrow money for treatment or manage family expenditure. This catastrophic expenditure causes force to very deprived position. OOP costs for public and private health-care services may stand at the beginning of a spiral into poverty for many families and exacerbate the poverty of the already poor. This situation has been termed the 'the medical poverty trap' (Whitehead et al. 2001(Whitehead et al. & 2006;;Iyer 2005). The loss of productive labour and frequently unaffordable expense of seeking treatment can thrust TB patients and their families deeper into poverty. When aggregated to the national level, the cost of TB to economic development and poverty reduction is tremendous (World Health Organization 2004). However the encouraging finding is that due to active case finding many poor TB patients dint not incurred any costs. Thus, TB control programme should consider active case finding strategy that provides financial risk protection to these kinds of vulnerable segments of population. So that the contribution of TB control makes to alleviation of poverty by reducing the economic burden that the disease inflicts on the poor.

Government of India was invested huge budget US$ 252 million for the year 2014 alone for National Tuberculosis Control Programme. The DOTS strategy was based on global scientific and operational guidelines and evidence, and that evidence has continued to evolve with time. As new evidence became available, the TB control programme has made necessary changes in its policies and programme management practices. In addition, with the changing global scenario, RNTCP is incorporating newer and more comprehensive approaches to TB control. To generate the evidence needed to guide policy makers and programme managers, the programme implemented measures to encourage operational research. Efforts of RNTCP to promote operational research yielded success and most of the studies has are linked to the main priorities of TB control. The programme requires more knowledge and evidence of the effectiveness of interventions to optimize policies, improve service quality, and increase operational efficiency. The current study provided evidence on different dimension to improve TB and economic outcomes among poor people living in poor countries.

The RNTCP has continuously been innovative and progressive in addressing issues related to TB control in the country. The programme is decentralized and diagnosis and treatment is provided free of costs to all patients. Despite these a patient suffering from TB incurred out of pocket expenditure for travel, stay and food while shopping for diagnosis and treatment. When people have to pay fees if they go to private or traditional healers or co-payments for health care, the amount can be so high in relation to income that it results in 'Financial Catastrophe' for the individual or the household. Such high expenditure can mean that people have to cut down on necessities such as food and clothing, or are unable to pay for their children's education. It was estimate that every year, approximately 44 million households, or more than 150 million individuals, throughout the world face catastrophic expenditure, and about 25 million households or more than 100 million individuals are pushed into poverty by the need to pay for services (World Health Organization 2005). Moreover, the impact of these OOP payments for health care goes beyond catastrophic spending alone. Many people may decide not to use services, simply because they cannot afford either the direct costs, such as for consultations, medicines and laboratory tests, or the indirect costs, such as for transport and special food. This was true from our study 45% didn't take any action for their symptoms suggestive of TB. DOTS may be failing to reach the poor because of the barriers that obstruct accessing TB control services along the pathway to cure from onset of symptoms to achieving a cure. Such impediments may undermine progress towards achieving the regional targets for TB control. Strategies are thus needed to improve the accessibility of DOTS for the poor. These strategies will also begin to address inequity in the burden of TB and access to TB control.

17 a) Limitations of the study

The possible limitation of the analysis was this study captures only the patients making OOP payments for health services and does not consider people who need services but cannot afford them. Also the data on OOP payment collected for different recall periods using different questions introduce more memory bias. But it is undoubtedly

important to continue to develop the database and the methods to strengthen knowledge about this important topic.

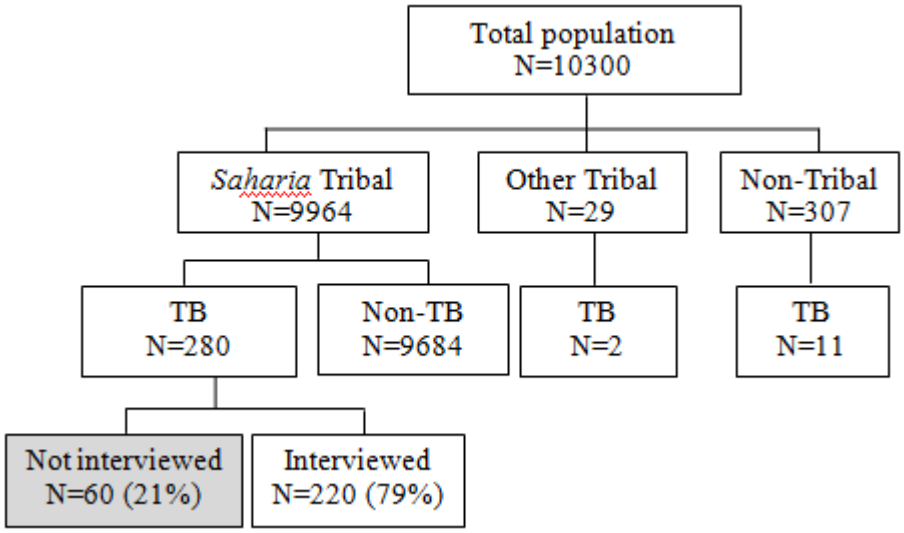
V.

18 Conclusion

TB is a disease that disproportionately affects the poor. TB control program therefore need to ensure that the economically and socially disadvantaged groups do not face barriers that keep them from seeking treatment. It is a major challenge, not only for TB control, but also for overall health system to protect households from the risk of impoverishment resulting from health expenditure, and to ensure that the population receives health services when needed. Decision makers can use the information presented in this paper to better target financial risk protection strategies. Although decision makers in the health sector do not control many of the levers necessary to reduce income inequality and poverty directly, they can do so indirectly. But, Ministry of Health can actively advocate for complementary policies to reduce social inequalities and increased funding for health because they can improve health, reduce the chances of financial catastrophe, help poor households escape from poverty, and contribute to overall economic growth. [1]

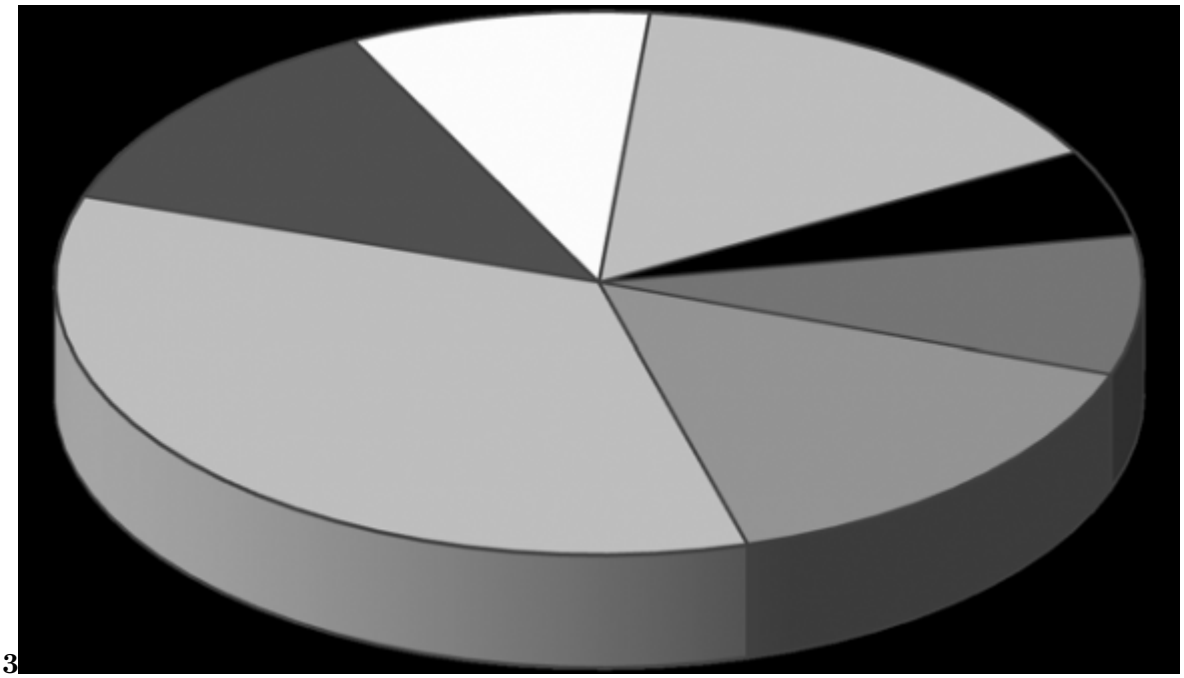
Figure 1:

[1] © 2015 Global Journals Inc. (US)



12

Figure 2: Figure 1 :Figure 2 :



3

Figure 3: Figure 3 :

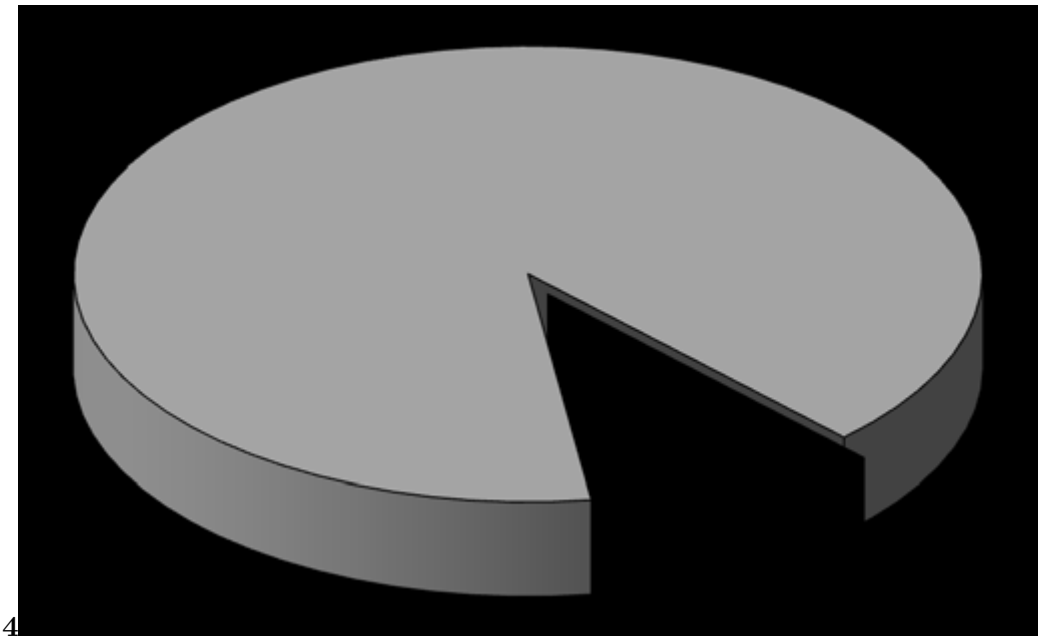
4 

Figure 4: Figure 4 :

Figure 5:

1

Year 2015 Volume XV Issue V Version I (D D D D) K	Demographic	Age in years	?35	>35	Female	Total patients No % 87 40 133 60 42 19 178 81 80 36
	Sex	Family size	Male	?4 member		
				>4 member	140	64
	Socioeconomic					
	Education		Literate		35	16
			Illiterate		185	84
	Occupation		Labour		204	93
			Others		16	7
	Poverty					
			BPL		173	79
			APL		47	21
	Housing					
	House type		Pucca		19	9
			Kuchcha		201	91
	No of room		One		196	89
			> One		24	11
	Separate kitchen		Yes		8	4
			No		212	96
	Smoking					
	Status		Yes		127	58
			No		93	42
	Alcoholism					
	Consumption		Yes		80	36
			No		140	64

Figure 6: Table 1 :

2

		Diagnosis	Treatment	Total
Direct	Nil (No. & %)	189 (86)	195 (89)	188 (85)
	Mean (SD)	1229 (1193)	579 (567)	1642 (1530)
	Median (Range)	1000 (520-5250)	340 (60-2400)	1105 (210-6350)
Indirect	Nil (No. & %)	207 (94)	209 (95)	206 (94)
	Mean (SD)	573 (499)	1718 (2074)	1882 (2003)
	Median	400 (200-2000)	800 (200-7000)	1150 (300-7400)
Total	Nil (No. & %)	189 (86)	195 (89)	188 (85)
	Mean (SD)	1469 (1419)	1335 (2016)	2466 (2794)
	Median	1000 (210-6000)	500 (60-1800)	1300 (210-10100)

Figure 7: Table 2 :

3

Nil cost		Cost incurred		Total	
No	%	No	%	No	%

[Note: K © 2015 Global Journals Inc. (US)]

Figure 8: Table 3 :

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