THE IMPACT OF SOCIO-ECONOMIC FACTORS ON DIABETES CARE

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INTRODUCTION

Diabetes is rapidly emerging as a major health care problem in India, especially in urban areas. The prevalence of type 2 diabetes has been steadily increasing in urban areas from a low of 2.1% reported in early 1970[1] to a whopping 11.6%[2] in 1996, in the adult population. Moreover, there is an equally large pool of persons with IGT, many of whom will go on to develop type 2 diabetes in the future [2]. There is evidence to suggest that prevalence of type 2 diabetes is increasing even in rural areas[3]. The rapid increase in population, increased longevity and high ethnic susceptibility to diabetes, coupled with rapid urbanization and changes from traditional lifestyles, will most likely trigger a diabetes epidemic[4]. The WHO estimates that there were 19.4 million persons with diabetes in India in 1995 and that this number is likely to be 57.2 million 2025.[5] These figures are based on lower estimated prevalence rates than currently seen. Moreover, type 2 diabetes amongst Indians is being increasingly seen in younger, less obese persons than reported in the west.

Health care delivery in India is provided either by doctors in the health centers, clinics, district, municipal and tertiary teaching hospitals run by the central and state governments; or through private general practitioners, specialists in their clinics, nursing homes or large corporate hospitals. the quality and cost of care varies considerably from place to place, depending on the available resources, training and interest in diabetes of the treating doctor and the patients' ability to pay for it. Generally, care provided in government institutions in free for at low subsidized cost. These institutions are crowded, ill equipped, and have scant resources. The quality of care suffers in this setting. Due to the scant and limited resources, the system is geared towards care of acute pressing illness with virtually no infrastructure for chronic diseases like diabetes. Those seeking medical care in the private sector pay for everything on their own as there is limited or no reimbursements. This is a unique situation where the capacity to pay determines quality of medical care which indirectly affects long term prognosis.

The prevailing poverty, ignorance, illiteracy and poor health consciousness further adds to the problem. Patients can access any level of care (primary, secondary or tertiary) based on close location, knowledge of its existence and resources. Thus many sociological factors determine long term outcome of illness. A study of these factors and their influence on the prognosis and outcome are necessary to tackle diabetes in the community. Previous studies by Kapur A et al[6,7] have looked at perceptions and attitudes of persons with diabetes and of the diabetes care providers and their significance to proper diabetes care delivery. Diabetes education and awareness programmes are an integral and essential part of diabetes care. There is now irrefutable evidence that diabetes education, awareness and improving motivation for self care, improves care, reduce complications and thus overall reduces economic costs of diabetes [8,9]. the absence of a proper infrastructure for this activity may have serious consequences.

In the absence of significant or credible social security system to fall back on during illness or bad times, the Indian social support system is centered around the nuclear and extended family which supports medical or other such calamities either by providing for the event, loaning money, or help by working, to augment the family income. Thus an illness affecting the earning or active member of the family, affects not only this individual but may have significant effect on others as well. It may force other normally non working members to start work, often prematurely, at lower wages cut short children's education with its long term financial consequence for them and the family.

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Table 1 : Comparison of sample population with general population of study area by region, sex and religion.

Characteristics	Study area (1991) (general population)	Sample (1997) (study population)
Region		
Bangalore city	55%	61%
Talukas	45%	39%
Sex		
Male	53%	55%
Female	47%	45%
Religion		
Hindu	80%	90%
Muslim	13%	9%
Others	7%	1%

Due to a combination of these factors, diabetes will pose a severe burden on the Indian health care system in the near future. There are neither published studies on the cost of diabetes treatment in India nor on the sociological factors that influence it. In the absence of adequate public health programmes to effectively deal with this problem, estimates of cost, however imprecise, will help conceptualize strategies to deal with the situation at local, regional and national level. This information is also useful to the individual.

As a prelude to a much large national study to be undertaken later, we carried out a pilot study in Bangalore urban district, with a primary air to test the method/questionnaire. The secondary aim was to assess the present state concerning the treatment of patients with diabetes, demographic and cost figures in rural and urban part of Bangalore district, in South India. It is a pilot study to help develop a framework for the larger survey.

The study was carried out by the Institute of Social and Economic Change (ISEC) Bangalore, an autonomous, partly government funded institute, in collaboration with Novo Nordisk Pharma India Ltd. Bangalore and Pharmaco Economic Affairs department of Novo Nordisk A/S, Denmark
In this paper we present the socioeconomic factors that influence diagnosis, care, progression and prognosis of diabetes in the population under study, representative of the urban/semi urban India. However we would not like to extrapolate the findings to the national level. The aspects pertaining to the costs will be presented in another paper.

Method of Study

The study is based on patient interviews using a structured questionnaire and the foremost task was to develop an appropriate instruments for the interviews.

Instrument of survey: After detailed discussion on the protocol amongst the investigators and prominent diabetes health care providers in Bangalore, a structured questionnaire was developed and tested on a small sample (60 patients in two stages) and the obvious inadequacies rectified.
The questionnaire is structured for easy flow of interview and data entry, and has only a few open ended questions. On an average it took 30 minutes to fill (28-32 minutes), The questionnaire is in English. All field investigators were familiar with the local language as well as English and with a pre-survey training, had no problem in eliciting responses and filling the data.

The questionnaire consists of six sections and is designed to elicit substantial information as follows:

1. **General background information:** Name, address, type of institution, place of residence, religion/caste, age, sex, marital status, education level, occupation, personal monthly income, family monthly income, persons living in the household.

2. **Diagnosis and complications:** Duration of diagnosed disease, age at diagnosis, physical ailment/complaint that lead to diagnosis, where/whom did the patient visit first with his complaints, tests advised at diagnosis, tests undertaken/advised ever since related to diabetes or its complications, if not, why. Type of treatment initiated following diagnosis. Inquiry for complications related to limbs, eye, heart, blood pressure, stroke, kidney disease, hypoglycemia and others.

3. **Current treatment and monitoring:** Current associated problems, current treatment, frequency and method of monitoring, change in doctor or course of treatment since diagnosis and reasons, awareness or record of certain clinical examination and/or clinical / laboratory tests.

4. **Cost of diabetes care: Direct costs** - Weekly expenditure on various items

related to treatment and treatment delivery, laboratory tests and investigations, and recent hospitalization, source to meet these costs. Indirect costs - current job, illness induced change in job, problems in current job, change in ability to work, absenteeism, economic loss to the individual due to disease related work change or absenteeism, did it affect the plans of dependent family members or require other family members to work to augment family income.

5. **Awareness and knowledge about diabetes:** Awareness of diabetes before diagnosis, if aware, source of information, family or friend with diabetes, death in family or amongst friends as a result of diabetes or its consequences.

6. **Quality of life survey:** Based on a modified, abbreviated SF-36 health survey.

Table 2: Percent distribution of diabetes patients (n=611) by background characteristics

Background characteristics	n	Percent
Residence		
Talukas	240	39.3
Bangalore City	371	60.7
Sex		
Male	335	54.8
Female	276	45.2
Religion		
Hindu	551	90.2
Muslim	54	8.8
Others	6	1.0
Marital Status		
Never married	27	4.4
Married	571	93.5
Others	13	2.1
Educational Level		
Illiterate	126	20.6
School Education	328	53.7
College Education	157	25.7
Occupation		
Non worker	91	14.9
Employed	152	24.9
Laborer	52	8.5
Retired	92	15.1
Housewife	224	36.7
Monthly Family Income (INR)		
Upto 2,500/-	293	48.0
2,501 to 5,000	155	25.4
5,001 to 10,000	126	20.6
10,001 plus	37	6.1

Selection of respondents and representatives of the study sample: A random, unbiased, selection of sample respondents, representative of the population under study is a pre-requisite. When the universe is not clearly identifiable or indefinite, sample selection for field studies poses several problems, in the absence of registries, proper hospital or clinic records, particularly in the government run institutions and in the peripheral, semi urban and rural areas, it required considerable effort to obtain a representative sample. In Bangalore city, this was achieved by preparing a list of patients belonging to different socioeconomic groups, attending government institutions, teaching hospitals, private institutions ranging from minor clinic to major hospitals and hospitals and clinics meant only for diabetes care. In taluka areas, a list of known diabetes patients was made after talking to the staff of the primary health centers (PHCs), and community centers (CHCS). Out of the total of 31 PHCs and 2 CHCs in the study area, patients attending 9 PHCs and both CHCs were selected. In all 620 patients were contacted and 611 could provide enough information to be included in the study. Ideally the representativeness of the sample should be tested by comparing with a known diabetic universe, but in its absence, we compared it with the general population in the area under study [10, 11]. While the sample selection was not random and we could not eliminate any subconscious bias, we have attempted to get a representative sample by choosing the respondents attending a wide variety of institutions.

Table 3 : Distribution of respondents by diabetes related characteristics

Diabetes related Characteristics	n	Percent
Duration of diabetes (years)		
0 to 4	216	35.4
5 to 9	167	27.3
10 to 14	110	18.0
15+	118	19.3
Type of diabetes		
Type 1	35	5.7
Type 2	576	94.3
No. of complications		
None	185	30.3
One	168	27.5
Two	134	21.9
Three plus	124	20.3
Insulin use at diagnosis		
Yes	189	30.9
No	422	69.1
Current insulin use		
Yes	217	35.5
No	394	64.5

Interview process and data quality: Interviewers were non medical graduates and post graduates from ISEC, Bangalore who were given a thorough orientation to the questionnaire and to basics about diabetes. They were also trained in the techniques of interview. Interviews were conducted at the patients' home, where address was previously available, or in the hospital or clinic when addresses were not previously available. Interviews were conducted in the patients' own language and they were allowed to take help form other family members if required and available at the time of interview. While field work was in progress, weekly review meetings were held to check the quality of data and progress of work. Fieldwork was monitored on a daily basis by the project staff. The data was evaluated for its quality by internal cross checks. The comprehensive data collected on hospitalization and treatment was used to cross check expenses, and discrepancies if any, were verified and corrected immediately. The study is based on patient interviews and therefore reflects patient perceptions. These perceptions are based on what their treating doctors informed them. It was not possible in all cases to cross-verify the information provided by the respondent with hospital or clinical record as these were not widely available. However, when this information was readily available, it was used to confirm the patients' responses. Attempts were made to collect information on the results of clinical and lab tests undergone by the patient by it was not possible in many cases. Expenses on treatment were cross-checked for consistency with current treatment and the known costs of such treatment. Investigators particularly made attempts to find any discrepancy in tests undergone and tests prescribed and in general found that patients more often than not, undergo the prescribed tests. Patients' ability to recall expenses on tests was fairly good. However, their ability to recall in detail expenses on each aspect of hospitalization cost was very poor and in general were able to only provide for total costs of hospitalization. On quality cross checks interviewer's bias in eliciting information on expenses is found to be statistically insignificant. The details on the costs will be presented in another paper.

Table 4 : Symptoms at diagnosis

Symptoms	Percent
General tiredness	56.6
Urine frequency	48.4
Excessive thirst	45.7
Excessive hunger	30.3
Weight loss	14.1
Felt sick	17.5
Blurred vision	3.8
Delayed wound healing	10.0
Infection	5.2
Reduced sensations	2.5
Others	36.2

The greatest difficulty was found with the health status questionnaire, which is designed for the developed countries. Although questions were translated into the local language, they did not suit the local cultural background and many questions were beyond the comprehension of the respondents. It was also found that interviewers bias on this part of the study was statistically significant even after controlling for other variables which influence opinions. The responses were also dependent on educational background and level of complications. This part of the study will be presented as a separate paper and must be interpreted with care. The data was entered into a compute system and analyzed. Random checks wee performed to ensure correct transfer of data from paper to electronic record.

Table 5 : Lab tests / clinical examination ever undertaken

Test	Percent
Urine examination	98.7
Blood sugar	
Fasting	96.4
Post pandial	94.9
Glucose tolerance	66.1
Blood lipids	7.7
Kidney function	13.1
Blood pressure check	23.6
Eye exam	18.0
Check for circulation/ Sensation in legs	11.9
X-ray exam	17.0
ECG	20.6
Others	3.9

Results and Discussions: A total of 620 patients were interviewed, of which adequate information was available in 611 patients. The rejection rate was 1.5%. Background characteristics of these 611 respondents is shown in Table 2. These are quite similar to the population of the study area as shown in Table 1. Table 3 shows distribution of respondents by diabetes related characteristics.

The absence of dramatic symptoms and the general paucity of symptoms in type 2 diabetes is perhaps the biggest barrier to early diagnosis, as neither the patient not the general practitioner associated diabetes with the commonest presentation -- general tiresomeness. While delay in diagnosis is a phenomenon noted even in developed countries.

Table 7 : Details of hospitalization based on complications (*duration varied from one to ten hours.)

	Number of days hospitalized							
Complications	n	1	2	3	4	5	6	7+
Limb	53	2	-	4	-	2	2	43
Eye	30	2	3	4	-	4	-	17
Heart	22	-	1	4	1	2	1	13
Stroke	12	1	1	-	-	-	-	10
Kidney	3	-	1	-	-	-	-	2
Hypoglycemia	70	64*	3	-	2	-	-	1
Hyperglycemia	118	2	11	10	4	11	2	78

Table 6: Percent patients reporting complications, hospitalization, receiving special non surgical treatment or surgical treatment for the complication.

Complication	Percent (n) reporting the complication	Percent (n) with complication hospitalized	Percent (n) with complication undergoing sp. non-surgical Rx	Percent (n) undergoing surgery for complication
Limb	45.3 (277)	20.2 (53)	--	15.2 (42)
Eye	29.0 (177)	16.9 (30)	21.5 (38)	--
Heart	11.3 (69)	31.9 (22)	--	31.9 (22)
Hypertension	18.9 (116)	--	--	--
Stroke	2.5 (15)	80 (12)	--	--
Kidney	1.8 (11)	27.3 (3)	63.6 (7)	9.0 (1)
Hypoglycemia	13.9 (85)	82.3 (70)	--	--
Other (Hyperglycemia)	19.8 (121)	97.5 (118)	--	--

inspite of easy and free access to quality care; one of the question we asked -- do differences in prevailing social economic settings in India further influence delays in diagnosis. Table 4 shows the symptoms leading to diagnosis as reported by the respondents. The institution and training of the doctor can also influence the promptness of diagnosis. 28.2% visited doctors in government run institutions at the time of diagnosis while 71.8% visited private doctors. Only 8.2% visited diabetes specialists for diagnosis.

Table 5 shows the lab tests and special clinical examinations the respondents have under gone at least once either at the time of diagnosis or ever since diagnosis. We cannot vouch for the accuracy of this reporting, but even considering a 30-40% under reporting, these figures are worrying. Informal discussions by one of the authors (AK) with a lot of practicing diabetes specialists indicated that the general opinion was that the actual picture is not very different from the respondents' responses.
Table 6 shows the complications reported by the respondents as well as details about hospitalization, surgical or non surgical treatment received for the condition. The details of hospitalization including duration of stay for various complications is shown in table 7. Hospitalization for a day or more was most common with hyperglycemia, followed by limb complications.

Apart from compliance and adherence to the prescribed treatment and the general quality of care, the most important variables that influence late complications and therefore the costs and prognosis of type 2 diabetes, are delayed diagnosis and duration of diabetes. This has been shown in many earlier studies and recently confirmed in the UKPD study[12]. We looked at the influence of demographic and socioeconomic factors such as sex, place of residence, education level, occupation, monthly family income, family history of diabetes and pre diagnosis diabetes awareness on the age at diagnosis, mean duration of illness and complications.

The number of respondents with suspected type 1 diabetes (diagnosis before 30 years of age,

continuous insulin requirement since diagnosis, classical symptoms and hospitalization for drowsiness or coma related to high blood sugar) was only 35 and hence inadequate to make a meaningful analysis.

Table 8 : Mean age (years at diagnosis of type 2 diabetes amongst the respondents by background characteristics

Characteristics	n	Mean	SD
Total	576	49.2	10.9
Sex			
Male	314	49.3	10.8
Female	262	49.0	11.0
Residence			
Talukas	235	50.7	12.0
Bangalore City	341	48.1	9.9
Educational Level			
Illiterate	122	52.7	11.0
School Education	306	49.6	10.5
College Education	148	45.3	10.5
Occupation			
Employed	138	44.2	9.0
Laborer	47	45.4	10.3
Housewife	218	49.0	10.9
Retired	92	52.7	9.2
Non worker	81	56.2	10.9
Monthly Family Income (INR)			
Upto 2,500/-	270	50.8	10.7
2,501 to 5,000	146	48.1	11.3
5,001 to 10,000	123	47.6	9.9
10,001 plus	37	46.1	11.6
Complications			
None	177	46.5	10.9
One	156	49.7	10.4
Two	123	49.9	10.9
Three plus	120	51.7	10.6
Family H/O diabetes			
Yes	277	47.7	10.2
No	299	50.5	11.2
Pre diagnosis awareness			
Yes	321	48.3	10.2
No	255	50.1	11.5

Influence of socioeconomic factors on age at diagnosis: While socioeconomic factors may influence the age at onset of type 2 diabetes, we believe that the differences noted are more a result of delayed diagnosis due to these socioeconomic variables. Table 8 shows that the influence of various socioeconomic variables on the age at diagnosis for respondents with type 2 diabetes.

Table 9 : Mean diabetes duration (years) amongst respondents by background characteristics

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Characteristics	n	Mean	SD
Total	576	8.3	6.8
Sex			
Male	314	9.0	7.5
Female	262	7.4	5.6
Residence			
Talukas	235	7.0	6.3
Bangalore City	341	9.1	7.0
Educational Level			
Illiterate	122	7.5	6.0
School Education	306	8.1	6.2
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Pre diagnosis awareness			
Yes	321	8.4	6.6
No	255	8.1	6.9

The level of education and place of residence are important determinants of how quickly a diagnosis will be made. An almost seven year delay in diagnosis between illiterate and college educated persons and an almost three year delay between city and semi-urban area was seen in the study.

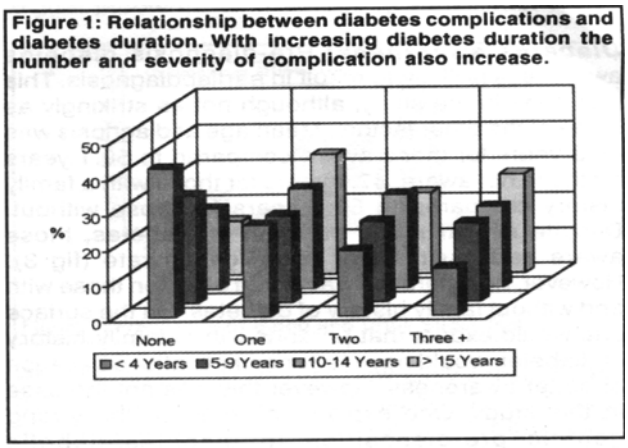
As noted earlier, type 2 diabetes produces few symptoms and is initially not life threatening. People often do not bother about the weakness and tiredness which often is the only manifestation of the disease. It is the actively working persons that take notice of these symptoms as it influences their working capacity. Because of their economic situation and perhaps dependence on others, those not actively working even when noticing early symptoms will often not seek medical attention till

other incapacitating symptoms or complications develop. In this study there was an almost one decade's difference in the age at diagnosis between the actively working and non working respondents. Similarly, there is a trend towards later diagnosis amongst those in the lower socioeconomic group. A mean delay of 4.7 years was noted between the highest and lowest socioeconomic groups. Pre diagnosis awareness or family history of diabetes tends to be associated with an earlier diagnosis. Patients with multiple complications are diagnosed an average five years later, compared to those without complications. Other studies also report a high rate of complications at presentation[12].

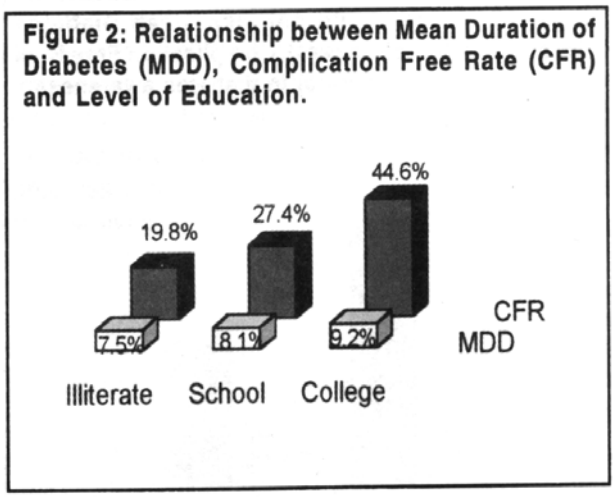
Influence of socioeconomic factors on diabetes complications: 70% of the respondents reported one or more complication. Commonly reported complications were related to the limb, eye, heart, hypertension, hyperglycemia and hypoglycemia. Uncontrolled hyperglycemia was the most common cause for hospitalization, even more common, that hypoglycemia. Moreover, while hospitalization was only for a few hours for hypoglycemia, it was for several days for hyperglycemia and consequently more expensive. It is not clear from the interviews whether the hospitalization for hyperglycemia was more common at the time of diagnosis or later in the course of treatment. In the former case it maybe justified, but in the latter it is an indication of poor control. In this context it maybe noted that the fear of hypoglycemia amongst the treating doctors is rampant as noted in an earlier study[5]. They rather prefer to have their patients remain slightly or substantially hyperglycemic rather than risk hypoglycemia. Also from psychological angle the onus of hypoglycemia is other on the medication and thus directly on the physician; whereas, the onus for hyperglycemia is with the patient and non-compliance to advice. Until this mind set can be changed both amongst physicians and patients, poorer rather good control will prevail.

Amongst patients undergoing surgery for diabetes related complications, surgery on the limbs (feet) was the most common. 30 of the 53 respondents (56.6%), reporting hospitalization for foot problems underwent amputations, (seven toes, four feet, eighteen legs and one finger). Another twelve underwent other foot surgery. One respondent and renal transplantation, and twenty two had surgery related to their heart problem.

The duration of diabetes is the most important independent determinant of long term diabetes complication and is a function of current age and the age at diagnosis. Table 9 shows the mean diabetes duration amongst the respondents in relation to different variables. The not so surprising finding is that other factors being equal, with increasing duration the risk of complications increases (fig 1).



Percentage distribution of respondents by number of complications in relation to other background variables are shown in the following figures. Duration of diabetes, education level, place of residence, diabetes awareness, employment, family income, type of diabetes and insulin use seem to have an association or influence on the complication rate. The influence of these variables on mean duration of diabetes and complication free rate is presented in the attached figures.

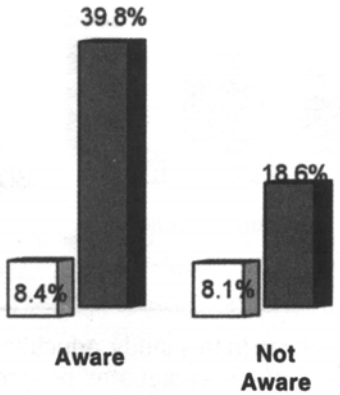


Level of education: In this study, education appears to have a major affect on diabetes prognosis. From this study it is not possible to say whether this is related to greater understanding of the illness and therefore greater commitment of self care or is a reflection of a better socioeconomic status and therefore better access to medical care, or perhaps both. In this study, inspite of a longer mean duration of diabetes, (perhaps reflecting earlier diagnosis)

those with a college education had much lower complication rate (complication free rate 44.6% vs 19.5% for illiterates).

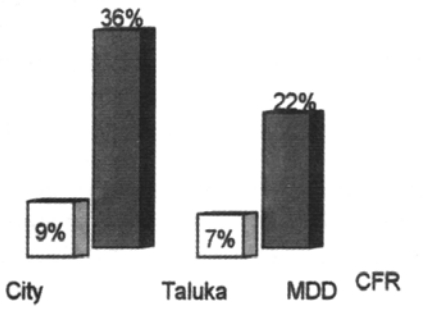
Diabetes awareness: Pre-diagnosis diabetes awareness is likely result in earlier diagnosis. This was seen in the study, although not as strikingly as some of the other factors. Mean age at diagnosis was 48.3 years for those aware compared to 50.1 years for those not aware, 47.7 years for those with a family history compared to 50.5 years for those without. Despite similar mean duration of diabetes, those aware had much lower complication rate (fig 3). However, no difference was noted between those with and without family history of diabetes. On the surface one would expect that persons with a family history of diabetes would have fewer complications because of better awareness. However this was not the case in this study. One explanation may be the strong genetic pre-disposition to diabetes/diabetic complications in persons with family history of diabetes, as well similar environmental influences affecting them. It may also just be a reflection of longer diabetes duration and more severe disorder in those with a family history, such that is offsets the advantage of awareness. A third possibility could be that the load of illness in two or more members in the family may stretch the budget and deprive optimum care.

Figure 3: Relationship between Mean Diabetes Duration (MDD) (clear bars), Complication Free Rate (CFR) (Verticle lined bars) to diabetes awareness.



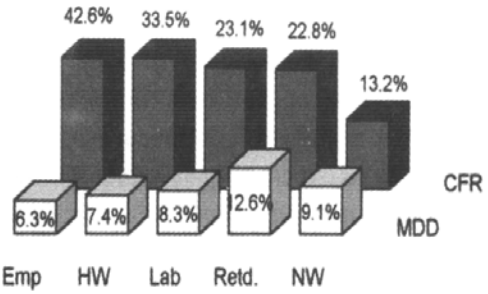
Place of stay, employment/work: The place of stay seems to play an indirect role, those staying in the semi-urban/rule (taluka) areas had a higher complication rate, inspite of lower mean duration of illness, perhaps reflecting delayed diagnosis and availability of less than optimum care. (figure 4).

Figure 4: Relationship between Mean Duration of Diabetes (MDD), Complication Free Rate (CFR) and Place of Stay.



Similar trend is noted with regard to employment/work. Persons who are currently employed or working, have fewer or no complications as compared to those not working or working as agricultural labor (fig. 5).

Figure 5: Relationship between Mean Duration of Diabetes (MDD), Complication Free Rate (CFR) and Occupation (Employed, House Wife, Retired, Non Worker).



Family income: Higher family income increase the likelihood of proper care being provided to persons with diabetes. More so fi the affected family member is actively working (gainfully employed or a housewife). This greater care should translate into fewer diabetes related complications. Those in the high family income group reported the highest complication free rate - 54.1% and lowest multiple complications (8.1% three or more complications), compared to those in the lowest socioeconomic group 22%, no complications; 26%, three or more complications.

Type of diabetes and diabetes treatment: Despite a slightly higher mean diabetes duration (9.2 vs. 8.3 years), patients with type 1 diabetes had more complication free rate (30.7% vs. 22.9%). Insulin treatment in type 2 diabetes is usually given for patients with long standing uncontrolled diabetes

not responding to oral agents alone. The mean diabetes duration for insulin receiving patients was 11.1 years compared to 7.0 years for those not receiving insulin. 37.6% respondents currently not on insulin had no complication compared to 17.1% currently on insulin. Type 2 respondents currently on insulin have a longer (both diagnosed and pre diagnosis), perhaps more severe hyperglycemia which is reflected in higher complication rate and is unlikely to be a result of insulin treatment.

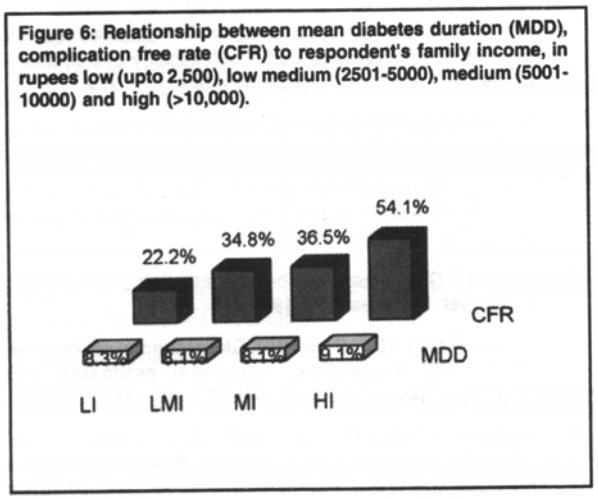


Figure 6: Relationship between mean diabetes duration (MDD), complication free rate (CFR) to respondent's family income, in rupees low (upto 2,500), low medium (2501-5000), medium (5001-10000) and high (>10,000).

Physicians related issues : While we have looked at the patient relate issues, it is equally important to consider care provider related issues as well. Most of the respondents, over 91%, initially visited a non specialist for diagnosis. It is this segment of doctors who are the most important link in early diagnosis and guiding the patient properly, but are often illtrained to handle diabetes related issues, unaware of the latest trends, or unable to devote time to diabetes due to their busy practice.

To prevent diabetes complications, it is crucial that proper monitoring be carried out, first to assess response to treatment and secondly to detect any complications. In the given socioeconomic situation in India, the lack of proper health care infrastructure and support for chronic illnesses; the rampant ignorance and absence of clear cut, even barely minimum guidelines on protocols for care and monitoring at the primary level means that diabetes care at this level is poor and the approach to the illness is ad-hoc. When resources are scarce, and the option is to choose between monitoring and treating. It is quite understandable that monitoring is neglected and does not receive the attention it deserves. Some times it is not merely an issue of resources but knowledge about it need which is the bigger problem.

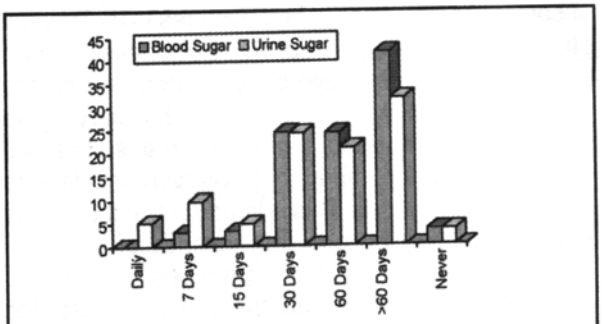


Figure 7: Frequency of Blood and Urine Sugar Tests.

Routine monitoring was very low. Only 7 respondents out of 611 (1.1%) undertook home monitoring of blood glucose. Twenty one did not ever monitor their blood sugar, while the remaining visited a lab or clinic for monitoring. The economics of this will be discussed in another paper. The frequency f monitoring as reported by the respondents is shown in figure 7. Table 5 provides the list and frequency of various lab and clinical tests that the respondents indicate as having undergone. Lipid analysis, kidney function tests, X-ray, ECG etc. were either carried out only in a few patients, or only a few patients had knowledge or records of these tests being performed on them. Even simple clinical examination of the feet, measurement of blood pressure and examination of the eye was not done in over 80% of the cases. It is important to carry out certain baseline clinical/laboratory test for persons diagnosed with diabetes in order to detect complications and to follow up progress. It is quite likely that the rate of complications maybe even higher than what is noted in this study because many of the complications may as yet have been sub-clinical and can be revealed only by lab or special clinical tests.

Limitations and value of the study: As mentioned above the study was pilot study to evaluate the questionnaire for major national study and as such has several limitations. The study is based on patient interviews and it has not been possible to verify the information provided from case records. But the general paucity of medical records would be barrier to such a community based study anyway. A hospital or clinic based study may provide between authentication of some of the findings but will be skewed in terms of patient selection. A more detailed analysis using multivariate analysis or other statistical methods may provide greater insight to the apparent links and associations seen in this study.

Inspite of these limitations, the study is the first large community based study to understand the interplay of socioeconomic factors and diabetes in India. Most studies on the economics of diabetes published from developed countries have concentrated only on the cost of care (direct and indirect). That part of the study is being reported separately. In this study we have looked at the impact of socioeconomic factors on diabetes prognosis. This is important, in the unique Indian situation where in the absence of universal optimum diabetes care program, an individual's paying capacity determines the quality of care and therefore prognosis. In most developed and developing countries, a diabetes care program fully supported by the state or through insurance usually exists. When uniformly good quality care is accessible, (as in many countries) it is the individual's own decision whether to take or not take advantage of it and the disease outcome is at least not pre determined by his/her socioeconomic standing.

It is now well known that undiagnosed and improperly treated type 2 diabetes is likely to give rise to long term complications. This study shows that the uneducated, unemployed people, especially those living in semi urban or rural areas cannot afford or do not have access to even bare minimum health care facilities. They are also likely to be diagnosed late, to develop or have at presentation diabetes related complications (because of delay in diagnosis and/or improper treatment). This has remarkable socioeconomic significance - those who will need more advanced/more expensive care for diabetes related complications, are often the ones who can ill afford such care. While some of those unfortunate people may still be able to afford routine care, when burdened with complications requiring advanced expensive care - it would be like the proverbial last straw that broke the camels back and would drive many of them to borrow and enter the debt trap. This is a likely scenario if urgent steps are not undertaken to enhance diabetes awareness in the community.

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