Pharmaco economic survey among patients with chronic diseases in Rural Andurban Healthcare System

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ABSTRACT
The health-care system currently is evolving from the conventional systems due to theadvancementinmedical technology,forinstant,diagnosticandtherapeuticoptionstherebyresultinginanincreased financialburdenonpatientsandthesocietyatlarge.Pharmacoeconomicstechniquesprovidevaluableinformationtohealthcaredecisionmakersfortheallocationofscarceresources. Thus, a prospective observational study was aimed to evaluate the economic burdenamong the patients suffering chronic ailments in the rural and urban areas of Tamil Nadu. A totalof205 participantswereincludedinthestudyamongwhich97 memberssuffereddiabetesmellitus,followed by hypertension (89) and 19 members suffered other chronic ailments. Majority (51%)ofthestudypopulationwasmalesand 49 %werefemales.Ourstudyshowsthat patientsinurbanareas were more aware about disease and they preferred to afford sophisticated medical settingswhich add up to the treatment cost when their hospital stay duration increases. Metformin wasusedas monotherapyby46%ofpatients fromBiguanidesclassofdrugs intheruralareasandthe drug of choice for combination therapy in the urban areas. Our study shows that the overallhealthcare costs were found to be higher in the patients with co-morbidities, which may be due to the greater number of medications, laboratory investigations, consultations and hospitalization. Apositive relationship between increased costs of health care services with increased number ofcomplications was also observed. The study indicates that the strategies in the management ofchronicillnessesvarybetweenaruralandanurbanare aintermsofcostperoutcomeofthehealth.More efforts and initiations in the health insurance must be taken immediately, considering theeconomic statusofthepeopleof Tamil Nadu.

KEYWORDS
 Pharmacoeconomics; cost benefit analysis; chronic illness; diabetes management; prescriptionanalysis.

I.INTRODUCTION
It is possible to think of Pharmacoeconomics as a subfield of health economics that examines, quantifies, and compares the expenses and effects of pharmaceutical goods and services. It assists in establishing an economic connection between drug research, manufacture, and distribution, storage, pricing, and subsequent human usage. Cost minimization, cost effectiveness, cost benefit analysis, and cost utility analysis are a few of the ideas used in pharmacoeconomic analysis. When comparing two medications from the same therapeutic class, Pharmacoeconomics can be a huge aid in decision-making when analyzing the cost of and access to the appropriate treatment for the right patient at the right time. This helps in establishing accountability that claims by a manufacturer regarding a drug isjustified pharmacists and administrators will be able to make wiser decisions about the goods and services they offer by properly utilizing pharmacoeconomics.[1]Pharmacists and administrators will be able to make wiser decisions about the goods and services they offer by properly utilizingPharmacoeconomics. Yet, there are few well-conducted, trustworthy, and open economic evaluations, which are crucial for demonstrating the economic impact of the pharmacist in reducing overall health expenditures, needless treatment, and societal costs. In order to maximize value for patients, Pharmacoeconomics, a subfield of health economics, typically focuses on balancing the costs and benefits of interventions with the utilization of scarce resources.[2]A critical component of rational

medication usage decision-making and access is Pharmacoeconomics. Also, it helps policymakers assess affordability Pharmacoeconomics is a scientific field that evaluates the clinical, financial, and humanistic aspects of pharmaceutical products, administrations, and projects, along for the allocation of limited resources, Pharmacoeconomics methodologies offer health care decision makers useful information. with other social insurance mediations, in order to provide key information to leaders in the medical industry, suppliers, and patients for the best outcomes and the allocation of social insurance resources.[3]One component of health economics is economic evaluation, which serves as a tool for evaluating the costs and effects of various therapies. Estimating the condition's direct (medical and non-medical) and indirect expenses is a part of the cost analysis. The costs associated with emergency clinic administrations, such as inpatient stays, ICU stays, research center tests, and other emergency clinic visits, as well as authority and essential consideration specialist visits, community health laborer, nurse, health instructor, drug specialist, and prescription costs, are referred to as direct clinical expenses. Transportation costs to and from medical facilities for treatment, food costs, and paid caretakers are examples of direct nonclinical expenses. The indirect costs include the opportunity cost of time missed due to gloom, as well as efficiency setbacks for patients and family members or parental figures.[4]In India, households' incomes cover 85–95 percent of total healthcare expenses for individuals and their families. Direct spending takes up 27–34% of the income of rural and urban poor households, while diabetes treatment takes up 5.0–12.6% and 4.8–16.9% of income for rural and urban middle-to-high income households, respectively. [5] The WHO and the UN Human Settlements Programme for India estimate that cardiovascular diseases will have the same economic impact as diabetes throughout this time span, totaling $2.25 trillion. [6] The cost of treating diabetes in India is estimated to be 1.5 lakh crore annually, which is 4.7 times the center's budget of 32,000 crore. The cost of treating diabetes-related CVD is correlated with this figure. The primary factors were identified as being the increased accessibility of processed foods and the lack of physical activity.[7]Cardiovascular problems are a significant contributor to the high cost of maintaining diabetic patients and raise additional issues for the healthcare system. Because to the significant clinical and financial burden of CVD

among patients with T2DM, there has been an increased emphasis on the simultaneous therapy of CVD and T2DM. Setting goals for glycated hemoglobin (HbA1c), cholesterol, and blood pressure are current management strategies. [8,9] In India, healthcare expenses are paid out-of-pocket by the majority of the population, and the cost of treatment can have a significant financial impact. The expense of diabetes care is seen to grow in the event of complications, when insulin therapy is needed, when hospitalization or surgery is necessary, etc. Indians from Asia [10,11]Due to improvements in medical technology, such as better diagnostic and therapeutic choices, the health-care system is currently changing from traditional approaches. This has led to a greater financial burden on patients and society at large. The operating costs and daily medical expenses have increased dramatically as a result of enhanced medical technology, despite improvements in the quality of service offered in the global health sector. While diabetes is typically managed for a lifetime, it is expensive because of its chronic nature, complications, and significant resource consumption. Understanding patient value in terms of how a condition and its treatment affect physical functioning and psychological well-being, commonly referred to as health-related quality of life, is a goal of health outcomes research and patient-reported outcomes in particular (HRQOL). The costs of pharmacological therapy to the health care system and society are described and analyzed. with an average age of onset of 42.5 years, the situation has gotten worse in India, where it is anticipated that there will be 109 million cases by 2035. [12]

Thus, this study was aimed to conduct a pharmacoeconomic survey among the patientssufferingchronicailmentsinthe ruralandurbanareas of Tamil Nadu.

II. MATERIALSANDMETHODS
StudySite: Ruralandurbanareas ofTamil Nadu.
StudyDesign: Prospectiveobservationalstudy
Sample Size: A total of 205 participants were included according to inclusion and exclusion criteria.
StudyDuration: Studywasconducted fordurationof6months.(October2022toMarch 2023)
Inclusioncriteria
➢ Patientsofeither genderwithmorethan35yearsagehavingchronicillnes s.

➢ Patientswithotherchronicco-morbidconditions.
➢ Patientswhoarewillingtoparticipateinthestudy.

Exclusioncriteria
➢ Patientsagedbelow35yearsandhavingchronicillness.
➢ Patientswhodidnotagreetoparticipateinthestudy.

Sourcesofdata collection
The data was collected through patient data collection forms from patients with chroniccomplicationsbyinterviewing patientsorpatientcaretakersinbothruraland urbanareas.Atotalof205validatedDataCollectionForms werefilledaccordingly.

Materialsused
Inordertorecordthenecessarydata,adetailedDataCollectionForm(DCF)includingthepatientdemography,lifestyleandhealthrelatedcostswasdesignedforthestud

yand

validatedbysenior professionals. The study details were explained to the patients and an informed consent was obtainedfrom all the study participants. The interview was carried out in English and Tamil languages forbetterunderstandingoftherespondents.

Statisticalanalysis
MSofficeExcelwasusedforpharmacoeconomicanalysis.

## III. RESULTS
A total of 205 participants having chronic ailments were included in our study. Out ofwhich,97memberssuffereddiabetesmellitus,followedbyhypertension(89)and19memberssufferedotherchronicailments.Thestudypopulationwaswithoneormoremorbidityandwasundertreatmentforoneormorechronic ailments. Majority (51%) of the study population were males and 49 % were females as shown inFigure-1
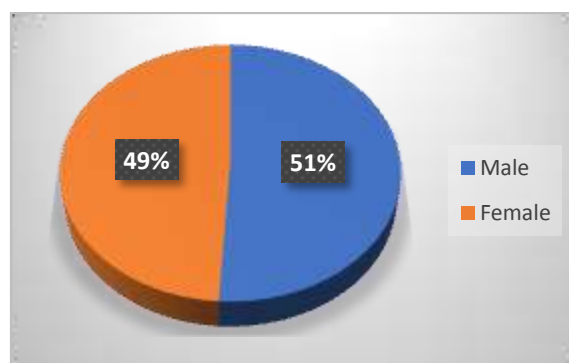
Fig1:Genderwisedistribution ofstudypopulation

Out of the 205 participants, 57% of participants belonged to the rural area while 43%were fromurbansettingas showninfigure-2.
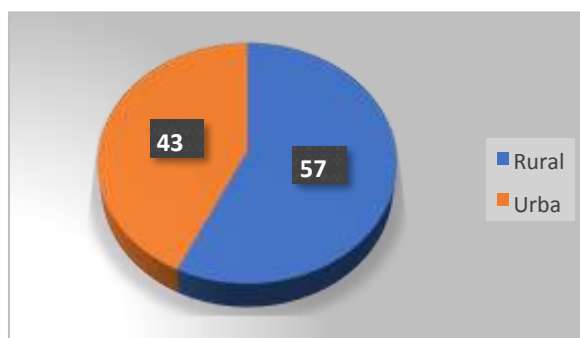
Fig2: Areawisedistribution ofstudypopulation

The highest percentage of age group was more than 50-60 years (25.36%) followed by60-70yearsandabove(20.48%),agegroupof40-50years(14.14%).Amongthesubjects, majority (59.3%) had school level education, 26.7% were graduated, 6.7% had a professionalqualification and 7.35were illiterate. By occupation a total of 29.3%were employed, 26% ofindividualswereself- employed,24%wereretired,14.7%werenonworkersand6%ofpatientswere house wives. Family history of participants was recorded. The percentage of familyhistorywithDMwas47%,HTNwas43%and10%werehavingnosignificantfamilyhistory.The socio-demographic profile ofstudyingparticipantsisgiveninTable-1.

Table1:Demographicdetailsofstudypopulation

| VARIABLES	NUMBER OF PARTICIPANTS	PERCENTAGE
GENDER		
Male	104	51%
Female	101	49%
AGE		
30-40	14	6.82%
40-50	29	14.14%
50-60	52	25.36%
60-70	42	20.48%
>70	24	11.07%
OCCUPATION		
Employed	60	29.3%
Self -employed	53	26%
Non workers	30	14.7%
Retired	49	24%
House wives	13	6%
SOCIAL HISTORY		
Smoking	120	58.6%
Junk foods	101	49.5%
Nil	15	8%
FAMILY HISTORY		
DM	97	47%
HTN	89	43%
Not Significant	19	10%

In our study, 47% of participants were under treatment for diabetes and 43% werehypertensive patients as showninfigure3.
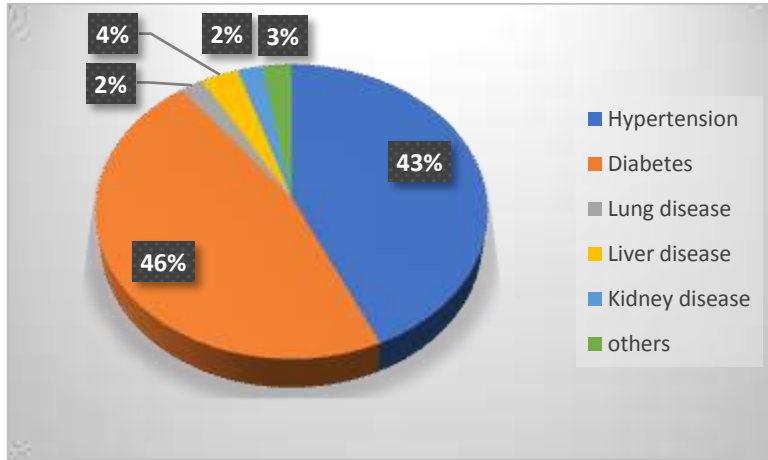
Fig3:Diseaseprevalenceamongstudypopulation

Figures4,5indicatetheprescriptionpatternof thediabetespatientsinboththeruraland urban population respectively. Metformin was used as monotherapy by 46 % of patients from Biguanides .

class of drugs in the rural areas. Metformin and Gliclazide were received by 23%oftheurbanpopulationandremainingpatientstook Glimepiride,Gliblenclamideandotherclass ofdrugs
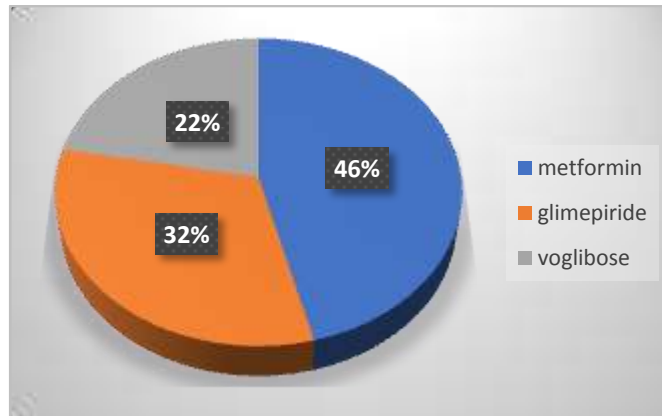

Fig4:Prescriptionpatternofdiabetespatientsinruralareas
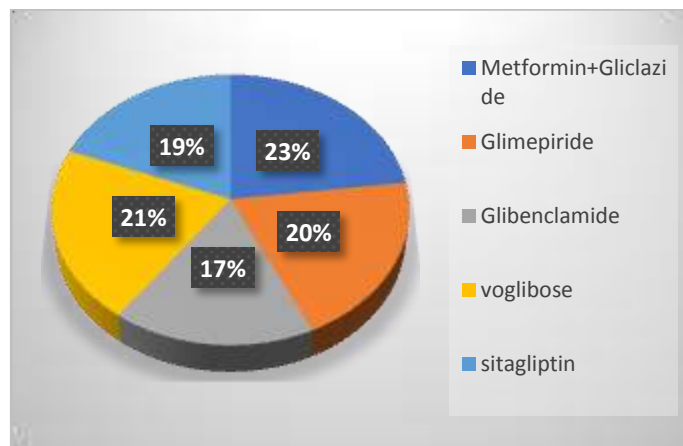

Fig5:Prescription patternofdiabetespatientsinurbanareas

The anti-hypertensive agent amlodipine was prescribed to 26% patients and was the most consumed cardiovascular agent for the rural population. While, Telmisartan was the drug of choice in the urban areas with 32% patients, followed by Amlodipine as shown in figures 6,7.
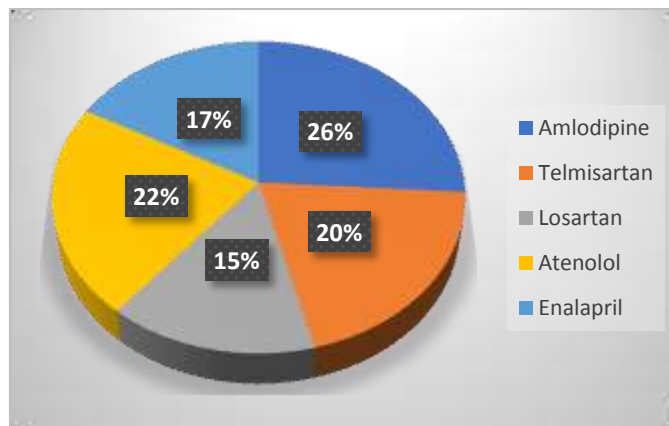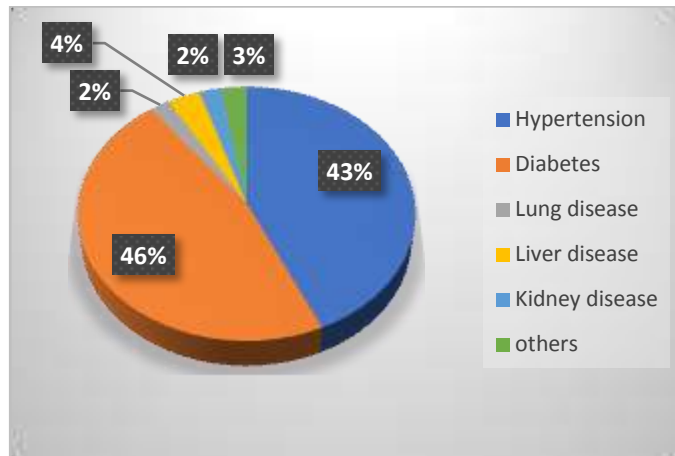

Fig6:Prescriptionpatternofhypertensivepatientsinruralareas
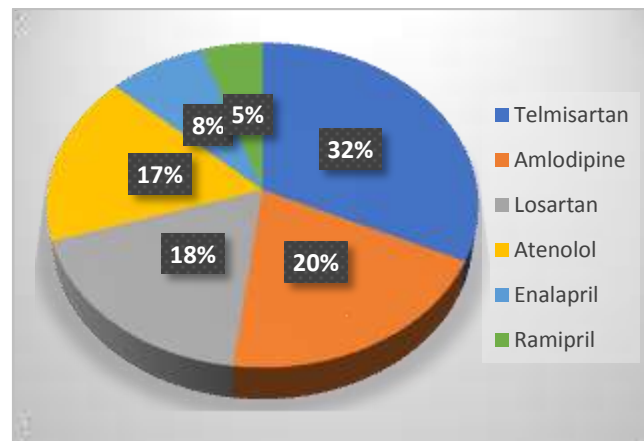
Fig7:Prescriptionpatternofhypertensivepatientsinurbanareas

Thestudyparticipantswerehavingvariouscomorbiditiesasshowninthefigure8,likerespiratory difficulty,liverdiseaseandkidneydiseasewhichincreasedthetreatmentcostforthepatients.

Fig8:Co-morbiditiesofstudypopulation

Amongthe47%(97nos)ofpatientssufferingdiabetes,around54%(52nos)werehavinghypertension as co-morbidity. Cardiovascular disorders were prevalent in 35% (34nos) of the participants.3%sufferedliverandkidneydiseaseswhilelungdiseasesandotherco-morbidities were seen in 2%of the study population.1% of the population was takingmedicamentsforthyroidandothergynaecologicalissues.
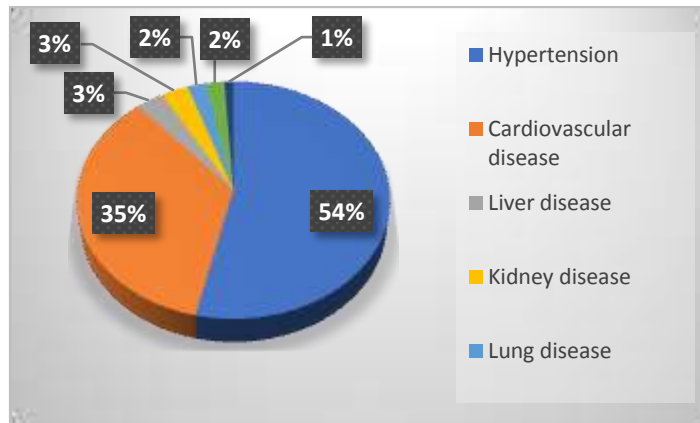
Fig9:Comorbiditiesindiabetespatients

Outofthe43%(89nos)ofpatientssufferinghypertension,around64%(57nos)wereundertreatmentforcardiovasculardiseasesalso.While25%(22nos)oftheparticipantsweresuffering diabetes;5%sufferedkidneydiseases.Strokeandotherneurologicaldisorderswereseenin3%andremaining3%ofthepopulationwastreatedforotherchronicdisorderslikerespiratoryillness.
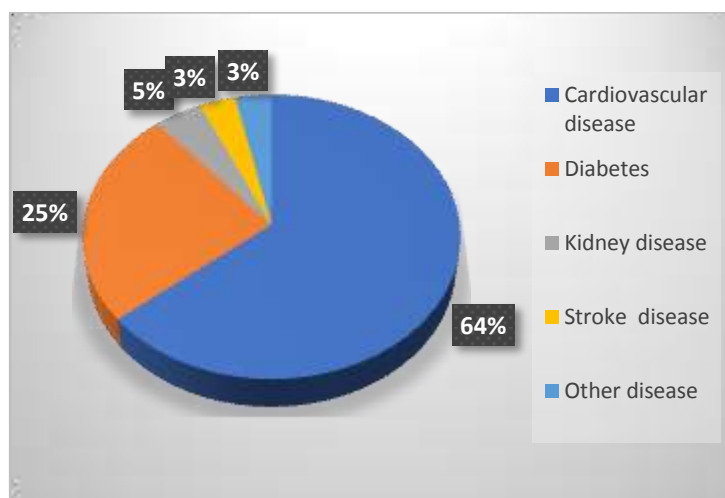
Fig10:Comorbiditiesin Hypertensivepatients

The treatment cost was calculated including the diagnostic cost, the consultation or thehospitalizationcostandalsothemedicationcost.

For an urban participant, the average cost incurred for diagnosis was approximatelyRs.500 per diagnosis; consultation or hospital cost of Rs.400 and the medication cost ofRs.1500pervisit.

The cost was calculated in the same manner for a rural participant who's diagnostic andconsultation or hospital cost were higher than that of the urban participant with Rs.600 andRs.800respectively.Themedicationcostofapatientfromruralareawas Rs.1200pervisit.

The consultation cost mainly dependent on the type of the health facility taken by thepatient. It also included the diagnostic cost. The average diagnosis cost of a patient withdiabetes was found to be Rs.5524.75 and that of a hypertensive patient was Rs.6875.55; thus,indicating that the diagnostic expense seems to be higher for the hypertensive patients ratherthanthediabetes patients.

TheaveragemedicationcostofaT2DMpatientwasRs.6200.50andhypertensivepatientwasRs.7400.25.Themedicationcostvariedforthepatientswhoweretreatedfortheirco-morbidities also. Patients having both diabetes and hypertension spent Rs.7820.10 whilepatientswithhypertensionandcardiovasculardisordershadtospendRs.8935.75onanaveragefortheirtreatment.

IV. DISCUSSION

The emergence of new epidemics has set an alarm to the entire health system for framingnewstrategiesandpoliciesformakingtheirtreatmentapproachesaffordabletothepeopleofvariedecono mic status. Pharmacoeconomics plays an important role in analyzing the affordability andcost effectiveness of any therapy. This study is an initiative to assess the variations among thepeoplehavingdifferenthealthsetups ofTamil Nadu.

Our study shows that patients in urban areas were more aware about disease and theypreferred to afford sophisticated medical settings which add up to the treatment cost when theirhospital stay duration increases. This was supported by a previous study report indicating that theaverage cost of treatment was significantly higher for those who were more educated, for thosewhovisited thehospitalmoreoften,andforthosewhoobtainedmore medications.[13]

In our study, most of the participants suffered diabetes mellitus followed by hypertensionand the most commonly occurring co-morbidity in diabetic patients was hypertension which wasinaccordancewiththestudyconductedbyRungbyJ etal.[14]

Metformin was used as monotherapy by 46 % of patients from Biguanides class of drugsin the rural areas and the drug of choice for combination therapy in the urban areas which wassupported by the previous studies reporting the most commonly prescribed drug was metformin,preferred as monotherapy as well asfor combined therapy withvoglibose,glimepiride andglipizide,whichmettheneedofthepatients andthepreferenceofthedoctors.[15]

The diagnosis cost mainly points out the

costs of laboratory findings of the patients whichincrease according to the severity of comorbidity as well as duration of hospital stay. Our studyshowsthattheoverallhealthcarecostswerefound tobehigherinthepatientswithco-morbidities,which may be due to a greater number of medications, laboratory investigations, consultations andhospitalization. In the present study, there was a positive relationship between increased costs ofhealth care services with increased number of complications. In addition, the average healthcarecosts were significantly increased with the increased length of the stay of the patients in thehospital.Admissiontothehospitalaccountsforthegr eatestpartofthecostofdiabetes;inaddition,the extra-need for inpatient hospital care for patients who have acquired late complications cangreatlyaffectcost,ashospitalbedcostsperdayhave relativelyhighunitcostscomparedtoother servicesandtotalmedicationcosts.Similarreportswere foundinastudyconductedbyAkariSet al[16] Itisalsofoundthatpatientsfollowingstrictmedicationa dherenceandlifestylemodificationswereabletominim izethetreatmentcosttoaconsiderablelevelwhetheritbe aruralorurbanarea.

V. CONCLUSION

The study indicates that the strategies in the management of chronic illnesses varybetweenaruralandanurbanareaintermsofcostper outcomeofthehealth.Moreeffortsandinitiationsinthe healthinsurancemustbetakenimmediately,considerin gtheeconomicstatusof the people of Tamil Nadu. Also, the demand for pharmacoeconomic researches has risendrastically due to the severity and uniqueness of the socio-economic status as well as the co-morbidconditionsofthepatients.Theincreaseinlifeexp ectancyandthedemographicchangeof aged population coupled with chronic diseases will increase the morbidity and healthexpenditure in the future. Establishment of standard treatment protocols ensuring qualityhealthcare and regulation of the private sector must be a priority for reducing health careexpenditure.

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