

ICMR - India DIABetes [INDIAB] Study

PHASE I

EXECUTIVE SUMMARY



Indian Council of Medical Research
Ansari Nagar, New Delhi – 110 029



Madras Diabetes Research Foundation
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FOREWORD

It gives me great pleasure to write this Foreword for the final report of the ICMR-INDIAB study (Phase I), which was conducted in the states of Tamil Nadu, Maharashtra, Jharkhand and the Union Territory of Chandigarh between 2008 and 2010. Non Communicable Diseases (NCDs) have now become a major cause of death and account for over 55% of all deaths in India. Diabetes represents one of the important NCDs.



Reliable population based data on the burden of NCDs such as diabetes is necessary to plan preventive and curative health services in the country. In this context, the ICMR-INDIAB study gains significance as it is collecting representative data from the various States and Union Territories in India. I am very happy to note that the Phase I of the ICMR-INDIAB study representing the states of Tamil Nadu, Maharashtra, Jharkhand and the Union Territory of Chandigarh has now been completed and the data has been compiled in a report. I am also happy to hear that the results of these four regions have been shared with the respective state governments. Data such as these are invaluable, as they provide a snap shot of the existing burden of disease in the country.

I congratulate the Principal Investigators of various states who have been involved in collecting these data, and the Madras Diabetes Research Foundation (MDRF) which is the national coordinating centre for this study, as well as my colleagues at ICMR. I also wish to thank the INDIAB Expert Committee Members for providing valuable guidance throughout the study. I hope to see the other phases of the ICMR-INDIAB study also completed in a timely fashion and the results presented and published in due course. I am sure this report will stimulate further research on NCDs in our country.

Dr. Soumya Swaminathan
Secretary, Department of Health
Research and Director General, ICMR

PREFACE

It gives me great pleasure to write this Preface for the ICMR-INDIAB study (Phase I) comprising of 4 regions of India and conducted between 2008 and 2010. The ICMR- INDIAB study is one of the first national studies to look at the prevalence of diabetes, hypertension, obesity and dyslipidemia in whole states of the country.



The study is being done in Phases and as the Chairman of the ICMR-INDIAB study Expert Group or Committee Group, I am pleased to note that the first Phase of the study done in the three states of Tamil Nadu, Maharashtra, Jharkhand and the Union Territory of Chandigarh, has been completed and the final report is brought out. I am also happy to note that 8 publications have come out of this phase of the ICMR INDIAB study till date. I hope that before long, the other phases of the ICMR INDIAB study including the North Eastern states of India and the Rest of India will also be completed so that we will have accurate and valuable data on the burden of non communicable diseases such as diabetes, hypertension and obesity from urban and rural areas of all parts of our country. Such data is extremely valuable to policy makers and other stake holders.

I wish to congratulate the Principal Investigators of the various states for conducting and completing the study in a timely manner and the Madras Diabetes Research Foundation (MDRF), the National Coordinating Centre, for supervising the study. I am particularly happy that the study has ensured capacity building in Non Communicable Diseases Prevention and Control in the various states where the study is being done and particularly help individual states in planning and policy formulation for Diabetes in the context of the disease status in their urban and rural areas.

I commend Dr.Bela Shah, Head, NCD and her team at the Division of NCD, ICMR for facilitating the planning and implementation of this nationally relevant study.

I am sure that this report will be useful to all researchers in this country and abroad.

Dr. Lalit M. Nath
Chairperson
Expert Group,
ICMR-INDIAB Task Force Project

PREFACE

In recent years, there is reportedly a sharp increase in the number of individuals sufferings with diabetes which has reportedly increased from 19 million in 1995 to 66.8 million in 2015 according to the International Diabetes Federation. These figures are predicted to increase to 123.5 million by 2040. Most of the currently available estimates of diabetes prevalence in India are regional and limited by small sample size. No study on diabetes has systematically sampled all the states in the country or even a whole state.



The Indian Council of Medical Research-India Diabetes (ICMR-INDIAB) study is aimed as a representative national survey. The Phase I data from the ICMR-INDIAB study, conducted in three states of Tamil Nadu, Maharashtra, Jharkhand and the Union Territory of Chandigarh serves as an important benchmark and highlights areas for public health and policy action. This Phase of the study has enhanced capacity building in combating Non Communicable Diseases in these States. I am also happy to note that several publications have come from this study which will help the scientific community and public health professionals in planning for prevention and control of diabetes and other metabolic NCDs.

I gratefully acknowledge the role played by the National Principal Investigator and the State Principal Investigators of Phase I in successfully conducting and completing the study in a timely manner. I am grateful to Prof LM Nath, chairperson of ICMR-INDIAB Expert Group and the members who have devoted their time and provided generous suggestions throughout the planning and implementation of the study.

The ICMR–INDIAB study will help provide nation wide data and establish a national framework for monitoring diabetes and cardiovascular risk factors in India.

Dr. Bela Shah
Head, Division of NCD, ICMR

MESSAGE

It gives me great pleasure to write a message for the final report for the ICMR- India Diabetes INDIAB study-Phase I which was conducted in 3 states and 1 Union Territory of India viz., Tamil Nadu, Maharashtra, Jharkhand and Chandigarh. India is a country with huge diversity. The heterogeneous nature of the country means that studies done in one part of the country cannot be extrapolated to another part, as there is so much cultural, socio economic and other differences from one part of the country to the other.



Hence, the Indian Council of Medical Research (ICMR) thought it fit to undertake a national study. ICMR decided to undertake a study to obtain reliable data on the prevalence of diabetes, hypertension, obesity, dyslipidemia and other non-communicable diseases in the various States of India. The total sample size planned for the study is 1, 24,000 which will make it one of the largest epidemiological studies on diabetes ever done. We are privileged that the Madras Diabetes Research Foundation (MDRF) was chosen as the National Coordinating Centre to execute the study. We were ably supported by the ICMR-INDIAB Expert Group. The Principal Investigators of every state provided their full co-operation and support to the study. The ICMR Headquarters and specially Dr. Bela Shah at Division of NCD and her team also extended their full support and thanks to the great team work of all the stake holders, the study has already been completed in 14 states and 1 Union Territory of the country. This report deals with the results of the study in the first regions. The INDIAB study has already resulted in several excellent publications and many more are to follow. On behalf of my colleagues at MDRF, we extend our grateful thanks to ICMR and to the Department of Health Research (DHR) for their support to the INDIAB study and we look forward to completing the study as early as possible.

Dr. V. Mohan
National Principal Investigator,
ICMR-INDIAB Task Force Project, MDRF

ACKNOWLEDGEMENT

The various ongoing research programmes in non-communicable diseases undertaken at the ICMR aim to identify risk factors, their prevention, health services requirements and control strategies. This ICMR INDIAB study is a joint effort of a large number of individuals and institutions to determine the prevalence of type 2 diabetes mellitus and pre-diabetes in urban and rural areas across India, by estimating the state-wise prevalence of the same. It is my pleasure to acknowledge the dedication and determination of each member who worked towards completing this phase of the study in these four regions.



I would also take this opportunity to thank Dr. L.M. Nath, Chairman of the ICMR-INDIAB study Expert Group for his constant guidance and support in conducting this study. The Chairman of the Expert Group is specially acknowledged for his critical inputs, suggestions and his initiative to ensure the quality of field data during the ICMR Expert Group audits.

I would like to express gratitude to Dr. VM Katoch, the former Secretary, Department of Health Research (DHR) and Director General, Indian Council of Medical Research, for his interest and understanding of the need to have this study implemented in the entire country so that reliable and valuable national data will be available on the burden of NCDs such as diabetes, hypertension and obesity. I also wish to thank Dr. Soumya Swaminathan, Secretary, DHR and DG, ICMR for her support and encouragement.

I would like to acknowledge here the initiatives undertaken under the able guidance of Dr. Bela Shah for this study. I would also like to thank Dr. D.K. Shukla, for his support. I would like to thank Dr. V. Mohan for his support and coordination in finalizing this report. I would also like to acknowledge the assistance provided by the ICMR administrative staff in this study.

The ICMR appreciatively acknowledges the valuable contribution of the Expert Group members, the National Principal Investigator and all the Principal Investigators of the States for extending their support in conducting this study.

Dr. Tanvir Kaur
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3. Indira Gandhi Government Medical College, Nagpur
4. Lilavati Hospital, Mumbai
5. King Edward Memorial Hospital & Research Centre, Pune

DATE OF COMMENCEMENT: 1st June 2008

DURATION: 3 years

DATE OF COMPLETION: 31st May 2011

ICMR- India Diabetes [INDIAB] Study – Phase I

Executive Summary

India is reported to have the second highest number of diabetic individuals in the world. There is no reliable data on the national prevalence of diabetes, hypertension, obesity, dyslipidemia and other non-communicable diseases (NCDs), nor is state level data available. With the aim of addressing this scarcity of information, the Indian Council of Medical Research (ICMR) decided to undertake a nationwide study to obtain reliable and accurate data on diabetes and other metabolic NCD's.

The ICMR-INDIAB Study is a cross-sectional, community- based survey of adults of either sex, aged 20 years and above, aimed at determining the national prevalence of type 2 diabetes mellitus and pre-diabetes [Impaired fasting glucose (IFG) / Impaired glucose tolerance (IGT)] from all the 28 states, National Capital Territory (NCT) of Delhi and 2 union territories (UTs) namely Chandigarh and Puducherry in the mainland of India. Each state, the National Capital Territory and the Union Territories will have an urban component [towns including metros, (wherever applicable)] and a rural component (villages). The secondary objectives are 1) to determine the prevalence of hypertension and hyperlipidemia in urban and rural India; 2) to determine the prevalence of coronary artery disease among subjects with and without diabetes and 3) to assess the level of diabetes control among self reported diabetic subjects in urban and rural India. The study was initiated to estimate the prevalence of diabetes in India in a phased manner. In Phase I, three states namely Tamil Nadu, Maharashtra, Jharkhand and one Union Territory namely Chandigarh located in the south, west, east and north of the country, respectively were studied. ICMR-INDIAB north east component, which is now ongoing, includes the 8 north eastern states of India namely Sikkim, Assam, Meghalaya, Tripura, Mizoram, Manipur, Nagaland and Arunachal Pradesh. The ICMR-INDIAB-Rest of India (ROI) component (Phase II) involving several other states of India is currently in progress.

The ICMR-INDIAB study (Phase I) reports on the results obtained from three states [Tamil Nadu, Jharkhand and Maharashtra] and one Union Territory [Chandigarh] of India. A stratified multi-stage sampling design was used. Of the 16,607 individuals selected for the study, 14,277 [86%] individuals participated. The weighted prevalence of diabetes (both known and newly diagnosed) in Tamil Nadu was 10.4%, Jharkhand, 5.3%, Chandigarh, 13.6% and Maharashtra, 8.4% **(Figure 1)**

Figure 1: Prevalence* of diabetes (self-reported , newly diagnosed and overall) in the urban and rural population in all the 4 regions studied

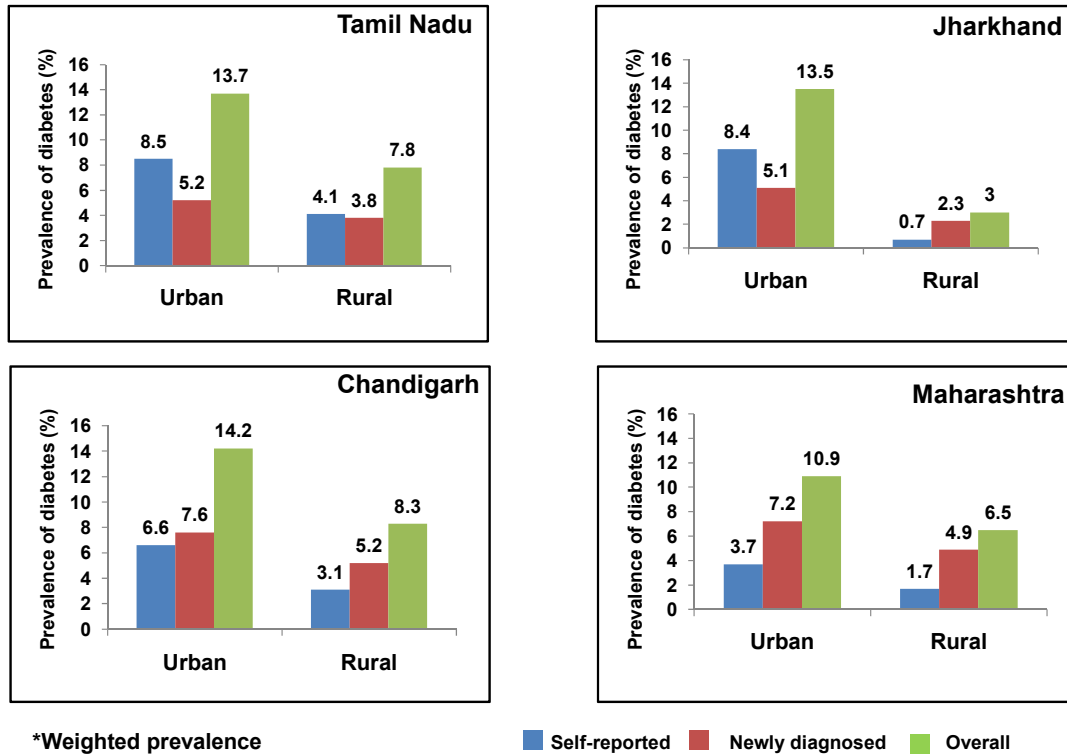
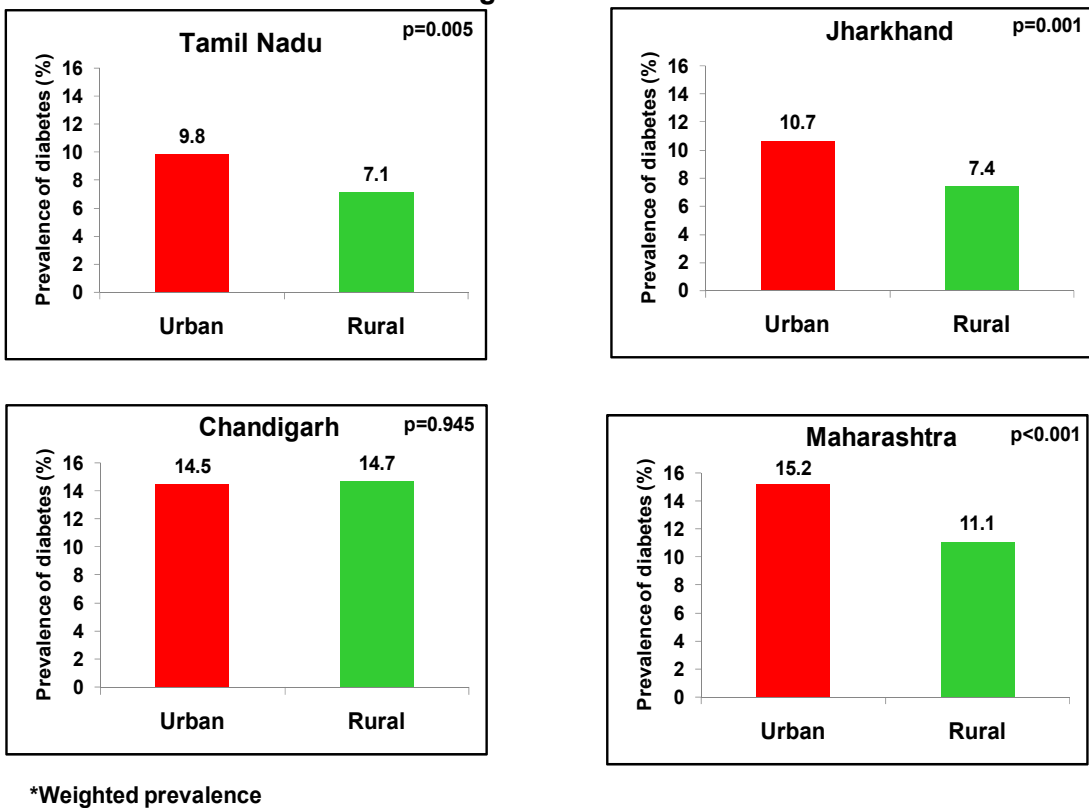
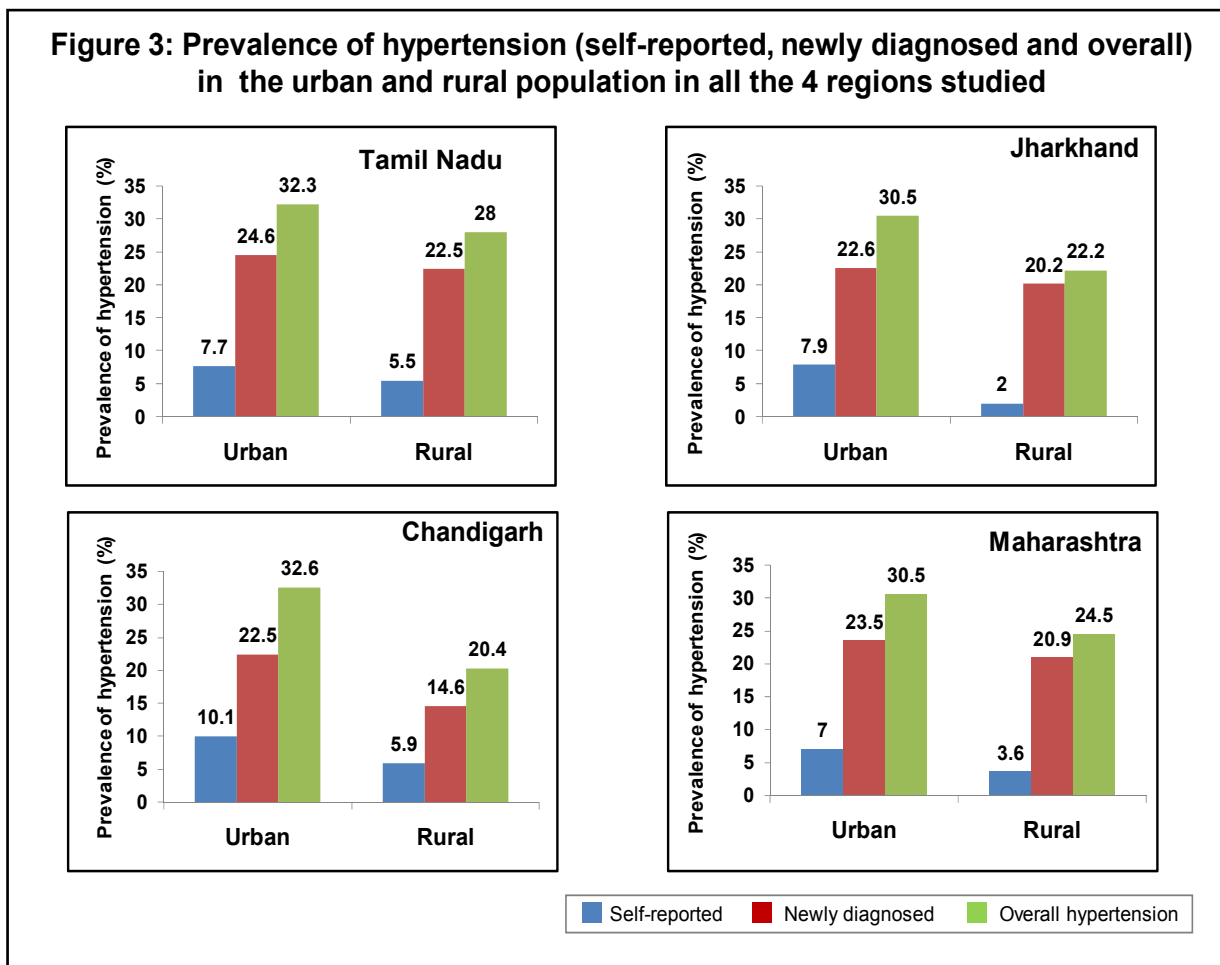


Figure 2: Prevalence* of prediabetes in the urban and rural population in all the 4 regions studied

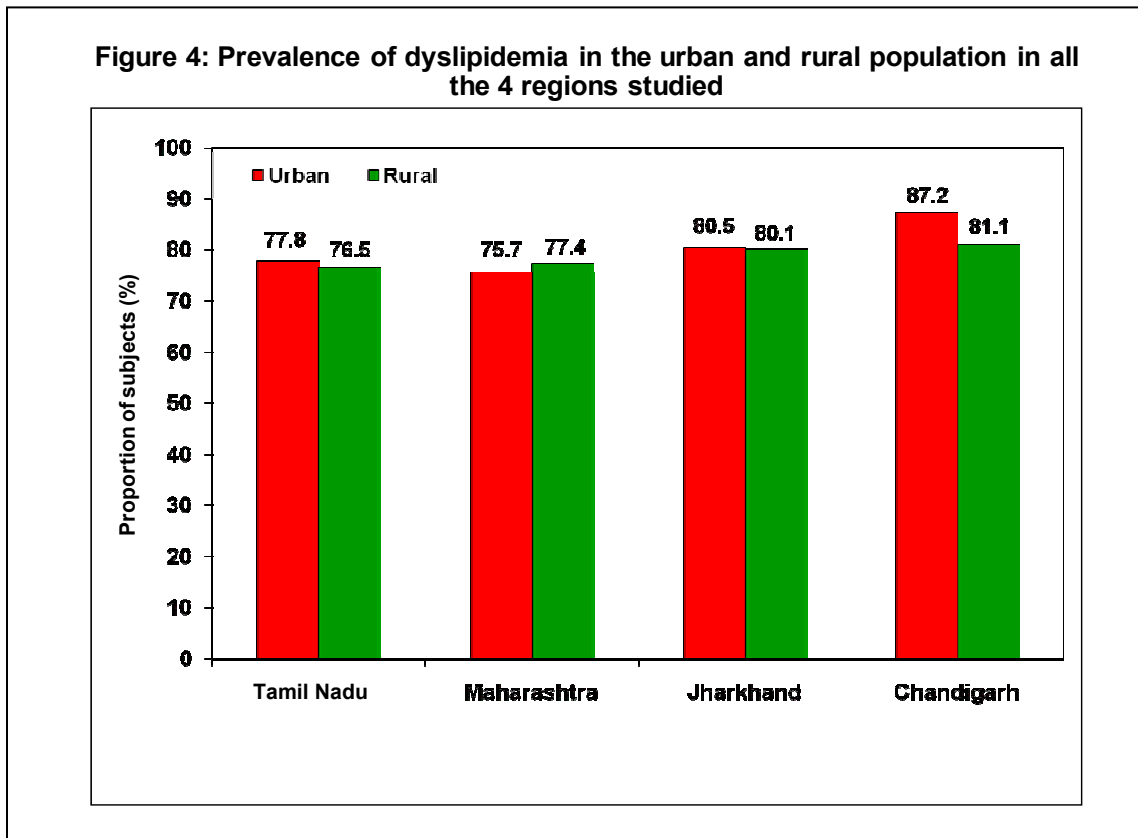


One of the primary objectives of the study was to find out the prevalence of prediabetes in these regions. **Figure 2** presents the prevalence of prediabetes in the urban and rural population in the four regions. The prevalence of prediabetes was 8.3%, 8.1%, 14.6% and 12.8% in Tamil Nadu, Jharkhand, Chandigarh and Maharashtra respectively. Except in Chandigarh, the prevalence of prediabetes was higher in urban areas in all age groups.

The burden of cardiovascular diseases (CVDs) is increasing worldwide and this is a major concern in developing countries like India. It is a known fact that hypertension and dyslipidemia are the two major contributing risk factors for CVD. The Phase I study has thrown some interesting data on the prevalence of hypertension and dyslipidemia in the four states of Tamil Nadu, Jharkhand, Chandigarh and Maharashtra (**Figure 3**). In urban areas, the highest prevalence of hypertension (overall) was observed in Chandigarh (32.6%) and Tamil Nadu (32.3%) followed by 30.5% in both Jharkhand and Maharashtra. In rural areas, Tamil Nadu had the highest prevalence of hypertension (28%) followed by Maharashtra (24.5%), Jharkhand (22.2%) and Chandigarh (20.4%).

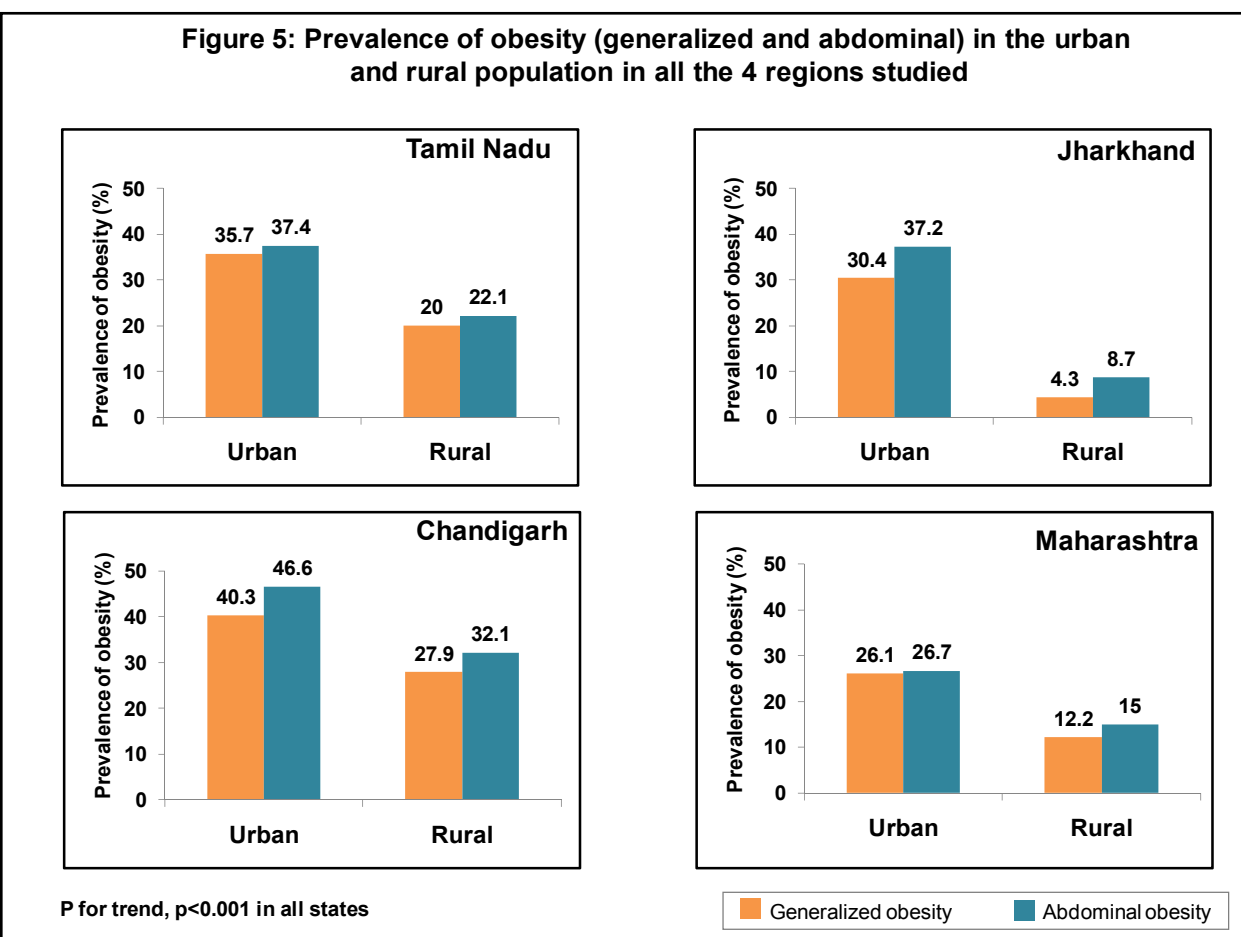


As far as dyslipidemia is concerned, the prevalence of dyslipidemia ranged from 75.7% in urban Maharashtra to 87.2% in urban Chandigarh and 76.5% in rural Tamil Nadu to 81.1% in rural Chandigarh (Figure 4).



The highest prevalence of obesity (both generalized and abdominal) (Figure 5) was seen in urban and rural Chandigarh. In all the regions, prevalence of both generalized and abdominal obesity was higher in urban areas compared to rural areas.

Figure 5: Prevalence of obesity (generalized and abdominal) in the urban and rural population in all the 4 regions studied

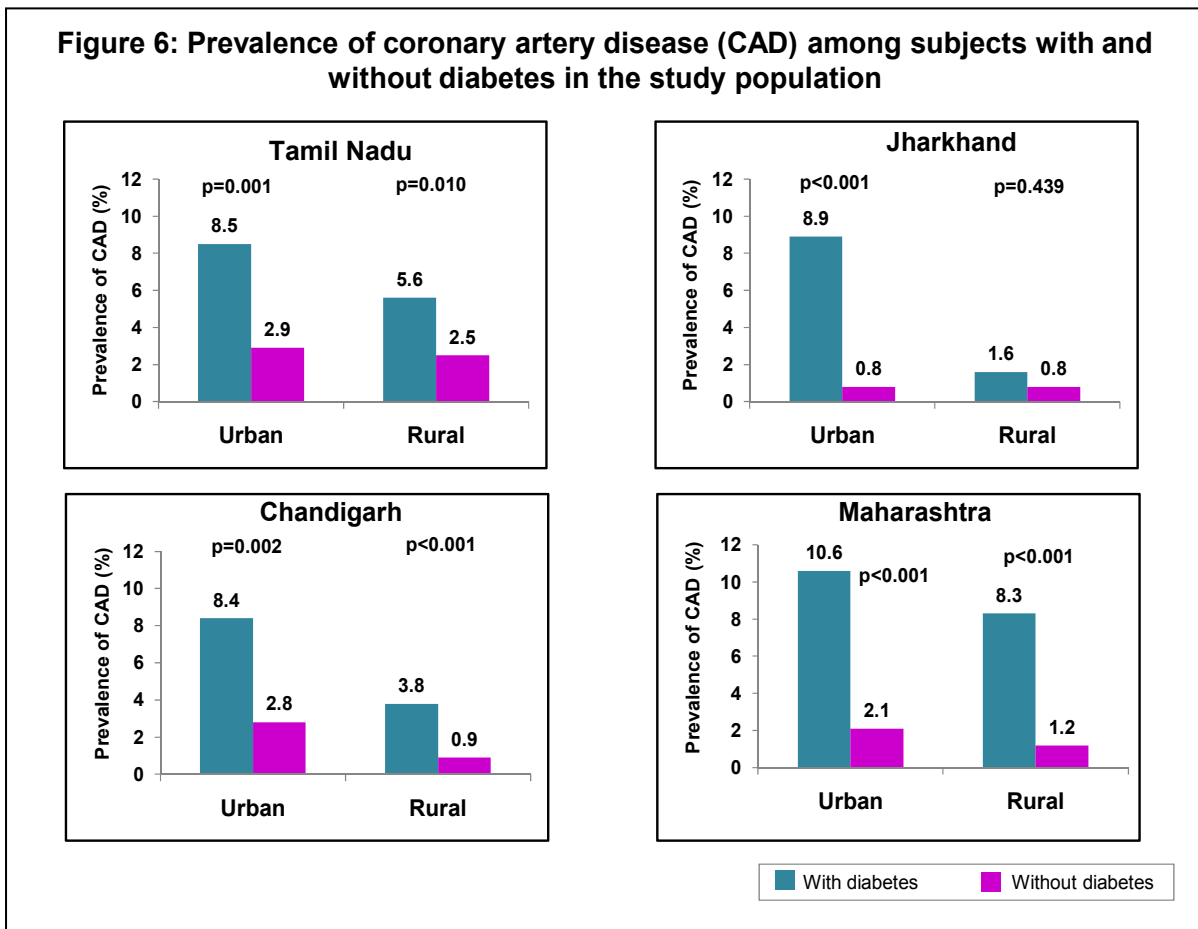


In terms of glycaemic control, the proportion of diabetic subjects with good glycaemic control in urban areas was 30.1%, 34.7%, 29.6% and 31.6% in Tamil Nadu, Jharkhand, Chandigarh and Maharashtra respectively and was 37.5%, 22.2%, 17.0% and 40.0% in rural areas respectively. Urban Jharkhand and rural Maharashtra had the highest proportion of diabetic subjects with good glycaemic control.

Regarding awareness of diabetes in the study population, only 58.4% of the urban residents and 36.8% of the rural residents reported that they knew about a condition called diabetes, of these only 65.7% of the urban residents and 51% of the rural residents were aware that diabetes could be prevented.

The prevalence of coronary artery disease (CAD) among subjects with and without diabetes is shown in **Figure 6**. In both urban and rural areas, the prevalence of CAD was higher among diabetic subjects compared to subjects without diabetes. Maharashtra (both urban and rural) had the highest prevalence of CAD among diabetic subjects compared to other regions.

Figure 6: Prevalence of coronary artery disease (CAD) among subjects with and without diabetes in the study population



This phase of the ICMR-INDIAB study helps to throw light on the large burden of undiagnosed risk factors in 3 selected states and one union territory and provides an opportunity for prevention of disease in this group of people. In addition, for those with an established diagnosis of diabetes, the level of control is assessed and this provides an opportunity for better control of diabetes. The ICMR-INDIAB study helps not only in early detection of diabetes through screening, but also helps individual States to tailor make their interventions based on the findings from their own state.

LIST OF RESEARCH PUBLICATIONS FROM THE PROJECT (TILL 2015)

1. ICMR-INDIAB study methodology

Anjana RM, Pradeepa R, Deepa M, Datta M, Sudha V, Unnikrishnan R, Nath LM, Das AK, Madhu SV, Rao PV, Shukla DK, Kaur T, Ali MK, Mohan V. The Indian Council of Medical Research–India Diabetes (ICMR–INDIAB) Study: Methodological Details. [ICMR-INDIAB-1] J Diabetes Sci Technol 2011; 5: 906-914.

2. Prevalence of diabetes and prediabetes

Anjana RM, Pradeepa R, Deepa M, Datta M, Sudha V, Unnikrishnan R, Bhansali A, Joshi SR, Joshi PP, Yajnik CS, Dhandhanika VK, Nath LM, Das AK, Rao PV, Madhu SV, Shukla DK, Kaur T, Priya M, Nirmal E, Parvathi SJ, Subhashini S, Subashini R, Ali MK, Mohan V for the ICMR– INDIAB Collaborative Study Group. Prevalence of diabetes and prediabetes in urban and rural India: results of the ICMR-INDIAB study (Phase-1) [ICMR-INDIAB-2]. Diabetologia 2011; 54: 3022-7.

3. Prevalence of generalized and abdominal obesity

Pradeepa R, Anjana RM, Joshi SR, Bhansali A, Deepa M, Joshi PP, Dhandhanika VK, Madhu SV, Rao PV, Geetha L, Subashini R, Unnikrishnan R, Shukla DK, Kaur T, Mohan V, Das AK, for the ICMR– INDIAB Collaborative Study Group. Prevalence of generalized and abdominal obesity in urban and rural India- the ICMR-INDIAB study (phase-I) [ICMR-INDIAB-3]. Indian J Med Res, 2015;142: pp 139-150

4. Knowledge and awareness of diabetes

Deepa M, Bhansali A, Anjana RM, Pradeepa R, Joshi SR, Joshi PP, Dhandhanika VK, Rao PV, Subashini R, Unnikrishnan R, Shukla DK, Madhu SV, Das AK, Mohan V, Kaur T for the ICMR–INDIAB Collaborative Study Group. Knowledge and awareness of diabetes in urban and rural India: The ICMR–INDIAB study (Phase I) [ICMR-INDIAB 4]. Indian J Endocrinol Metab. 2014;18:379-85.

5. Physical activity and inactivity patterns

Anjana RM, Pradeepa R, Das AK, Deepa M, Bhansali A, Joshi SR, Joshi PP, Dhandhania VK, Rao PV, Sudha V, Subashini R, Unnikrishnan R, Madhu SV, Kaur T, Mohan V, Shukla DK; ICMR– INDIAB Collaborative Study Group. Physical activity and inactivity patterns in India - results from the ICMR-INDIAB study (Phase-1) [ICMR-INDIAB-5]. *Int J Behav Nutr Phys Act.* 2014;11:26.

6. Prevalence and risk factors of hypertension

Bhansali A, Dhandania VK, Deepa M, Anjana RM, Joshi SR, Joshi PP, Madhu SV, Rao PV, Subashini R, Sudha V, Unnikrishnan R, Das AK, Shukla DK, Kaur T, Mohan V, Pradeepa R for the ICMR– INDIAB Collaborative Study Group. Prevalence and risk factors for hypertension in urban and rural India: the ICMR-INDIAB Study (Phase-1) [ICMR-INDIAB- 6]. *J. Hum Hypertens.* 2015; 29:204-9.

7. Prevalence of dyslipidemia

Joshi SR, Anjana RM, Deepa M, Pradeepa R, Bhansali A, Dhandania VK, Joshi PP, Unnikrishnan R, Nirmal E, Subashini R, Madhu SV, Rao PV, Das AK, Kaur K, Shukla DK, Mohan V, for the ICMR– INDIAB Collaborative Study Group. Prevalence of dyslipidemia in urban and rural India: The ICMR-INDIAB study [ICMR-INDIAB- 7]. *PLOS One* 2014;9: e96808.

8. Glycemic control in self reported diabetes

Unnikrishnan R, Anjana RM, Deepa M, Pradeepa R, Joshi SR, Bhansali A, Dhandania VK, Joshi PP, Madhu SV, Rao PV, Lakshmy R, Jaishri R, Velmurugan K, Nirmal E, Subashini R, Vijaychandrika V, Kaur T, Shukla DK, Das AK, Mohan V, for the ICMR– INDIAB Collaborative Study Group. Glycemic control among individuals with self-reported diabetes in India-the ICMR-INDIAB Study (PHASE-1) [ICMR-INDIAB-8]. *Diabetes Techno Ther.* 2014;16:596-603.



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