

- Prof. Jyoti S. Hallad attended Knowledge Dissemination workshop of PRCs for the studies conducted during 2020-21 on 4 & 5 March, 2022 held at Gokhale Institute of Politics and Economics, Pune. Mr. Basavaraj Pundappanavar, Research Investigator (RI) presented the paper on “Pregnancy Wastage in Karnataka: A District level analysis based on Health Management Information System data” during this workshop
- Prof. Jyoti S. Hallad Chaired the Technical Session VI on “Impact of COVID-19” on 11th March, 2022 during the International Seminar; Population, Health and Sustainable Development organized by IIPS, Mumbai.
- Dr. Praveen K. Chokhandre, Asst. Professor Mr. B. I. Pundappanavar and Mr. Javeed A. Goalandaj, (RIs) attended a workshop on “Ethics and Integrity in Social Science and Health Research” conducted by IIPS, Mumbai through virtual mode, during April 4-8, 2022.
- Dr. Jyoti S. Hallad and Dr. Shriprasad H., attended Annual Work Plan (AWP) meeting at Trivandrum, Kerala on 11-12 April, 2022 and presented the AWP proposals. Dr. Jyoti S. Hallad attended PRC Scientific and Advisory Committee meeting as a member.
- Dr. Jyoti S. Hallad attended PRC Steering Committee meeting on 28.04.2022 under the Chairpersonship of Health Secretary, MoHFW at Nirman Bhavan, New Delhi.
- Dr. Jyoti S. Hallad attended PRC Scientific Advisory Committee meeting on 10.05.2022 organized by IIPS, Mumbai
- Dr. Jyoti S. Hallad attended PRC Review meeting and a meeting with Karnataka State NHM officials under the Chairpersonship of DG, MoHFW on 20.05.2022 at ISEC, Bangalore.
- Dr. Jyoti S. Hallad and Dr. Shriprasad H., presented the research proposals of primary studies in the 1st meeting of the Programme and Management Unit (PMU) held at CRRID, Chandigarh during 15-17 June, 2022.
- Dr. Shriprasad H. and Dr. Praveen K. Chokhandre attended the 4 days workshop on 'PIP Process and Basics of Implementation Research' organized by NHRDC, New Delhi during 27-30 June, 2022. All the Research staff attended the workshop online.
- Prof. Jyoti S. Hallad, Professor & Director attended the “Institutional Ethical Committee” meeting of Shri Dharmasthala Manjunatheshwar College of Medical Sciences
- Dr. Jyoti S. Hallad attended the Executive Body meeting of Janata Shikshana Samiti, Dharwad on 22.06.2022 and presented the activities conducted by the Centre during 2021-22 and work plan for the year 2022-23.
- Dr. Jyoti S. Hallad elected as an 'Assistant Chief Editor' for the Journal 'Demography India' being published by Indian Association for the Study of Population (IASP).

Published by

**Padma Vibhushana Dr. D. Veerendra Heggade**  
**Chair for Studies on Health & Demography**

**JSS INSTITUTE OF ECONOMIC RESEARCH**

VIDYAGIRI, DHARWAD-580 004, KARNATAKA, INDIA



ISSN : 2454-9207

## IER JOURNAL OF HEALTH AND DEMOGRAPHY

### RESEARCH ARTICLES

- ◆ *Emerging Trends and Patterns of Organ Donation in India*  
Suparna B T & Shaikh Azim
- ◆ *Optimism level and its association with coping and happiness: A comparative study of institutionalized and non-institutionalized elderly*  
Nidhi Jaswal & Sukhbir Singh
- ◆ *Role of Literacy on Infant Mortality in North Eastern States of India: A Case Study*  
Dilip Kumar Kalita & Karuna Gogoi
- ◆ *Determinants of Chronic Health Diseases among the Elderly in India: an Investigation using data from LASI Wave I*  
N. Kavitha
- ◆ *Prevalence of Hypertension and Diabetes among the Middle-Aged in Punjab: A Study Based on Socio-Economic Background*  
Rajesh Kumar Aggarwal & Aswini Kumar Nanda

Published by

**Padma Vibhushana Dr. D. Veerendra Heggade**  
**Chair for Studies on Health & Demography**



**JSS INSTITUTE OF ECONOMIC RESEARCH**

VIDYAGIRI, DHARWAD-580 004, KARNATAKA, INDIA

**IER Journal of Health and Demography****ARTICLES**

- ❖ *Emerging Trends and Patterns of Organ Donation in India* 01  
Suparna B T & Shaukath Azim
- ❖ *Optimism level and its association with coping and happiness: A comparative study of institutionalized and non-institutionalized elderly* 19  
Nidhi Jaswal & Sukhbir Singh
- ❖ *Role of Literacy on Infant Mortality in North Eastern States of India: A Case Study* 29  
Dilip Kumar Kalita & Karuna Gogoi
- ❖ *Determinants of Chronic Health Diseases among the Elderly in India: an Investigation using data from LASI Wave I* 39  
N. Kavitha
- ❖ *Prevalence of Hypertension and Diabetes among the Middle-Aged in Punjab: A Study Based on Socio-Economic Background* 58  
Rajesh Kumar Aggarwal & Aswini Kumar Nanda

## Emerging Trends and Patterns of Organ Donation in India

Suparna B T<sup>1\*</sup> and Shaukath Azim<sup>2</sup>

### Abstract

*Organ Donation is an act of giving. It is like a gift to someone who is in need and waiting for recovery. Scarcity of Organ availability is the main reason behind the death of thousands of hundred patients across the world. By giving Organ as a gift one person could save eight lives and in the same way by donating tissue could save up to 50 needy patients. Everyone donates exchanges and shares something or else during their life time according to their capacity of gifting or giving. In that organ donation is the highest act of altruism or sacrifice. Kidneys, heart, lungs, liver, pancreas and the small bowel can all be transplanted. There would be various reasons behind organ donation likewise, sympathy, empathy, altruism, guiltiness, scare, high regard, unavailability, inevitable etc. Individual being a social animal for one or other reason depends on others. Willingly/Unwillingly, Voluntarily/Involuntarily people used to donate. Socio-economic factors like economic conditions, religion, gender, caste, region, age influence organ donation. Therefore some questions arises likewise, who usually donate more; which country, region or continent people donates more and why? What are the perceptions of people belongs to different continent about organ donation? In this background an attempt is being made to find out the trends and patterns of organ donation of different continent. This study is based on secondary data and the part of ongoing doctoral research in Sociology.*

**Key words:** Organ Donation, Presumed consent, Informed consent, dominated choice, Braine death, Circulatory death, Transplant tourism, Organ Donation trends and patterns.

### Introduction

One of the major issues emerging in health sector is about organ donation. Throughout the world there is a growing willingness and awareness about donating human vital organs. In recent times in India also inclination towards organ donation can be seen through the efforts of Government policies and programmes. Without doubt organ donation is a process of giving a new life. Therefore it has become crucial issue for the survival of human beings.

<sup>1\*</sup> Research Scholar (Full -time), Karnatak University, Dharwad-580003, e-mail: suparnabtnaik@gmail.com

<sup>2</sup> Professor, Dept of Studies in Sociology, Karnatak University, Dharwad-580003

Though organ donation involves medical aspects, various socio-economic factors like economic conditions, religion, gender, caste, region, age also influence organ donation especially in India. Geographical factors could also be the main reason behind different kind of perception and attitude among different region all over the world. The decision to donate one's organs is associated with many different demographic and medical characteristics (N, K.R. Sehagal, et al., 2016). Worldwide, Organ donation and transplantation has saved the life of many needy patients who are suffering from end stage organ failure and about to die. Retrieving organ and transplantation are the major inventions of mankind. Though it has invented and being practiced over the past five decades, Organ transplantation rates are still lower in developing countries including India (Manish, R. Balwani et al., 2018). For instance every year in India 5 lakh people die waiting for a transplant and for other the wait for a match can be as long as 18 years. 2 lakh people await kidney transplant, but only 10,000 get one that is only 5%. Over 2 lakh liver wait only 708 transplants took place. 50,000 individuals await heart; only 339 deceased heart donations were witnessed in the year 2017 (Fortis Organ Retrieval & Transplant, Organ India). There are 8-10 potential donors in ICUs declared brain dead at any major city, at any given time (Fortis NDTV-2017). It is emphasized by NOTTO (National Organ & Tissue Transplants Organization, India) that, 'even if 10% of road traffic accident deceased patients become organ donor, where there is no need of living person to donate an organ'. According to the WHO- Global Observatory on Donation and Transplantation Globally 39,100 (7.93%) total deceased organ donors were donated their various organs in the year 2019. But the data is not sufficient enough to reach worldwide waiting list. The reasons for low organ donation rate are attributable to many socio-economic and geographical factors. To diminish the disparity between organ demands and supply most of the countries adopted a range of policies and programmes. It is examined in this article that how organ donation trends vary from one region to another and what are the major and for most reasons stopping people towards organ donation.

### Objectives

- To highlight the importance of Organ Donation.
- To examine the trends and patterns of Organ Donation.
- To study the reasons behind the scarcity of organs.

## **Methodology**

Present paper is based on secondary data collected by the various websites especially, WHO-Global Observatory on Donation and Transplantation, National Organ and Tissue Transplant Organization (NOTTO), State Organ and Tissue transplant organization (SOTTO), Regional Organ and Tissue Transplant Organization (ROTTO) and also the NGO's working for Organ donation along with articles, magazines, newspaper reviews and television reports on the concerned issue.

## **Views on Organ Donation and Transplantation**

WHO (2016) defines Transplantation is the retrieval or engraftment of human cells, tissues or organs from a donor to patient having an aim of restoring functions in body. Encyclopedia of Britannica (2019) Stipulated that organ donation is an act of donating one or more body organs (or part of an organ), without recompense for transplantation into someone else. Organ donation is an extremely personal and yet complex decision, inter connected with medical, religious, legal, ethical and cultural issues. Cambridge Dictionary (2019) Defines that Organ donation is the decision of a person, giving consent for a part of their body to be retrieve, while they are living or after they are dead, and transplant into someone else's body to replace an organ that is not working appropriately.

## **Terminologies**

Every discipline has its unique terminologies, likewise Organ allocation and transplant process too had some terminologies, and those were not used frequently in our daily lives. There is a difference between Organ dysfunction, Organ failure & multiple Organ failure and it seems like enigma. Even though, there is widespread literature, little is known about the matter. Normally these terms wrongly used together while interpretation that needs to define separately.

## **Organ Dysfunction**

There is a fine line between Organ dysfunction and Organ failure. These are the two different terms to identify different health stages of organ damage. It is considered little difficult to explain distinction between these terms. Organ dysfunction is defined as a defect or disfigurement in the function of a particular corporal organ system (Limjoco, M. C, 2016).

Thus Organ dysfunction is a condition of Organ impairment or abnormality and it is declared where an organ does not carry out its anticipated function.

### **Organ Failure**

It is a condition of organ dysfunction to such an amount that customary homeostasis cannot be maintained without external medical intervention (Limjoco, M. C, 2016). Organ failure is stage where Organ is totally damaged and does not perform its actual functions ever after. This is the phase where Organ transplantation is essentially needed. For that organ donation is considered necessary.

### **Multiple Organ Failure**

The stoppage of a vital system in the body is considered as Organ failure. In the same way Multiple Organ Failure is the failure of two or more essential body system, and is a general consequence of sepsis (the present of bacteria in the blood) and very low blood pressure (Shiel, C. William, 2018). Multiple Organ Dysfunction Syndrome (MODS) is defined as the expansion of potentially reversible physiologic derangement concerning two or more organ systems not involved in the disorder (Marshall, C. John, 2001). Hence MOF is the irreversible organ functioning in the body system and it leads to life threatening consequences.

### **Presumed consent, Informed consent and dominated choice**

World is classified into different geographical regions and these regions have their own unique identity. This can be seen in their way of life, attitude, behavior, culture, morality, beliefs, decision making so forth. Thus according to these factors individuals decision making towards organ donation is also various from region to region. So worldwide, countries adopting different type of approaches do allocate organs. These were mainly recognized as presumed consent, informed consent and dominated choice.

‘Presumed consent’ is highly recommended to enhance organ procurement rate in many countries. Although it was criticized in many countries, some countries over the world follow this method. ‘Opting-in’ and ‘Opting-out’ are the two main categories recognized in Organ donation. These are the two ways regarding donation or registration process. In opt-out

system (Presumed consent), organ donation will occur automatically unless a specific request is made before death for organs not to be taken (Medical news Today, James mcIntosh, 2014). A presumed consent enables concerned hospitals to retrieve organs from potential donors except the person had an objection while alive (V, Sommerville, 2003). However, countries having opting-out system such as Spain, Croatia, Italy, Austria, Belgium has been achieved highest rate of organ donation. In this approach, every individual is supposed to be in favor of organ donation after death, unless the individual has decided not to donate their organs after death. (NOTTO- 2021). Perhaps opting out system may not be the only option for increasing organ donation but the results of this model adopted countries could not be ignored. But we can't disregard the fact that the results vary from country to country based on their ethics, social norms and values.

Informed consent or opting in approach is used in majority of the countries worldwide. In this approach individual has to register his willingness of being organ donor after his/her death (Medical news Today, James mcIntosh, 2014). In this system family consent will also give more importance.

In the dominated or mandated choice system potential adults has choice to decide whether they supposed to donate their organs or not after their death (Chouhan, P et al., 2003). Dominated choice approach falls between presumed consent and informed consent. Public opinion towards these consents is vital and likely to be culture specific (Wright, L, 2007).

## **Forms of Organ Trade**

### **Transplant Tourism**

Transplant tourism is nothing but the process involves organ sale and organ purchase across nations. When recipient used to travel abroad to get or find a matching organ to undergo transplantation is generally referred as 'Transplant tourism' (WHO,2015). This procedure not only involves organ allograft and surgery, it also had the commercialization of organ procurement. More likely people choose countries of South eastern Asia and Northern Africa where this kind of practice is obtainable (Hussein, Ell. S, 2019). Furthermore, Health exports uses foreign patients as an instrument of economic expansion (WTO & WHO, 2002).

### **Third country Tourism**

In these cases both donor and recipients move to different country to perform transplantation from their country. Here both of them travel to third country which is not their origin (McLaughlin, A et al., 2004). This method involves commercialization of organ transplantation. Many countries it is illegal to perform this type of procedure. It was evident in Brazil and South Africa around 2001-2002 (McLaughlin, A et al., 2004). Within some cases living donors have been brought from Nepal to India or from Republic of Moldova to USA (Haviland, C, 2004). This needs to be tackled and irradiate to achieve healthy trade of organs whoever is actually needed and getting organs legally.

### **Organ Donation in India: An Overview**

India has a rich and long tradition in the field of organ donation and transplant. It can be observed in the era of Indian mythology and epics itself. Organ donation in Indian context has its footprint in Bhagavanta Purana, According to this there is one story of demon called Vrutasoor. Both the mankind and Gods wanted to get rid of him. He was killed by the weapon made from the bones of the great sage Dadhichi, who left his body with the power of yoga so that his bones could be used. Using his spine Gods made a weapon called 'Vajrayudha'(Anand, Arun, 2018). Similar stories can be seen in the Hindu mythology, Lord 'Shiva' transplanting elephants head into Lord 'Ganesh' after that lord Ganesh has been worshiped by Hindus as 'Gajamuka'. India's first transplant was conducted in the year 1970. It was 'kidney' transplant (Shroff, 2009). India has done many studies then after but lot more need to be progress. No doubt the number of transplant done annually has been gradually increasing. Even if, there is a poor organ donation rate it is only 0.52 per million populations in India during 2019, compared to some of the better performing countries such as Spain 49, USA 36.88, Croatia 34.63, Portugal 33.8, France 33.25 per million population respectively (IRODaT, 2019). In 2019, 715 (0.52) deceased organ donation and 12,666 (9.25) transplantation carried out. The decease organ donation rate was decreased compare to 2018 (0.65 per million populations). But the absolute transplantations increased by 7.64pmp to 9.25pmp. Living donation rate were highest among Indians rather than deceased. India needs to donate organs; there were 5 lakh people die due to inaccessibility of organs. In that, 1, 00, 000 people die due to liver disease only 1, 000 get a liver one. Over 2, 20, 000 kidney patients only 15, 000 get a transplant, 10 lakh people await corneal transplants, 50, 000 await



for heart transplant, 20, 000 people awaiting lung transplant (Fortis- NDTV, 2017). Thus India needs to donate organs to overcome from organ scarcity.

### Organ Donation around the World

Organ donation and transplantation process is not a new issue. It was started long back in 1954, done by Dr.Murry in USA. It was kidney transplantation which performed. According to the data given by GODT worldwide 40,782(6.99pmp) deceased organ donors and 1,50,244 (25.75) transplantations carried out during the year 2019. In 2018 17 transplants performed in an hour and world witnessed 5.6% of increase in donation rate over 2017. Worldwide Spain had the highest, 49pmp actual deceased organ donors, followed by USA 36.88, Croatia 34.63, Portugal 33.8 and France 33.25 per million populations respectively. Furthermore, Turkey had the least number of deceased organ donors 7.54 per million populations followed by South Korea 8.68, Saudi Arabia 3.77, Netherlands 14.93 and Israel 10.8 deceased donors per million populations. At the same period of time turkey had the highest living organ donors per million populations (53.02) and France had the lowest of 8pmp. Deceased kidney transplantation was highest in Spain with 72.8pmp; worldwide living kidney donation was more performed in turkey (36.64pmp). And also highest deceased liver donors found in Croatia with 30pmp, and liver transplant from living donors found greater in South Korea with 22.87pmp. Adding to this data most heart transplants performed in USA (10.86pmp), Higher Lung transplants done in Austria with 11.3 pmp and lastly Finland has the large number of pancreas transplants with 7.06 pmp (IRODaT- International Registry in Organ Donation and Transplantation, 2019).

**Table 1: Region wise Deceased Organ Donation Statistics (2019)**

SI. No	Continents	Actual Deceased Organ Donors	Total Organ Transplantations	Total Global Deceased Organ Donors
1	South-East Asia	1,016 (0.71)	13,782 (6.99)	40,782 (6.99)
2	Africa (2018)	92 (0.02)	873 (1.86)	40,782 (6.99)
3	Americas	18,145 (18.64)	61,907 (63.61)	40,782 (6.99)
4	Europe	13,490 (16.92)	45,195 (56.7)	40,782 (6.99)
5	Eastern Mediterranean	163 (0.43)	4,463 (11.7)	40,782 (6.99)
6	Western Pacific	7,966 (4.22)	24,696 (13.08)	40,782 (6.99)

Source: WHO- Global Observatory on Donation and Transplantation

World Health Organization categorized world into SIX major continents (Region) i.e. South-East Asia, Africa, Americas, Europe, Eastern Mediterranean, and Western Pacific. These Regions has many countries within it. According to this classification, every year Regional wise organ donation data has specified by Global Observatory on Donation and Transplantation (GODT). Table-1 figure outs the Actual Deceased Organ Donors (ADOD) and Total Organ Transplantations by 2019. Above table indicates that America region has the highest Actual deceased Donors (18,145 (18.64pmp) and high organ transplants 61,913(63.52pmp) Followed by Europe. Among those, actual Deceased donors after Braine death are 15.83pmp and actual deceased donors after circulatory death are 2.79pmp throughout the year. Total 40.59 kidney, 13.41 liver, 4.62 heart, 3.46 lung, 1.39 pancreas and 0.1 small bowel transplants per million population occurred over the region (GODT). Lifestyle connected disease, diabetes mellitus, and hypertension, are the essential driver of persistent kidney infection. While in Central America, there has been a developing number of instances of constant kidney disease from nontraditional causes, principally among youngsters and in lesser extent ladies, children, and teenagers (Soyibo, A.K,2009 and PAHO, 2017).Hepatitis C is the most well-known cause of liver infection in Latin America and the major precursor for liver transplantation (Salvalaggio,P.R, 2014). Although, while these numbers are encouraging, a more in-depth examination uncovers the disproportionate improvement of access to transplants in the countries of the Region, since the greater part of the measures are performed in just a few countries. The United States reports the highest organ donation rate followed by Canada within the region (GODT, 2018). Furthermore, the equal development of organ transplant procedures all over the regions and healthy lifestyle, healthy food pattern cloud is more helpful to achieve better health status of the inhabitants.

There are limited information regarding organ donation and transplantation in Africa region when compare to other regions. During the year 2018 there was only 873 (1.86pmp) transplantations took place over the region. Among those, actual Deceased donors after Braine death are 0.2pmp and actual deceased donors after circulatory death are 0pmp during the year. Total 1.5 kidney, 0.2 liver, 0.09 heart, 0.05 lung, 0.02 pancreas and 0 small bowel transplants per million populations took place over the region (GODT). There are less effective legal and regulatory guidelines in most of the countries so far. Countries belonging

to this region also have a poor national competence to carry out organ and tissue transplantations and the organizational and administration of national programmes is weak too. Along with these problems patients have inadequate financial support from both domestic and outdoor sector (Loua, A, 2020). Most countries of the African Region are facing rapid boost in noncommunicable diseases (Nyirenda, M.J, 2018 and Daar, A.S, 2007). The study conducted by Loua, A, 2020 revealed that financial source for organ and tissue donation and transplantation came from public sources in six countries i.e. Algeria, Comoros, Ethiopia, Ghana, Mali and Seychelles. While in 14 countries patients were responsible for post-transplant treatment and supplements, those countries are Burkina Faso, Côte d'Ivoire, Ethiopia, Gabon, Ghana, Guinea, Kenya, Madagascar, Mali, Namibia, Nigeria, Rwanda, Uganda and Zimbabwe. Whereas living donors need to pay for their treatment in 8 countries. They are Burkina Faso, Gabon, Guinea, Kenya, Madagascar, Namibia, Uganda and Zimbabwe. These are the major reasons for lack of organ donation and transplantation in the region. It should be tackled by public and administrative framework.

Europe has the second highest organ donors next to Americas region. In 2019, Spain had the highest deceased donors all over Europe. Both the donation after brain death (DBD) and after circulatory death (DCD) was 49.6pmp. Portugal had the second highest rate of deceased organ donation 33.7 per million populations. Finland experienced the biggest enhance in the rate of organ donation from 21.3 to 25.9 per million populations by 2019 (Conor, Stewart-Statista, 2020). Throughout the year 2019 there was 45,195 (56.7pmp) transplantations carried out over the region. Between those, actual Deceased donors after Braine death are 14.22pmp and actual deceased donors after circulatory death are 2.7pmp during the year. Total 35.54 kidney, 13.57 liver, 3.62 heart, 2.96 lung, 0.96pancreas and 0.05 small bowel transplants per million populations performed all over the region (GODT). In comparison with the Euro transplant community comprises of Austria, Belgium, Croatia, Germany, Hungary, Luxembourg, Netherlands and Slovenia. About 1.2 thousand persons died while on the transplant waiting list in 2019. More or less half of those were waiting for a kidney and around a quarter waiting for a liver. In 2019, 107 patients died while waiting for a heart transplant, the maximum amount in Europe followed by 93 deaths in Poland and 61 in France. Austria had 11.4pmp transplants which was highest by 2019, followed by Belgium

with 9.7pmp. And Finland had the highest pancreas transplants of 7pmp (Conor, Stewart-Statista, 2020). Thus it is evident by the above data that, although achieving good organ donation rate compared to other regions, the waiting list was increased over the year. Donation rate yet could not sufficient over demand.

Eastern Mediterranean had the least deceased organ donation rate next to Africa. Although, region organ donation growth rate is gradually increasing it is not adequate do eradicate the death rate because of organ failure. In the year 2019 absolute deceased donors were 163 (0.43pmp). Furthermore, total deceased organ donors after brain death was 0.43, deceased donors after circulatory death was 0. Whereas absolute 9.72 kidney, 1.71 liver, 0.14 heart, 0.11 lungs, 0.02 pancreas, 0 small bowel and totally 4,463 (11.7) transplantations carried out during the year (GODT-2019). The WHO region has composed of 21 countries. The overall life expectancy of these countries ranges from 54 to 79 years for men and 57 to 80 years for women (WHO-2019). Major countries of Eastern Mediterranean region were following Islamic religion. And it was proven by many studies conducted over different countries that, till now there is confusion in the minds of community people about whether their religion supports the idea of organ donation and transplantation. Furthermore, they were frequently unsure regarding Organ donation that whether the issue is permissible or forbidden within Islam. So Islam is linked with negative propaganda towards Organ donation and shows lack of support for the retrieval of organ and transplant process (Randhawa, 1998., Sheikh & Dhimi, 2000, Alkhawri et al., 2005 in UK, Lach et al., 2010 in Malaysia, Shaheen et al., 1996 in Saudi Arabia, Padela et al., 2010a in USA) Consequently, community members willingly or unwillingly used to stay out of the concerned issue.

Divergent regional differences could be seen in the rate of organ donation and transplantation. According to WHO (World Health Organization) Western Pacific region has 37 countries and each of them had diverse ratio of organ donation. During the year 2019, the region had 4.22 (7,966) deceased organ donors (DCDs) and 13.08 (24,696) transplantations per million population (GODT, 2019). Although, the donation rate was gradually increasing over the year it was not satisfactory. The region experienced Absolute 195 DCDs in 2000, 449 DCDs in 2005, 806 DCDs in 2010, 3,915 DCDs in 2015 (GODT, 2019). There were total

1.32 deceased donations after brain death, 2.18 donations after circulatory death carried out by 2019. Subsequently, 8.42 kidneys, 3.71 livers, 0.48 hearts, 0.42 lungs, 0.05 pancreases, 0(2) small bowel and total 13.08 (24,696) transplantations processed over the year 2019 (GODT, 2019).

India is the only country among South-East Asia region had the organ donors and transplantation procedures over the year 2019. According the data of GODT there were absolute no data regarding organ donation and transplantation officially. Comprehensive information is discussed in table 2.

**Table 2: Deceased Organ Donation rate in South-East Asia (2019)**

SI. No.	South-East Asia Continent	Total Population	Actual Deceased Organ Donors	Total Organ Transplantations	Total Global Deceased Organ Donors
1	India	1,210,854,977	715 (0.52)	12,666 (9.25)	40,782 (6.99)
2	Bangladesh	170,153,000	-	-	40,782 (6.99)
3	Bhutan	839,430	-	-	40,782 (6.99)
4	Democratic People's Republic of Korea	50,617,045	-	-	40,782 (6.99)
5	Indonesia	261,890,900	-	-	40,782 (6.99)
6	Maldives	344,023	-	-	40,782 (6.99)
7	Myanmar	51,486,253	-	-	40,782 (6.99)
8	Nepal	28,037,904	-	-	39,100 (7.93)
9	Sri Lanka	22,480,000	-	-	39,100 (7.93)
10	Thailand	65,926,261	-	-	39,100 (7.93)
11	Timor-Leste	1,167,242	-	-	39,100 (7.93)

Source: WHO- Global Observatory on Donation and Transplantation

India is the country of unity in diversity. We could observe diverse culture, religion, caste, customs, norms, traditions, beliefs and so on. Thus the country people stay together and created one country. Although, there were difference of opinion regarding concerned issues. Organ donation is also one of those issues where individuals have frequently uncertain behavior. People of India showed the highest willingness towards organ donation (Money control news: 2018) but the practical involvement was not appreciable. During the year 2019 absolute 715 (0.52pmp) deceased organ donors were witnessed in India. Among those donors all were deceased donors after brain death and there were no donors after circulatory death.

Furthermore, total 7.12 (9,751) kidney and 1.89 (2,592) liver donors per million population were processed. Between those 0.83 (1,138) deceased, 6.29 (8,613) living kidney donors per million population and 0.44 (599) deceased, 1.45 (1,991) living liver donors over India (GODT, 2019). Absolute 12,666 (9.25pmp) transplantations took place in those 187 (0.14pmp) hearts, 114 (0.08pmp) lungs, and 22 (0.02pmp) pancreas transplants carried out in 2019 (GODT, 2019). Definitely organ donation and transplantation rate is increasing but it was not sufficient to heal everyone in the waiting list. Throughout the year 2018 the deceased organ donation rate in India was 0.65pmp. In 2017 it was 0.58pmp, in the year 2010 the rate was only 0.08pmp. So it is evident by the above data that over the year donation rate was increased but not extended even to 1000.

The threatening outbreak of diabetes and hypertension was possible to further include to the disease burden. An elevated incidence has been reported as of various regions, suggestive of the presence of unique etiologic factors. A large amount of Patients present delayed even though having multiple complications and advanced kidney failure. Ironically management is lagging behind to provide good health facilities especially in the rural areas. The government is not taking overall responsibility of health care disbursement among these countries. If it all government is concerned also it would be in very low amount. By that patients could not carry over all expenditure, and there were no appropriate public policies and government programmes regarding organ donation. Moreover, there was a shortage of chief trained nephrologists in those countries (Jha, V, 2009). Through the escalating morbidity of organ failure due to the growth of nutritional and environmental cause, there were ever-increasing complications on the transplant waiting lists. That could not counterpart the demand of available transplants. Poor health care facilities and longevity also outcome for growing population of patients with end-stage renal disease (ESRD).

As indicated by the information appeared on the above table, in the year 2017Tamil Nadu leads the table with highest number of organ donors per million populations. Maharashtra, Telangana, Andhra Pradesh, Kerala, has first 5 position followed by Tamil Nadu respectively. Karnataka stands in the 6<sup>th</sup> place. However, it is ironic that despite of having rich history and Knowledge of narration India is lagging behind in organ donation.

**Table 3: State wise Deceased Organ Donation Rate in India: (Top 10 states)**

States	No. of Deceased Organ Donors	Kidney	Liver	Heart	Lung	Pancreas	Intestine	Total Organs
Tamil Nadu	160	268	144	97	87	4	0	618
Maharashtra	170	320	125	55	1	2	0	503
Telangana	150	221	137	33	2	1	0	394
Andhra Pradesh	34	62	29	16	25	0	0	132
Kerala	18	34	15	5	1	3	0	60
Karnataka	68	106	61	18	4	5	1	195
Gujarat	85	162	68	12	0	0	0	242
Delhi-NCR	45	78	36	22	0	0	0	136
Chandigarh	44	82	20	12	4	3	0	121
Uttar Pradesh	7	12	5	2	0	0	0	19

Source: Mohan Foundation (2017)

‘In Asian countries, such as India, China and Japan the concept of life after death is cross linked with the concepts of ethics, religion, and spirituality, It is very difficult to even start a conversation regarding organ donation in these regions of the world, especially in the case of brain dead donor religious concerns may also have an impact’ (Srivastava, Aneesh and Mani, Anil, 2018). Thus India is lagging behind in organ donation due to unawareness and prejudices among majority of the population.

**Table 4: Transplantation rates of Organs in India (2019)**

Kidney		Liver		Heart	Lung	Pancreas	Total Organ Transplants	Actual Deceased Donors	
Living	Deceased	Living	Deceased					Actual DD after Brain Death (DBD)	Actual DD after Circulatory Death (DCD)
8,613 (6.29)	1,138 (0.83)	1,991 (1.45)	599 (0.44)	187 (0.14)	114 (0.08)	22 (0.02)	12,666 (9.25)	715 (0.52)	-

Source: WHO- Global Observatory on Donation and Transplantation

According to Ministry of Health and Family Welfare (2018) reveals that in India five lakh people die because of non-availability of organs. Among them two lakh people die due to

liver disease and 50, 000 people die because of heart disease. More than 1,50,000 people wait a kidney transplant but only 5,000 get among them. With 1 million donation rate, India would have 1100 organ donors or 2200 kidney, 1100 livers, 1100 pancreas and 1000 hearts. This could take care of almost all current demands for organs (Organ India). Table: 4 demonstrate the information of transplantation rate of different organs in India by 2019. Total 12,666 (9.25pmp) organs were transplanted during the year. It could not even satisfy a 5% of waiting list for all organs over the nation. Above data reveals that, living kidney and living liver donation was higher than deceased one. It is legal in India to donate kidney or liver while living. Transplantation of human Organs Act (THOA) 1994 was indorsed to clarify the legal system of human organ retrieve, storage and transplantation in India. These were essential guidelines to perform transplantation procedure and prevention of human organ trade. All most all states adopted the THOA except Jammu & Kashmir and Andra Pradesh. These states also have their own guiding principles much similar to THOA (THOA, 1994).

Furthermore, there were two ways of organ retrieval after death. One is Deceased organ donation after brain death (DBD) and another one is deceased organ donation after circulatory death (DCD). Brain death is the condition of complete loss of consciousness. 'Brain death (also known as brain stem death) is when a person on an artificial life support machine no longer has any brain functions. This means they will not regain consciousness or be able to breathe without support' (NHS, 2019). Ironically majority of Indians were not had an awareness about the concept. While brain death when injury occurs to the brain and stops working and dies. But the heart continues working for few hours or a day and also the crucial blood supply to the organs is maintained (Dr. Seth, Avnish, 2017). Thus, traditional country like India does not believe and supports the concept of brain death so deceased organ donation was low as compare to living organ donation. It is evident by the literature that, awareness about the terminologies related to organ donation and transplantation and legal framework need to be increase among individuals of the country.

## Conclusion

Organs for donating others is emerging one of the major issues in health sector especially in India. Very rarely human beings come forward to donate their vital organs. In India beliefs,



religious concerns, lack of adequate information and awareness, suspicious health facilities discourage people from organ donation. To tackle the shortage of organ donation and enhance the condition, public administration should take responsibility and have to give treatment with free of cost to the patients. Furthermore, legal framework's among different countries of diverse region need to be restructured on the basis of community beliefs, customs, ethics and norms. From primary education itself awareness about organ donation need to be shared among children. Children in the schools should be appreciated about the value of organ donation.

## References

- Ananad, Arun. (2018), Body Organ Donation, PrabatPrakashan, New Delhi.
- Chouhan P, Draper H. (2003), "Modified mandated choice for organ procurement", *J Med Ethics*, Vol. 29, No.3, pp. 157-162.
- Daar, A.S., Singer, P.A., Persad, D.L., Pramming, S.K., Matthews, D.R., Beaglehole, R., Bernstein, A., Borysiewicz, L.K., Colagiuri, S., Ganguly, N., Glass, R.I., Finegood, D.T., Koplan, J., Nabel, E.G., Sarna, G., Sarrafzadegan, N., Smith, R., Yach, D., & Bell, J. (2007), "Grand challenges in chronic non-communicable diseases", *Nature*, Vol. 450, pp. 494-6.
- English V, Sommerville A. (2003), "Presumed consent for transplantation: a dead issue after Alder Hey?", *J Med Ethics*, Vol.29, No. 3, pp.147-152.
- Hussein El Samra. (2019), "Addressing the trafficking in persons for the purpose of removal of organs", The Hague International Model United Nations Qatar, available at: <https://qatar.thimun.org/wpcontent/uploads/2018/11/Organ-Trafficking-Hussein.pdf>. (accessed 11 December 2019).
- Kates B. (2005), "Black market in transplant organs donors smuggled into US to sell body parts", Daily News.
- Loch, A., Hilmi, I. N., Mazam, Z., Pillay, Y., & Choon, D. S. K. (2010), "Differences in attitude towards cadaveric organ donation: Observations" *Hong Kong Journal of Emergency Medicine*, Vol. 17, pp. 236-242.
- Loua, A., Feroletto, M., Sougou, A., Kasilo, O. M. J., Nikiema, J. B., Fuller, W., ...& Tumusiime, P. (2020), "A review of policies and programmes for human organ

- and tissue donations and transplantations”, WHO African Region. Bulletin of the World Health Organization, Vol.98, No.4, p. 420.
- McLaughlin A, Prusher IR, Downie A. (2004), “What is a kidney worth?”, Christian Science Monitor, 2004 Jun 9.
- Nyirenda, M.J. (2016), “Non-communicable diseases in sub-Saharan Africa: understanding the drivers of the epidemic to inform intervention strategies”, *Int Health*, Vol.8, No. 3, pp.157-158.
- Padela, A., Rasheed, S., Gareth, J., Hwajung, C., & Matur, A. (2010a), “Factors associated with positive attitudes toward organ donation in Arab Americans”, *Clinical Transplantation*, Vol.25, pp. 800-808.
- Shaheen, Faissal., Mohammad, Z., Souqiyyeh, Beshar Al-Attar., Ahmed, Jaralla., & Abdul, Rahman. (1996), “ Survey of opinion of secondary school students on Organ donation”, *Saudi journal of Kidney Diseases and Transplantation*, Vol.7, pp. 131-34.
- Sheikh, Aziz., & Sangeeta, Dhami. (2000), “Attitudes to Organ Donation among South Asians in the UK”, *Journal of the Royal Society of Medicine*, Vol.93, pp. 161-62.
- Shroff, S. (2009), “Legal and ethical aspects of organ donation and transplantation”, *Indian Journal of Urology*, Vol. 25, No.3, pp. 348-355.
- Srivastava, Anil., Mani, A. (2018), “Deceased organ donation and transplantation in India promises and challenges”, *Neurology India*, Vol.66, No.2, pp. 316-322.
- Theodosopoulou, M., Dor, F. J., Casanova, D., Baskozos, G., & Papalois, V. (2018), “Health Literacy: The Way Forward to Increase the Rates of Deceased Organ Donation. In Optimizing Health Literacy for Improved Clinical Practices”, *IGI Global*, 260-273. DOI: 10.4018/978-1-5225-4074-8.ch015
- Transplantation of Human Organs Act, India; 1994, Act No. 42.
- UNOS. Waiting list data: United Network for Organ Sharing. 2010.
- WTO agreements and public health: a joint study by the WHO and the WTO secretariat. Geneva: WHO, World Trade Organization; 2002.
- Pan American Health Organization. Epidemic of Chronic Kidney Disease in Agricultural Communities in Central America: Case definitions, methodological basis and approaches for public health surveillance. Washington, DC: PAHO; 2017.
- N, K. R. Sehgal., C, Scallan., C, Sullivan., M, Cedeno., J, Pencak., J, Kirkland., K, Scott., J, D.Thornton. (2016), “The Relationship Between Verified Organ Donor

- Designation and Patient Demographic and Medical Characteristics”, *American Journal of Transplantation*, Vol. 16, pp.1294–1297.doi: 10.1111/ajt.13608
- Soyibo AK, Barton EN. (2009), “Chronic renal failure from the English-speaking Caribbean”, *West Indian Med J*, Vol.58, pp.596-600.
- Pan American Health Organization. Epidemic of Chronic Kidney Disease in Agricultural Communities in Central America: Case definitions, methodological basis and approaches for public health surveillance. Washington, DC: PAHO; 2017.
- Global Observatory on Donation and Transplantation Organ Donation and Transplantation Activities.2016, Organización Nacional de Trasplantes/ World Health Organization, 2018 (accessed 6 May 2019).
- Conor, Stewart. (2020), Rate of deceased organ donors including both donation after brain death (DBD) and donation after cardiac death (DCD) in Europe from 2018 to 2019, by country (per million population). *Statista*, <https://www.statista.com/statistics/537908/deceased-organ-donor-rate-in-europe/>
- Jha, V. (2009), “Current status of chronic kidney disease care in southeast Asia”, *Seminars in nephrology*, Vol. 29, No. 5, pp. 487-496).
- Regional Office for the Eastern Mediterranean.World Health Organization.available at: <https://www.who.int/about/regions/emro/en/>. (accessed 27 March 2020).
- Salvalaggio PR, Caicedo JC, de Albuquerque LC, Contreras A, Garcia VD, Felga GE, et al. (2014), “Liver transplantation in Latin America: the state-of-the-art and future trends”, *Transplantation*, Vol.98, No. 3, pp.241-6.
- Limjoco, M. C. (2016), Organ dysfunction versus Organ Failure.ICD10 monitor.
- Marshall, C. John. (2001), “The Multiple Organ Dysfunction Syndrome: Surgical treatment: Evidence based and problem oriented
- Organ India, available at: <https://www.organindia.org/>, (accessed 13 August 2019).
- McIntosh, James. (2014), available at: <https://www.medicalnewstoday.com/articles/282905.php#targetText=With%20an%20opt-in%20system,organs%20not%20to%20be%20taken>, (accessed 18 August 2019).
- Irodat, available at: <https://www.irodat.org/?p=databse&c=IN&year=2019#data>, (accessed 12 January 2021).
- Global Observatory on Donation and Transplantation. (2019), available at: <http://www.transplant-observatory.org/>, (accessed 12 January 2021).

Estimated number of worldwide liver transplants in 2020, by region, available at: <https://www.statista.com/statistics/398685/liver-transplants-by-world-region/>, (accessed 13 January 2021).

Distribution of deceased and living kidney donors worldwide in 2026, by region, available at: <https://www.statista.com/statistics/398674/share-of-deceased-and-living-kidney-donors-by-world-region/>, (accessed 15 January 2021).

World Health Organization, available at: <https://www.who.int/transplantation/gkt/statistics/en/>, (accessed 15 January 2021).

United Nations, available at:

<https://www.un.org/en/sections/wherewework/#:~:text=The%20UN's%20work%20is%20divided,Asia%2C%20and%20the%20Middle%20East>, (accessed 17 January 2021).

World Health Organization, available at: <https://www.afro.who.int/health-topics/organ-donation-and-transplantation>, (accessed 17 January 2021).

Rate of deceased organ donors including both donation after brain death (DBD) and donation after cardiac death (DCD) in Europe in 2020 and 2021, by country, available at: <https://www.statista.com/statistics/537908/deceased-organ-donor-rate-in-europe/>, (accessed 18 January 2021).

Conard, Melissa, available at: [https://www.medicinenet.com/organ\\_failure/definition.htm](https://www.medicinenet.com/organ_failure/definition.htm), (accessed 18 January 2021).

Marshall, John, available at: <https://www.ncbi.nlm.nih.gov/books/NBK6868/>, (accessed 20 January 2021).

## Optimism level and its association with coping and happiness: A comparative study of institutionalized and non-institutionalized elderly

Nidhi Jaswal<sup>1</sup> and Sukhbir Singh<sup>2</sup>

### Abstract

*Optimism is an inclination to put the most favourable construction upon actions and events or to anticipate the best possible outcome. Optimism is not just a cognitive characteristic: It has inherent emotional and motivational components. Optimism is defined as the generalized expectation of positive experiences and outcome throughout one's life. The present study is undertaken with the objectives to study the socio-demographic profile of the elderly, to assess and compare the optimism level of the institutionalized and the non-institutionalized elderly and its association with coping and happiness level of the respondents in low resource setting. The present study is a cross-sectional study, consisting of both quantitative and qualitative variables and was undertaken in the Union Territory of Chandigarh in 2009-10. The sample size consisted of 337 elderly people of Chandigarh. Out of these 337 respondents, 200 were non-institutionalized (122 males and 78 females) elderly and 137 were institutionalized (73 males and 64 females) in the age group of 60-80 years. The Life Orientation Scale (Scheier and Carver, 1985) was used to study the optimism level of the respondents. The scale has an internal reliability (Cronbach alpha) of 0.76 and a test-retest reliability of 0.79.*

*Proportion of males was more than females among both the institutionalized (53.3%) and non-institutionalized elderly. Nearly sixty per cent (57.5%) NIs respondents and 69 (50.4%) Ins. respondents were having high level of optimism (61%). Males were found to have higher level of optimism among both institutionalized (65.8%) and non-institutionalized respondents (63.1%) as compared to females. A significant difference was found in the category of 'extremely happy' within a continuum of happiness measure which comprised of 12 (10.5%) respondents from high level of optimism and only 2 (2.4%) respondents from low level of optimism. Majority of the non-institutionalized respondents with high level of optimism were found in the range from 'mildly happy' to 'pretty happy'. Contrary to it, none of the institutionalized respondents was found in the former mentioned range.*

1. School of Public Health, Postgraduate institute of medical Education and research Chandigarh (INDIA) nidhi.jaswal@gmail.com
2. Population Research Centre, Panjab University Chandigarh INDIA) drsukhbirsingh85@gmail.com

## Background

Optimism is an inclination to put the most favourable construction upon actions and events or to anticipate the best possible outcome (Merriam-Webster's Online Dictionary, 2007). Scheier and Carver (1985) defined optimism as "the tendency to expect the best possible outcome or to think about the most hopeful aspects of any situation". Optimism is not just a cognitive characteristic: It has inherent emotional and motivational components (Carver and Scheier, 1990). More generally, optimism in the form of wishful thinking can distract people from making concrete plans about how to attain goals (Oettingen, 1996).

Some evidence indicates that optimists are people who have general expectancies for good outcomes (Scheier and Carver, 1988). They focus on problem-focused coping: making and enacting specific plans for dealing with sources of stress. They also seek to obtain social support – the advice and help of others (Carver et al., 1993). Optimism acts by several pathways to ensure better health. First, optimism affects a person's efforts to avoid illness by increasing attention to information about potential health threats. Secondly, optimism directly improves coping. Third, optimism acts through its influence on the maintenance of positive mood.

Optimism is defined as the generalized expectation of positive experiences and outcome throughout one's life (Scheier and Carver, 1985). Studies had shown that people who rate their optimism as high also report better well-being than those who rate their optimism as being low (Scheier and Carver, 1992, 1993). Dispositional optimism, defined as the generalized expectation that good rather than bad things will occur in one's life, has been related to better psychological and physical well-being, particularly during times of heightened stress (Brydon, et al., 2009). The present study also includes optimism as one of the variables because the respondents targeted in this study are the elderly and the researcher wants to find out if they still have much hope for living and whether this hope will make them happy.

The present study is undertaken with the objectives to study the socio-demographic profile of the elderly, to assess and compare the optimism level of the institutionalized and the non-

institutionalized elderly and its association with coping and happiness level of the respondents in low resource setting.

### **Methodology**

The present study is a cross-sectional study, consisting of both quantitative and qualitative variables and was undertaken in the Union Territory of Chandigarh in 2009-10. The sample size consisted of 337 elderly people of Chandigarh. Out of these 337 respondents, 200 were non-institutionalized (122 males and 78 females) elderly and 137 were institutionalized (73 males and 64 females) in the age group of 60-80 years. For selecting the non-institutionalized elderly, Census (2001) data was considered. The number of elderly within the age-group of 60-80 years is 23,000 in Chandigarh (urban and rural). Excluding the elderly with any psychiatric morbidity, physical disability, severe chronic health problems; unmarried elderly and the elderly belonging to rural area, the sample size of 200 non-institutionalized elderly was selected for the present study. In case of the institutionalized elderly, the list of inmates residing in the old age homes of Chandigarh was collected from the Help Age India Directory 2007 and the Social Welfare Department, Sector-17, Chandigarh. Institutionalized elderly consisted of 137 inmates residing in all 6 old age homes of Chandigarh. All the 137 inmates were selected as the respondents for the study, hence no sampling was undertaken.

The Life Orientation Scale (Scheier and Carver,1985) was used to study the optimism level of the respondents. This scale is intended to reflect a pervasive orientation to the experiences of life. The scale contains 12 items, in which 4 items are filler items. They are to be rated on a 5 point scale from “strongly agree = 5” to “strongly disagree = 0”. The scale has an internal reliability (cronbach alpha) of 0.76 and a test-retest reliability of 0.79. Informed consent was taken from each subject for his/her voluntary participation in the present research study.

### **Results**

#### **Socio-demographic profile of the respondents**

Table 1 presented the socio-demographic profile of the non-institutionalized (N-Ins) and institutionalized (Ins)elderly. Proportion of males was more than females among both the institutionalized (53.3%) and non-institutionalized elderly (61%). (Table 1).

**Table 1: Socio-demographic profile of the respondents**

Variables	Non-Institutionalized (N=200)	Institutionalized (N=137)	p-value
<b>Gender</b>			
Males	122 (61.0)	73 (53.3)	.234
Females	78 (39.0)	64 (46.7)	
<b>Age group</b>			
60 years	19 (09.5)	10 (07.3)	.159
61-65 years	89 (44.5)	54 (39.4)	
66-70 years	55 (27.5)	43 (31.4)	
71-75 years	30 (15.0)	18 (13.1)	
76-80 years	7 (03.5)	12 (08.8)	
<b>Marital status</b>			
Unmarried	-	5 (03.6)	-
Married	200 (100.0)	34 (24.8)	
Widow	-	40 (29.2)	
Widower	-	48 (35.0)	
Divorced	-	10 (07.3)	
<b>Caste</b>			
General caste	166 (83.0)	83 (60.6)	-
Other Backward Class	34 (17.0)	41 (29.9)	
Scheduled Caste	-	13 (09.5)	
Scheduled Tribe	-	-	
<b>Educational Level</b>			
Illiterate	17 (08.5)	9 (06.6)	.432
Up to primary	17 (08.5)	16 (11.7)	
Matriculation	54 (27.0)	50 (36.5)	
High school	19 (09.5)	8 (05.8)	
Graduation	67 (33.5)	39 (28.5)	
Post graduation	15 (07.5)	9 (06.6)	
Other	11 (05.5)	6 (04.4)	

Age-wise distribution of the elderly showed that two-fifth (44.5%) of the non-institutionalized elderly and 39.4% of the institutionalized elderly belonged to the age-group of 61-65 years. All non-institutionalized elderly were married. However, only 24.8% of the institutionalized elderly were married and 35.0% and 29.2% of them were widowers and



widows, respectively. Majority of the respondents (83% non-institutionalized and 60% institutionalized) belonged to the general caste group. Among the non-institutionalized elderly, the highest attained qualification was graduation (33.5%) followed by matriculation (27%) (Table 1).

### Optimism level of the respondents

Nearly sixty per cent (57.5%) NIs respondents and 69 (50.4%) Ins. respondents were having high level of optimism. The association of optimism with the category of respondents or type of institution to which the respondents belonged (non-institutionalized and institutionalized) was found to be non-significant.

Table 2 shows the gender differences in the level of optimism among both institutionalized and non-institutionalized respondents. Males were found to have higher level of optimism among both institutionalized (65.8%) and non-institutionalized respondents (63.1%) as compared to females.

**Table 2: Association of optimism with gender (N-Ins. and Ins.)**

Level of optimism	Non-institutionalized		Institutionalized		p-value
	Males	Females	Males	Females	
High	77 (63.1)	38 (48.7)	48 (65.8)	21 (32.8)	.000*
Low	45 (36.9)	40 (51.3)	25 (34.2)	43 (67.2)	
<b>Total</b>	<b>122 (100.0)</b>	<b>78 (100.0)</b>	<b>73 (100.0)</b>	<b>64 (100.0)</b>	

Note: percentage in parenthesis

The dependency of optimism on gender among the institutionalized respondents was found to be highly significant statistically ( $p < .001$ ).

The association of optimism and coping illustrated that 49 (42.6%) and 37 (43.5%) non-institutionalized respondents with high and low level of optimism respectively used 'Positive Reappraisal' as a coping strategy (Table 3). It was followed by the strategy of 'Planful Problem Solving' used as a way of coping by 23 (33.3%) highly optimistic non-

institutionalized respondents (Table 3). No significant association was found between optimism level of the respondents and coping strategies being used by them.

**Table 3: Association of optimism with ways of coping among Non-institutionalized (N-Ins.) and institutionalized**

Ways of coping	Non-institutionalized		Institutionalized	
	High optimism	Low optimism	High optimism	Low optimism
Confrontive Coping (CC)	8 (7.0)	2 (2.4)	5 (7.2)	7 (10.3)
Distancing (D)	9 (7.8)	3 (3.5)	12 (17.4)	9 (13.2)
Self-controlling (SC)	6 (5.2)	9 (10.6)	7 (10.2)	12 (17.6)
Seeking Social Support (SSS)	6 (5.2)	8 (9.4)	4 (5.8)	4 (5.9)
Accepting Responsibility (AR)	4 (3.5)	5 (5.9)	7 (10.2)	9 (13.2)
Escape Avoidance (EA)	10 (8.7)	9 (10.6)	23 (33.3)	16 (23.5)
Planful Problem Solving (PPS)	23 (20.0)	12 (14.1)	5 (7.2)	5 (7.5)
Positive Reappraisal (PR)	49 (42.6)	37 (43.5)	6 (8.7)	6 (8.8)
<b>Total</b>	<b>115 (100.0)</b>	<b>85 (100.0)</b>	<b>69 (100.0)</b>	<b>68 (100.0)</b>

Note: percentage in parenthesis

In case of institutionalized respondents, 23 (33.3%) and 16 (23.5%) respondents with high and low level of optimism respectively as compared to respondents with low level of optimism followed by use of 'distancing' and 'Self-Controlling' as a coping strategy in 12 (17.4%) and 12(17.6%) respondents with high and low level of optimism.

### Association of optimism with happiness

Table 4 showed that 35 (30.4%), 25 (21.7%), and 18 (15.7%) non-institutionalized respondents with high level of optimism felt pretty happy, mildly happy, very happy respectively. A significant difference was found in the category of 'extremely happy' within a continuum of happiness measure which comprised of 12 (10.5%) respondents from high level of optimism and only 2 (2.4%) respondents from low level of optimism.

**Table 4: Level of optimism in relation to happiness measure among Non-institutionalized (N-Ins.) and institutionalized**

Happiness Measure	Non-institutionalized		Institutionalized	
	High optimism	Low optimism	High optimism	Low optimism
Extremely unhappy	0	0	0	0
Very unhappy	0	0	0	0
Pretty unhappy	0	0	0	2 (3.0)
Mildly unhappy	3 (2.6)	2 (2.4)	9 (13.1)	4 (5.9)
Slightly unhappy	6 (5.2)	4 (4.7)	21 (30.4)	19 (27.9)
Neutral	9 (7.8)	9 (10.6)	16 (23.2)	13 (19.1)
Slightly happy	7 (6.1)	11 (12.9)	13 (18.8)	18 (26.5)
Mildly happy	25 (21.7)	22 (25.8)	10 (14.5)	12 (17.6)
Pretty happy	35 (30.4)	25 (29.4)	0	0
Very happy	18 (15.7)	10 (11.8)	0	0
Extremely happy	12 (10.5)	2 (2.4)	0	0
<b>Total</b>	<b>115 (100.0)</b>	<b>85 (100.0)</b>	<b>69 (100.0)</b>	<b>68 (100.0)</b>

Note: percentage in parenthesis

Table 4 showed that majority of the respondents, i.e. 21 (30.4%) with high level of optimism felt slightly unhappy, with 16 (23.2%) and 13 (18.8%) respondents representing the ‘neutral’ and ‘slightly happy’ measures of happiness. None of the respondents felt pretty unhappy. Among 68 respondents with low level of optimism, majority of the respondents, i.e. 19 (27.9%) felt slightly unhappy. 18 (26.5%) and 13 (19.1%) respondents feeling ‘slightly happy’ and ‘neutral’ formed the second and largest and third largest groups respectively. There was no significant association between optimism and coping both among the institutionalized and non-institutionalized elderly.

It was important to observe that as compared to the non-institutionalized respondents, 13.1 per cent of the institutionalized respondents with high level of optimism and 5.9 per cent of them with low optimism level felt mildly unhappy. And also 14.5 per cent with high optimism and 17.6 per cent with low optimism felt mildly happy. The dependency of optimism on the level of happiness was found to be non-significant among the institutionalized respondents. Majority of the non-institutionalized respondents with high

level of optimism were found in the range from ‘mildly happy’ to ‘pretty happy’. Contrary to it, none of the institutionalized respondents was found in the former mentioned range.

### **Discussion**

The purpose of the study was to clarify relationships among the institutionalized and non-institutionalized elderly in relation to optimism and self-reported health, perceived personal control, depression, life satisfaction, self esteem, and forgiveness of others. With the expanding worldwide population of people in this age category, better understanding of well-being indicators among older people are important in for the most effective and appropriate allocation of welfare funding and services.

The dependency of optimism on gender among the institutionalized respondents was found to be highly significant statistically the number of respondents with both high and low optimism level was similar in case of upper high SES. Schutte et al. (1996) examined the relationship between optimism and socioeconomic status (SES) in a sample (N=245) of Anglo- and Mexican-Americans and found small but significant correlations between dispositional optimism (measured by the Life Orientation Test; LOT) and SES.

In the present study, no significant association was found between the coping and optimism. However, research has shown that optimism plays a significant role in the selection of coping strategies. Optimists are more likely to report using problem-focused coping, emotion-focused coping responses such as positive reinterpretation and seeking emotional support, and disengagement coping strategies such as acceptance and resignation (Scheier et al. 1986). They are less likely to use disengagement strategies such as denial and distancing (Hatchett and Park 2004; Brissette et al., 2002; Carver et al., 1989).

The percentage of respondents with high as well as low levels of optimism was found to be similar for using ‘planful problem solving’, ‘positive reappraisal’, ‘confrontive coping’, ‘distancing’, ‘seeking social support’, and ‘accepting responsibility’ (Table 3). No significant association was found between optimism and problem-focused coping. Solberg and Segerstrom (2006) found out in their study that dispositional optimism was not significantly associated with approach coping strategies aiming to eliminate, reduce, or manage stressors

or emotions ( $r = .17$ ), and negatively associated with avoidance coping strategies seeking to ignore, avoid, or withdraw from stressors or emotions ( $r = -.21$ ).

## References

- Brissette, I., Scheier, M. F., & Carver, C. S. (2002). The Role of Optimism in Social Network Development, Coping, & Psychological Adjustment during a Life Transition; *Journal of Personality and Social Psychology*, 82, 102–111
- Brydon, L., Walker, C., Wawrzyniak, A. J., Chart, H., & Steptoe, A. (2009). Dispositional Optimism and Stress-Induced Changes in Immunity and Negative Mood; *Brain Behav. Immun.*, 23(6), 810-816. doi: 10.1016/j.bbi.2209.02.018
- Carver, C. S., & Scheier, M. F. (1990). Origins & Functions Of Positive And Negative Affect: A Control-Process View. *Psychological Review*, 97, 19-35.
- Carver, C. S., Pozo, C., Harris, S. D., Noriega, V., Scheier, M. F., Robinson, D. S., Ketcham, A. S., Moffat, F. L., & Clark, K. C. (1993). How Coping Mediates The Effect Of Optimism On Distress: A Study Of Women With Early Stage Breast Cancer; *Journal of Personality and Social Psychology*, 65, 375-390.
- Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing Coping Strategies: A Theoretically Based Approach; *Journal of Personality and Social Psychology*, 56, 267-283
- Census of India. (2001). Census Data: Chandigarh. Office of the Registrar General and Census Commissioner. New Delhi: Logic Soft International.
- Hatchett, G. T., & Park, H. L. (2004). Relationships among Optimism, Coping Styles, Psychopathology, and Counseling Outcome. *Personality and Individual Differences*, 36, 1755–1769.
- Merriam-Webster's Online Dictionary. (2007). United States of America: Merriam-Webster Inc.
- Oettingen, G. (1996). Positive Fantasy & Motivation. In P. M. Gollwitzer and J. A. Bargh (Eds.), *The Psychology of Action: Linking Cognition and Motivation to Behavior* (pp. 236-259). New York: Guilford Press.

- Scheier, M. F., & Carver, C. S. (1985). Optimism, Coping and Health: Assessment and Implications of Generalized Outcome Expectancies; *Health Psychology*, 4(3), 219-247.
- Scheier, M. F., & Carver, C. S. (1988). *Perspectives on Personality*. Boston: Allyn and Bacon.
- Scheier, M. F., & Carver, C. S. (1992). Effects of Optimism on Psychological and Physical Well-Being: Theoretical Overview and Empirical Update; *Cognitive Therapy and Research*, 16, 201-228.
- Scheier, M. F., & Carver, C. S. (1993). On the power of Positive Thinking: The Benefits of Being Optimistic; *Current Directions in Psychological Science*, 2, 26-30.
- Scheier, M. F., Weintraub, J. K., & Carver, C. S. (1986). Coping with Stress: Divergent Strategies of Optimists and Pessimists; *Journal of Personality and Social Psychology*, 51, 1257-1264.
- Scheier, M. F., Weintraub, J. K., & Carver, C. S. (1986). Coping with Stress: Divergent Strategies of Optimists and Pessimists; *Journal of Personality and Social Psychology*, 51, 1257-1264.
- Schultz, R., & Heckhausen, J. (1996). A Life Span Model of Successful Aging; *American Psychologist*, 51, 702-714.
- Solberg, N. L. S., & Segerstrom, B. C. (2006). Dispositional Optimism and Coping: A Meta-Analytic Review; *Personality and Social Psychology Review*, 10(3), 235-251.

## Role of Literacy on Infant Mortality in North Eastern States of India: A Case Study

Dilip Kumar Kalita<sup>1</sup> and Karuna Gogoi<sup>2</sup>

### Abstract

*The infant mortality rate (IMR) is defined as the number of deaths in children below one year of age per 1000 live births in the same year. In demography, Infants are defined as "an exact age group, namely, age 'zero', or those children in the first year of life, who have not yet reached age one" (Barclay,1958). The infant mortality rate measures the apparent relationship between the causes of infant mortality and other factors that are likely to influence the health status of the population such as economic development, living conditions, social wellbeing, rates of illness, and the quality of the environment. The infant mortality rate in India has remarkably declined from 129 in 1971 to 30 in 2019. However, the rural-urban difference in the infant mortality rate indicates that the IMR 34 for rural India is much higher than the rate of 20 for urban India (SRS Bulletin, October 2021).*

*Literacy means the ability to read and write. Literacy plays a vital role in the overall growth and development of society. Literacy rate especially female literacy is considered to be a key variable affecting demographic indicators like fertility, mortality rate, and migration. It greatly contributes to improving the quality of life, particularly life expectancy, infant mortality, and nutritional levels of children.*

*North-Eastern (NE) Region of India consists of eight States namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim. The region shares about 4 percent of India's population. As per the 2011 census, among the NE States Mizoram has the highest percentage of female literacy rate (89%), which is higher than the national average, while the minimum is observed in Arunachal Pradesh (60%). However, it is encouraging to note that in the NE States the infant mortality rates show a declining trend. As female literacy has immense contribution in declining the infant mortality rate and thus helps in improving the health status of both women and children.*

*The objective of this study is therefore to establish a relationship between female literacy rate and infant mortality rate of NE States. The Data on the literacy rate has been obtained from census 2011 and the data of the infant mortality rate was obtained from Sample Registration System (SRS) Bulletin, 2011. The study finds that there is no statistically significant linear relationship between literacy rate and IMR of NE States. So we can conclude that literacy rate especially female literacy may not be the sole determinant to reduce IMR in the NE States, other socio-economic and demographic factors like age at marriage, occupation, living standard, access to health care service can influence IMR. Therefore, the study suggests going for further extension of the studies to explore the causes which can influence infant mortality in the North Eastern Region.*

1. Associate Professor (Rtd.), Population Research Centre, Guwahati, Assam
2. Field Investigator, Population Research Centre, Guwahati, Assam  
Email ID of corresponding author: dilipk102@gmail.com

## Introduction

The infant mortality rate (IMR), defined as the number of deaths in children below one year of age per 1000 live births in the same year is regarded as a highly sensitive measure of population health. This reflects the standard of living of the people and the effectiveness of intervention for improving maternal and child health in a country. High infant mortality reveals a lack of proper health care, lack of education, and societal preferences. In demography, Infants are defined as "an exact age group, namely, age 'zero', or those children in the first year of life, who have not yet reached age one" (Barclay,1958).

The infant mortality rate measures the apparent relationship between the causes of infant mortality and other factors that are likely to influence the health status of the population such as economic development, living conditions, social wellbeing, rates of illness, and the quality of the environment. In India, there has been an appreciable decline in the infant mortality rate. The present level of IMR (30, for the year 2019) is about one-fourth as compared to 1971 (129 infant deaths per thousand live births). However, the rural-urban difference in the infant mortality rate indicates that the IMR 34 for rural India is much higher than the rate of 20 for urban India (SRS Bulletin, October 2021).

Literacy plays a vital role in the overall growth and development of society. Literacy means the ability to read and write. Education is associated with the social, economic, and health development of a nation especially female education as it bounds the next generation to be educated. The advantages of education for women are numerous and diverse: one prime benefit is healthier children. Female literacy is one of the important factors for determining the socio-economic progress of a country and has played a significant role in developing every aspect of a female's life. The literacy rate is considered to be a key variable affecting demographic indicators like fertility, mortality rate, and migration. It greatly contributes to improving the quality of life, particularly life expectancy, infant mortality, and nutritional levels of children. The female literacy of the country has increased from 54 percent in the 2001 census to 65 percent in 2011. The female literacy rate is considered the key variable in determining infant mortality. Education of families, especially of women has a 'multiplier effect' on development. There is a significant gender gap in India's literacy rate: whereas male literacy is 82 percent, female literacy is only 65 percent, notwithstanding improvements in female educational achievement over the past several decades.. There is also significant variation observed by place of residence, with rates in rural areas lagging behind rates in



urban areas. In urban India, the female literacy rate is 80 percent whereas, in rural areas, the female literacy rate is only 59 percent.

North-Eastern (NE) Region of India consists of eight States – Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim. The region shares about 4 percent of India's population. As per the 2011 census, among the NE States Mizoram has the highest percentage of female literacy rate (89%), which is higher than the national average, while the minimum is observed in Arunachal Pradesh (60%). All the NE States showed an increase in female literacy rate in the 2011 Census as compared to the 2001 Census. It is encouraging to note that in the NE States the infant mortality rates show a declining trend.

Rao et al. (1996) analyzed that there is an inverse relationship between female literacy and infant mortality rate. Gibson (2001) also observed that nutritional status and educational status are improved by having better-educated parents, particularly the mother's education. The mechanism of literacy's impact on infant survival has been examined by Gokhale et al. (2002). Kateja (2007) derived an inverse relationship between female literacy rate and mortality rates (IMR and MMR) in major states of India. Saurabh et. al (2013) studied the relationship between male and female literacy rates with crude birth rates (CBRs) and IMRs of the states and union territories (UTs) of India. They found a significant inverse relationship between IMR and female literacy. In the Kashmir valley, Batool et al (2019) looked at the effect of female literacy on newborn mortality and maternal death ratios. They discovered that the infant mortality rate was negatively correlated with both the female and male literacy rates.

### **Objectives**

The goal of this study is to establish a relationship between female literacy rate and infant mortality rate of NE States since female literacy greatly contributes to lowering the newborn mortality rate and so aids in improving the health status of both women and children. In the study, a comparison among the NE States is also carried out concerning literacy rate and IMR by sex and residence.

### **Methodology**

The Data of the literacy rate of the NE States- Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim concerning sex and residence has been obtained from census 2011 and The Sample Registration System was used to acquire information on infant mortality rates, (SRS) Bulletin, 2011. For identifying the relationship of

female literacy rate over infant mortality rate linear regression was used. The equation of linear regression is given by

$$Y = a + bX$$

Where X is independent variable, Y is dependent variable, a is the intercept and b is the slope of the regression. Micro-soft Excel was used to calculate the lines and statistical values of linear regression analysis. The value of R<sup>2</sup> or the square of correlation from the regression analysis was used to show how strong the correlation and relationship between variables X and Y.

### Results and Discussion

Literacy is one of the vital socio-economic indicators which helps to draw the development path of a country. The biggest obstacle for a developing nation is the wider gender disparity in terms of literacy rate. The literacy rate has a major impact on infant mortality, one of the important measures of a country's health care system. The low infant mortality rate shows the poor health scenario of the country. It is the result of the prevailing socio-economic factors. The key factors can be outlined as poverty, lack of awareness and infrastructure facilities, and conservative cultural values.

**Figure1: Literacy rate of NE States in 2011 Census**

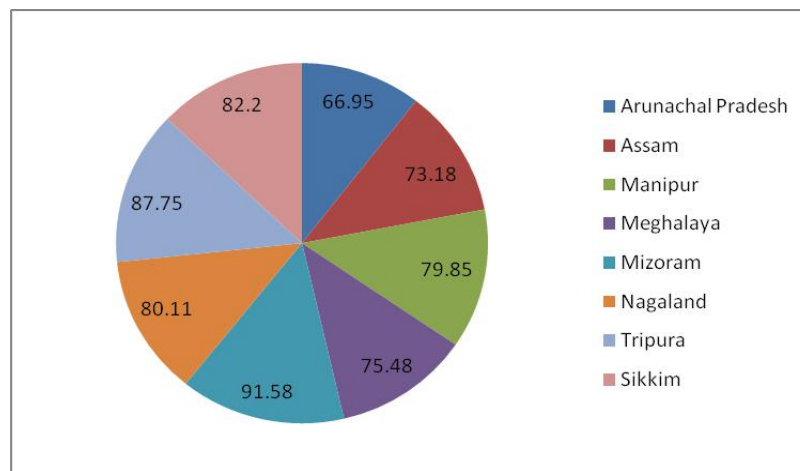


Figure 1 shows the literacy rate of the NE states according to the 2011 census. Mizoram ranks first in NE Region with a literacy rate of 92 percent, closely followed by Tripura (88%). Arunachal Pradesh with a literacy rate (67%) ranks last in NE Region preceded by Assam (73%) and Meghalaya (75%). The NE States with literacy rates below the national average (74%) are Arunachal Pradesh and Assam and two states namely Mizoram and

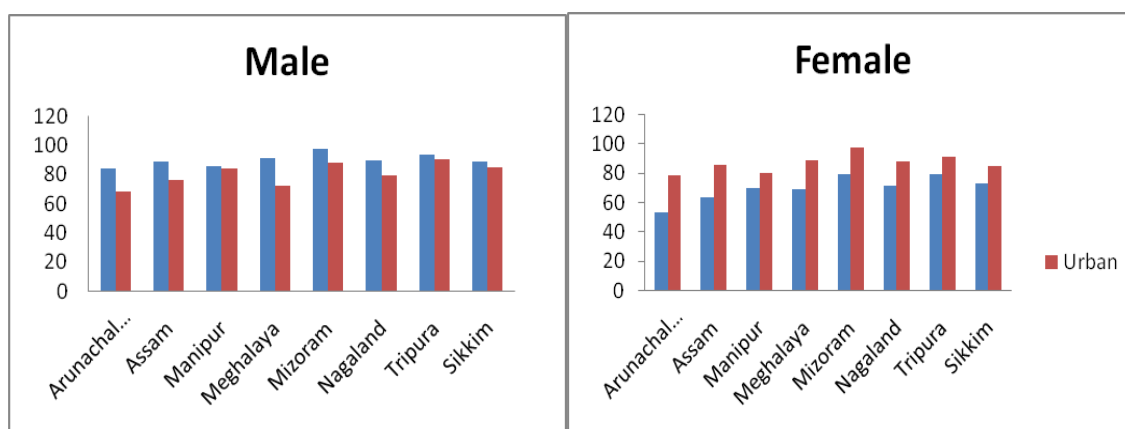
Tripura have achieved a literacy rate of above 85 percent, the target set by the Planning Commission for the year 2011-12.

**Table 1: Gender gap in literacy rate in NE States**

States	Male	Female	Gap in literacy rate
Arunachal Pradesh	73.69	59.57	14.12
Assam	78.81	67.27	11.54
Manipur	86.49	73.17	13.32
Meghalaya	77.17	73.78	3.39
Mizoram	93.72	89.4	4.32
Nagaland	83.29	76.69	6.6
Tripura	92.18	83.15	9.03
Sikkim	87.29	76.43	10.86

Among the NE States, the highest male, as well as female literacy rates, are found in Mizoram, 94 percent and 89 percent respectively (Table 1). On the other hand, the lowest is observed in Arunachal Pradesh, male (74%) and female (60%). The States Mizoram and Tripura have reported more than 90 percent male literacy in the 2011 census and Manipur and Sikkim have above 85 percent for the same. At the country level, the male-female literacy gap for census 2011 is 16.7. It is encouraging to note that in all NE States, the gender literacy gap is less than the national average. Meghalaya has reported minimum differentials in the male-female gap (3%) only. It is observed that although the total literacy rate in Meghalaya (75%) is not high, the male-female gap in literacy rate is the lowest. Among the NE States, the highest gender literacy gap is found in Arunachal Pradesh (14%) followed by Manipur (13%) and Assam (12%).

**Figure 2: Literacy rates in NE States by residence according to 2011 census**



In India, the urban literacy rate is higher than the rural counterpart. In the 2011 Census, India has recorded a literacy rate of 74 percent with the rural areas reporting a literacy of 69 percent and urban areas registering 85 percent literacy. The rural-urban gap in literacy rate existed for both males and females. Among the NE States, the top and bottom contenders in terms of male urban literacy rate are Mizoram with a figure of 99 percent and Arunachal Pradesh registering 89 percent respectively (Figure 2). Tripura has secured the maximum percentage of rural male literacy rate (91 %) while Arunachal Pradesh has the lowest in this regard (only 69 percent). In Arunachal Pradesh, the difference in the rural and urban male literacy rates is skewed in favor of the urban areas with a difference of 20 percentage points. In respect of female literacy rate, Mizoram and Tripura have reported the highest rural literacy rate (80%) and the lowest is seen in Arunachal Pradesh (54%). That is in Arunachal Pradesh about half of the rural female population are illiterate. In the urban areas, the maximum is recorded in Mizoram (98 %) followed by Tripura (91%), Meghalaya (89%), and Nagaland (88%), and the minimum is observed in Arunachal Pradesh (79%) followed by Manipur (80%). Among the NE States, although Assam shares the highest percentage of the population, only 64 percent female and 77 percent male are literate in rural areas.

**Table 2: Infant mortality rates in NE States by residence, 2011**

States	Total	Rural	Urban
Arunachal Pradesh	31	34	12
Assam	58	60	36
Manipur	14	15	9
Meghalaya	55	58	37
Mizoram	37	47	21
Nagaland	23	24	20
Tripura	27	29	19
Sikkim	30	31	19

In India, the infant mortality rate which plays an important role in health planning has shown a considerable decline from 129 per 1000 live births in 1971 to 47 in 2011. At the National level, the IMR varies from 51 in rural areas to 31 in urban areas. Among the NE States, Assam has secured the first position with IMR 58 whereas the minimum is seen in Manipur (14), the difference is significantly high with 44 points. It is important to note here that

Mizoram where the literacy rate is maximum, has recorded the third highest IMR (37) among the NE States (Table 2). In rural areas, Manipur performs best with IMR 15 and Assam has fared the worst with the highest IMR 60. In the context of urban areas, Meghalaya has recorded the maximum IMR 37 followed by Assam (36), and the lowest is observed in Manipur with IMR 9. In Arunachal Pradesh and Mizoram, the IMR in rural areas is two times higher than that of urban areas.

**Table 3: Literacy rates and infant mortality rates of NE States**

States	Literacy rate	Male literacy rate	Female literacy rate	Infant mortality rate
Arunachal Pradesh	66.95	73.69	59.57	31
Assam	73.18	78.81	67.27	58
Manipur	79.85	86.49	73.17	14
Meghalaya	75.48	77.17	73.78	55
Mizoram	91.58	93.72	89.4	37
Nagaland	80.11	83.29	76.69	23
Tripura	87.75	92.18	83.15	27
Sikkim	82.2	87.29	76.43	30

**Table 4: Results of individual linear regression between literacy rates and IMR of NE States**

Dependent variable	Literacy rate	Slope of Regression line	95% confidence interval	p value	R <sup>2</sup> value
IMR	Total	-0.563	(-2.406, 1.281)	0.483	0.085
	Male	-0.893	(-2.819, 1.032)	0.3	0.177
	Female	-0.286	(-1.928, 1.357)	0.685	0.029

Table 3 shows the Literacy rates for males and females including infant mortality rates of NE States together. However, from table4, an inverse relationship is found between female literacy rate, male literacy rate, and total literacy rate has taken individually with the IMR of the NE States. As the values of R<sup>2</sup> are not high, we can say that the linear regression model is not strong enough to predict the dependent variable. The slope of -0.286 for female literacy versus IMR suggests that every 1% increase in female literacy is associated with a fall in

IMR by 0.286/1,000 live births. Only 3 percent of the variability in IMR is explained by this relationship, as suggested by the R<sup>2</sup> value. Since p values are not less than 0.005, we can conclude that the relationship between female literacy rate, male literacy rate, and total literacy rate with the IMR is not statistically significant.

In earlier literature, we found that there is a significant inverse relationship between female literacy rate and IMR. This suggests that literacy in women is related to delayed age of marriage, proper health care during pregnancy, maintaining adequate nutritional status, and better access to contraception, thereby contributing to population stabilization. However, it was not discovered that the NE States of India with higher female literacy rates had lower IMRs. The percentage increase in female literacy rates relative to newborn mortality rates in the NE States has not decreased. The major reasons are poor health care system, poor transportation system, and poverty. Despite the launching of different healthcare schemes, in some NE States, health indicators are expected to remain poor. The health infrastructures, delivery system, manpower, resources, all have to be strengthened enough so that they can be properly utilized.

### **Conclusion**

In the study, it is tried to establish a relationship between female literacy rate and infant mortality rate of NE States of India. From the study, we observed that there is no statistically significant linear relationship between literacy rate and IMR of NE States. So we can conclude that literacy rate especially female literacy may not be the sole determinant to reduce IMR in the NE States, other socio-economic and demographic factors like age at marriage, occupation, living standard, access to health care services, etc. can influence IMR. The study, therefore, suggests going for further extension of the studies to explore the causes which can influence infant mortality in the North Eastern Region.

### **References**

Basak, Arpita (2020). 'Impact of Literacy on Infant Mortality in North Eastern States of India': Study report: Population Research Centre, Gauhati University.

Batool, N., Shah, S.A., Dar, S.N. et al. Impact of female literacy on infant mortality and maternal mortality in Kashmir valley: a district level analysis; *Geo Journal*, 85, 1545–1551 (2020). available at: <https://doi.org/10.1007/s10708-019-10041-1>.

Gibson, J. (2001). ‘Literacy and intrahousehold externalities’. *World Development*, 29(1), 155–166.

Gokhale, M. K., Rao, S. S., and Garole, V. R. (2002). ‘Infant mortality in India: Use of maternal and child health services in relations to literacy status’. *Journal of Health Population and Nutrition*, 20(2), 138–147.

Infant mortality data: Kerala comparable with US, but MP worse than Yemen, available at: <https://thefederal.com/news/infant-mortality-data-kerala-comparable-with-us-but-mp-worse-than-yemen/>

Infant Mortality & Replacement Rate in Fertility Rate, available at: <https://byjus.com/free-ias-prep/infant-mortality-replacement-rate-fertility-rate/>

Kameih, Kshatriya. Demographic Anthropology, Mortality: Basic concepts and measures Available at: <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=Vu+b7LQyc9e/jifd2gmpPA==>

Kateja, A. (2007). ‘Role of female literacy in maternal and infant mortality decline’. *Social Change*, 37(2), 29–39.

Literacy rate by sex and residence (2011). Census of India, Registrar General of India, New Delhi.

Saurabh, S., Sarkar, S., and Pandey, D. K. (2013). ‘Female Literacy Rate is a Better Predictor of Birth Rate and Infant Mortality Rate in India’. *Journal of family medicine and primary care*, 2(4), 349–353.

Shah. 2013, Literacy rate in India; *International journal of research in all subjects in multi languages*, vol. 1, issue:7, October 2013 (IJRSML) ISSN: 2321 -2853

SRS Bulletin, January, 2011, Registrar General, India Vital Statistics Division. Available at [https://censusindia.gov.in/vital\\_statistics/SRS\\_Bulletins/SRS\\_Bulletin\\_January\\_2011.pdf](https://censusindia.gov.in/vital_statistics/SRS_Bulletins/SRS_Bulletin_January_2011.pdf)

SRS Bulletin, October, 2021, Registrar General, India Vital Statistics Division. Available at- [https://censusindia.gov.in/vital\\_statistics/SRS\\_Bulletins/SRS%20Bulletin%202019.pdf](https://censusindia.gov.in/vital_statistics/SRS_Bulletins/SRS%20Bulletin%202019.pdf)



## Determinants of Chronic Health Diseases among the Elderly in India: an Investigation using data from LASI Wave I

N. Kavitha<sup>1</sup>

### Abstract

Globally, there were 703 million persons of age 65 or more in 2019 and it is projected to be doubled in the year 2050 (United Nations, 2019). According to UN report on World Population Ageing, the percentage of the population aged 65 years or over almost doubled from 6 per cent in 1990 to 11 per cent in 2019 in Eastern and South-Eastern Asia. The share of the elderly population of India is projected to increase to one-fifth of its population by the year 2050. The prevalence of chronic morbidity increases with increase in proportion of elderly population. Chronic diseases cause medical, social and psychological problems among elderly population, which would ultimately limit the activities of them. Chronic diseases impact the quality of life of the elderly.

The present study aims to focus on the prevalence of chronic diseases among the elderly in states of India by sex. It also aims at exploring the association between socioeconomic factors and the prevalence of multi-morbidity by sex.

This study uses data from the Longitudinal Ageing Study in India (LASI) – Wave 1 survey which was conducted in the year 2017-18. The LASI is a biennial panel survey representative of the older and elderly population 45 and above in states and union territories of India. Wave 1 of LASI covered a panel sample of 72250 individuals. The LASI is designed to provide estimates of all reliable health outcomes and social and economic well-being for older adults.

It is found that percentage suffering from hypertension and chronic bone/ joint disease is higher among women whereas percentage suffering from chronic lung disease and chronic heart disease is higher among men than their counterparts. Many of the states in India have high prevalence of chronic morbidity among the elderly irrespective of their sex. States such as Chandigarh, Jammu and Kashmir, Punjab, Daman and Diu, Goa, Maharashtra, Andaman and Nicobar, Andhra Pradesh, Kerala, Lakshadweep, Puducherry, Tamil Nadu and Telengana have higher prevalence of chronic multi-morbidity i.e., more than one-fifth of the elderly are suffering from multiple chronic diseases. Women in the states of Punjab and Jammu and Kashmir have higher risk of being affected with chronic morbidity than men.

Two way association between background characteristics and the prevalence of single and

---

1 Chief, Population Research Centre, Gandhigram Institute of Rural Health and Family Welfare Trust, Soundaram Nagar, Gandhigram Post, Dindigul District, Tamil Nadu -624302. e-mail: kavitha.sampathkumar@gmail.com

*multi-morbidity brought out the following findings: increase in age increased the risk of chronic morbidity irrespective of their gender. Women who are widowed and women who are divorced or separated or deserted are at high risk of chronic morbidity compared to their men counterparts. Non-working elderly, both men and women have higher chances of being affected with the chronic morbidity as compared to their working counterparts. Elderly belonging to Muslim religion are more prone for multiple chronic conditions than their counterparts irrespective of the gender. Results have also shown that elderly belonging to richer and richest MPCE quintiles are more prone for coexisting multi-morbidities.*

**Key Words:** multi-morbidity, elderly, determinants, levels, states

## **Introduction**

Around the world, demographic transition, in which reduction in mortality is followed by reduction in fertility, has increased the percentage share of elderly population and decreased the percentage share of child population. The process of ageing of population is expected to intensify in the near future. Globally, there were 703 million persons of age 65 or more in 2019 and it is projected to be doubled in the year 2050 (United Nations, 2019). According to UN report on World Population Ageing, the percentage of the population aged 65 years or over almost doubled from 6 per cent in 1990 to 11 per cent in 2019 in Eastern and South-Eastern Asia. Though this demographic process resulted in positive implication in the society in terms of increased life expectancy, there are certain challenges such as health, economy etc. There is substantial increase in life expectancy across the world due to advancement in medicine and health. Life expectancy was 78 and 68 for developed and developing societies respectively during 2010-15, it is projected to reach 83 and 74 respectively by 2050 (United Nations Population Fund and HelpAge International, 2012). Increase in life expectancy was noticed in 165 out of 193 countries in the world during 1990-2009 and 29 countries having more than one-fifth of the population aged more than 60 years (WHO, 2011). According to 2011 census, India had 8.6 percent of the population above age 60. The share of the elderly population of India is projected to increase to one-fifth of its population by the year 2050 (United Nations Population Division, 2019).

Chronic illness is one of the major causes of mortality and morbidity among the elderly. The prevalence of chronic morbidity increases with increase in proportion of elderly population. Chronic diseases cause medical, social and psychological problems among elderly

population, which would ultimately limit the activities of them (Resnick, 1999; Mobbs, 2011). Research has clearly brought out that there is clear relationship between chronic morbidity and disability among the elderly (Fried et al., 1999; Martin and Schoeni, 2014; Klijs et al., 2011; Parmer and Saikia, 2018). Studies have also found that the prevalence of chronic diseases has significant association with functional disabilities among the elderly (Sherina et al., 2004). Chronic diseases impact the quality of life of the elderly. Increasing proportion of elderly population and the impact of chronic diseases on the quality of life of the elderly call for immediate attention in this dimension.

Multi-morbidity is defined as the coexistence of multiple health conditions in an individual (Uijen and Lisdon, 2008; Fortin et al., 2012; IIPS, 2020), which is a result of decline in mortality combined with ageing population. Multi-morbidity among older adults is a major health problem among the elderly in many countries. Older adults with multi-morbidity are more likely to experience poorer quality of life and death, which creates burden on the health care system. Therefore understanding the patterns, prevalence and factors associated with the prevalence is essential.

Further, socioeconomic characteristics of the elderly play a vital role in influencing the morbid conditions of the elderly. Numerous studies have proved that the relationship between socioeconomic inequalities and health among the older population in developed and developing countries (Jerliu et al., 2013; Mackenbach et al., 2008; WHO, 2008; Kiulia and Mieszkowski, 2007). Ideally, types of chronic morbidities among the elderly differ from women to men. Moreover, longevity too differs by gender. Women live longer than men and therefore, the prevalence and type of chronic diseases are also different for men and women. There are studies which have addressed one chronic morbid condition among men and women. However, there is lack in terms of studies addressing multi-morbidity among elderly by sex. Some hospital based studies have focused on the issue. However, it is important to understand these issues at macro level. The LASI wave 1 data provides information on these aspects at the national level and hence is used for this study. The present study aims to focus on the prevalence of chronic diseases among the elderly in states of India by sex. It also aims at exploring the association between socioeconomic factors and the prevalence of multi-morbidity by sex.

## Data

This study uses data from the Longitudinal Ageing Study in India (LASI) – Wave 1 survey which was conducted in the year 2017-18. The LASI is a biennial panel survey representative of the older and elderly population 45 and above in states and union territories of India. It aims at following a representative sample of the population 45 and above every two years for the next 25 years with refreshment samples for attrition due to death, dislocation, non-contact and refusal. Wave 1 of LASI covered a panel sample of 72250 individuals. The LASI is designed to provide estimates of all reliable health outcomes and social and economic well-being for older adults. The survey adopted multistage stratified area probability cluster sampling design. Information was collected using the following instruments: 1. Household survey schedule, one schedule was administered per HH and the information was collected from one or more knowledgeable adults in the HH, and collected information on household roster, housing and environment, household consumption, household assets and debts, household income and household health insurance. 2. Individual survey schedule was administered to each respondent age 45 and above and their spouses in the sampled households, and was designed to collect information about individuals under following sections: the demographics module, the work, retirement and pension module, the health module, the mental health module, the healthcare services utilization and the healthcare financing module, the family and social networks module, the social welfare schemes module and the experimental modules. 3. Community survey schedule was administered at the village level in rural areas and Census Enumeration Blocks (CEBs) in urban areas. Respondents for this schedule were several key informants such as village-level elected representatives, panchayat staff and government health programme staff and community leaders. Information on population characteristics, infrastructure and common resources, the accessibility and availability of health care resources, and the coverage of health and social welfare programmes. The LASI field survey was conducted across 34 states during April, 2017 to December, 2018.

## Methods

In view of the objectives mentioned earlier in the study, initially, percentage distribution of different types of chronic diseases (hypertension, diabetes, cancer, chronic lung disease, chronic heart disease, stroke, chronic bone/ joint disease, neurological/ psychiatric problem

and high cholesterol) by sex is obtained. An attempt is also made to understand the background characteristics of the respondents by their sex. In the next step, prevalence of single morbidity and multi-morbidity by sex is tabulated for states of India. Finally, the association of background characteristics with the prevalence of single and multi-morbidity is assessed. Multi-morbidity in this study is defined as presence of more than one of the morbidities listed above.

### **Explanatory variables**

Explanatory variables used in the study are:

**Current Age:** Age is a significant predictor for chronic diseases among the elderly. As age increases, risk of chronic morbidity also increases. Studies have found that prevalence of chronic morbidity is higher among the oldest old compared to other older adults (CDC, n.d; Jaul and Barron, 2017). In the present study, age of elderly is categorized as 45-49, 50-54, 55-59, 60-64, 65-69, 70-74 and 75 and above.

**Educational Level:** Educational status of elders is an important determinant in determining the health status. Studies have shown that lower level of educational status is associated with poor health conditions among the elderly. Educational level of respondents is included in the bivariate and multivariate analysis (Categories: Illiterates, primary, secondary and higher).

**Wealth status of the household:** Economic status plays a vital role in the case of prevalence of chronic diseases among the elderly. Studies have shown that hypertension and diabetes are concentrated among economically advanced groups (Zhu et al., 2015; Lai et al., 2019). In the LASI survey, data on consumption expenditure are collected using the abridged version of the consumption schedule of the National Sample Survey (NSS). Sets of 11 and 29 questions on the expenditures on food and non-food items, respectively, was used to canvas the sample households. Food expenditure was collected based on a reference period of seven days, and non-food expenditure was collected based on reference periods of 30 days and 365 days. Food and non-food expenditures have been standardised to the 30-day reference period. The monthly per capita consumption expenditure (MPCE quintile) is computed and used as the summary measure of consumption. The MPCE quintile is used in the analysis with the following categories: Poorest, poorer middle, richer and richest.

**Place of residence:** Earlier research has abundant evidence on the type of place of residence i.e., urban or rural has high correlation with the prevalence of chronic diseases. It is evident from the literature that older adults residing in rural areas are at lower risk of chronic diseases (Singh et al., 2019; Mini, 2014) and therefore is used in the analysis.

**Religion:** Religiosity is an important determinant of health of the elderly. It is found that religion has high bearing on the prevalence of chronic diseases among the elderly (Singh et al., 2019; Himanshu and Talukdar, 2017). Religion of the household is collected in NFHS and is categorized as Hindu, Muslim, Christian and others in the present study.

**Caste:** In India, prevalence of poor health outcomes is observed among the Scheduled Caste (SC) and Scheduled Tribe (ST) elderly compared to other caste groups. Information on caste is divided into four categories: SC, ST, OBC and others and is used in the analysis.

**Living Arrangement:** Living arrangements of the elderly has strong association with health outcomes of the elderly (Agarwal, 2012; Zhang et al., 2017). In this study, the living arrangements of the elderly is categorized as; Living alone, living with spouse and/or others, living with spouse and children, living with children and others, and living with others only.

## Results

Percentage distribution of different types of chronic diseases by sex of the elderly is presented in Table 1. It is found that percentage suffering from hypertension and chronic bone/ joint disease is higher among women whereas percentage suffering from chronic lung disease and chronic heart disease is higher among men than their counterparts. In the case of other chronic diseases, not much variation is observed by sex.

**Table 1: Prevalence of Chronic Disease by Sex**

Type of Chronic Disease	Male	Female
Hypertension	24.7	29.7
Diabetes	13.3	11.2
Cancer	0.5	0.7
Chronic Lung Disease	6.2	4.8
Chronic Heart Disease	4.2	2.8
Stroke	2.4	1.2
Chronic Bone/ Joint Disease	11.3	16.2
Neurological/ Psychiatric problem	2.3	2.1
High Cholesterol	3.2	3.5

**Fig. 1: Prevalence of Different Types of Chronic Diseases among Elderly Men and Women**

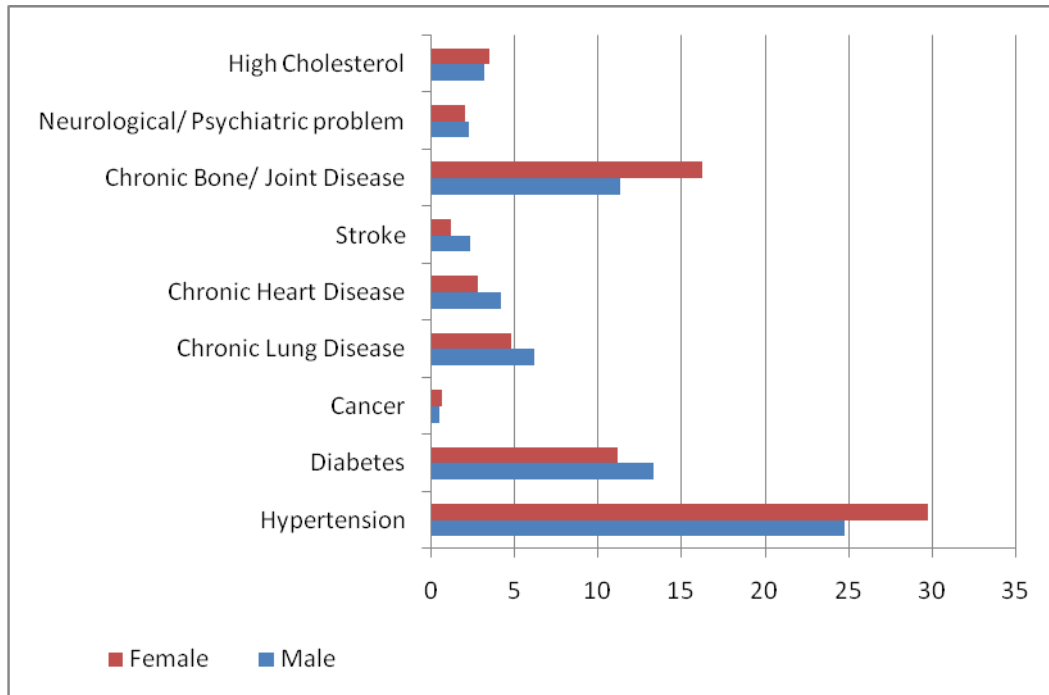


Table 2 presents the sex differentials in background characteristics of the sample respondents. Results show that there is no significant variation by sex as far as the age group of the respondents is concerned. Slightly more than one-third of the respondents live in rural areas irrespective of their sex. It is also evident that nearly two-thirds of women and 88 percent of men are currently married. Results also brought out that percent that are widowed are significantly higher among women than among men. Living with spouse and children is the main type of living arrangement among both men (69 percent) and women (54 percent). Slightly less than one-fourth of women and 8 percent of women live with children and others. Further, 18 percent of men and 13 percent of women live with spouse and/ or others. About three-fourths of both men and women belong to Hinduism and 39 percent belong to other backward caste. Higher percentage of sample women are illiterates compared to that of men. Results revealed that 68 percent of men and 61 percent of women elderly are currently working. No significant differentials are observed by sex in terms of MPCE quintiles.

**Table 2: Background Characteristics of Respondents by Sex**

<b>Age</b>	<b>Male</b>	<b>Female</b>
45-49	19.4	20.7
50-54	16.4	16.8
55-59	14.7	15.8
60-64	15.2	15.7
65-69	14.2	12.9
70-74	9.5	8.1
75 and above	10.6	10.0
<b>Place of Residence</b>		
Rural	65.2	63.8
Urban	34.8	36.2
<b>Marital Status</b>		
Currently Married	87.7	68.6
Widowed	9.1	28.4
Divorced/Separated/ Deserted/ Others	1.0	1.6
Never Married	2.2	1.4
<b>Living Arrangement</b>		
Living alone	1.9	4.1
Living with spouse and/ or Others	17.8	13.0
Living with spouse and Children	68.7	54.4
Living with Children and Others	8.3	23.9
Living with others only	3.3	4.6
<b>Religion</b>		
Hindu	73.6	73.2
Muslim	11.6	12.3
Christian	9.9	10.0
Others	4.9	4.6
<b>Caste/ Tribe</b>		
Scheduled Tribe	17.1	17.4
Scheduled Caste	18	18.0
Other Backward Class	39.1	39.0
None of the above	25.8	25.6
<b>Education</b>		
No Schooling	31.1	56.9
Up to primary level	13.3	9.6
Up to secondary level	15.5	11.9
High school Level	12.7	8.0
Graduate and above	27.5	13.6



<b>Currently Working</b>		
Yes	67.8	60.7
No	32.2	39.3
<b>MPCE Quintile</b>		
Poorest	19.5	19.6
Poorer	20	20.2
Middle	20	20.2
Richer	20.4	20.3
Richest	20.1	19.7

Table 3 presents the prevalence of at least one chronic morbidity among elderly for states of India for men and women. Results revealed that many of the states in India have high prevalence of chronic morbidity among the elderly irrespective of their sex i.e., more than one-fifth of the elderly have one or the other chronic morbidity except few states such as: Chhattisgarh, Arunachal Pradesh, Meghalaya, Nagaland and Dadra and Nagar Haveli. Results also show that except the state of Nagaland, in all other states, the prevalence of Chronic diseases observed to be 20 percent or more among the elderly. In some states, one-third of the elderly population is suffering from one or the other chronic disease.

**Table 3: Prevalence of single chronic morbidity among elderly by sex for states of India**

States/ Union Territory	Single morbidity	
	Male	Female
<b>India</b>	25.6	27.6
<b>North</b>		
Chandigarh	25.0	31.2
Delhi	28.7	28.6
Haryana	31.4	37.7
Himachal Pradesh	25.8	29.3
Jammu and Kashmir	29.4	31.9
Punjab	28.7	32.7
Rajasthan	29.8	29.2
Uttarakhand	29.0	31.2
<b>Central</b>		
Chhattisgarh	16.1	20.0
Madhya Pradesh	20.6	24.4

Uttar Pradesh	22.6	25.5
<b>East</b>		
Bihar	23.2	27.8
Jharkhand	22.7	21.7
Odisha	22.3	24.0
West Bengal	28.6	29.5
<b>Northeast</b>		
Arunachal Pradesh	18.7	17.0
Assam	24.7	29.2
Manipur	23.6	25.6
Meghalaya	16.0	26.3
Mizoram	24.2	24.6
Nagaland	12.6	12.0
Tripura	27.9	28.3
<b>West</b>		
Dadra and Nagar Haveli	18.1	21.5
Daman and Diu	28.8	28.6
Goa	35.6	29.3
Gujarat	24.3	28.0
Maharashtra	28.1	29.5
<b>South</b>		
Andaman and Nicobar	32.9	27.9
Andhra Pradesh	29.6	32.2
Karnataka	22.8	25.7
Kerala	28.4	27.4
Lakshadweep	30.5	26.1
Puducherry	28.3	30.3
Tamil Nadu	28.3	29.5
Telangana	30.1	23.0

The prevalence of multi-morbidity among elderly men and women is presented in Table 4. States such as Chandigarh, Jammu and Kashmir, Punjab, Daman and Diu, Goa, Maharashtra, Andaman and Nicobar, Andhra Pradesh, Kerala, Lakshadweep, Puducherry, Tamil Nadu and Telangana have higher prevalence of chronic multi-morbidity i.e., more than one-fifth of the elderly are suffering from multiple chronic diseases. It is worth mentioning that in the state of Kerala, almost 38 percent of the elderly suffer from more than one chronic condition irrespective of their gender. It is also found that women in the states of Punjab and Jammu and Kashmir have higher risk of being affected with chronic morbidity than men. In other

states, no noticeable difference is found in the case of prevalence of chronic morbidity by sex.

**Table 4: Prevalence of multi-morbidity among elderly by sex for states of India**

States/ Union Territory	Multi-morbidity	
	Male	Female
<b>India</b>	17.5	18.3
<b>North</b>		
Chandigarh	25.7	27.2
Delhi	18.0	20.3
Haryana	14.5	15.1
Himachal Pradesh	17.4	17.8
Jammu and Kashmir	22.1	29.9
Punjab	24.5	30.5
Rajasthan	14.4	14.3
Uttarakhand	16.5	16.2
<b>Central</b>		
Chhattisgarh	8.2	6.3
Madhya Pradesh	10.6	11.8
Uttar Pradesh	10.7	11.2
<b>East</b>		
Bihar	13.2	15.3
Jharkhand	10.7	8.1
Odisha	12.7	11.5
West Bengal	24.4	27.0
<b>Northeast</b>		
Arunachal Pradesh	9.1	4.7
Assam	10.4	8.8
Manipur	13.3	9.8
Meghalaya	3.0	7.2
Mizoram	11.4	10.1
Nagaland	4.1	3.7
Tripura	14.7	13.4
<b>West</b>		
Dadra and Nagar Haveli	12.0	14.1
Daman and Diu	27.1	24.8
Goa	23.9	26.0
Gujarat	15.9	17.8
Maharashtra	20.8	20.0
<b>South</b>		

Andaman and Nicobar	22.8	25.8
Andhra Pradesh	24.9	22.3
Karnataka	16.9	17.3
Kerala	37.0	39.7
Lakshadweep	28.7	31.7
Puducherry	29.0	30.5
Tamil Nadu	24.5	23.6
Telangana	22.4	21.5

Association of background characteristics with the prevalence of morbidity is well established in the literature. In this study, an attempt is made to establish the relationship between background characteristics and the prevalence of morbidity viz., prevalence of single morbidity and coexistence of more than one chronic morbidities. In this context, table 5 presents the percent distribution of male and female elderly by their background characteristics. It is noted that increase in age increased the risk of chronic morbidity irrespective of their gender. Though living in urban area found to have negative impact on the health of the elderly, the difference observed to be very less for both men and women elderly. Results show that marital status has strong association with the prevalence of single morbidity and significant differentials are noted between men and women. Women who are widowed and women who are divorced or separated or deserted are at high risk of chronic morbidity compared to their men counterparts. It is seen that differentials by educational level of the elderly, religion and caste in the case of prevalence of one or the other chronic disease do not exist for both men and women. It is surprising to note that non-working elderly have higher chances of being affected with the chronic morbidity as compared to their working counterparts irrespective of their gender. Though slight increase in the prevalence of chronic morbidity is noticed as the MPCE quintile moves upwards from poorest to the richest, there is no strong association found.

**Table 5: Prevalence of single morbidity among elderly by background characteristics for men and women**

Background Characteristics	Single morbidity	
	Male	Female
<b>Age</b>		
45-49	20.1	25.8
50-54	24.2	29.1

55-59	25.5	29.5
60-64	26.2	28.8
65-69	28.8	31.1
70-74	29.1	31.2
75 and above	30.3	30.9
<b>Place of Residence</b>		
Rural	24.0	26.7
Urban	28.6	29.3
<b>Marital Status</b>		
Currently Married	25.6	26.2
Widowed	27.1	30.9
Divorced/Separated/ Deserted/ Others	20.4	31.1
Never Married	23.5	26.5
<b>Living Arrangement</b>		
Living alone	23.0	31.0
Living with spouse and/ or Others	27.6	27.1
Living with spouse and Children	25.1	26.0
Living with Children and Others	26.3	31.1
Living with others only	25.7	28.0
<b>Religion</b>		
Hindu	25.7	27.8
Muslim	27.2	29.8
Christian	20.9	22.5
Others	30.0	29.9
<b>Caste/ Tribe</b>		
Scheduled Tribe	24.9	29.2
Scheduled Caste	20.1	20.6
Other Backward Class	26.5	28.8
None of the above	28.0	29.6
<b>Education</b>		
No Schooling	23.7	27.4
Up to primary level	25.5	29.6
Up to secondary level	26.0	28.7
High school Level	24.8	26.3
Graduate level and above	27.9	27.3
<b>Currently Working</b>		
Yes	23.4	24.2
No	30.2	31.5
<b>MPCE Quintile</b>		
Poorest	21.8	24.1
Poorer	24.6	27.3

Middle	26.0	28.4
Richer	27.3	29.2
Richest	28.2	29.1

Table 6 provides the percentage distribution of elderly men and women suffering from more than one chronic condition by their background characteristics. It is observed that percentage suffering from more than one chronic morbidities observed to be higher among women than among men. As seen in the case of single morbidity, higher the age, higher is the risk of suffering from multi-morbidity. There is no strong association found between place of residence and the prevalence of multiple chronic morbidity. Living arrangement of the elderly and educational level do not show any significant association with the prevalence of coexisting multiple chronic morbidities. Elderly belonging to Muslim religion are more prone for multiple chronic conditions irrespective of their gender, followed by “others”, Hindus and Christians. Further, elderly belonging to other than SC, ST and OBC have higher chances of suffering from multiple chronic morbidities. Non-working elderly are at high risk of multiple chronic morbidities than working elderly. Results have also shown that elderly belonging to richer and richest MPCE quintiles are more prone for coexisting multi-morbidities.

**Table 6: Prevalence of multi-morbidity among elderly by background characteristics for men and women**

Background Characteristics	Multi-morbidity	
	Male	Female
<b>Age</b>		
45-49	8.5	11.6
50-54	12.3	16.2
55-59	15.7	20.2
60-64	19.3	23.9
65-69	23.8	26.2
70-74	25.9	29.4
75 and above	26.2	26.8
<b>Place of Residence</b>		
Rural	14.2	14.3
Urban	23.7	25.4
<b>Marital Status</b>		
Currently Married	17.5	15.9
Widowed	18.5	24.4
Divorced/Separated/ Deserted/ Others	14.2	16.2

Never Married	16.1	19.8
<b>Living Arrangement</b>		
Living alone	16.8	21.3
Living with spouse and/ or Others	21.4	20.5
Living with spouse and Children	16.5	14.8
Living with Children and Others	19.4	23.6
Living with others only	13.6	24.0
<b>Religion</b>		
Hindu	17.1	17.2
Muslim	22.1	26.3
Christian	14.1	14.8
Others	19.1	22.7
<b>Caste/ Tribe</b>		
Scheduled Tribe	15.3	15.7
Scheduled Caste	10.0	10.3
Other Backward Class	18.4	19.0
None of the above	22.3	23.8
<b>Education</b>		
No Schooling	13.3	15.8
Up to primary level	15.9	22.6
Up to secondary level	18.6	22.0
High school level	16.2	20.5
Graduate and above	23.0	21.4
<b>Currently Working</b>		
Yes	11.7	9.1
No	29.6	23.7
<b>MPCE Quintile</b>		
Poorest	11.8	13.1
Poorer	14.6	15
Middle	16.2	18.1
Richer	20.0	20.3
Richest	24.8	25.1

## Discussion

The study clearly brought out that percentage suffering from hypertension and chronic bone/ joint disease is higher among women whereas percentage suffering from chronic lung disease and chronic heart disease is higher among men than their counterparts. Many of the states in India have high prevalence of chronic morbidity among the elderly irrespective of their sex.

States such as Chandigarh, Jammu and Kashmir, Punjab, Daman and Diu, Goa, Maharashtra, Andaman and Nicobar, Andhra Pradesh, Kerala, Lakshadweep, Puducherry, Tamil Nadu and Telangana have higher prevalence of chronic multi-morbidity i.e., more than one-fifth of the elderly are suffering from multiple chronic diseases. Women in the states of Punjab and Jammu and Kashmir have higher risk of being affected with chronic morbidity than men.

Two way association between background characteristics and the prevalence of single and multi-morbidity brought out the following findings: increase in age increased the risk of chronic morbidity viz., both single morbidity and multi-morbidity irrespective of their gender. Marital status appeared to be a strong indicator associated with the prevalence of one or the other chronic morbidity. Women who are widowed and women who are divorced or separated or deserted are at high risk of chronic morbidity compared to their men counterparts. Non-working elderly, both men and women have higher chances of being affected with the chronic morbidity as compared to their working counterparts. Elderly belonging to Muslim religion are more prone for multiple chronic conditions than their counterparts irrespective of the gender. Results have also shown that elderly belonging to richer and richest MPCE quintiles are more prone for coexisting multi-morbidities.

It is evident from the literature as well as from the present study that age is an important factor in determining the chronic morbidity among the elderly. Therefore it is important to take steps to create awareness about importance of physical activeness and diet intake during adulthood and entry to the old age. Findings revealed that type of chronic diseases that men and women suffering from is different. However, with the analysis on the prevalence of any one of the chronic diseases and coexistence of more than one chronic disease do not reveal any significant difference by gender, which means that disaggregate analysis by each chronic condition would provide a bigger picture. It is also noted that work status of the elderly appears to be an important characteristic affecting the existence of chronic morbidity among the elderly. There is a possibility of causal relationship with this association. Elderly may not be working due to their chronic diseases and vice versa.

Based on the findings from this study, it is suggested that health system should be up to date to reduce the multi-morbid deaths and there should be a clear plan to handle the



multi-morbidity among the elderly. It is also vital that there is scope for more research how some chronic condition occur together, which would provide a clear idea to make the health system ready to face the challenge. Though government has introduced many programs such as Rashtriya Vayoshri Yojna, Pradhan Mantri Vaya Vandana Yojana (PMVVY), National Programme for the Health Care of the Elderly, Varistha Medclaim Policy, Varishtha Pension Bima Yojana, Pradhan Mantri Jan Arogya Yojana, Senior Citizens Welfare Fund, Indira Gandhi National Old Age Pension Scheme, which focus on safety and security of the life of the elderly, awareness among the elderly appear to be less. Therefore, awareness on schemes that focus on the elderly should be created in order to make the senior citizens of our country to lead a quality life.

## References

- Agarwal, S. (2017). "Effect of living arrangement on the health status of elderly in India: Findings from a national cross sectional survey", *Asian Population Studies*, Vol. 8, No. 1, pp. 87-101.
- Center for Disease Control and Prevention. (2020). Chronic diseases and cognitive decline – A public health issue, Center for Disease Control and Prevention. <https://www.cdc.gov/aging/publications/chronic-diseases-brief.html>.
- Fortin, M., Stewart, M., Poitras, M., Almirall, J. and Maddocks, H. (2012). "A systematic review of prevalence studies on multimorbidity: Toward a more uniform methodology", *Annals of Family Medicine*, Vol. 10, No. 2, pp. 142-151.
- Fried, L.P., Bandeen-Roche, K., Kasper, J.D. and Guralnik, J.M. (1999). "Association of comorbidity with disability in older women: the Women's health and aging study", *Journal of Clinical Epidemiology*, Vol. 52, pp. 27-37.
- Himanshu, H. and Talukdar, B. (2017). "Prevalence of multimorbidity (Chronic NCDS) and associated determinants among the elderly in India", *Demography India*, Special Issue, pp. 69-76.
- International Institute for Population Sciences (IIPS), National Programme for Health Care of Elderly (NPHCE), MoHFW, Harvard T.H. Chan School of Public Health (HSPH) and the University of Southern California (USC). (2020). *Longitudinal ageing study in India (LASI), Wave I, 2017-18, India Report*. International Institute for Population Sciences, Mumbai.

- Jaul, E. and Barron, J. (2017). "Age-related diseases and clinical and public health implications for the 85 years old and over population", *Frontiers in Public Health*, Vol. 5, No. 335, pp. 1-7.
- Jerliu, N., Ervin, T., Burazeri, G., Ramadani, N. and Brand, H. (2013). "Prevalence and socioeconomic correlates of chronic morbidity among elderly people in Kosovo: a population-based survey", *BM Geriatrics*, Vol. 13, No. 22, pp.1-9.
- Kiuiila, O. and Mieszkowski, P. (2007). "The effects of income, education and age on health", *Health Economics*, Vol. 16, No. 8, pp. 781-798.
- Lai, S., Shen, C., Yang, X., Zhang, X., Xu, Y., Li, Q., Gao, J. and Zhou, Z. (2019). "Socioeconomic inequalities in the prevalence of chronic diseases and preventive care among adults aged 45 and older in Shaanxi Province, China", *BMC Public Health*, Vol. 19, No. 1460, pp. 1-12.
- Mackenbach, J.P., Stirbu, I., Roskam, A.J., Schaap, M.M., Menvielle, G., Leinslaui, M. and Kunst, A.E. (2008). "Socioeconomic inequalities in health in 22 European countries", *The New England Journal of Medicine*, Vol. 358, pp. 2468-2481.
- Martin, L.G. and Schoeni, R.F. (2014). "Trends in disability and related chronic conditions among the forty-and-over population: 1997–2010", *Disability and Health Journal*, Vol. 7, No. 1, S4–S14.
- Mini, G.K. (2014). "Patterns and correlates of chronic non-communicable diseases among older adults in selected states of India", Building Knowledge Base on Population Ageing in India, Working Paper – Vol. 3, No. 2, New Delhi: UNFPA.
- Mobbs, C. (2011). *The Merck Manual of Geriatrics*. Available from: [http://www.merck.com/pubs/mm\\_geriatrics/sec2/ch2.htm](http://www.merck.com/pubs/mm_geriatrics/sec2/ch2.htm).
- Parmer, M.C. and N. Saikia. (2018), "Chronic morbidity and reported disability among older persons from the India Human Development Survey", *BMC Geriatrics*, Vol. 18, No. 299.
- Resnick, N.M. (2000). *Geriatric Medicine. Current Medicine and Treatment* (Eds. Tierney, L.M., McPhee, S.J. and Papadakis, M.A.), Appleton & Lange, USA, 39th Edition, 1999, pp. 47-70.
- Sherina, M.S., Rampal, L. and Mustaqim, A. (2004). "Factors associated with chronic illness among the elderly in a rural community in Malaysia", *Asia Pacific Journal of Public Health*, Vol. 16, No. 2, pp. 109-114.
- Singh, P.K., Singh, L., Dubey, R., Singh S. and Mehrotra, R. (2019). "Socioeconomic determinants of chronic health diseases among older Indian adults: A nationally representative cross-sectional multilevel study", *BMJ Open*, Vol. 9, No. 9, pp. 1-12.

- Uijen, A.A. and Van de Lisdon, E.H. (2008). "Multimorbidity in primary care: prevalence and trend over the last 20 years", *European Journal of General Practice*, Vol. 14, No. 1, pp. 28-32.
- United Nations Population Fund and HelpAge International. (2012). Ageing in the twenty first century: A celebration and a challenge. United Nations Population Fund and HelpAge International, New York.
- United Nations. (2019). World Population Ageing 2019: Highlights. Department of Economic and Social Affairs, Population Division.
- United Nations. (2019). World Population Prospects, 2019: Data Booklet (ST/ESA/SER.A/397). Department of Economic and Social Affairs, Population Division, United Nations, New York.
- World Health Organization. (2008). Closing the gap in a generation: health equity through action on the social determinants of health. Final report of the Commission on Social Determinants of Health. Commission on Social Determinants of Health, Geneva.
- World Health Organization. (2011). World Health Statistics., WHO Press, Geneva, Switzerland.
- Zhang, L., Zeng, Y. and Fang, Y. (2017). "The effect of health status and living arrangements on long term care models among older Chinese: A cross-sectional study", *PLOS One*, Vol. 12, No. 9, pp. 1-15.
- Zhu, S., Hu, J., McCoy, T.P., Li, G., Zhu, J., Lei, M., Yuan, J., Peng, J. and Kong, L. (2015). "Socioeconomic status and prevalence of type 2 diabetes among adults in Northwest China", *Diabetes Education*, Vol. 41, No. 5, pp. 599-608.

## Prevalence of Hypertension and Diabetes among the Middle-Aged in Punjab: A Study Based on Socio-Economic Background

Rajesh Kumar Aggarwal<sup>1</sup> and Aswini Kumar Nanda<sup>2</sup>

### Abstract

*It is a well-known fact that among the non-communicable diseases (NCDs), especially cardiovascular diseases, prevalence of hypertension and diabetes emerge as major causes for mortality as well as morbidity. The present paper aims to study the prevalence of both these diseases among the middle aged (35-49 in case of women, 35-54 in case of men) by their socio-economic backgrounds namely the place of residence, caste, religion, education, occupation, wealth index, immovable assets ownership (both house and land), personal habits, and body mass index (BMI). Based on National Family Health Survey (NFHS-4) unit level data analysis, the paper highlights that in Punjabi society, socio-economic transition is occurring very fast. Among other things, the study found that 35+ population accounts for major portion of prevalence for these two diseases. Not only the study found inter-district variations in prevalence of diabetes and prevalence of hypertension but also reveals that onset of hypertension starts at age 25+ while the onset of diabetes starts from age 30+, irrespective of the sex of the respondent. Though caste, religion, education or occupation did not show any significant variations in prevalence of these diseases yet the prevalence of diabetes was higher among richer and richest class categories among both sexes. Ownership of house/land reduced prevalence of these diseases to a certain extent. Regarding personal habits and prevalence of diabetes and hypertension, contrary to the popular belief, men who were smokers or drinkers did not show a higher prevalence of diabetes or hypertension in Punjab. Women sample size for smoking and drinking was insignificant to come to any conclusions. Body Mass Index (BMI) had a direct and significant relationship as prevalence level of both these diseases increases significantly among the overweight and obese people. Thus, the paper help in setting the baseline and identifying various socio-economic groups which are more likely to suffer from diabetes or hypertension. Conclusions arrived at might be useful in future planning and management of these disease in a more systematic and robust manner.*

**Keywords:** Cardio-vascular diseases, prevalence of hypertension, prevalence of diabetes, NFHS-4, Caste, religion, landholding, BMI, education and occupation, smoking, drinking, socio-economic groups

1. Director (Acting), Centre for Research in Rural and Industrial Development (CRRID) and Associate Professor, Population Research Centre (PRC), CRRID, Chandigarh 160019 Email: aggarwalrka@yahoo.com
2. Professor, Population Research Centre (PRC), Centre for Research in Rural and Industrial Development (CRRID), Chandigarh 160019 Email: akn\_aswini@yahoo.co.in

## Introduction and background

Hypertension and Diabetes are two most commonly prevalent non-communicable diseases worldwide, including the developing countries. Hypertension is one of the major risk factors for cardio-vascular disorders (CVDs) and stroke; and its burden increasing disproportionately in developing countries as they undergo demographic transition. It is responsible for 57 percent of stroke deaths and 24 percent of coronary heart diseases deaths in India. Hypertension affects nearly 26 percent of the entire population globally. Age, educational status; economic status, level of physical activity, alcohol consumption and body mass index (BMI) were significant factors affecting hypertension. (Bamrara et al., 2013) In India, the hypertension prevalence rates have increased rapidly (about 30 times for urban residents and about 10 times for rural residents) during the past three decades. Sidhu et al. (2005) found hypertension prevalence of 20 percent among adult Punjabi females aged 20-60 years. They found significant influence of some socio-demographic variables namely age, income, education and caste. Bansal et al. (2012) identify the prevalence and risk factors for hypertension in a rural community in north-east India (all residents of a village in Uttarakhand province) and found that rates of hypertension in rural community were quite similar to those seen in high-income households and urban India. Devgan, et al. (2016) studied a cross-section adults aged 30+ years under a Primary Health Centre (PHC) in Pathankot District of Punjab. The study found 25 percent sampled respondents to be hypertensive with nearly 50 percent among them to be known hypertensive. Increase in age, family size, occupation, alcohol use, smoking, obesity, tobacco chewing and diabetes mellitus have been found to be significantly correlated with prevalence of hypertension. Mitra, et al. (2017) found that all the risk factors of lifestyle are known to cause the early onset and rapid worsening of hypertension. The study found that the chances of hypertension are directly proportional to age and shows peak between 50-59 years of age. Hypertension prevalence rate was the highest among respondents with BMI >30. The prevalence of hypertension was slightly higher among smokers than non-smokers and among vegetarians than non-vegetarians. The study points out the necessity to adopt a lifestyle with regular physical activity for at-least 30 min a day, for 5 days of the week, to decrease prevalence of obesity and to maintain BMI within normal range. Kaur and Walia (2018) obtained information about diet and physical activity from 1,200 young adult unmarried females aged 18-40 years from both the rural and urban areas in the States of Haryana and Punjab and found that Body Mass

Index (BMI) and Waist Circumference (WC) are important indicators of hypertension. The young female population had shown high salt and fat intake with sedentary life-style leading to disturbance of anthropometric parameters. Acharya, et al. (2019) points out that Punjab had 157 percent higher per person burden from diabetes, 134 percent higher burden from ischaemic heart disease, 49 percent higher burden from stroke and 56 percent higher burden from road injuries. Consistent with these findings, Punjab had substantially higher levels of cardiovascular risks as compared to many other states is evident from an ICMR, PHFI and IHMEI report of 2017. All of these risks are generally higher in males than in females and even treatment seeking was higher among males than females.

The review of literature found similar trends for prevalence of diabetes. Ramachandran and Snehalatha (2009) estimated the prevalence of diabetes among adults to be nearly 20 percent and 10 percent for urban and rural areas respectively. Singh et al. (2012) studied prevalence of diabetes among elderly persons and found that one-third of the diabetic participants were aware of their condition, two-thirds of these were on treatment and three-fourths of those on treatment had controlled fasting blood sugar level. Goswami et al. (2016) shows the prevalence of diabetes and hypertension among elderly persons are associated with socio-demographic variables. Conducting a cross-sectional study in a resettlement colony of South-East Delhi, they found that from among the diabetes patients, 62 percent were on treatment and 34 percent were under control while among the hypertensive patients, 41 percent were under treatment but only one-third of them had their blood pressure under control. Kansra (2018) says that despite 96 percent awareness about diabetes, the women had misconceptions about vaccine and treatment. A comprehensive review of literature invariably shows that prevalence of hypertension and diabetes in Punjab was higher with influence of socio-economic factors. However, on methodology front, most of these studies were ad hoc in nature with inadequate sampling and covered only small areas.

### **Objectives**

The paper aims to find out the prevalence of hypertension and diabetes among the middle aged (women aged 35-49 and men aged 35-54) by their socio-economic backgrounds namely the place of residence, caste, religion, education, occupation, wealth index, immovable assets ownership (both house and land), personal habits, and body mass index (BMI). It also examines in brief the inter-district variations (if any).

## Methodology

The paper is based on unit level data provided by National Family Health Survey-4 (NFHS-4, 2015-16), a national level data collected under the auspices of the Ministry of Health and Family Welfare, Government of India. NFHS is a large-scale representative households survey at state-level throughout the India. NFHS-4 interviewed 19,484 women aged 15-49 years and 3,250 men aged 15-54 years in the State of Punjab. After examining the age-wise and sex-wise details about prevalence of diabetes and hypertension in Punjab (Table 1), it was understood that both hypertension and diabetes were more prevalent among the population aged 35 and above. Since the broad objective of the paper was to examine the prevalence of these diseases among middle aged, the paper is based on data belonging to women aged 35-49 years and men aged 35-54 years, which essentially constitutes Middle Ages in an individual's life span. Thus, from the entire unit level data-sets, a sub-sample has been culled consisting of 7,266 middle aged women and 1,247 middle aged men.

## RESULTS

### Prevalence of diabetes and hypertension by sex and age

Table 1 shows prevalence of diabetes and hypertension by sex and age, and found that nearly all the diabetes prevalence was among 35+ age-group (80% among men and 84% among the women), Similarly, nearly two-thirds (65% among women and 63% among men) was for respondents aged 35+. Further, the data clearly indicate that onset of hypertension starts at the age 25+ while the onset of diabetes starts from age 30+, irrespective of the sex.

**Table 1**  
**Prevalence of diabetes and hypertension classified by sex and age, Punjab, 2015-16**

Age-group	Women				Men			
	Yes	No	Don't know	N	Yes	No	Don't know	N
<b>Prevalence of diabetes</b>								
15-19	2.1	20.4	13.9	2670	2.0	15.2	0.0	488
20-24	1.8	12.2	16.9	3250	0.0	17.1	0.0	545
25-29	5.1	4.1	17.5	3354	3.9	16.8	0.0	540
30-34	11.2	14.3	15.2	2944	9.8	13.3	0.0	430
35-39	11.2	12.2	14.0	2716	15.7	12.1	0.0	395
40-44	25.4	20.4	11.9	2366	15.7	9.9	25.0	325

45-49	43.2	16.3	10.6	2184	25.5	9.1	25.0	304
50-54	-	-	-	-	27.5	6.5	50.0	223
Total	100.0	100.0	100.0	19484	100.0	100.0	100.0	3250
<b>Prevalence of hypertension</b>								
15-19	2.6	15.1	-	2670	2.2	16.1	-	477
20-24	6.2	18.0	-	3250	7.3	17.7	-	538
25-29	11.7	17.9	-	3354	12.4	17.2	-	536
30-34	14.4	15.2	-	2944	15.3	13.1	-	425
35-39	17.7	13.5	-	2716	15.6	11.9	-	392
40-44	22.7	10.8	-	2366	13.5	9.6	-	317
45-49	24.7	9.4	-	2184	19.6	8.4	-	299
50-54	-	-	-	-	14.2	6.1	-	218
PUNJAB	100.0	100.0	-	19484	100.0	100.0	-	3202

Source: Self calculation from NFHS-4, Punjab data-set

## Middle-aged and prevalence

### District level variations

Table 2 shows the district-wise prevalence of diabetes and hypertension in the State of Punjab. The mean prevalence of diabetes at 3.6 percent among middle-aged women and 3.4 percent among the middle-aged men was nearly similar. Eight districts (Kapurthala, SBS Nagar, Ludhiana, Rupnagar, Moga, Amritsar, Gurdaspur and Fatehgarh Sahib) shows higher prevalence levels of diabetes among the women (3.8-6.6%) compared to the State whereas all the remaining 12 districts showed low prevalence of diabetes compared to the State average. Mansa (0.8%) and Barnala (2.0%) had lowest diabetes prevalence rates among the women. On the other hand, the prevalence rate of diabetes among men aged 35-54 years shows that six districts (SAS Nagar, Bathinda, SBS Nagar, Jalandhar, Mansa and Amritsar) had high diabetes prevalence level (3.6-10.7%) compared to Punjab, one district namely Ludhiana was similar to state average while the remaining 12 districts showed a lower prevalence rate than the state average. levels. The prevalence rates were lower than State average for some districts irrespective of sex of the respondents (Barnala, Patiala, Sangrur, Gurdaspur, Hoshiarpur, Muktsar, Moga, Faridkot and Tarn Taran). Interestingly, a few districts (SAS Nagar, Bathinda and Mansa) showed exactly opposite findings for men and women.

Similarly, prevalence of hypertension shows that only six districts (Faridkot, Jalandhar, Sangrur, Bathinda, Moga, and Fatehgarh Sahib) had lower prevalence levels than Punjab among women (13-17%), five districts (Firozpur, Gurdaspur, Barnala, Mansa and SBS Nagar) were at the state average (20%) and nine districts (Hoshiarpur, Kapurthala, Amritsar,



Patiala, Rupnagar, Muktsar, Ludhiana, Tarn Taran and SAS Nagar) had higher prevalence levels (21-28%). It is important to note that state average for prevalence of hypertension for men (14%) was much lower compared to women (20%). While some districts (Gurdaspur, Patiala, Hoshiarpur, Moga, Sangrur, Faridkot and Jalandhar) reported a single digit prevalence level (6-9%), three districts (Fatehgarh Sahib, Barnala and Bathinda) also reported a lower prevalence (10-13%) while rest of the districts (Kapurthala, Amritsar, SBS Nagar, SAS Nagar, Mansa, Ludhiana, Firozpur, Tarn Taran, Rupnagar and Muktsar) reported higher prevalence levels (15-25%) compared to the state average.

**Table 2**

**District-wise prevalence of diabetes and hypertension among middle aged Women and men, Punjab, 2015-16**

District	WOMEN				MEN			
	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)	N
Gurdaspur	3.8	339	19.5	334	2.0	50	6.1	49
Kapurthala	6.6	396	21.2	396	2.7	74	14.9	74
Jalandhar	2.8	392	13.3	392	4.7	64	9.4	64
Hoshiarpur	3.5	345	21.2	344	2.1	48	6.7	45
Sangrur	3.2	347	14.5	345	2.0	50	8.0	50
Fatehgarh Sahib	3.8	341	17.5	326	0.0	43	10.0	40
Ludhiana	5.1	351	25.6	348	3.4	59	17.2	58
Moga	4.9	345	15.7	345	2.9	70	7.1	70
Firozpur	3.4	382	19.2	381	2.7	73	20.5	73
Muktsar	2.3	349	24.4	349	2.7	73	24.7	73
Faridkot	2.9	374	13.1	374	3.1	65	9.2	65
Bathinda	3.0	400	14.8	400	5.6	71	12.7	71
Mansa	0.8	361	20.5	361	4.7	64	17.2	64
Patiala	3.2	371	22.8	369	1.5	65	6.3	64
Amritsar	4.7	383	22.3	382	3.9	76	15.8	76
Tarn Taran	2.7	374	26.5	374	3.2	62	22.6	62
Rupnagar	5.0	363	23.4	355	3.6	55	23.5	51
SAS Nagar	3.6	333	28.1	306	10.7	56	16.7	48
SBS Nagar	5.1	369	20.5	366	4.8	63	15.9	63
Barnala	2.0	351	20.0	350	1.5	66	12.1	66
PUNJAB	3.6	7266	20.1	7197	3.4	1247	14.1	1226

Source: Self calculation from NFHS-4 (2015-16), Punjab data-set

### Place of residence

Prevalence of diabetes among middle aged women in urban areas was higher (4.3%) compared to rural areas (3.2%). On the contrary, the prevalence of hypertension among middle aged women was higher in rural areas (21.5%) compared to urban areas (17.9%). Among middle aged men, urban men showed higher prevalence of diabetes (3.6%) compared to men in rural areas (3.3%). Surprisingly, men in rural areas showed a similar trend to women with higher prevalence rate of hypertension in rural areas (14.7%) as compared to men in urban areas (13.2%).

**Table 3**  
**Prevalence of diabetes and hypertension by place of residence among middle aged women (35-49) and men (35-54), Punjab, 2015-16**

Caste	Women				Men			
	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)
Urban	2773	4.3	2736	17.9	497	3.6	484	13.2
Rural	4493	3.2	4461	21.5	750	3.3	742	14.7
PUNJAB	7266	3.6*	7197	20.1	1247	3.4*	1226**	14.1

\*- excludes 24 cases and 4 cases (with response don't know) for women and men respectively.

\*\* - Excludes missing system cases (21)

Source: Self calculation from NFHS-4, Punjab data-set

### Caste

Table 4 lists the prevalence of diabetes and hypertension across different caste groups namely scheduled castes, other backward castes (OBC) and general. So far as prevalence of diabetes among middle-aged women is concerned, there is hardly any noticeable difference. However, among the middle-aged men prevalence of diabetes was higher in case of general caste men (4.1%) as compared to the scheduled castes men (3.2%) and other backward classes men (2.5%). Further, among the women, hypertension shows no major differentials among castes but prevalence was higher among general caste men (16.3%) compared to scheduled caste men (13.5%) and OBC men (10.0%).

**Table 4****Caste-wise prevalence of diabetes and hypertension among middle aged women (35-49) and men (35-54), Punjab, 2015-16**

Caste	Women				Men			
	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)
Schedule caste	2622	3.7	2606	19.8	441	3.2	437	13.5
Schedule tribe	8	0.0	8	50.0	0	0.0	0	0.0
OBC	1329	3.5	1311	20.1	240	2.5	231	10.0
None of them	3302	3.6	3267	20.2	565	4.1	0	0.0
Don't know	2	0.0	2	0.0	0	0.0	557	16.3
PUNJAB	7263	3.6*	7194**	20.1	1246	3.5	1225	14.1

Notes:

\* - excludes 24 cases and 4 cases (with response don't know) for women and men respectively.

\*\* - Excludes missing system cases (3) in case of caste of women and 1 case in case of men, and another 69 cases when women did not report hypertension and four and 21 cases when men did not report diabetes and hypertension respectively.

Source: Self calculation from NFHS-4, Punjab data-set

**Religion**

Table 5 shows the prevalence of diabetes and hypertension across different religious-groups namely Hindus, Muslims, Christians and Sikhs. As the sample size is very less for other groups, we have analyzed mainly two major religious groups of Punjab, i.e., Hindus and Sikhs. The prevalence of diabetes among middle aged women was slightly high for Hindus (3.9%) as compared to Sikhs (3.6). Contrary to these findings, the prevalence of diabetes among Sikh men in middle-ages was higher (3.7%) as compared to their counterparts Hindus (3.3). However, so far as the prevalence of hypertension among middle aged men and women are concerned, Sikhs had higher prevalence of hypertension than Hindus (21.0 percent as against 18.6% among females and 15.3% as against 12.9% among men).

**Table 5****Religion -wise prevalence of diabetes and hypertension among middle aged women (35-49) and men (35-54), Punjab, 2015-16**

District	Women				Men			
	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)
Hindu	2489	3.9	2456	18.6	453	3.3	443	12.9
Muslim	104	1.0	104	17.3	23	0.0	23	13.0
Christian	63	3.2	62	17.7	19	0.0	19	0.0
Sikh	4602	3.6	4567	21.0	750	3.7	739	15.3
Buddhist/Neo-Buddhist	1	0.0	1	0.0	1	0.0	1	0.0
Jain	5	0.0	5	40.0	0	0.3	0	0.0
Parsi/Zoroastrian	1	0.0	1	0.0	0	0.0	0	0.0
No religion	1	0.0	1	0.0	1	0.0	1	0.0
PUNJAB	7266	3.6	7197	20.1	1247	3.4	1226	14.1

Source: Self calculation from NFHS-4, Punjab data-set

**Education**

Table 6 depicts that there is no visible relationship between education of women and prevalence of diabetes or hypertension. However, among men, more educated respondents showed higher diabetes prevalence compared to less educated though no such trend was visible in case of prevalence of hypertension.

**Table 6****Prevalence of diabetes and hypertension among middle aged women (35-49) and men (35-54) classified by education, Punjab, 2015-16**

District	Women				Men			
	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)
No education	2154	3.4	2141	19.4	241	1.7	239	12.1
Primary	1063	4.0	1054	22.6	121	2.5	118	16.1
Secondary	3312	3.7	3278	20.6	734	4.0	721	14.8
Higher	737	3.1	724	16.0	151	4.6	148	12.2
PUNJAB	7266	3.6	7197	20.1	1247	3.4	1226	14.1

Notes:

\*- excludes 24 cases and 4 cases (with response don't know) for women and men respectively.

\*\*- Excludes missing system cases (3) in case of caste of women and 1 case in case of men, and another 69 cases when women did not report hypertension and four and 21 cases when men did not report diabetes and hypertension respectively.

Source: Self calculation from NFHS-4, Punjab data-set

### Occupation

Likewise, table 7 shows no direct relationship between occupation and prevalence of diabetes or hypertension, both among men and women.

**Table 7**

**Prevalence of diabetes and hypertension among middle aged women (35-49) and men (35-54) classified by occupation, Punjab, 2015-16**

District	Women				Men			
	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)
Not working/no profession	860	4.8	842	18.4	31	(9.7)	31	(25.8)
Professional/technical/managerial	38	0.0	36	13.9	95	(2.1)	93	(14.0)
Clerical	5	0.0	5	(40.0)	35	(8.6)	32	(28.1)
Sales	8	0.0	8	0.0	163	(3.1)	161	14.3
Agricultural	31	(6.5)	31	(25.8)	359	(3.6)	355	14.4
Services(household and domestic)	35	(5.7)	35	(28.6)	68	(5.9)	67	(7.5)
Skilled and unskilled manual	114	(5.3)	113	23.0	496	(2.6)	487	13.1
Don't know	2	0.0	2	0.0	0	0.0	0	0.0
Total	1093	4.7	1072	19.2	1247	3.4	1226	14.1

Notes:

\*- Excludes 24 cases and 4 cases (with response don't know) for women and men respectively.

\*\*- Excludes missing system cases (6173) in case of house ownership by women and prevalence of diabetes, and (6194) missing cases in case of house ownership for women and 21 missing cases for men for reporting hypertension.

( ) sample size too small to analyze

Source: Self calculation from NFHS-4, Punjab data-set

### Wealth Index

The prevalence of diabetes was higher among richer and richest class categories compared to other wealth index groups. Likewise, the prevalence of hypertension was higher among the middle, richer and richest class both among, men and women.

Table 8

**Prevalence of diabetes and hypertension among middle aged women (35-49) and men (35-54) classified by wealth index, Punjab, 2015-16**

District	Women				Men			
	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)
Poorest	48	0.0	48	16.7	13	0.0	13	(15.4)
Poorer	219	3.2	217	10.6	35	0.0	35	8.6
Middle	723	1.9	719	18.4	155	1.9	154	14.9
Richer	1596	3.3	1590	20.1	277	3.2	275	13.8
Richest	4680	4.1	4623	20.9	767	4.0	749	14.3
PUNJAB	7266	3.6	7197	20.1	1247	3.4	1226	14.1

Notes:

\*\_- excludes 24 cases and 4 cases (with response don't know) for women and men respectively.

\*\*\_- Excludes missing system cases (3) in case of caste of women and 1 case in case of men, and another 69 cases when women did not report hypertension and four and 21 cases when men did not report diabetes and hypertension respectively.

( ) sample size too small to analyze.

Source: Self calculation from NFHS-4, Punjab data-set

## Assets ownership

Table 9

**Prevalence of diabetes and hypertension among middle aged women (35-49) and men (35-54) classified by house ownership (alone or jointly), Punjab, 2015-16**

House ownership	Women				Men			
	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)
Does not own	649	4.6	643	20.7	188	4.3	182	16.5
Alone only	79	3.8	76	19.7	809	3.7	799	14.8
Jointly only	169	6.5	164	17.7	111	2.7	108	8.3
Both alone and jointly	196	3.6	189	15.3	139	1.4	137	11.7
Total	1093	4.7	1072	19.2	1247	3.4	1226	14.1

Notes:

\*\_- Excludes 24 cases and 4 cases (with response don't know) for women and men respectively.

\*\*\_- Excludes missing system cases (6173) in case of house ownership by women and prevalence of diabetes, and 6194 missing cases in case of house ownership for women and 21 missing cases for men for reporting hypertension.

Source: Self calculation from NFHS-4, Punjab data-set

The prevalence of diabetes was higher for women who does not own any house or had a joint house. It was also higher among men who do not own any house. However, the prevalence

of hypertension was higher among women and men, who either did not own any house or had a house with alone ownership.

The prevalence of diabetes was higher among women who had land ownership alone or jointly. On the other hand, the prevalence of diabetes was higher for men who had land ownership at sole name. However, the prevalence of hypertension was higher among women, who had a land ownership with sole ownership or had no land ownership at all.

**Table 10**

**Prevalence of diabetes and hypertension among middle aged women (35-49) and men (35-54) classified by land ownership (alone or jointly), Punjab, 2015-16**

Land ownership	Women				Men			
	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)
Does not own	775	4.5	764	20.0	734	3.4	717	13.8
Alone only	35	5.7	34	32.4	316	4.1	315	15.9
Jointly only	116	6.9	113	15.0	79	2.5	78	14.1
Both alone and jointly	167	3.6	161	15.5	118	2.5	116	11.2
Total	1093	4.7	1072	19.2	1247	3.4	1226	14.1

Notes:

\*- Excludes 24 cases and 4 cases (with response don't know) for women and men respectively.

\*\* - Excludes missing system cases (6173) in case of land ownership by women and prevalence of diabetes, and 6194 missing cases in case of land ownership for women and 21 missing cases for men for reporting hypertension.

Source: Self calculation from NFHS-4, Punjab data-set

### Personal habits

The paper attempted to know whether some sort of relationship exist smoking and prevalence of diabetes. This relationship could not be examined for women as out of a total sample of 7266 women aged 35+, only four and five women smoked or drank alcohol according to survey. On the other hand, contrary to the popular perceptions, men who were smokers or drinkers did not show a higher prevalence of diabetes or hypertension in Punjab. (Table 11)

**Table 11**

**Prevalence of diabetes and hypertension among middle aged women (35-49) and men (35-54) classified by personal habits (smoking and drinking), Punjab, 2015-16**

Personal habits	Women				Men			
	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)
Smokes cigarettes								
Yes	4	(0.0)	4	(25.0)	79	1.3	78	15.4
No	7262	3.6	7193	20.1	1168	3.6	1148	14.0
Total	7266	3.6	7197	20.1	1247	3.4	1226	14.1
Drinks alcohol								
Yes	5	(20.0)	5	(0.0)	585	3.4	581	14.5
No	7261	3.6	7192	20.1	662	3.5	645	13.8
Total	7266	3.6	7197	20.1	1247	3.4	1226	14.1

Notes:

\*\_- Excludes 24 cases and 4 cases (with response don't know) for women and men respectively.

\*\*\_- Excludes missing system cases (3) in case of caste of women and 1 case in case of men, and another 69 cases when women did not report hypertension and four and 21 cases when men did not report diabetes and hypertension respectively.

( ) sample size too small to analyse.

Source: Self calculation from NFHS-4, Punjab data-set

**Body Mass Index (BMI)**

The Body Mass Index (BMI) is a measure of body fat based on height and weight of the individual. BMI defines the level of weight as underweight (for BMI <18.5 Kilograms/Meter Square), Normal weight (18.5-29.99), Overweight (25.0-29.9) and Obese (30+). Table 12 clearly shows that both the prevalence of diabetes and the prevalence of hypertension has a direct relationship with increase in Body Mass Index (BMI) of women.

**Table 12**

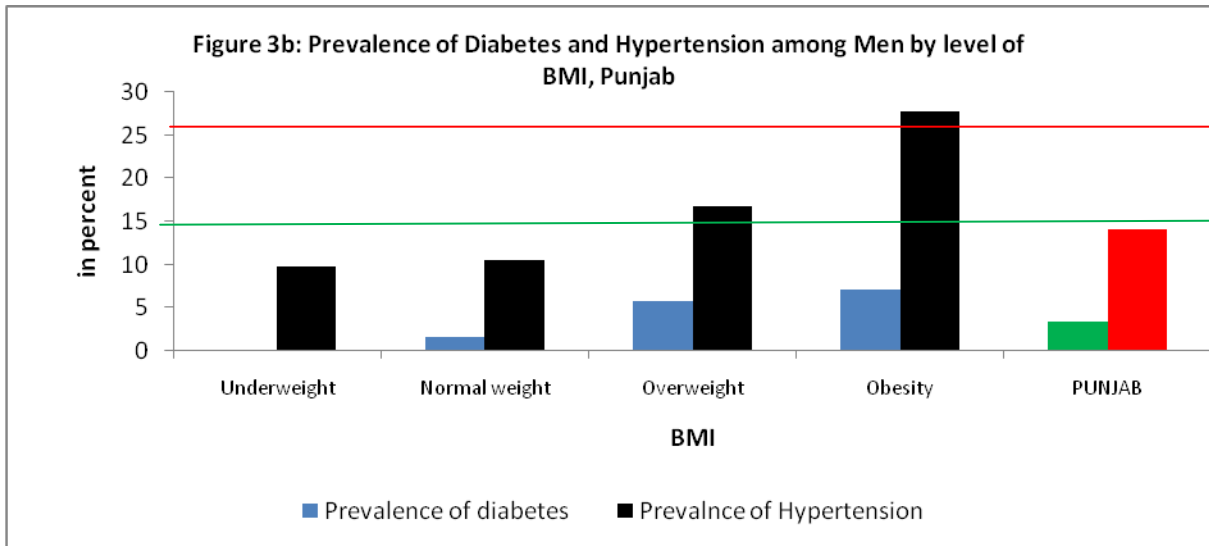
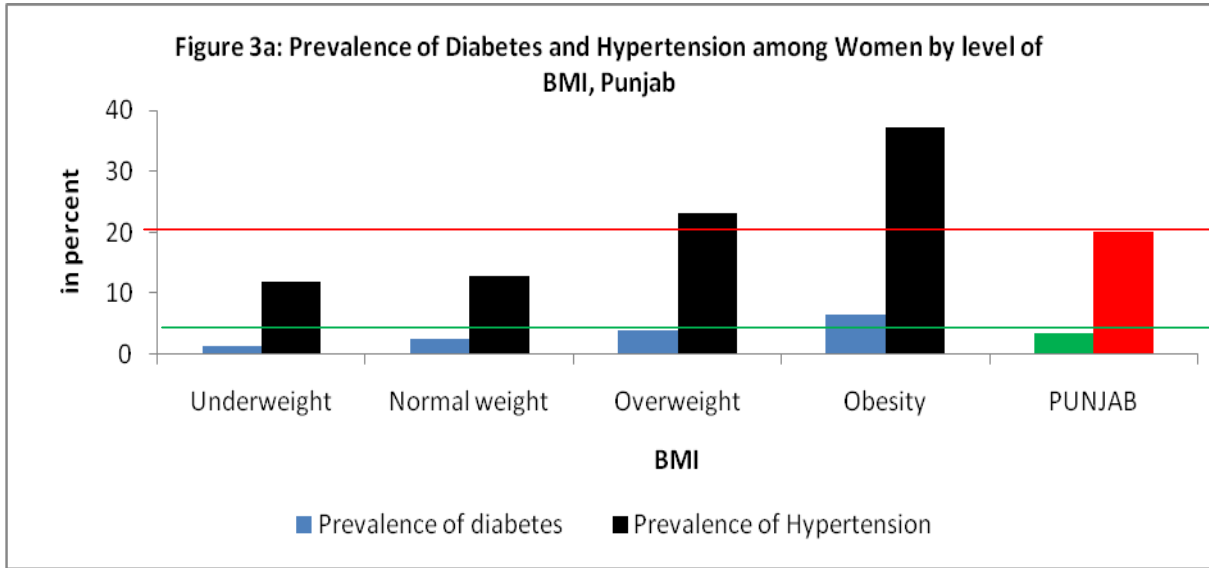
**Prevalence of diabetes and Hypertension among middle aged women (35-49) and men (35-54) classified by the level of BMI, Punjab, 2015-16**

BMI	Women				Men			
	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)	N	Diabetes prevalence (in %)	N	Hypertension prevalence (in %)
Underweight (<18.5 kgs/per sq. meter)	216	1.4	216	12.0	61	0.0	61	9.8



Normal (18.5-24.9)	3370	2.6	3369	12.8	655	1.7	655	10.5
Overweight (25-29.9)	2357	3.9	2354	23.2	395	5.8	394	16.8
Obesity (30+)	1153	6.5	1151	37.1	112	7.1	112	27.7
Total	7096	3.6	7090	20.2	1223	3.4	1222	14.1

Source: Self calculation from NFHS-4, Punjab data-set



Source: NHFS-4, 2015-16

## Summary and Conclusions

The paper highlights that in Punjabi society, socio-economic transition is occurring very fast. Among other things, the study found that 35+ population accounts for major portion of prevalence for diabetes and hypertension. Not only the study found inter-district variations in prevalence of diabetes and prevalence of hypertension in Punjab but also reveals that onset of hypertension starts at age 25+ while the onset of diabetes starts from age 30+, irrespective of the sex of the respondent. Among the socio-economic characteristics, caste, religion, education or occupation did not show any significant variations in prevalence of these diseases. However, the prevalence of diabetes was higher among the richer and richest class categories both among men and women. Ownership of house/land reduced prevalence of these diseases to a certain extent. Regarding personal habits and prevalence of diabetes and hypertension, contrary to popular belief, men who were smokers or drinkers did not show a higher prevalence of diabetes or hypertension in Punjab. Women sample size for smoking and drinking was insignificant to come to any conclusions. BMI had a direct and significant relationship as prevalence level of both these diseases increases significantly among overweight (with  $BMI=25<29.99$ ) and obese people (with  $BMI>30$ ). Thus, the paper help in setting the baseline and identifying various socio-economic groups which are more likely to suffer from diabetes or hypertension. Conclusions arrived at might be useful in future planning and management of these disease. Recently, Government of India took an initiative to provide Comprehensive Primary Health Care (CPHC) especially through the newly set-up Health and Wellness Centres (HWCs) all over India. These newly established HWC (Health Wellness Centres) aims to control the prevalence of non-communicable diseases. The study conclusions are helpful in identifying the vulnerable groups of population which are more likely to suffer from the prevalence of diabetes or hypertension. We need to focus on the identified vulnerable groups for management of diabetes and hypertension. Among other things, study sees the importance of lifestyle modifications or healthy lifestyle, regular walking/exercise as an effective tool for the prevention of these diseases. Screening, early detection, diagnostics and treatment are equally important from supply side perspective to manage the prevalence of hypertension and diabetes.

### Acknowledgements:

The authors acknowledge with thanks The Demographic and Health Surveys (DHS) Program, ICF, Rockville, USA for providing full access to large datasets required for the study. As per the terms of reference of this permission, an electronic copy (pdf) of this publication will be sent to [references@dhsprogram.com](mailto:references@dhsprogram.com).

Thanks are due to the Ministry of Health and Family Welfare (MoHFW), Government of India, for approving the study on "Prevalence of Hypertension and Diabetes among the Middle Aged in Punjab: A Study based on Socio-Economic Background" during the Annual Plan of 2020-21 of Population Research Centre (PRC) at the Centre for Research in Rural and Industrial Development (CRRID), Chandigarh. It is a great initiative by the Ministry to involve the PRCs all over the country in a meaningful way and to get policy inputs with the help of research studies done through primary or secondary data.

### References

- Acharya SS, et al. (2019) Disease Burden and Health Inequalities in Punjab-Understanding Economic and Social Consequences. *International Journal of Preventive Curative & Community Medicine*, Med 2019; 5(2): 15-24
- Bamrara P, et al. (2013). Prevalence of Hypertension and its Determinants in An Urban Area of Uttarakhand, *Journal of Biomedical and Pharmaceutical Sciences*, 3(21), 12-16.
- Bansal SK et al. (2012). The prevalence of hypertension and hypertension risk factors in a rural Indian community, A prospective door-to-door study, *Journal of Cardiovascular Disease Research*, 3(2), 117-123.
- Devgan S. et al. (2016). An Epidemiological Study of Hypertension in a Rural Household Community in one of the Districts of Punjab, *International Journal of Community Health and Medical Research*, 2(3), 24-29.
- Goswami KA, et al. (2016). Burden of Hypertension and Diabetes among urban population aged > 60 years in South Delhi: A Community Based study, *Journal of Clinical and Diagnostic Research*, 10(3), 1-5.
- Kansra P. (2018). Awareness about diabetes risk factors and prevention strategies among women of Punjab, *Journal of Social and Administrative Sciences*, 5(1), 60-64.

- Kaur K, Walia S. (2018). Anthropometric Indicators as Predicators of High Blood Pressure in Young Females of North India, *International Journal of Anatomy and Research*, 6 (1.3), 4977-4981.
- Mitra C et al. (2017). Prevalence and Role of Risk Factors for Hypertension in 18-69 years of Age in Rural and Urban Areas of District Amritsar, Punjab, India, *International Journal, Community Medicine Public Health*, 4(2), 460-464.
- Ramachandran A, Snehalatha C. (2009). Current scenario of diabetes in India, *Journal of Diabetes*, (1), 18–28.
- Sidhu S, Kumari K & Kumari P. (2005). Socio-demographic Variables of Hypertension Among Adult Punjabi Females, *Journal of Human Ecology*, 17(3), 211-215.
- Singh A K et al. (2012). Prevalence, awareness, treatment and control of diabetes among elderly persons in an urban slum of Delhi, *Indian Journal of Community Medicine*, 37(4), 236
- Singh A, Shenoy S and Sandhu, J S. (2014). Prevalence of Hypertension and its Risk Factors Among Urban Sikh Population of Amritsar, *International Journal of Science and Research*, 3(3), 827-832.

## Research papers in National and International Journals by PRC, Dharwad

1. Jyoti S. Hallad, H. R. Channakki and S. R. Vataavati (2020) “An Assessment of Implementation of CPHC through Ayushman Bharat Health and Wellness Centres in Karnataka” Programme Evaluation under National Health Mission: Evidence to Policy – A Compendium of Studies conducted by the Population Research Centres 2019-20.
2. Shriprasad H., Manjula Hadagalimath and Ragini Itagi (2020) “The Knowledge of Accredited Social Activists (ASHAs) and Mothers' on Home Based Neonatal Care – A Cross Sectional Study” Programme Evaluation under National Health Mission: Evidence to Policy – A Compendium of Studies conducted by the Population Research Centres 2019-20.
3. Pradeep S. Salve and Shrikant Vataavati (2020) “The Assessment of Implementation of National STEMI Programme in Goa” Programme Evaluation Under National Health Mission: Evidence to Policy – A Compendium of Studies conducted by the Population Research Centres 2019-20.
4. Shriprasad H. and S. R. Vataavati (2022) “Dynamics of hypertension and diabetes; grass root level evidences from rural Haveri district of North Karnataka, India” SHODHA, Volume 11, No 2 January 2022. ISSN 2249-0396.
5. Jyoti S. Hallad and Shrikant R. Vataavati (2021) “Magnitude of Caesarean Deliveries in India: An Analysis at Subnational level using HMIS Data” Demography India, Vol. 50, Special Issue (2021), pp. 112-125.
6. Pradeep S. Salve, Suvarna K. Naikar, Channabasappa Noolvi and Jyoti Hallad (2021) “Neonatal Mortality in India: A District-level Analysis Using Health Management Information System data” Demography India, Vol. 50, Special Issue (2021), pp. 126-133.
7. Javeed A. Gollandaj, Karabasappa G. Kallihal and Jyoti S. Hallad (2021) “National Quality Assurance Standards (NQAS) Accreditation in Public Health Facilities: An Impact Assessment in Karnataka, Maharashtra and Chhattisgarh” Demography India, Vol. 50, Special Issue (2021), pp. 26-38.
8. Basavaraj Pundappanavar and Jai Prabhakar S C (2021) “Perceiving Social and Economic Gerontology Issues in Elder Healthcare” Indian Journal of Research in Anthropology, Vol. 7, No. 2, July-December, 2021.

9. Basavaraj Pundappanavar and C. N. Noolvi (2022) “Pregnancy Wastage in Karnataka: A District level analysis based on Health Management Information System data” Dynamics of Health Care Services in India: A Compendium of Studies Conducted by the Population Research Centre 2020-21, Centre for Research in Rural and Industrial Development (CRRID).
10. Ajay Bailey, K.S. James and Jyoti S. Hallad “All my responsibilities towards my children are over! Linked lives and life course obligations among older adults with migrant children in India” in the edited book Ageing in a Global Context – Care for Older Adults in India: Living Arrangements and Quality of Life edited by Ajay Bailey, Martin Hyde and K. S. James pp. 118-139.
11. Dr. Jyoti S Hallad, Director has been nominated as the member of Technical Advisory Committee of National Family Health Survey -6 (NFHS-6) for sub-group II. She attended the meetings of TAC.