Summer Internship

At

IIHMR, Delhi (April 1 to May 31st, 2020)

A Report

By

Dr. Neha Rani

Post-graduation Diploma in Hospital and Health Management

2019-2021

IIHMR DELHI

(Completion of Summer Internship from respective organization)

DECLARATION

I, Dr. Neha Rani, hereby declare that this Internship Assignments entitled a). Case study on AROGYA WORLD Non-Profit Organization b). AROGYA WORLD Non Communicable diseases Prevention Programs c).Comparative Analysis of prevalence and mortality Rate of Four Major Non Communicable diseases d). A literature review of Covid 19 in association with Non communicable diseases is the outcome of my own study undertaken under the guidance of Prof/ Dr. Pradeep Panda, IIHMR-New Delhi. It has not previously formed the basis for the award of any degree, diploma, or certificate of this Institute or of any other institute or university. I have duly acknowledged all the sources used by me in the preparation of this field internship report.

Date:

Sign:

Postgraduate Diploma in Hospital and Health Management

International Institute of Health Management Research

New Delhi

CERTIFICATE OF COMPLETION

The certificate is awarded to

Dr. Neha Rani (PG/19/53)

In recognition of having successfully completed her/ his Internship in the department of

Title _____

and has successfully completed her/his Project on Review of Non communicable diseases

Date_____

Organization- Arogya world Organization

She/ He has found to be a committed, sincere and diligent student who has a strong drive & zeal for learning.

We wish him/her all the best for future endeavors

Dean- Academics & Student Affairs **Mentor Name & Signature**

Certificate of Approval

The following Summer Internship Project titled **"REVIEW OF NON COMMUNICABLE DISEASES"** at **"AROGYA WORLD"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the report only for the purpose it is submitted.

Name of the Mentor: Professor & Dr. Pradeep Panda

Designation: Dean Academics

IIHMR, Delhi

ACKNOWLEDGEMENT

I would like to express my gratitude to my director **Prof. SHANKAR DAS** for giving me the opportunity to be a part of this Summer Internship Program. I would like to thank my teachers **Ms. Divya Agarwal** and **Dr. Anandhi Ramachandran** for briefing well about the project which made me understand it.

I offer my special thanks to my mentor, **DR. PRADEEP PANDA**, whose valuable guidance helped me in completing my Summer Internship report within the due time.

At last I would like to thank my family and friends for their cooperation and motivation.

Dr. NEHA RANI

PGDHM

PG/19/53

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ABBREVIATIONS

1. **NCD- Non communicable diseases**
2. **WHO- World Health Organization**
3. **DALY- Disability Adjusted Life Year**
4. **SARS-CoV-2- Severe Acute Respiratory Syndrome- coronavirus-2**
5. **MERS- Middle East Respiratory Syndrome**
6. **MMWR- Mortality and Morbidity weekly report**
7. **ACE- Angiotensin Converting Enzyme**
8. **RBD- Receptors binding domain**
9. **DNA- Deoxyribonucleic acid**

CASE STUDY

AROGYA WORLD

INTRODUCTION- AROGYA WORLD

Arogya world is a global health nonprofit organization that works to prevent non communicable diseases like Diabetes, Cancer, heart diseases, and chronic lung diseases through health education and lifestyle changes.

It was established in 2010 at Greater Chicago area, Great Lakes, Midwestern United States, on 7 May 2012, this organization reaches Bangalore, India with the name "**Arogya World India Trust"** with the goal to reach millions of Indian population in 3-5 years.

Global Scenario of Non communicable disease

Non communicable diseases are the biggest challenge because:

- $47 trillion impact 2010-2030
- 25% of income among poor families spent on care for one person with one chronic illness
- 25% of women globally spend 25% of income on chronic disease
- 7% of women globally spend 50% of household income on chronic disease

VISION

The vision of the organization shows in its name "Arogya" in Sanskrit meaning live life without diseases.

MISSION

The mission is to change the path of chronic diseases through focusing on partnership and innovation technology and by implementing scalable, sustainable programs with measurable impact.

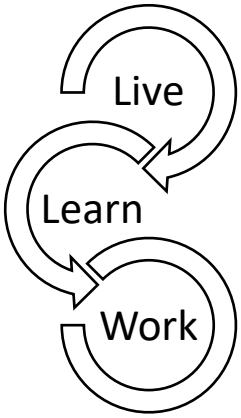
ORGANIZATION AIM:

WHO says nearly 80% of heart diseases, 80% of diabetes and 40% of cancer can be prevented with some changes in your daily routine. Arogya world works to prevent NCDs by encouraging 3 lifestyle changes:

- Eating healthy food,
- Exercising,
- Avoiding Tobacco.

HEALTH MODEL OF AROGYA WORLD

Arogya world follows a health model in which a doorstep approach is taken to prevent NCDs where they live, learn and work.

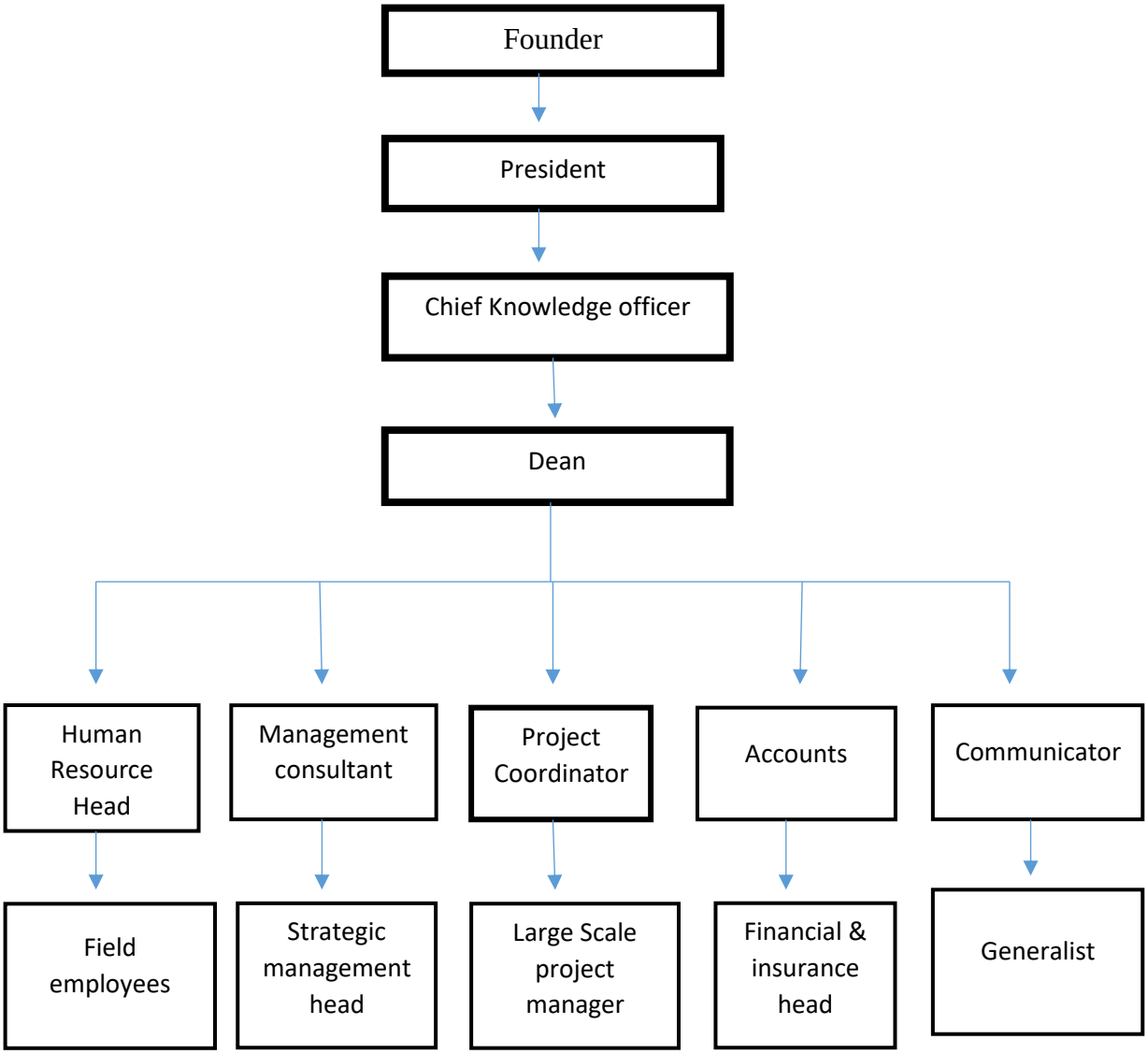


ORGANIZATION KEY STRATEGIES:

India is a culturally complex country with many food, many different languages, difference in rural and urban living. Arogya world with the aim to hone their health model, developed a robust approach that reach to different regions especially middle east that also hardly affected by NCDs. This organization emphasize on science based work, its measurement impact and

designed to drive change in the population. Its health model shown promising results and have been designed to scale up in a cost-effective manner.

ORGANOGRAM:



LEADERSHIP

Founder and Chief Executive Officer

- Dr. Nalini Saligram, Ph.D. is the founder of this nonprofit organization, with the aim to change the course of chronic disease.
- Under the leadership of Dr. Nalini Saligram, Arogya world design a diabetes prevention program in schools, workplaces and in deep community of India to create awareness, and educate peoples to build a healthy lifestyle to avoid chronic disease in future.
- She worked with public private organization, to launch the programs and improve the world we live in.

ROLES AND RESPONSIBILITIES OF THE AROGYA WORLD TEAM

- Strategic marketing,
- Commercialization strategies and opportunity assessments,
- Portfolio planning and development of cross-functional commercial planning and evaluation processes.
- Developing capabilities in colleagues to make them expert and increase their productivity Drive Growth
- Recruiting volunteers and other physicians
- Plays proactive role on the executive board
- Work for the prevention in the field of Hypertension and Diabetes.

COMMUNICATION CHANNELS

1. **Within The Organization**

   Arogya world has many branches in different countries, so the method they use to communicate with each other are:

- Personal communication- Personal communication or face to face communication is the best way to transfer messages, but this method of communication is used within one branch because many other branches of the organization is located very far from each other and it's difficult to reach there personally.

- Electronic Communication Channel- This channel used mostly in this organization, encompasses emails, internet, intranet and social media platforms. This method can be used to communicate one on one or a mass of people together.

2. **Within The Community**

   The organization has aim to reach millions of people in 3-5 years, and hence they use innovative technology and methodology for the success of their program, these are:

- Mobile communication channel- this channel used to create awareness in the community by sending text message to let them know what the disease is, what its complication are and how to prevent from it by changing their lifestyle.
- Broadcast media communication- This method used to addressing a mass population by TV ads etc. Arogya world used this method of communication by showing a pictorial representation of My Thali program in which one can easily understand what they should eat and in what quantity to tackle with malnutrition and obesity.

PROGRAMS LAUNCHED BY AROGYA WORLD:

- Healthy Workshops
- Healthy Schools
- mDiabetes

- mArogya
- My Thali

PROGRAM TOOLS

Arogya world established public health programs in schools, workplaces, and in the deep community to empower people to change the behavior regarding chronic diseases and make them aware about their health by using following tools like:

For Diabetes:

A program named mDiabetes is launched in which a consumer friendly text message is sent to the people in multiple Indian languages, to create awareness that what are causes of diabetes and what are its complications, and motivate changes in diabetes risk behavior.

For Healthy Schools;

A 2 year school based academic Program for 6-8th grade students in which they learn about choosing healthy life style with age appropriate games and materials before their life style habits fully set.

For Healthy Workplace

A healthy workplace designed which focuses in NCDs prevention by transparent assessment processes and making different criteria like tobacco free workplace, easy access to healthy food and opportunity for physical activities.

My Thali

A picture depicted which shows that what should eat and in what quantities should a person eat to tackle obesity and malnutrition.

PARTNERS AND SPONSORSHIP

Partnership with public health institution, industries, NGOs together make a formidable force to accomplish these projects

Healthy Workplace

- Public Health foundation of India
- Cigna
- One Mind Initiative at work
- The Infrastructure, Facility, Human Resource & Reality Association (iNFHRA)
- Ashoka
- Sodexo
- Global Centre for Healthy Workplaces

Healthy Schools

- Rural India Supporting Trust
- Agastya International Foundation
- Social Research and Upliftment
- Hriday
- HANS the foundation
- Ashoka
- Merck

mDiabetes

- Rural India Supporting Trust
- Arvind eye Care
- Nokia
- Lions Club Foundation
- IPSOS
- Johnson & Johnson
- Emory University
- Aetna

- My Thali
- Cigna
- Avian

mArogya

- Cigna
- Emory University
- Madras Diabetes research Foundation

My Thali

A picture depicted which shows that what should eat and in what quantities should a person eat to tackle obesity and malnutrition.

AROGYA WORLD INDIA TRUST

Arogya world's main focus is on India because 1 in 4 Indians has risk of dying from an NCD before the age of 70. According to a WHO report, nearly 5.8 million deaths in India is due to NCDs (Diabetes, Cancer, Heart and Lung diseases). More than 72 million people have diabetes, and it is developed 10 years earlier that is in 30s and 40s. An average of 25% of poor Indian family income is spent on diabetes treatment of one person.

Objective

- The motto of Arogya world India trust is changing the course of chronic diseases.
- A message about healthy life style such as eating healthy food, avoiding tobacco use, increasing physical activities sent to targeting population using mobile technology.
- A platform provide for service of healthy workplaces.
- Reach young children to change their lifestyle habits and increase physical activity in their day to day life, before their lifestyle habits fully established.

Organization profile

Organization Primary and secondary classification	Health & Other health service
Organization Activities	• Health • Public Health Education Activities
Location	• All India
Geographical focus	• Urban and rural
Beneficiary groups	• Adolescents • Adults • Children • Students • Women • Youth

WHO Statistics of NCDs

Non communicable diseases are major cause of mortality and morbidity worldwide. According To Global Health Observatory Data of World Health Organization, 40.9 million deaths out of 56.9 million global deaths was due to NCDs in the year 2016, and the four NCDs Cardiovascular disease, Cancers, Diabetes, and chronic lung diseases are the major cause of death. Below the table shows the total death due to NCDs and disease percentage of death out of all NCDs in 2016.

Disease	Total Death (in millions)	% out of all NCD death
Cardiovascular Disease	17.9	44%
Chronic Lung Disease include Asthma, chronic obstructive pulmonary disease	3.8	9%
Cancer	9.0	22%
Diabetes	1.6	-

The statistics shows that India is hardly hit by Non communicable disease

- More than 61% of death in India is due to non-communicable diseases.
- More than 20% have one chronic disease
- In metro areas, 75% of adults are diabetic or pre-diabetic
- More than 72 million live with diabetes
- Almost 1 lac death in country due to diabetes.
- Indian develop Diabetes in 30s and 40s, almost 2/3rd of indian has diabetes before the age of 35. And 10% of school going kids are pre-diabetic.

Arogya World India Trust Door Step Model

In India Arogya world initiate programs like Healthy schools, Healthy workshops, mDiabetes, My Thali and try to reach at the community level where people live learn and work.

Where People Live

- ✓ My Thali- Innovative technologies and social media where pictorial representation of plate full of food is used to empower women to make healthy food and give it to their family in right quantity to avoid obesity or malnutrition. This program reaches to 45 workplaces.

- ✓ mDiabetes- 900 million cell phones used to deliver text and voice message to1.7 million population of rural and urban area to aware the population about diabetes and prevention of it in future.

Where People Learn

- ✓ Healthy Schools- Schools are the best place where children learn and here teach them to maintain healthy living before they ruin their lifestyle and facing these hazardous diseases. Arogya health reaches at the school level and educate kids about having a healthy lifestyle by eating healthy food, avoid junk foods and wrong habits and so on, before their lifestyle fully set and till date 5, 00,000 children are educated.

Where People Work

- ✓ Healthy workplace – Healthy workplaces helping create data-driven cultures of health by providing easy access to healthy food, tobacco free atmosphere, opportunities of doing physical activities. More than 130 companies became healthy workplaces and more than 3 million employed at healthy workplaces.

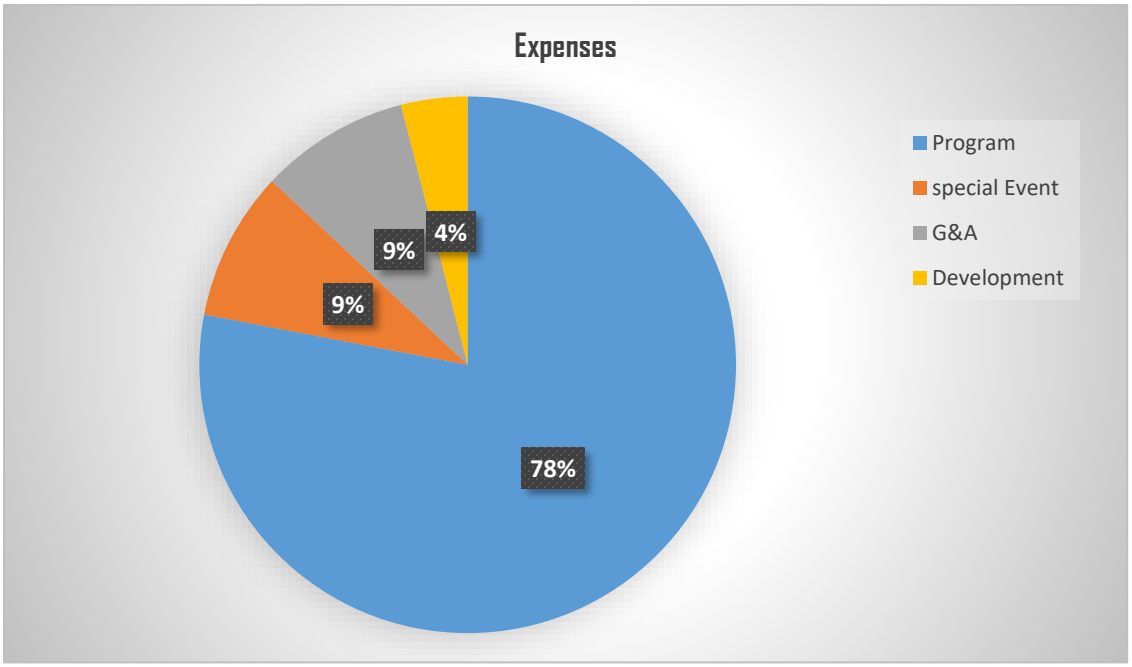
Number of people reached through Arogya world

- 2022- Projected 22 million
- 2020- Projected 10 million
- 2019- Achieved 5 million

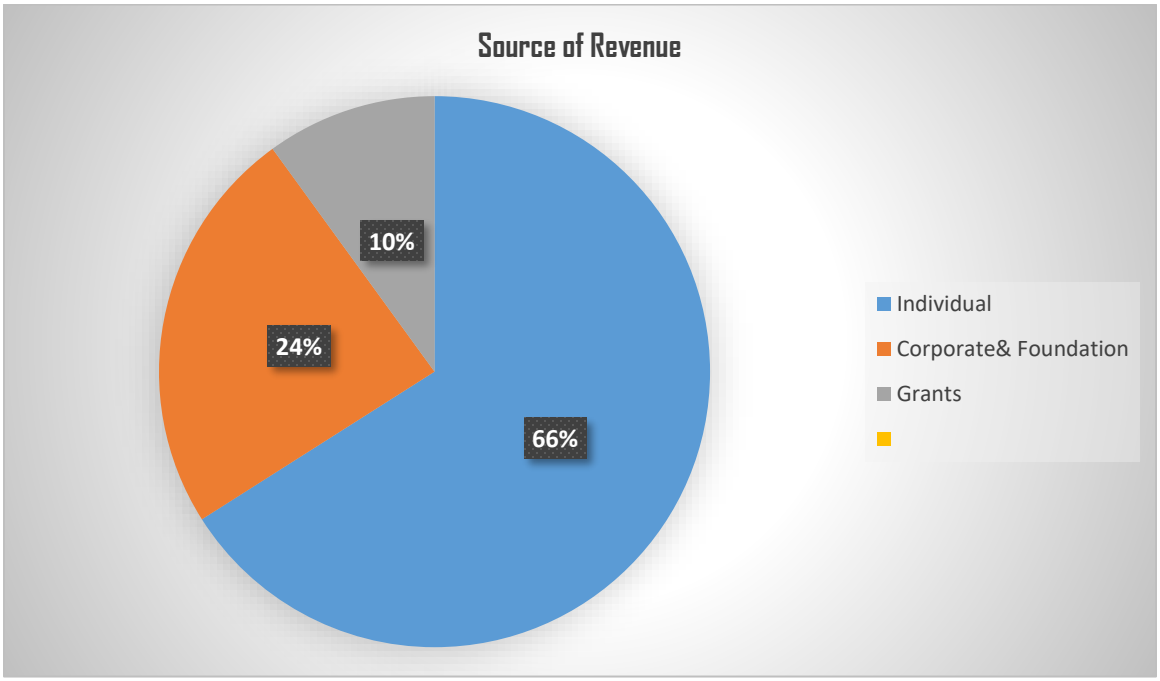
Arogya world financing

Arogya world is funded by the organizations like Path India, Lions Club, Cigna, Sodexo etc. that donated in in this nonprofit firm. In 2019 this organization awarded by grant of $712,000 and $100, 00 from Rural India Supporting Trust and Cigna respectively. Mr. B.S. Ramaswamy – the chairperson of Arogya world India trust was strong contributor to the organization, unfortunately he passed away suddenly and the leadership is taken up by Sumathi Rao. The donors of 2020 are Agastya International Foundation, Ambuja Cement foundation, Ashoka, Arvind Eye care, Public Health Foundation of India and many other discussions occur for 2020 funding. All development, Special event, are covered by donoted and 100% of donation go directly to support programs.

Total - $577,811



Total - $492,084



ACHIEVEMENTS

- In 2019, Arogya world become a founder member of Indian Philanthropy Alliance.
- Fundraising record of $250,000 through annual gala event in Chicago, and awareness event in San Diego, California in October 2019
- A Chapter added on Arogya World in the book named “The Gamechangers” wrote by Dr. Ashwin Naik, a healthcare entrepreneur
- Deepa Prahalad Board member of the organization wrote an article in the well-known prestigious publication leader to leader highlighting Arogya world.
- Healthy Workplace Conference in November was a huge success – and featured big-name speakers, including Dr. Indu Bhushan, CEO of Ayushman Bharat, Dr. Srinath Reddy, President of Public Health Foundation of India, and Mr. Pawan Agarwal, CEO of FSSAI.
- Finalist of Peter F. Drucker award of nonprofit innovation in 2014
- Won the mBillionth award for mDiabetes in 2013

AROGYA WORLD DISEASE PREVENTION PROGRAM

Healthcare has been developing alongside one line for centuries. Arogya world appear to help far too late in the method to have any meaningful intervention. For example, once anyone provides with type 2 diabetes, then the horse has already bolted. Not solely are all attempts from then on about managing a disease as an alternative than curing it, but the time and money wished to do this with the aid of a ways outweigh in the past intervention. It would check the talent of any medical doctor to now not only perform an operation or prescribe the right treatment, but additionally inspire humans to do the proper things. This is really one of the key factors in altering behaviors. There are two strands to this,

- The training to recognize what impacts fitness and how to act.
- The motivation to put this training into action.

THE PROBLEM

Chronic Diseases are the main motive of death in most areas of the world. Globally, the rate of infectious illnesses is reducing and that of persistent diseases and non-communicable ailments are increasing. Chronic diseases causes two out of three deaths today; six times as many deaths as HIV/AIDS, TB, and Malaria combined. Chronic illnesses such as coronary heart attacks, diabetes, hypertension or respiratory disorders can often be traced back to lifestyle choices. Long working hours, unhealthy diets, lack of workout and stress have resulted in a close to epidemic of continual diseases. Although multiple studies, consisting of the landmark Diabetes Prevention Program, have established that exercising for 30 minutes a day, 6 hours of sleep, and a wholesome weight-reduction plan can reduce the chances of creating NCDs through 60%, but, there has been no movement in India in the direction of this type of preventive fitness care. The present day health care device is only equipped to treat NCDs on an individual foundation solely once they are already developed and diagnosed, but there is a

clear lack of promotion healthful lifestyles to prevent NCDs. While there has been some public cognizance messaging via the authorities in famous media, the content has been restrained to anti-addiction, and there has been no supportive infrastructure or community around folks to encourage them to choose healthy lifestyle.

THE NEW IDEA

Dr. Nalini Saligram, discussed the problem with several health and industry experts and come to conclusion that it's better to promotion healthful life before the NCDs utterly show up or diagnosed. For introducing continual diseases prevention, youngsters and formative years are the critical target population. Thinking that it is less complicated to have an effect on their habits and the outcomes in their mind-set shifts are durable. An education model is added to the school curriculum and also discovered that the majority of employees in the agencies are young human beings so program also address to them. And workplaces turned into allies to promote healthy lifestyle changes.

AROGYA WORLD PROGRAMS ARE:

- Healthy Schools
- Healthy Workplaces
- mDiabetes

HEALTHY SCHOOLS

Description: The program started in 2011, having 2 year duration with agenda to prevent the non-communicable disease especially the diabetes before it affect any individual i.e. the primordial care. Diabetes is a lifestyle disorder that affects aged population earlier but now the shift occur in 30s and 40s age group, to prevent this there is a need to adapt healthy lifestyle habits since childhood. This program mainly focuses on the school children to educate them and encourage them to increase their physical activities, improve dietary intake before their lifestyle fully set

Objective: The objective is to promote healthy life style in 11-13 years of age group to prevent non-communicable diseases in future.

Methodology: The founder of the organization shall propose a design of methodology for a healthy School program.. A mix of government and private school of rural and urban areas in north and south India i.e. Karnataka, Andhra Pradesh. Telangana, Tamil Nadu, Maharashtra, Rajasthan, Bihar, Uttar Pradesh, Haryana, Madhya Pradesh, Assam, West Bengal is taken in which middle school children of classes 6^{th} -8^{th} age 11-13 years were targeted. Different innovative ways were used to educate those children and encourage them to create a strong base for healthy lifestyle practices with specific focus on behavior change in 2 years of duration.

Actions undertaken

- ✓ Age appropriate activities each year like
    - Be Fit, Eat Right
    - Cross Word and Recipe Writing,
    - Involving the Community for Further Impact And

- Perform a skit, Show you are fit

✓ Engage students with staff and community as a peer leader.

✓ Participatory learning model

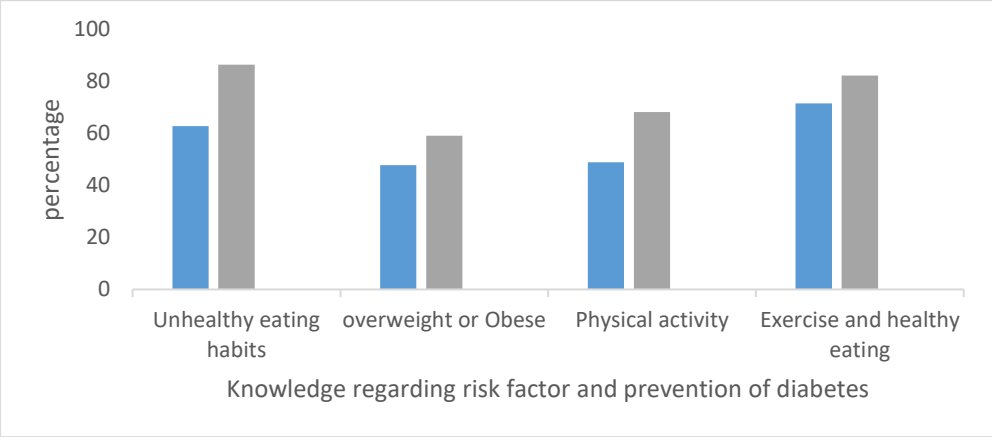
Implementation

- The program being implemented with many partners like Agastya foundation, Ashoka, Child in need institute (CINI), Hriday, and Sharp and
- Continue funding from Rural India Supporting system (RIST).
- Third Party validation is done by Stanford's Care to implement the program.
- This educational program was implemented in more than 9 languages in 1, 50,000 middle school children from all over India.
- Pre and post survey was conducted to compare for the student's knowledge, attitude, and behavior after the program ended to measure the effectiveness of it.

Outcomes

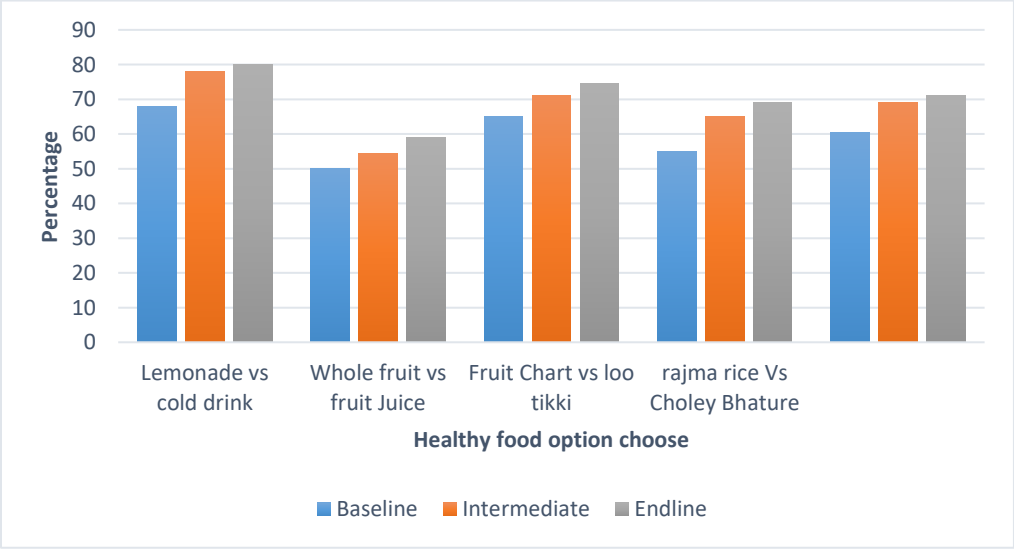
- Currently more than 1.5 lakh kids educated about non-communicable diseases diabetes and its prevention.
- An estimate of 15% impact in the improvement of generating awareness and healthy behaviors is achieved.
- Cost for implementation is now $1-3 per child per year.
- In 2014, a commitment to United Nation's Every Women Every Child initiative to reach and teaching 10,000 children by 2019, and met that goal in much advance.
- Pre and post survey comparison of are as follows:

Result of 2,263 kids from 6 school (3 government and 3 private) in 2011-2013



- More than 23.7% understood that unhealthy eating habits increase the risk of diabetes.
- More than 18% understood that being physically inactive can cause the risk of at least one NCDs
- 12.2% learned that overweight or obese is one of factor for diabetes.
- Approx. 10.7% kids started doing exercise and adapt healthy eating behavior.

Result of Behavior Change



- The daily intake of vegetables increased from 61.2% to 76.9%,
- The overall average servings per day of fruits, vegetables and milk (or milk products) were significantly increased while the serving per days of carbonated drinks, fried snack, traditional Indian sweets and packed chips were significantly decreased.
- Data showed significant increases in physical activity – doing physical activity/games at school and exercise at home, climbing more stairs, walking to the market and playing outdoor games during leisure time - for both boys and girls, at private and government schools.

HEALTHY WORKPLACES

Objective: The objective of the program is to promote the healthy lifestyle in the organizations to prevent non-communicable diseases.

Methodology: A team of 3 person does the assessment of the companies which are registered for healthy workplace program of Arogya world and score them on the basis of healthy workshop criteria. The criteria created with industries and organized into 4 levels- Bronze, Silver, Gold and platinum which include work-life balance and behavior change about healthy lifestyle, in addition to a workplace no-tobacco-use policy and easy access to healthy foods and opportunities for physical activity. The assessment shows at which level the company are.

Actions Undertaken are:

- Promote healthy food eating by My Thali program which includes plenty of green vegetables, fruits, lead protein, whole grains and minimum sugar, fat and salt content.
- Cafeteria audit of the organizations once in 6 month to educate employees and promote healthy eating.

- Communication packages for employee engagement in which a set of mails. Posters, innovative communication project are design to educate employees about NCDs, and eating healthy food, physical activities, proper sleep are the key strategies to prevent all NCDs
- Lifestyle modification workshop in which lifestyle coach conduct a workshop for his/her employees in which share learning to improve their health behavior through many activities, discussions.
- Promoting mental health at work

Criteria	**Policy**
Pre-Accreditation	Organization review the program and apply it.
Assessment	Rigorous, direct, transparent assessment of each employee
Bronze	Ban tobacco use, Promote healthy eating, Increase physical activity, Improve balance between work and personal life, and Leadership endorsement
Silver	Same as Bronze
Gold	Recognition at healthy workplace conference and award event
Platinum	Track metric, estimate return of investment from workplace wellness
Hall of fame	Workplace health champions, Workplace healthy cafeteria, My Thali, Lifestyle change training, and Full commitment to lifestyle change metrics

Implementation

- A modest of one time participation fees is INR 50,000 for every organization.
- A lifestyle training will provide to 2-3 coaches of each company, once a year which further trained his/her colleagues.
- A group session training is provide for 10-20 employees in the company site.
- This program is supported by Public Health Foundation of India, Jamanlal Bajaj Foundation, Cigna, and Indian Association of Occupational Health.

Outcomes

- A total of 131 companies with more than 3 lakhs employees earned the recognition of healthy workplace.
- In 2016, platinum healthy workshop program introduced to encourage the companies to become data-driven around the health and wellness of their employees.
- In 2019, the highest level, Hall of fame level of healthy workplace program reach.

mDIABETES

Objective: The objective of the program is to examine the behavior change regarding Diabetes using innovative mobile technology.

Methodology: As there are 900 million mobile phone users in India, it is easy to convey the messages to the targeted population to improve health. Text messages delivered to the targeted population to explain the risk factor and prevention strategies of Diabetes and promote healthy eating (fruits, vegetables, less fat intakes and physical exercise) for a period of time and the pre and post telephonic interview will conduct to examine the improvement in eating habits of each individuals.

A study of mDiabetes program

India is a country where one million people die from diabetes and more than sixty million live with it, and being a developing country India does not have limited access of health facility. Keeping the status in mind, Arogya world started an mDiabetes intervention program to improve public health using the mobile phones. To examine the practicality and evidences of effectiveness of diabetes a text messaging process started to aware the population regarding Diabetes, its risk factors, and key prevention strategies.

Objective of the study: A prospective, cohort study was conducted in 2012-2015 with the objective whether this mDiabetes program improve the eating habits of fruits, vegetables, fat intakes and exercise.

Methodology of the study: In 2012-2013, an mDiabetes intervention group of one million Nokia users and a control group of non Nokia users were selected for this program. mDiabetes participants receive 56 messages in 12 languages (English, Hindi, Kannada, Tamil, Malayalam, Bengali, Marathi, Gujarati, Telugu, Punjabi, Assamese, and Oriya) of their choice for 6 months, the messages arrived in fixed order and frequency(twice a week) and the control group do not have any contact. A telephonic interview is conducted for the randomly selected mDiabetes participants of Nokia users (n=982) and the control group of non Nokia users (n=943). The only eligibility basis were that participants of both the group are adult of age 18 or above.

Procedure of the study

- A baseline interview conducted in 2012 to examine the behavior of selected participants through mobiles text in their choice of language.
- A follow up interview in 2013 was conducted and scripted by individuals who were kept blind to the interviewee's treatment assignment, and lasted about 20 minutes.
- The 56 unique messages were sent to mDiabetes intervention participants in order of one message per day for the first 6 days, then 2 messages per week.
- The baseline and the follow up interview consist of 19 questions like "Do you exercise currently?" with response options "yes" or "no." Number of fruit and of vegetable servings was assessed with response options of "0 to 1 servings, 2-3 servings, or 4 or

more servings." "Do you consistently avoid eating high fat food/fried food such as samosas, Vada, bajji, bondas, etc.?" with response options " yes" or "no." with other information such as self-reporting demographic, location of the residence, age and health behavior etc.

Result of the study:

- At the end the of the 6 month period, 611 (62.22%) out of 982 participants of intervention group and 632 (67.02%) out of 943 in the control group consented to take the phone survey at baseline.
- Participants receiving text messages shows greater improvement in a health behavior composite score over 6 months, compared with those who received no messages.

Implementation

- Arogya World is launching mDiabetes in multiple states to educate 200,000 people on diabetes prevention with support from Ambuja Cement Foundation.
- A mDiabetes program in Mysore, Bangalore were launched in 2019 with the support of Lions Club International Foundation to educate 2, 00,000 people 15,000 street sweepers

Outcome:

- Consumers are now more aware of diabetes and its complications, and positive shift were noticed in the behavior of individuals.
- After receiving text messages about diseases prevention, more than 20% people improved their health behavior.
- There is increase of 11% people in daily exercise, 15% increase the intake of fruits 2-3 times a day, 8% increase in the vegetables intake 2-3 a day.

Comparative Study

OBJECTIVE

To review and compare the mortality rate of four major non communicable diseases in the year 2016 and which states has higher prevalent rate in India.

METHODOLOGY

Research Design

The research design is literature review based.

Search Strategy

A search strategy with terms non- communicable disease, burden, India, cardiovascular disease, diabetes, chronic obstructive pulmonary diseases, cancer was conducted using Google scholar, PubMed, and Scopus.

Time Period

The time period is between 2010 –2020.

Characteristics of studies

The search generated many articles out of which 5 articles were selected in the review, in which 4 studies were about cardiovascular disease, chronic respiratory disease, Diabetes, and cancer, and 1 study was about the overall burden of non-communicable disease in India.

Quality of studies

Four of the 5 articles were published in September 2018, and analyzes the trends and distribution of respective diseases between 1990-2016 in states of India. All the 4 articles were based on report published by Global Burden of disease 2016.

Table 1,

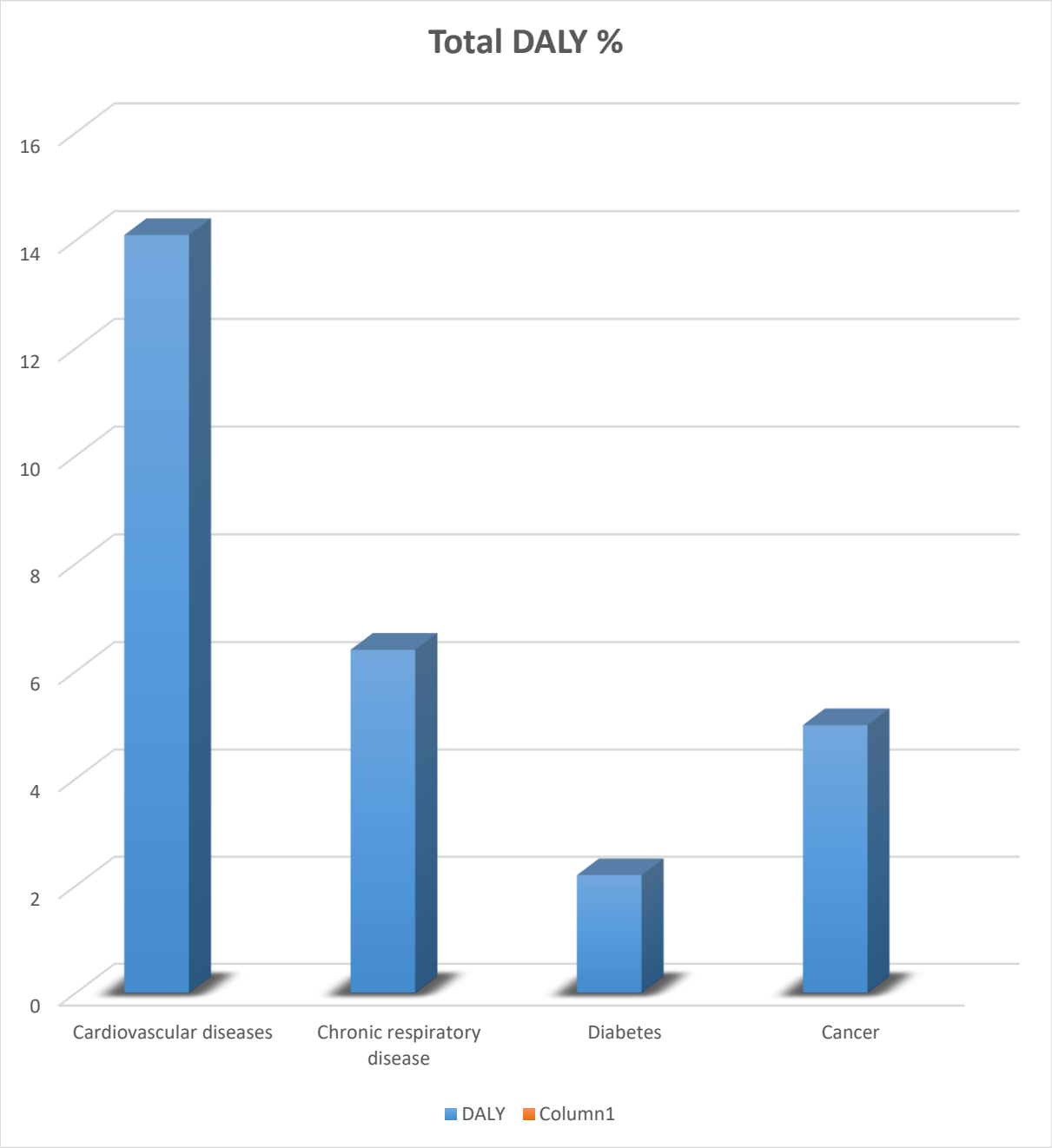
Inclusion and Exclusion Criteria

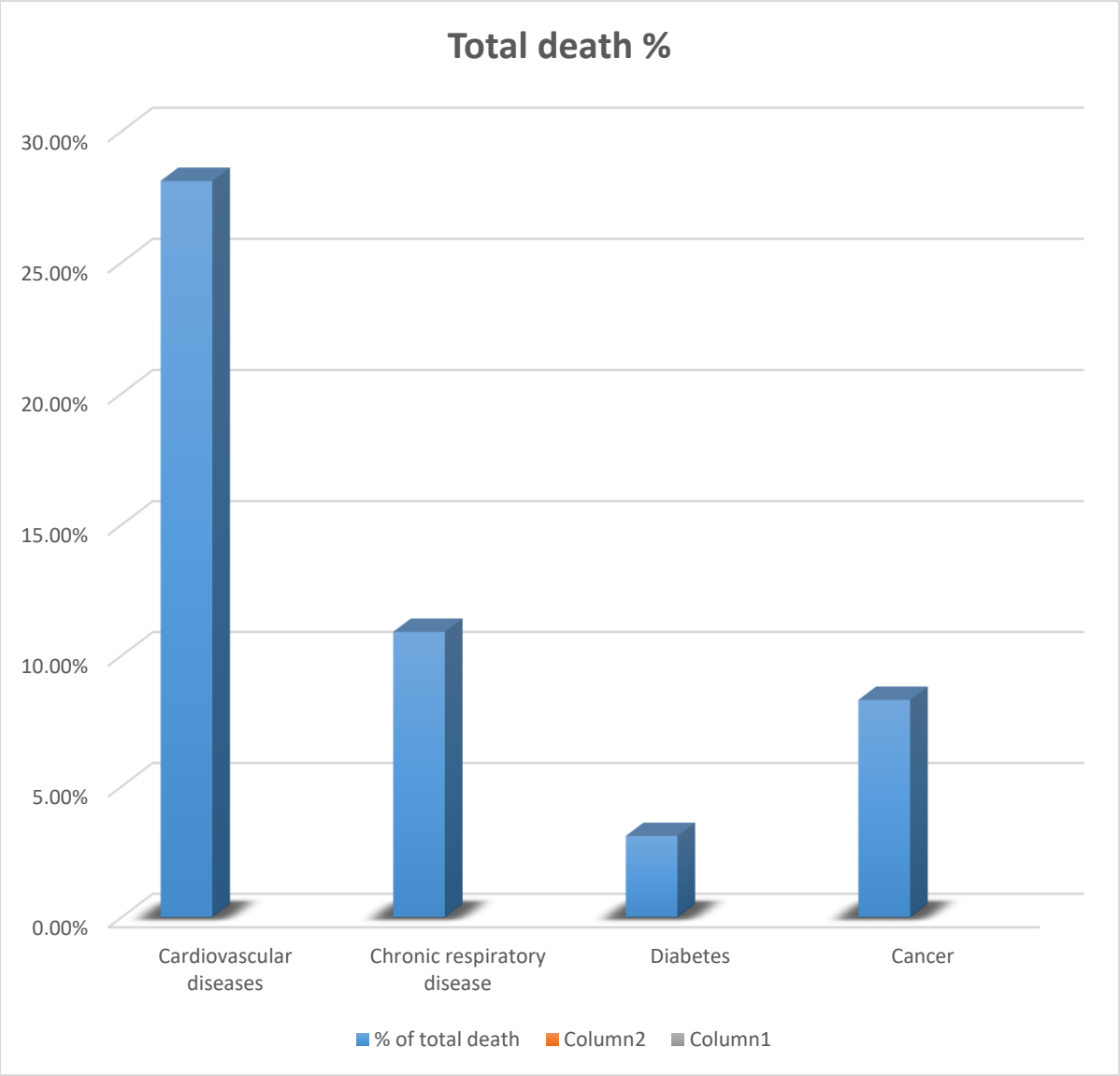
Inclusion criteria	Exclusion Criteria
• Diseases condition limited to four major diseases that is Cardiovascular diseases, Cancer, Chronic respiratory diseases and Diabetes.	• Exclude other non-communicable diseases like Obesity, Chronic kidney diseases, and any chronic mental diseases.
• Studies conducted in India	• Exclude the studies conducted outside India.
• Articles selected were of last 10 years.	• Exclude the studies conducted before last 10 years.
• Articles should be in English language only.	• Articles of other languages excluded.

Author	Objective	Methodology	Time Horizon
D Prabhakaran P Jeemon M Sharma GA Roth	To analyze the pattern of cardiovascular disease in states of India between 1990-2016	Literature Review	2018
N Tondon RM Anjana V Mohan	To analyze the time trends and heterogeneity in the distribution of diabetes between 1990-2016	Literature Review	2018
S Salvi GA Kumar K Paulson	To report the trends and heterogeneity of chronic respiratory disease in all states of India between 1990-2016	Literature Review	2018
PK Dhillon P Mathur A Nandakumar	To report the trends of burden of total cancer and specific cancer type in all states of India between 1990-2016	Literature Review	2018
D. Wayne Taylor	To study the burden of non-communicable disease in India.	Literature Review	2004

The quality of the comparative study was evaluated on the basis of research design. No research paper was excluded due to quality of paper.

RESULTS





- Cardiovascular diseases come up with highest death rate i.e. approx. 28.1% and 14.1 % of total DALY. The prevalent cases of cardiovascular disease are 54.5 million in 2016. According to the study of selected article Kerala, Punjab, Tamil Nadu has higher prevalence rate followed by Andhra Pradesh, Himachal Pradesh, Maharashtra, Goa and West Bengal.

- Chronic respiratory disease that include asthma, respiratory allergies and Chronic obstructive pulmonary disease accounts for 10.9% of total death whereas the total DALY percentage is 6.4 in 2016. And the crude prevalence of chronic obstructive pulmonary diseases specifically is 4.2% in 2016, the states with higher prevalence rate are Jammu & Kashmir, Himachal, Uttarakhand and Haryana.
- Cancer of all type together contribute to 8.3% of total death and 5.0% of total DALY in India. Till 2016, the total number of incidence cases of cancer are 1069000 (1043000-1101000). States with highest crude rate of cancer were Kerala and Mizoram followed by Haryana, Delhi, Karnataka, GAO, Himachal Pradesh, Uttarakhand and Assam.
- Diabetes is the second most leading cause of death worldwide but cardiovascular diseases, respiratory diseases and cancer keep it lag behind. The total death percentage 3.1% and total DALY percentage 2.2%, the prevalence cases were 65.0 million was of diabetes. Tamil Nadu and Kerala followed by Punjab, Goa and Karnataka were the highest crude rate of Diabetes in 2016.

DISCUSSION

Non communicable disease are also known as the chronic diseases, having long course of duration and are result of combination of genetic, physiological, environmental and behaviors factors. The number one killer of global deaths are Non-communicable diseases causes 71% death worldwide, 80% in low middle income countries, 29% of NCD death before the age of 60. NCD kill 41 million people each year, equivalent to 71% of all deaths globally. In India, nearly 5.8 million people die from NCDs every year or in other words 1 in every 4 individual has a risk of dying from NCDs before they reach the age of 70. If timely interventions are not taken for the prevention and control of NCDs, the total annual deaths increase by 55 million by 2030. Industrialization, urbanization, changes in age structure, change in lifestyle are the major reason responsible for the shift towards the non-communicable diseases. In a report of health of nation, by Ministry of Health and Family Welfare, the graph of DALY which is the sum of the number of years of life lost due to premature death and a weighted measure of the years lived with disability due to a disease or injury is tilt towards the NCDs. It is found that

DALY contribution is increase from 30% in 1990 to 55% in 2016, and also increase in the proportion of death due to NCD from 37% in 1990 to 61% in 2016. It shows a rapid epidemiological transition from communicable diseases to non-communicable diseases in our country.

Narrative Study

INTRODUCTION: The Novel coronavirus is a new strain of virus that has not been previously identified. The scientific name of the virus is Severe Acute Respiratory Syndrome-coronavirus-2 (SARS-CoV-2). The index case of the coronavirus was found in Wuhan city of China on December 8, 2019, and it spread to more than 177 countries across the world within a span of only 3 months. On 11 March 2020, the World Health Organization announces the rapidly spread corona virus is a pandemic and named it as "COVID-19 VIRUS". As of 31 May 2020 covid 19 affects 59, 39,234 individuals in 216 countries, with highest number of cases in America and Europe out of which 367255 were died due to it[i]. The total number of death already exceed 367255 and it is expected to increase as the virus spreads. The case fatality rate of Covid 19 is 6.12% worldwide[ii], older adults and patients with comorbidities are likely to have severe infection and at risk of dying. So those who are at highest risk of covid-19 infection are those who survived with non-communicable disease for longer times, namely the elderly. From this aspect it is clear that elderly are at risk but it does not mean that younger population are exempted. According to World Health Organization, 71% of global death are due to non-communicable disease and 15 million die from non- communicable diseases between the ages of 15 to 69 years. And the reason for younger population develop NCDs are lack of physical activity, use of tobacco that results in high blood pressure, Diabetes, obesity etc. In this paper a scoping review was conducted to provide brief summary of COVID-19 and an assessment of association between COVID and Non communicable diseases, with the hope to provide meaningful information from this research article.

OBJECTIVE: The objective of the study to evaluate the risk of Covid-19 in patients with non-communicable diseases and hat are the pathophysiology of Covid-19 virus to enter into host body especially in persons with pre-existing diseases.

METHODOLOGY:

Literature Search

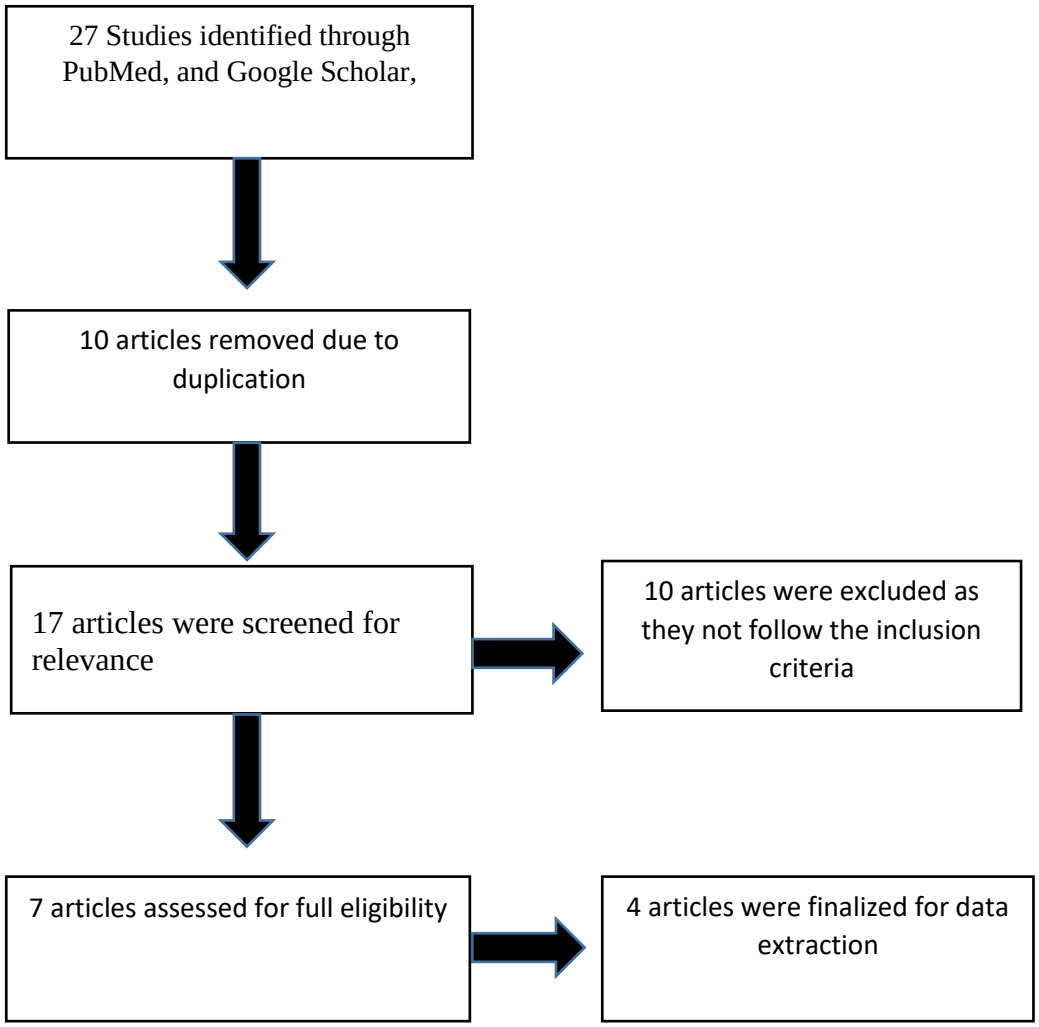
A literature search of PubMed, and Lancet articles was performed using the keywords 'Covid 19' 'Non communicable diseases' 'Diabetes' 'Chronic respiratory diseases' 'cardiovascular

diseases. A gray literature was also performed on Google scholar using the same keywords for the relevant articles. The searches were limited to articles published in December 2019 to June 2020 and the studies selected were of worldwide.

Eligibility Criteria and Study selection

For the inclusion criteria, the articles needed to be published in English only, of the patients diagnosed with new coronavirus (SARS-CoV-2) and had pre-existing non communicable diseases. The other studies pertaining to communicable diseases any other virus like Middle East Respiratory Syndrome (MERS) were excluded.

PRISMA Flowchart Diagram of studies screening



Studies included in the review from searching to screening

- In the databases search a total of 27 potentially relevant studies were identified, of 10 studies were removed due to duplication, leaving 17 papers. Inclusion and exclusion criteria applied to the remaining papers.
- In the next round, 17 papers were screened on the basis of title and abstract and 10 papers were excluded as they clearly not relevant to the review. That left 7 papers.
- In the last round all the 7 papers assessed for full eligibility, the eligibility criteria applied again for detailed screening and at the end 4 papers were finalized, the detail of these 4 studies given at the end.

Characteristics of Included Studies

- The 4 papers included in the review were study conducted across countries like Italy, China, United States and England.
- Out of 4 studies 2 studies dealt with retrospective observational study, one is Cohort study and the other one is MMWR report.

GENERAL FEATURE OF COVID – 19

Incubation period of the virus

The incubation period is the time between exposure to the infection and manifestation of the symptoms. The incubation period for the Novel coronavirus suggests 1 to 12.5 days (with median estimates of 5-6 days), but can be as long as 14 days.

Modes of Transmission

Covid-19 causes respiratory disease and transmitted infection mainly:

- Person to person
- Contact with infected objects

Stages of Transmission

The novel coronavirus has four stages of transmission:

1st – It is the first arrival of the disease through the people with travel history of any infected country. There is no local spread through affected people. The number of confirmed cases was quite low at this stage.

2nd – In the second stage local transmission occur, when the infected person comes in contact with their friends, families and any other person. Those people can be traced and isolated.

3rd --The next stage is the stage of community transmission where the source of virus cannot be detected and infection happen in the public, where the lockdown of geographical area become important step for the prevention.

4th- The final stage where the infection become epidemic with large number of infected cases and large number of deaths like in United States.

Physical Manifestation of the disease

When an individual expose to the virus, it takes 5-6 days for the appearance of symptom, however the time extend up to 14 days.

Most Common	Less Common	Serious Symptom
• Fever • Dry cough, • Tiredness	• Aches and Pains, • Sore Throat, • Diarrhea, • Conjunctivitis, • Headache , • Loss of taste and smell,	• Pain in chest • Difficulty Breathing or Shortness of breath, • Loss of speech or movement

	• A rash on Skin, or discoloration of fingers and toes	

NON COMMUNICABLE DISEASES ASSOCIATED WITH HIGHER COVID-19 RISK

It is clear that immunocompromised person or those are suffering from non-communicable disease like Diabetes, Cardiovascular diseases, Lung diseases, are most likely to take the infection and have poor outcome. According to the new study published in May 2020, these medical conditions influence the expression of genes that are linked to the entry of SARS-CoV-2 into the cell. Furthermore the study also says that in addition to the lungs, this virus also target the other organ system such as heart, kidney demonstrated in experimental and clinical evidences. [iii]

Pathophysiology of viral entry into the host body[iv]

SARS-CoV-2 virus has spikes on its surface that made up of S protein, which is a main component of viral entry into the host body. These protein spikes binds the virus to the ACE-2 receptors that present in host body. The ACE-2 receptors which is a part Renin-Angiotensin system presents in multiple organ like Lung, Heart, Endothelium, renal endothelium, and in Pancreas. The Renin angiotensin system have other genes like ACE and AGTR1, which transcribed from the DNA at various levels.

The S protein domain contains the Receptors binding domain (RBD), when the virus gets binds with the ACE-2 receptor, the RBD gets spilt off. This splitting process fuse the virus to the host body. The protease involved in the splitting process may depend upon a change in the cellular endosomes, activity of L-Cathepsin, or membrane bound serine proteases found either at host body surface or inside vesicles.

Another mechanism is when sometimes these serine protease spilt the ACE-2 molecule itself and results in increase entry of virus. Here the serine protease inhibition plays the major role

in viral entry. The most well-known serine protease are TMPRSS2, and human airway trypsin like protease (HAT or TMPRSS11D), the other protease genes like ADAM17, TMPRSS1-5, TMPRSSD, TMPRSSE and TMPRSS15 are differentially expressed and helps the virus to enter into the host body.

Findings:

- In cancer, the ACE-2 expression is increases very much, along with almost every TTSP, This verify their importance in cancer cell proliferation, motility and invasion. Smokers are also at high risk as ACE-2 expression increases.
- Asthma not show any significant increase in ACE-2 expression but bronchial tissues more likely to express ACE-2 and TTSPs at higher levels than nasal epithelium.
- In case of Hypertension, there is increase expression level of ACE-2, TMPRSS1 and TMPRSS4 in cortex of kidney and tubulointerstitial tissue, the obese person also has increase ACE-2 expression level.
- In chronic kidney disease, the expression level is highest where TMPRSS4 at higher levels in both glomerular and tubular tissue.
- In heart, the increase level of ACE-2 is in patients with heart failure and who had aortic stenosis, the ACE-2 generally increased in left ventricle and decreased in right ventricle. Most of the TTSPs increases insignificantly.
- Diabetes also shows the increase expression of TMPRSS2 and Furin.

The findings of the paper are made on the basis of pathophysiology mechanism of association between Covid-19 and Non- communicable diseases. No definite based on current limited conclusion can be made on current limited evidences.

RESULTS

- All the 4 studies of Italy, China, England, and United States taken into the consideration, shows positive relationship between Covid 19 and Non Communicable

diseases as most of the patient that admitted in the Intensive care Unit has at least one pre-existing non communicable disease.

- Three studies analyzed the data from hospitalized patient and 1 study take the sample size of patients had at least one comorbidity and died due to coronavirus.
- The below table shows the percentage of Corona positive patient with at least one comorbidity in different countries:

NCD	**ITALY**	**CHINA**	**UNITED STATES**	**ENGLAND**
Hypertension	49%	16.9%	49%	9820
Other Cardiovascular diseases	21%	NA	27.8%	NA
Diabetes	17%	8.2%	28.3%	4399
Chronic Respiratory diseases	4%	1.5%	34.6%	2900
Total sample size	**1043 hospitalized patients**	**1590 Hospitalized patients**	**178 hospitalized adult patients**	**Out of 38847 death in hospital**

Similarity Between all studies

- All the 4 studies talks about the confirmed cases of coronavirus associated with underlying non communicable diseases.

- All studies were recent that held in April and May, 2020.
- All studies consider the major Non communicable diseases that is Hypertension, Cardiovascular diseases, Diabetes, Chronic respiratory diseases.
- Three studies analyzed the data from hospitalized patient and 1 study take the sample size of patients had at least one comorbidity and died due to coronavirus.

CONCLUSION:

In conclusion, no definite conclusion can be made which shows why Covid 19 affect patients with Non communicable diseases. But, patients with non-communicable diseases are vulnerable to become severely ill with the virus. The highest number of Covid 19 patients has hypertension followed by other cardiovascular diseases and Diabetes.

DISCUSSION:

According to the paper published by Colombia Mailman School of Public Health researchers in the journal named British Medical Journal, the relation of Covid 19 with pre-existing non-communicable diseases is a perfect storm, particularly for communities of poverty. According to World health organization, non-communicable diseases like cardiac diseases, diabetes, cancer and chronic pulmonary diseases are the “leading killers” and “slow motion disaster” accounts for 71 per cent (77million) deaths globally. The Global Health report of 2018 says that out of the total NCDs global deaths, approx. 85 % occurs in European region. 82 per cent in Japan, 88% in United States and 89% in United Kingdom deaths. And now The Covid -19 infection will worsen the situation of these countries. Old age and pre-existing NCD conditions can reduce the immunity level and will lead to worse outcomes. The global statistics on COVID-19 also shows that the death rate is 21.9 per cent in the age group of above 80 years, 8 per cent in the age group between 70-79 years and further 3.6 per cent in the age group of 60–69 years of age group.

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