

RESEARCH PAPER

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COVID19-The Pandemic Disease of 2020

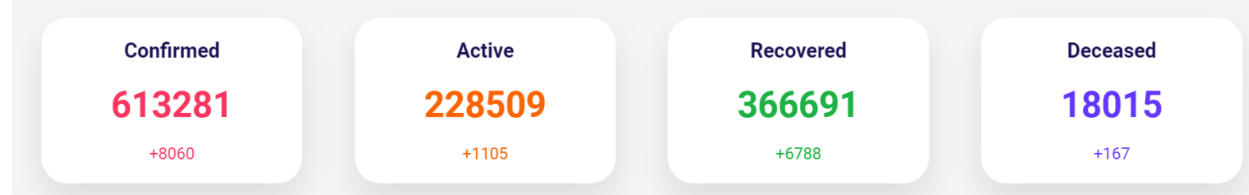
Objective:

To study the current status of the pandemic disease COVID-19 in Indian state of Madhya Pradesh versus India's trend of this disease up till 2nd July 2020.

Abstract:

For the past few months the whole world is facing a pandemic disease known as COVID-19. First case of COVID-19 was confirmed by WHO on 13th January in Wuhan city of China and from there it has now spread to almost every country (approximately, 213 countries), including India. First case of COVID-19 in India was confirmed on January 30th.

COVID-19 INDIA TREND -last updated on 2nd July 2020 (Ref.-<https://www.covid19india.org>)



COVID-19 was declared a **pandemic disease on 11th March, 2020 by WHO**. Currently the tally is 10,857,346 (last updated on 2nd July, 2020) and the number of cases are increasing each day. Here is an observational study was conducted for Madhya Pradesh state by actively collecting data from various websites, newspapers, journals, articles on the topics like mortality, morbidity, age and sex parameters of the disease and about recovery and death indicators. This study talks about the current situation of COVID-19 in India more focusing on Madhya Pradesh and impact of it along with the measures taken by the Government.

Statistics of Top 5 COUNTRIES - Affected by Covid-19

Statistics ⓘ							
Country	↑↓ Infected	↑↓ In 24h	↑↓ Deaths	↑↓ Recovered	↑↓ Active Cases	↑↓ Serious	↑↓
USA	2,783,705	+ 3,752	130,869	1,168,422	3,742	1,484,414	
Brazil	1,456,969	+ 3,600	60,813	916,147	89,281	480,009	
Russia	661,165	+ 6,760	9,683	428,978	6,047	222,504	
India	612,486	+ 7,266	17,996	366,027	6,131	228,463	
UK	313,483	+ NA	43,906	NA	NA	NA	

India on 6th June surpassed Spain and became the 5th worst hit nation by the ongoing pandemic disease by crossing the tally over **2,43,733** according to John Hopkins University Data.

Madhya Pradesh figures (Ref.- <https://www.covid19india.org>):

Last updated on 2nd July, 2020:

Total cases: **14,106**

Total Deaths: **589**

Total Recovered: **10,815**

In this study we infer that males are more susceptible to this virus than Females. Disease is seen more in the 60+ age demographic.

Introduction:

COVID-19 popularly known as **CoronaVirus**, is associated with the respiratory disorder which was declared as a global pandemic for the first half of the year 2020 by the World Health Organization. As per the latest data (1st-2nd July 2020) tracking sites state, around **10,857,346 confirmed cases** of COVID-19 all around the world and **520,127 deaths** have occurred worldwide with **6,076,094 recovered cases** worldwide.

India accounts for almost one-fifth of the world's population and is the second leading country in terms of population in the world. India after a nationwide lockdown since 22-March-2020, which was a one-day lockdown, followed by a 21-day lockdown after two days.

This was followed by three more phases of lockdowns through 15th April to 31st May, 2020.

To improve the financial instability caused by the lockdown, and bringing life back to normal, the next **two phases to unlock (1 June - 31st July)** focus jump starting the economy.

Every activity in India since then has been monitored through permissions and almost all forms of domestic and international travels has been banned or closely monitored.

India has not yet entered the third phase of the COVID-19 epidemic, the global pandemic witnessed through borders, around the world, but the infected have increased in numbers.

India's lockdown period has been influenced by two major factors during the days, combined with the mass exodus of labourers and manual workers migrating through the country (especially Delhi to neighboring states) and the conduct of a religious event in Delhi which led to a peak in the number of cases in across the country. Meanwhile, the Prime Minister of India has tried to connect with Indian citizens through innovative strategies and encourage the community through engagement activities, boosting country morale.

Some information about Coronavirus

Timeline Stages of Early stages of coronavirus

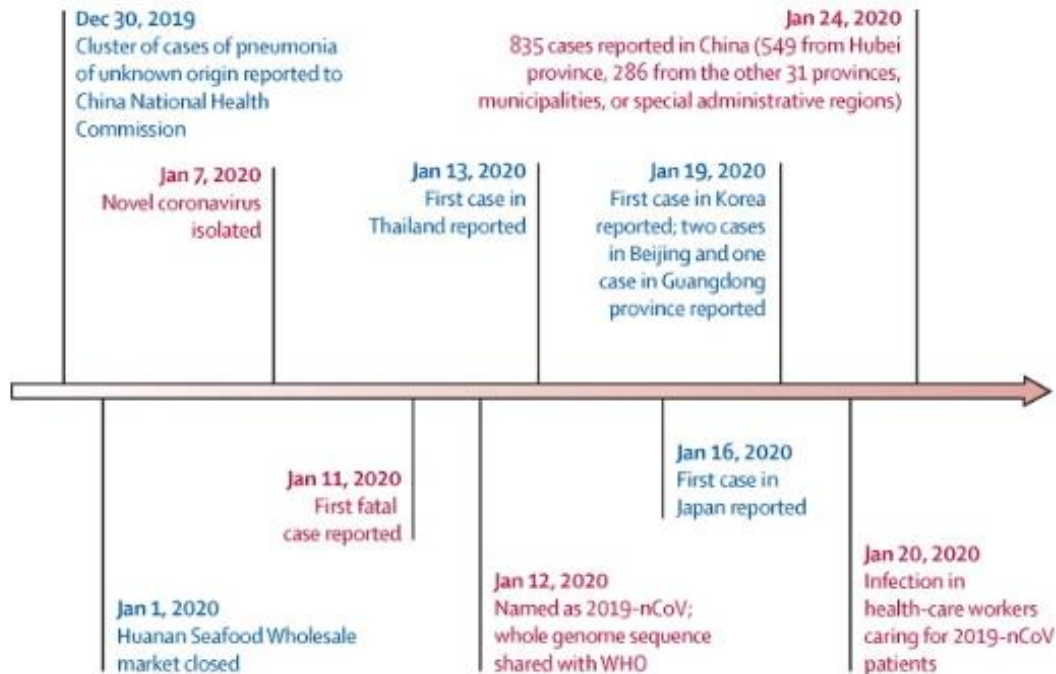


Figure Timeline of early stages of 2019-nCoV outbreak

The COVID-19 is caused by the SARS-CoV-2 virus. Reservoirs of SARS-CoV-2 most likely found in bats, but the virus has crossed a threshold and reached humans through intermediate animal hosts. The host has not yet been identified, but speculated to be **Pholidota commonly known as the pangolin**. Coronavirus (respiratory virus) disease is airborne and **spreads through the droplets of sneezes, coughs, saliva or phlegm of the infected person**.

Literature Review:

S No	Title	Author	Reference
1	Prediction of COVID-19 Disease Progression in India : Under the Effect of National Lockdown	Sourish Das	https://arxiv.org/abs/2004.03147

2	A vulnerability index for the management of and response to the COVID-19 epidemic in India: an ecological study	Rajib Acharya, Akash Porwal	https://www.sciencedirect.com/science/article/pii/S2214109X20303004
3	Modeling and forecasting the COVID-19 pandemic in India	Kankan Sarkara, Subhas Khajanchi, Juan J. Nietoc	https://www.sciencedirect.com/science/article/pii/S096007792030446X
4	Short-term forecasts of COVID-19 spread across Indian states until 1 May 2020	Neeraj Poonia, Sarita Azad	https://arxiv.org/abs/2004.13538
5	Evaluation and prediction of COVID-19 in India: A case study of worst hit states	Danish Rafiq, Suhail Ahmad, Suhail Mohammad, Abid Bazaz	https://www.sciencedirect.com/science/article/pii/S0960077920304124

Methodology:

Research Question:

To study the ongoing pandemic disease world wide, study the trends of COVID-19 in India specifically in the state of Madhya Pradesh up till 3rd July 2020.

Objective to study:

- To study how many countries and states and cities are affected by COVID-19.
- To study coronavirus in Madhya Pradesh.
- To study the demographic of disease age and sex wise.
- To study indicators such as mortality, morbidity, recovery rate.
- To enlist the measures taken by the government nationwide and at community level in lockdown and unlock phases and some specific measures taken by M.P government
- The action plan of lifting or extending lockdown in M.P.

Type of Research Method:

Quantitative Method

Type of Research Design:

Observational study design

Data Collection:

Data collected from websites, newspapers, articles , journals.

Data collected from: MOHFW, WHO, STATE health department

India COVID-19 tracker (by Govt of india):

<https://www.covid19india.org/>

Total cases in India: **6,13,281**

Total active cases : **2,28,509**

Total recovered cases: **3,66,691**

Total deaths: **18,015**

Top 5 affected states of India (last updated on 2nd July, 2020)

States	Confirmed	Active	Recovered	Diseased
1)Maharashtra	1,86,626	77,260	1,01,172	8,178
2)Tamil Nadu	98,392	41,050	56,021	1,321
3)Delhi	92,175	26,304	63,007	2,862
4)Gujarat	33,999	7,511	24,601	1,887
5)Uttar Pradesh	24,825	6,869	17,221	735

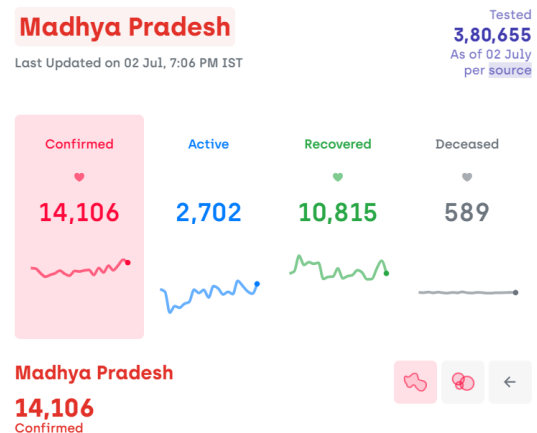
M.P. stands on **12th position** with cases number
(last updated on 12th july, 2020)

Confirmed : **14,106**

Active : **2,702**

Recovered: **10,815**

Diseased : **589**

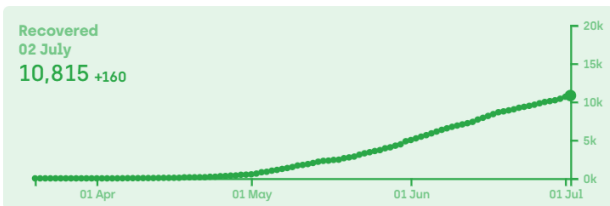
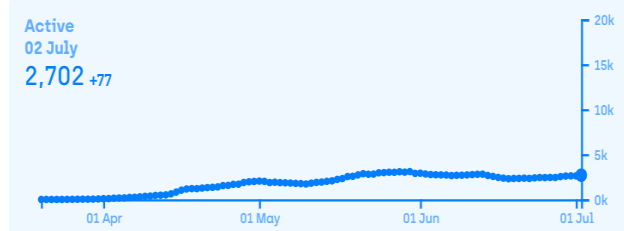
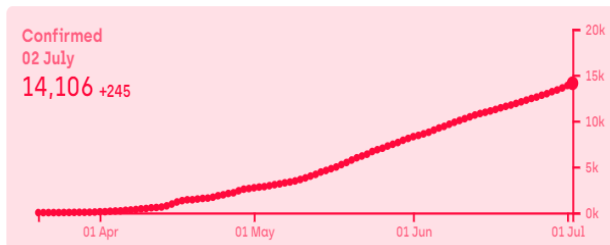


Bottom 5 affected states of India (last updates on 2nd july ,2020)

State/UT	Confirmed	Active	Recovered	Diseased
Arunachal Pradesh	232	160	71	1
Mizoram	162	36	126	0

Andaman & Nicobar Island	116	65	51	0
Sikkim	101	49	52	0
Meghalaya	62	18	43	1

Coronavirus in M.P



Top districts

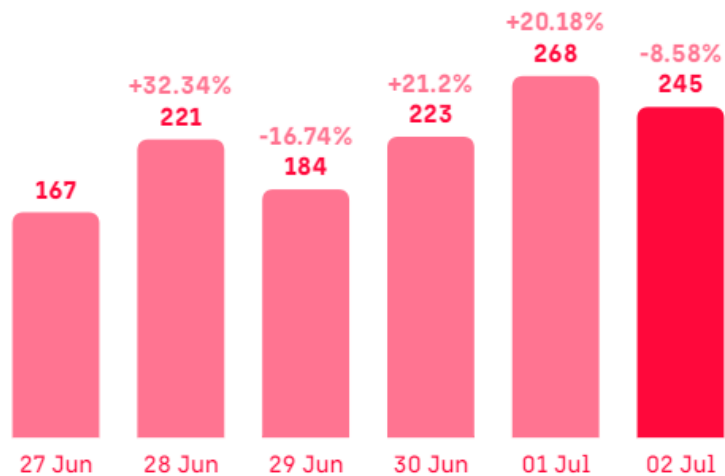
4,753 Indore

2,884 Bhopal

862 Ujjain

538 Morena

447 Neemuch



Details of Madhya Pradesh On Coronavirus



POPULATION
8,22,32,000

Confirmed Per Million ⓘ

171.54

India has 471.49 CPM

172 out of every 1 million people in Madhya Pradesh have tested positive for the virus.

Active ⓘ

19.15%

For every 100 confirmed cases, 19 are currently infected.

Mortality Rate ⓘ

4.18%

For every 100 confirmed cases, 4 have unfortunately passed away from the virus.

Recovery Rate ⓘ

76.67%

For every 100 confirmed cases, 77 have recovered from the virus.

Avg. Growth Rate ⓘ

1%

26 Jun - 03 Jul

In the last one week, the number of new infections has grown by an average of 1% every day.

Tests Per Million ⓘ

≈ 4,629

As of 1 day ago

For every 1 million people in Madhya Pradesh, 4,629 people were tested.

Districts wise cases in M.P

Top 5 affected Districts:

Bottom 5 affected districts :

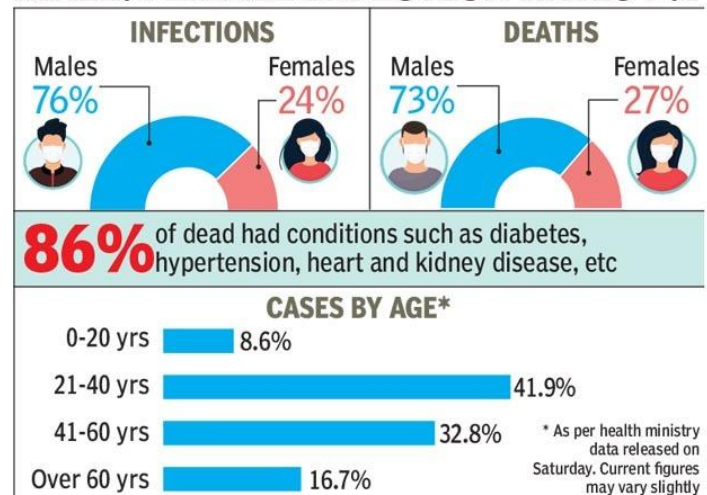
Districts	Confirmed	Active	Recovered	Deceased
Seoni	15	5	10	0
Umaria	11	1	9	1
Niwari	10	3	7	0
Mandla	6	1	4	1
Alirajpur	4	1	3	0

Age and Sex wise distribution of COVID-19 in India

This image depicts Males are more susceptible to coronavirus than Females and even have a high mortality rate.

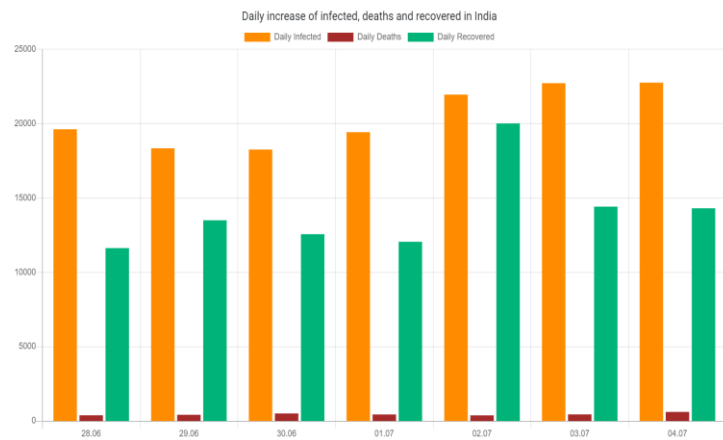
Highest number of cases is seen in the age group between 21-40 yrs as the younger population of India is highest.

MALE: FEMALE INFECTION RATIO 3:1



Death Rate in India

This graph shows mortality rate of India from 28th June till 4th July. Mortality rate on 4th July was 4.07%. Medical Experts believe that the reason for lower mortality rate in India is accredited to higher percentage of young population and decision of an early lockdown.



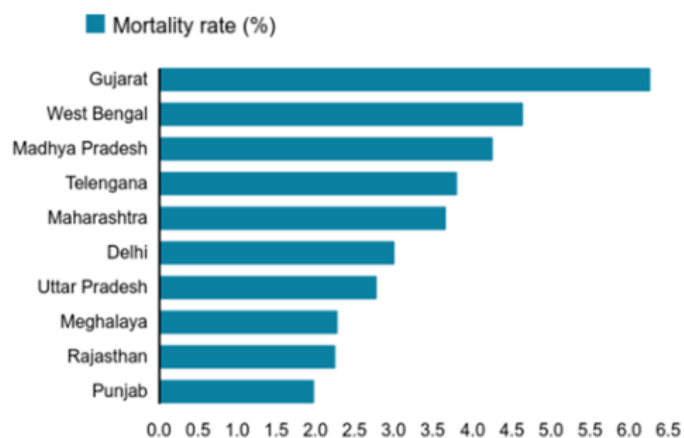
This figure shows the high mortality rate of COVID-19 in M.P.

In indore within 20 days the tally from 4 it reaches to 900 of corona patients.

Central team did an investigation and they found out that people didn't take lockdown seriously. As indore is the cleanest city so there is no chance of spreading corona here. Because of it, coronavirus spread very rapidly in Indore.

When health workers went into a locality in Indore for COVID-19 testing, people attacked and threw stones on them. **As they didn't want to get tested and cured.** Some people applied their saliva on notes and on vegetables on fruits passed those things to other people.

These are some reasons why cases suddenly increased in MP and MP became the hotspot.



Recovery Rate

India ranks 4th position among the worst hit countries by coronavirus disease pandemic. However, the recovery rate has improved in the country in the past two months from 11% to 60.73%.

On **3rd July 2020**, nearly **60.73%** of the total COVID-19 patients in the country were reported either cured or discharged from hospitals.

This number has gone up from last day's 60%.

In the last 24 hours, a sharp rise in the number of COVID patients was observed with 20,033 cured patients taking the cumulative figure to 3,79,891.

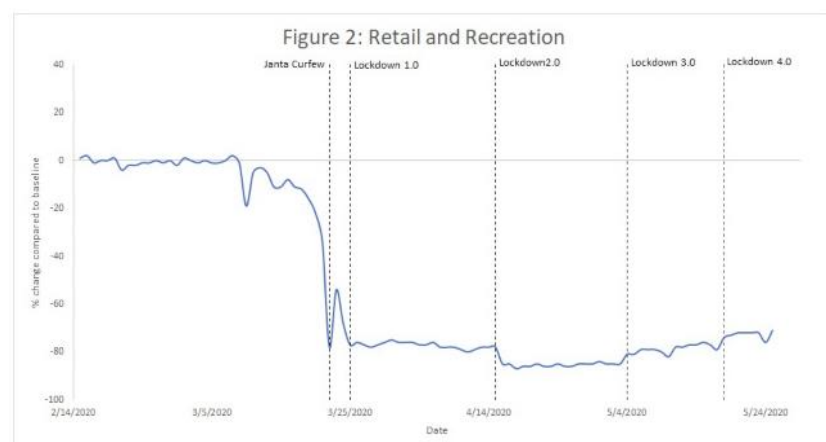
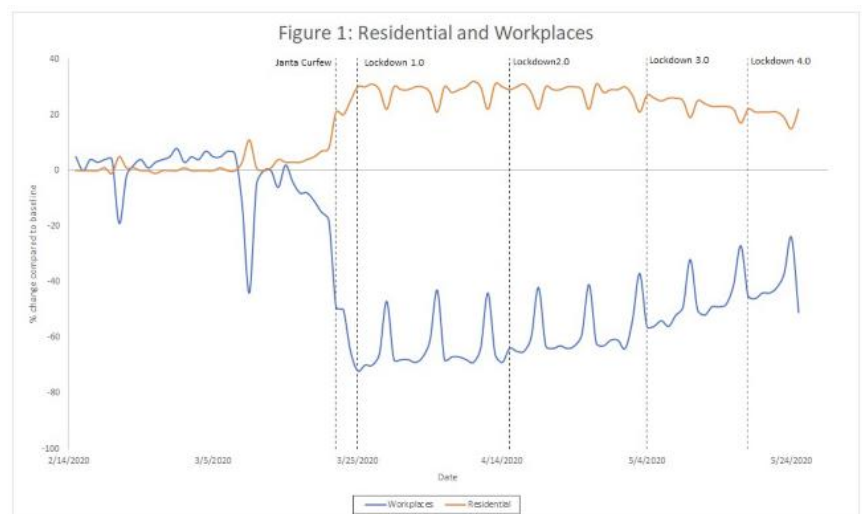
Practices adopted by Government/Non-Government Organisations to control spread of COVID-19

Phase 1 Lockdown “JANTA CURFEW” - 25th March-14th April (21 Days)

On March 25th 2020 the Prime Minister announced a **21-day nationwide lockdown**, a complete ban was imposed on people from stepping out of their homes except in case of an emergency.

International and domestic travel of tourists was **banned** within and outside the countries of the world to prevent further spread of this disease.

Mandatory screening of passengers and tourists at airports and railway stations was undertaken and passengers recognised as infected were quarantined until recovery.



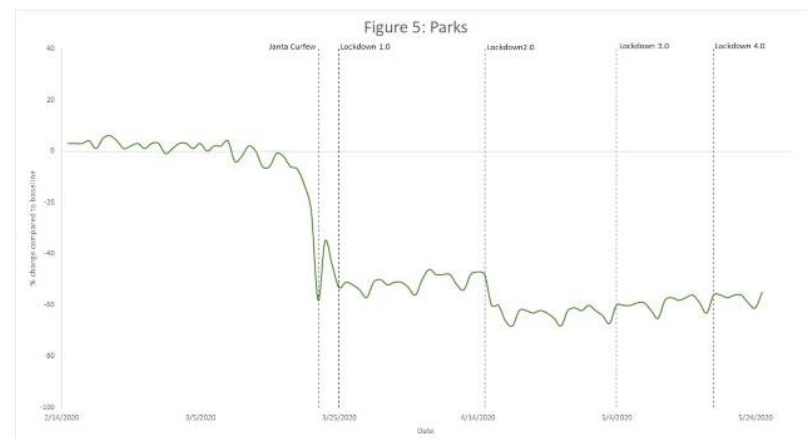
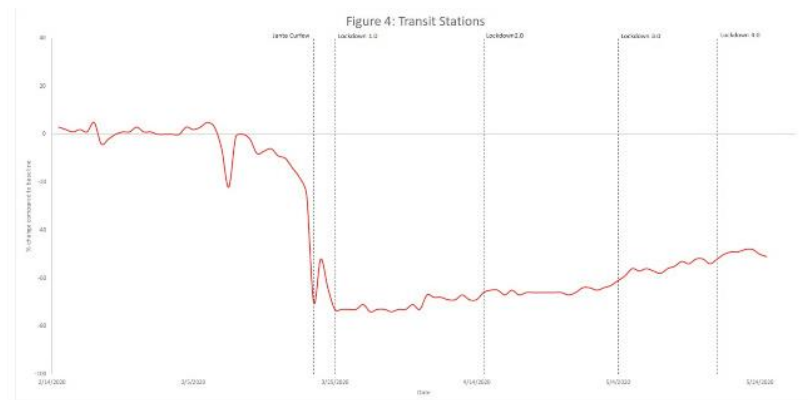
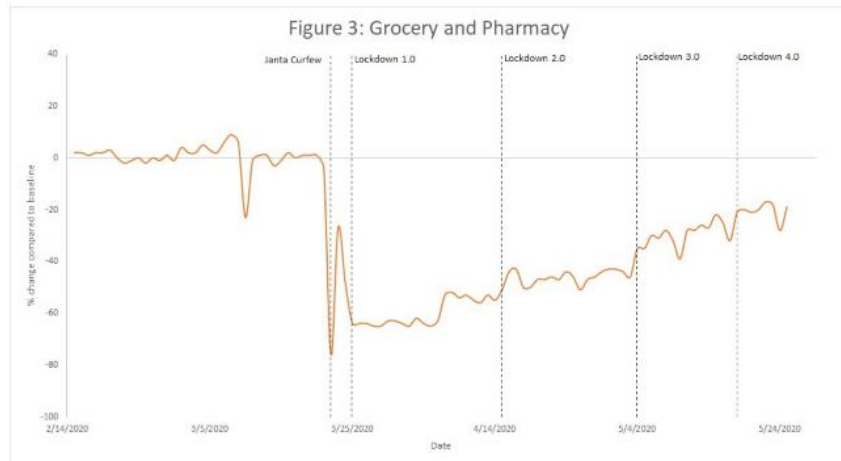
Mass gatherings at public places were strictly **prohibited** with strong instructions to wear a mask before leaving their home.

Guidelines to **sanitize** oneself hourly by using soap or a sanitizer were also advised. People are advised to follow **social distancing** and have been asked to stand at least at a distance of a meter from each other while talking or standing at public places.

All transport facilities including but not limited to buses, trains and flights were also **suspended** till further notice. Even all the educational institutes and offices were shut down until the pandemic subsided. The graph shows the high compliance of the citizens towards the government orders.

An expected surge in mobility was observed as people left homes to retrieve groceries and other amenities.

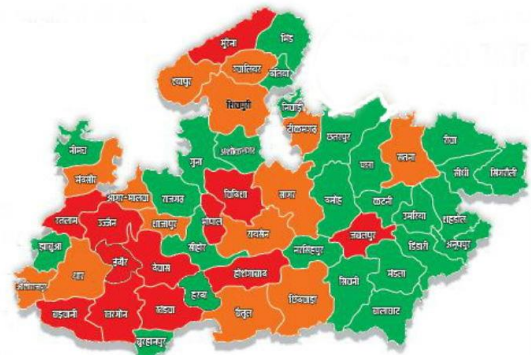
Post lockdown one the mobility remained static as relaxations were enforced and new services were put to effect to avoid unnecessary inconveniences for the general public.



An expected consistent surge in pharma and groceries can also be noticed from the above graphs as the most required amenities are bound to attract citizens. As the economy plummets the government was forced to enforce relaxations as the economy hits all time low since the last decade.

Phase 2 lockdown - 15th April-3rd May (19 days)

- As Prime Minister, Narendra Modi announced an extension of the first lockdown, till May the 3rd.
- In the states which have reported six or more cases in particular areas were marked as **hotspots** and are completely quarantined to prevent the spread of the infection in the society.
- **Contactless delivery systems** were established by many shopkeepers where shopkeepers will leave your order at your doorstep and you can collect it once the person has left to prevent the spread of infection by having minimal or no contact.
- The police forces were passed strict orders to monitor and close off any area suspected to be infection hotspots, and as any new cases emerged the area was quarantined with prohibitions to enter or exit the area under all circumstances.
- Areas were marked as **red, orange and green zones** according to the infected population reports, with green being least infected and red being most infected and control over activities were imposed accordingly.
- As time progressed and stocks dwended, **transit facilities** and necessary businesses were **allowed** to transit between zones to restock goods to be provided to the public, among them cargo trains, planes busses were provided with relaxations to transport goods across borders.
- Banks and other essential services were also provided with this relaxation.
- By the 25th of April, groceries, pharma, banks and other offices were **allowed to function with half the workforce**.



District-Wise zone allocation

CM of Madhya Pradesh Shivaraj Singh Chouhan on 20th April announced

- a) **MP Mukhyamantri Pravasi Majdoor Sahayata Yojana App** in which every worker who is stuck amid lockdown will be provided with 1000Rs in their respective account.

- b) **Jivan Shakti Yojana or MP Mask Yojana** this scheme was launched for females living specifically in urban areas. These females can earn without stepping out the door from their home only. Females under this scheme will make masks and the government will pay them 11 rs per mask.

Phase 3 Lockdown - 4th May-17th May (14days)

- By May, **migrants and stranded citizens** like students were given special **permission to travel** across borders through services provided by the government still discouraging travel through personal means or in masses
- New restrictions and definitions for the zones were enforced, with half capacity functioning of businesses in green zones, transit through no public but private means in orange zones, and full effect lockdown in red zones.
- Doubling rates now defined the zone type as **high rates** meant **red zone** and **low rates** being **green**, the situation was revised every twenty-one days and monitored under high stress, allowing zones to change state as per the case count of the region.

Phase 4 lockdown - 18th May-31st May (14days)

- As the lockdown progressed the **central government left decision making matters into the hands of the state government** as the situation highly varied.
- Madhya Pradesh remained highly contagious overall forcing the state to take severe measures. **Madhya Pradesh government adopts "Jatkheti Model"** which locates an infected case, quarantines them and tests radially outwards to avoid further spread of the virus, determining new updated zones to pinpoint the spread in micro scales and avoid further spread
- As the economy suffered workplaces were allowed to extend working hours from eight to twelve in an attempt to resume usual financial status
- As the migrant population reached state borders, Madhya Pradesh Chief minister, Shivraj Singh Chauhan setup **new bus and food services to help migrants travel** from state borders to respective hometown with safety.
- Free packets of herbal oils and ayurvedic powders were handed out by the administration in an attempt to boost immunity of residing citizens.

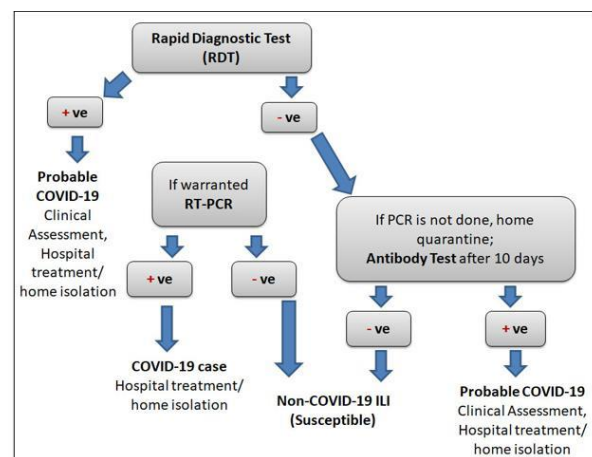
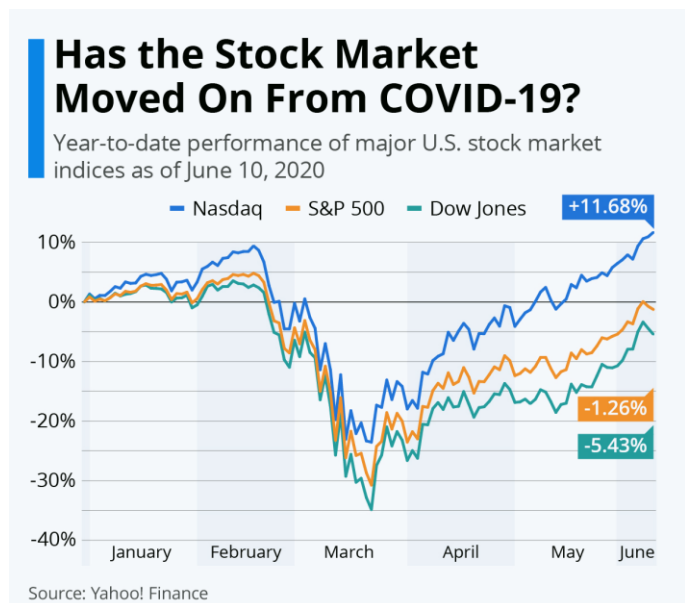


Figure 1: RDT workflow

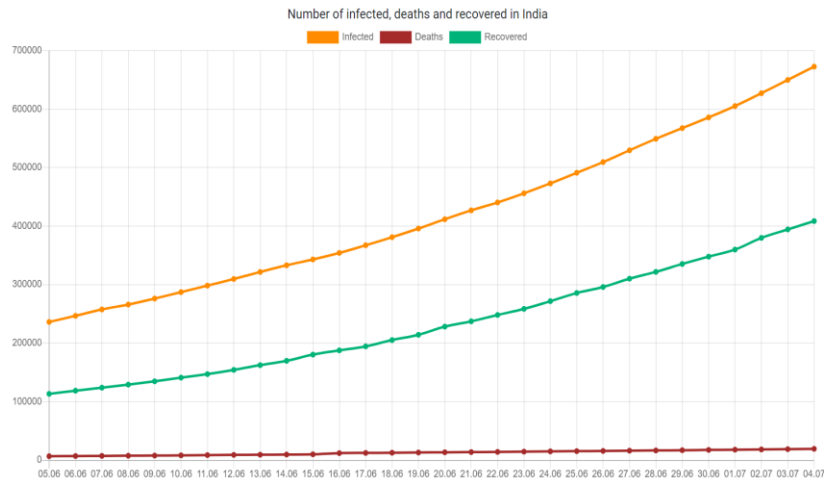
- On May 27th, through a letter to the chief minister the central government decided to **adopt** the “**Kerala model**” to tackle the virus which proved to be the most effective under the circumstances.
- Kerala model entails, **high grade medical services at low cost** so all can avail the benefits with high understanding of the threat by the citizens. This led to increased infrastructures and special permissions to private hospitals to provide special care for coronavirus infected patients under substantial low cost.
- **Special awareness campaigns** were enforced to allow citizens to understand the risk and how to avoid getting infected. Public announcements guiding through the steps on how to avail services if one was infected were widely enforced round the clock to help the illiterate be informed.

Phase 5 Unlock 1.0 - 1st June-20th June (30days)

- Through special orders led by the central government, the state government started to withdraw the curfew with an economic centric approach.
- While the red zones remained secluded, activities were allowed in the green and orange zones as per instructions, retaining the half workforce clause in the orange zones and minimal restriction in the green.
- After being closed for almost 2 months **malls got opened in M.P** with making sure all the safety measures are followed by everyone like wearing a mask and having arogyasetu app on phone is checked and temperature of each and every person before entering the mall is checked.
- **Dine-in** in the Food court and **Entertainment zone**(cinema hall, playing zone) **gyms, spas, swimming pools, bars, auditorium, playing areas will remain closed. Educational institutes** remain closed till further notice.
- Hotels and Restaurants will open with allowing only 50% seating availability.



- **Night curfews** were ordered to be in **effect from 9PM to 5AM**, with limited restriction to inter-state transit. State governments were still given the final say in the matter as the conditions widely differed through different states.



Graph showing steep rise in the cases in **Phase-5 UNLOCK 1.0**

Phase 6 Unlock 2.0 - 1st July - 31st July

- On July 1st, Madhya Pradesh government announced the “Kill Corona” Campaign where door-to-door surveys and tests were conducted to reduce and pin-point the spread of the virus.
- As people are allowed to gather in places the infected count increased, this led to introduction of new protective measures including setting up of special infrastructure for coronavirus infected individuals.
- Special schemes and steps were to be enforced to resume normal economic activities through subsidies and relaxations.
- Lockdown rules are still imposed in containment zones, and recreational places are still under shutdown till conditions improve and will be decided in August. Limited international travel is permitted under **Vande Bharat Mission** as an effort to jump start the economy.

Cases in Madhya Pradesh Phase wise

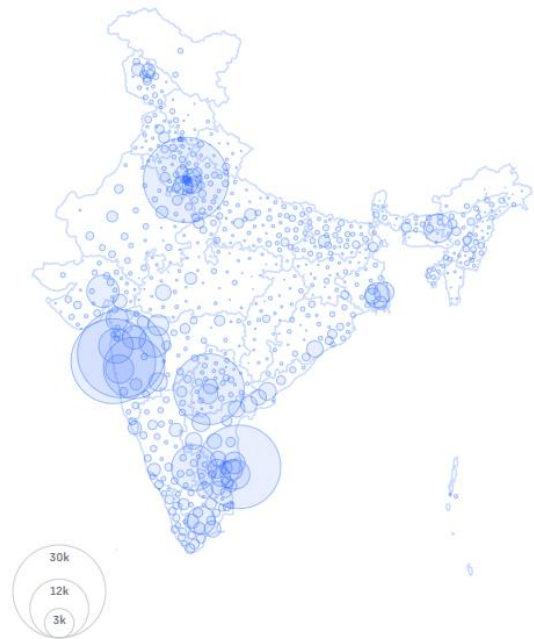
PHASE	CONFIRMED CASES
Lockdown Phase-1 (25th March - 14th April)	741

Lockdown Phase-2 (15th April - 3rd May)	2096
Lockdown Phase-3 (4th May - 17th May)	2140
Lockdown Phase-4 (18th May - 31st May)	3112
Unlock 1.0 Phase-5 (1st June - 20th June)	5504
Unlock 2.0 Phase 6 (1st July - 31st July)	513

As you can see in the table the number of cases increased in unlock phase as compared to lockdown phase

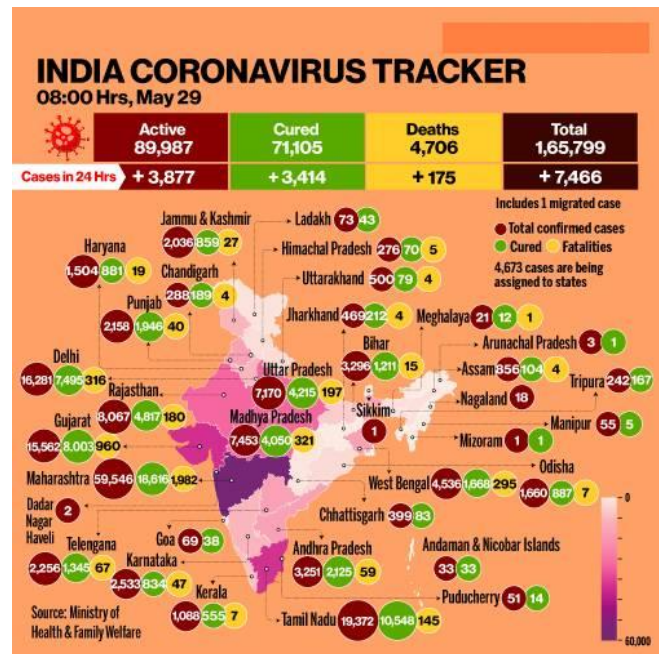
Conclusion:

- Through these dire times of pandemic, while the world squanders frantically to patch its health care systems, unfortunately India although not as traumatised struggles to endure.
- After the WHO (World health organization) declared coronavirus pandemic on 11th February 2020, many world leaders declared a state of emergency and enforced country-wide lockdowns.
- As the lockdown passes us by, we have suffered losses of life, finance and basic amenities.
- The state of Madhya Pradesh is no different, as the first case was registered on 21st of March 2020, it has risen to 14,930 since then (as of 6th July, 2020), and continues to threaten us with inflating numbers and doubling in as few as four day time periods.
- As the world leaders try desperately to reduce the casualties through immediate responses and management of resources of personal protective equipment (PPEs),



ventilators, masks among other necessities, some first world countries like Spain, Italy, United states of

- America is digging mass burial sites, which is unsettling to hear of in this modern age.
- Amidst this chaos Maharashtra has the worst, with 2,06,619 cases on the fortieth day of the crisis. As reported the male population is highly susceptible to this disease compared to their female counterparts, nevertheless the risk of increased casualties looms over the world. The collective efforts through the world of our coronavirus “heroes” have helped us dwindle these numbers, but the fight to contain the pandemic carries on, together as a species



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**ONLINE COURSE REPORT WRITING
ON
ESSENTIALS OF GLOBAL HEALTH**

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Essentials of Global Health is a comprehensive introduction to global health. Their goal is to present this topic to you in a well-structured, clear and easy-to-understand manner. Much of the course will focus on five questions: What do people get sick from, disabled from, and die of? Why do they suffer from these conditions? Who are the most affected? Why should we be concerned with such concerns? What can be done to solve major health problems, at minimal cost, as quickly as possible and in a sustainable way? The course will have global coverage, but will focus on low- and middle-income countries, the health of the poor, and health disparities. Particular attention will be paid throughout the course to health systems issues, the links between health and development, and health issues related to global interdependence. The course will cover key concepts and frameworks, but will have a practical orientation.

OBJECTIVES:

- Tell key public health concepts related to global health;
- Analyze the key issues in global health from a number of perspectives;
- Discuss with confidence the burden of disease in various regions of the world, how it varies by sex, age, and location; key risk factors for this burden; and how the disease burden can be addressed in cost-effective ways;

- Assess key health disparities, especially as they relate to the health of low-income and marginalized people in low- and middle-income countries;
- Review key global health challenges that are likely to arise in the coming decades.

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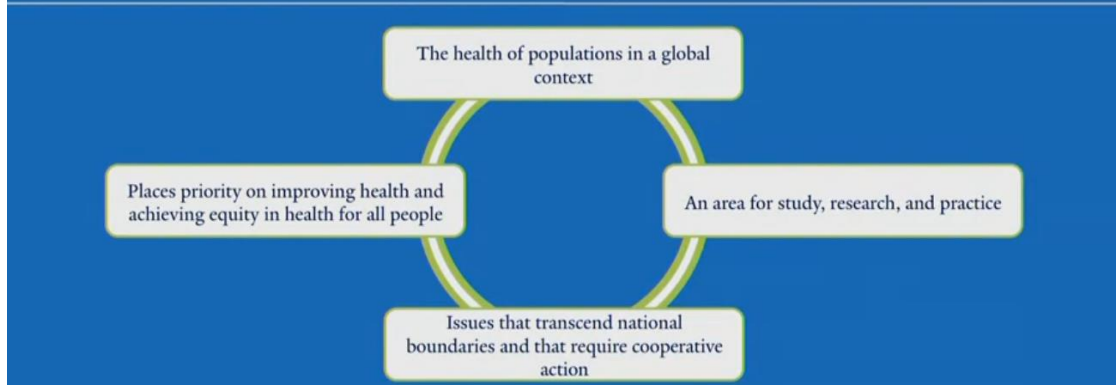
1. INTRODUCTION:

What is global health?

Global health: it has been defined as "the area of study, research and practice that places a priority on improving health and achieving equity in health for all people worldwide". Thus, global health is about worldwide health improvement (including mental health), reduction of disparities, and protection against global threats that disregard national borders.

The predominant agency associated with global health (and international health) is the WHO. Other important agencies UNICEF and the World Food Programme.

What is Global Health?

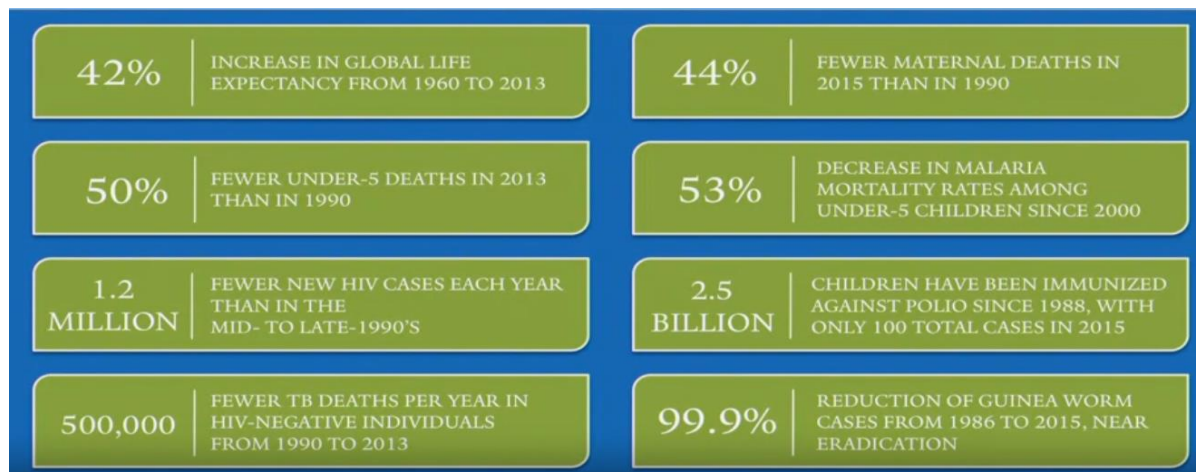


	Geography	Cooperation	Populations	Access	Disciplines
Global Health	Health issues that transcend national boundaries	Global	Prevention and clinical care	Health equity among nations	Highly interdisciplinary and multidisciplinary
International Health	Focus on issues outside of one's own country	Bi-national	Prevention and clinical care	Help other nations	Embraces a few disciplines
Public Health	Focus on specific communities or countries	National	Prevention	Health equity within a nation or community	Multidisciplinary, particularly with health and social sciences

Source: Kaplan JP et al. *Lancet* 2009, 373:9679 pp 1993-1995

2. THE STATE OF WORLDS HEALTH:

- Some good news globally:-



- Some less good news:-



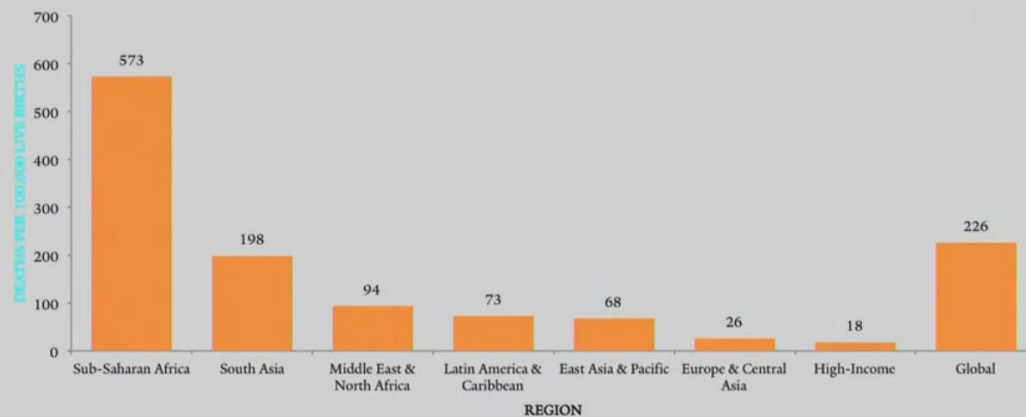
There's still 6.3 million under five children who die every year in the world. And if you divide that by 365 days, that's about 17,000 under five children who die every single day in the world. In about 45% of these deaths are related to the fact that these children are undernourished. They don't get enough food or they don't get a diverse enough diet or they're lacking for example in certain micronutrients. These deaths would not occur if these children were better nourished. Despite the progress against HIV, there's still 1.5 millions AIDS deaths in 2013. Despite the progress against HIV, there's still more than two million new HIV infections every year. There's been substantial progress in reducing the burden of tuberculosis. And yet there were still 1.5 million TB deaths in the world in 2013, almost 600,000 malaria deaths. Almost 300,000 women who die of pregnancy related causes. And about two billion people worldwide who are infected with soil transmitted helminths.

- **Maternal mortality rate**

The maternal mortality ratio is the number of women who die as a result of pregnancy related causes per 100,000 live births in a given year.

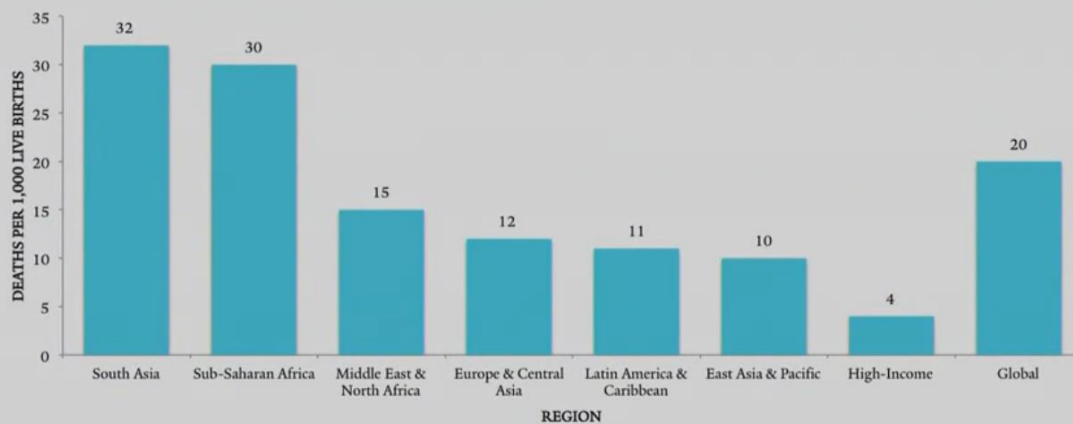
The maternal mortality ratio in Sub-Saharan Africa in fact is about 30 times the rate in the high income countries. And this Maternal Mortality Ratios in South Asia is more than 10 times the rate in the high income countries.

Maternal Mortality Ratios for World Bank Regions, High-Income Countries, and Globally, 2013



Source: Data from World Bank, World Development Indicators. Accessed December 17, 2015. <http://data.worldbank.org/indicator/SH.STA.MMRT/countries/1W-8S-XD-ZF-XQ-XJ-4E?display=graph>

Neonatal Mortality Rates for World Bank Regions, High-Income Countries, and Globally, 2013

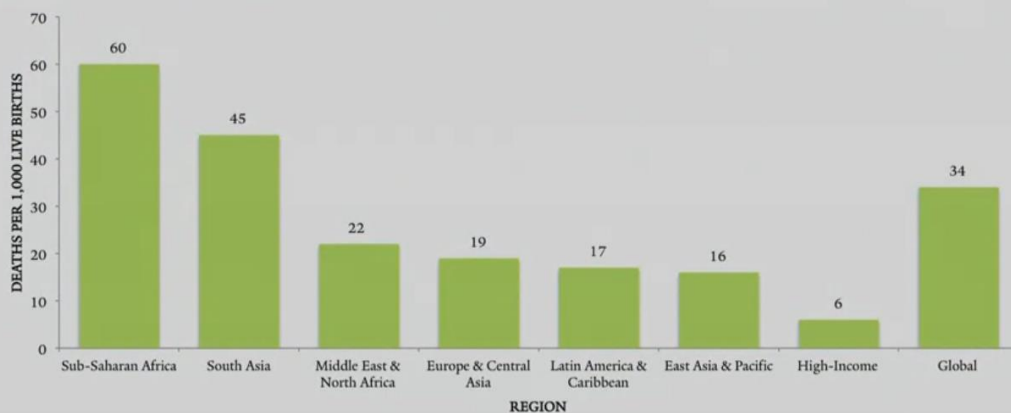


Source: Data from World Bank, World Development Indicators. Accessed December 17, 2015. Available at: <http://data.worldbank.org/indicator/SH.DYN.NMRT/countries/1W-8S-ZF-4E-XQ-XI-XD?display=graph>

- **Neonatal mortality rate** is the number of deaths to infants under 28 days of age in a given year per 1,000 live births in that year.

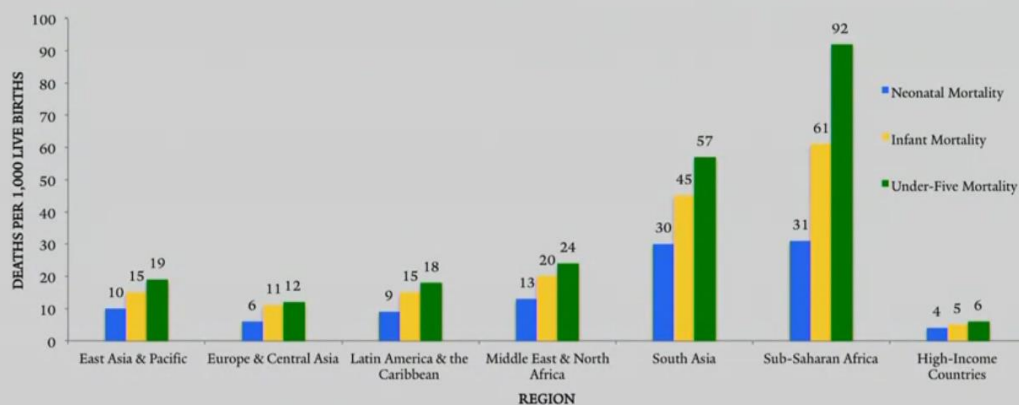
In this graph we see eight times the rate of neonatal mortality in neonates in South Asia as in high-income countries.

Infant Mortality Rates for World Bank Regions, High-Income Countries, and Globally, 2013



Source: Data from World Bank, World Development Indicators. Accessed December 17, 2015.
Available at: <http://data.worldbank.org/indicator/SP.DYN.IMR.TN/countries/1W-ZF-8S-4E-XJ-7E-XD/display=graph>

Neonatal, Infant, and Under-Five Child Mortality Rates, By World Bank Region and for High-Income Countries, 2013



Source: Data from the World Bank, World Development Indicators: Mortality. <http://data.worldbank.org/indicator/SH.DYN.MORT/countries/1W-Z4-ZQ-Z7/display=graph>. Accessed February 22, 2015.

What we see here is in the high income countries young children rarely die. For every 1,000 who are born only six will die before their fifth birthday. But of the six who die, four will actually die in their first 28 days. We look at Sub-Saharan Africa, what we see is a really different pattern. Here we see high rates of neonatal mortality, high rates of infant mortality, and high rates of under five child mortality.

3. VALUE FOR MONEY IN GLOBAL HEALTH

Definition of Cost-Effectiveness Analysis in Health



A method for comparing the cost of an investment with the amount of health that can be purchased with that investment

Deciding Between Interventions

Example: TB Programs

Approach 1: Unobserved Therapy

- The cost is \$US 180 per patient
- 70% cure rate

Approach 2: Observed Therapy

- The cost is \$US 200 per patient
- 90% cure rate

Let's take an example:-

Approach 1 :- In the case of the unobserved therapy, Let's say that the cost per patient is \$180. Let's say that 70% of the patients who take this therapy are cured.

Approach 2 :- which is directly observed therapy. In this case, it's \$200 per patient, it's more expensive, but 90% of the patients are cured. Which is a higher cure rate than you have in the case of unobserved therapy

So let's work this out and see what's the cost per patient cured?

The Solution

Unobserved Case	Observed Case
■ Treating 10 patients would cost US\$1,800 & 7 of the patients would be cured	■ Treating 10 patients would cost US\$2,000 & 9 of the patients would be cured
■ Cost per patient cured is US\$257	■ Cost per patient cured is US\$222

Cost effectiveness analysis is only one of many tools for making investment choices in health.

Important Considerations in Cost-Effectiveness Analysis

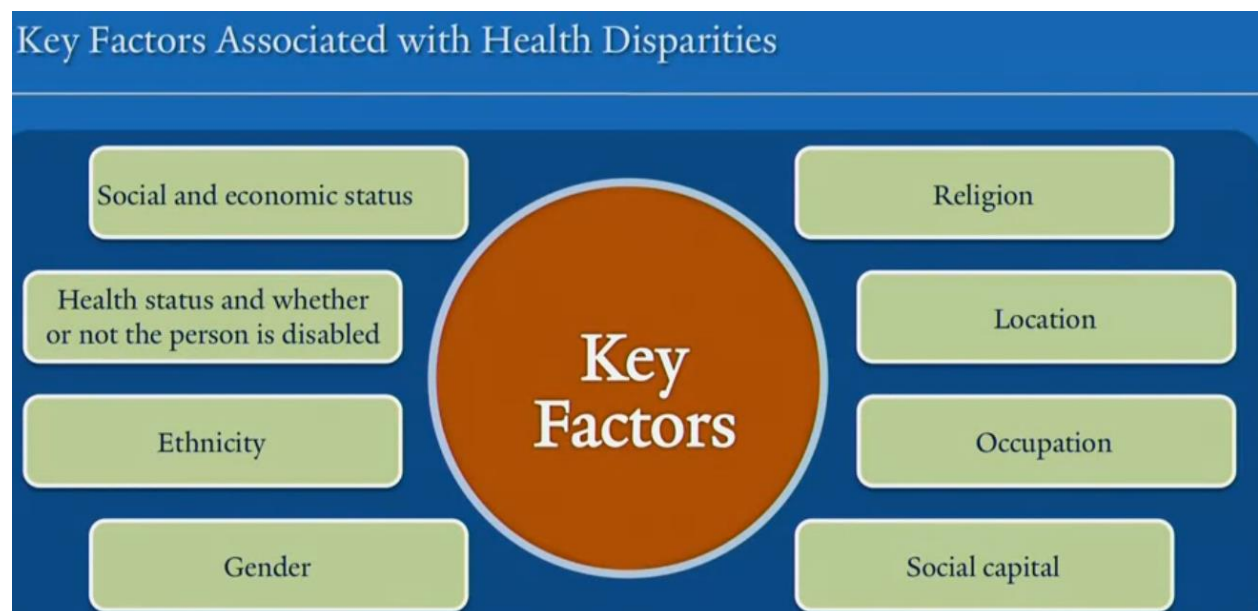


In decision-making, remember to account for:

- Equity considerations
- The burden of disease
- The extent to which the investment serves society as a whole
- The extent to which the investment produces benefits additional to its usual ones
- The impact of the intervention on the provision of insurance

4. HEALTH DISPARITIES:-

Health disparities have to do with **social and economic status**. People that are better off or less well off.



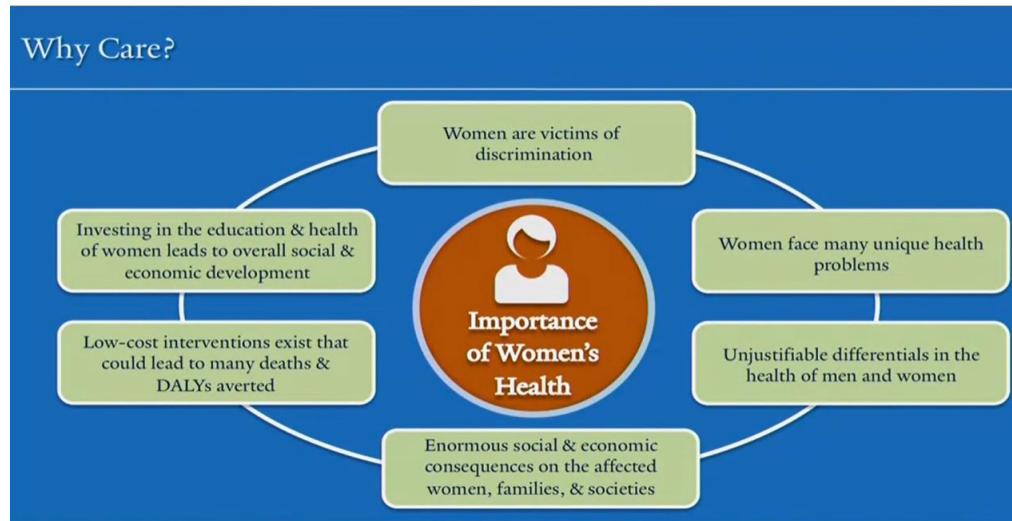
What is their state of health? And are they disabled? If a patient has leprosy or HIV, the society in which they live or the health worker who is not used to working with these patients may discriminate against them. **Ethnicity** - People who may belong to certain ethnic groups may also have lower income and education levels than others. **Gender** is often the root cause of health disparities. In many countries there are **preferences for men**. **Religion** is often a force that divides rather than unites. As we see in some societies where maybe the majority religious group enjoys better health, better access, better coverage, partly linked to higher incomes, more education etc. , as minority groups. **Location** is generally played out in terms of urban and rural. And **occupation** also makes a big difference. **Social capital, the relationships people have with others in society** and the support they derive from those relationships.

5. CROSS-CUTTING THEMES IN GLOBAL HEALTH

5.1 WOMEN'S HEALTH

Learning Objectives:-

- Describe the key burdens of diseases that women face globally.
- Discuss the women who are most affected by this burden.



Women are often victims of discrimination. Which can harm their health or reduce their ability to seek health services. Women face many unique problems such as cervical cancer, ovarian cancer and only they can give birth. There are often unjustifiable differentials in the health of men and women as was also pointed out.

There are enormous social and economic consequences on the affected woman, families and societies,
marked from

There are enormous social and economic consequences on the affected woman, families and societies.

There are low cost interventions that could lead to many deaths and many dallies averted. But a substantial share of these are not being used sufficiently or not taken to scale in some of the countries where they are most important. And lastly investing in the health and education of women, we know are really high yielding investments that have a big benefit for families, for communities, for nations, and for the world as a whole.

To understand the key issues that affect the health of women, it's important to understand some of the biological and some of the social determinants of women's health. Some **issues clearly relate to biology**, such as ovarian cancer. Other health issues referred to or relate to the **social status of women**. Such as families that might encourage strongly or push them into getting married very young. Having their first birth very young, having a large number of

children, and having them in quick succession. And some **nutritional concerns** might also relate to social determinants. In societies where a woman might eat last and might eat less, or girls might be fed less than boys are fed.

Leading Causes of Death for Females, Low- and Middle-Income Countries and High-Income Countries, 2013

Low- and Middle-Income Countries		High-Income Countries	
Rank	Disease	Rank	Disease
1	Stroke	1	Ischemic heart disease
2	Ischemic heart disease	2	Stroke
3	Lower respiratory infections	3	Alzheimer's disease & other dementias
4	COPD	4	Lower respiratory infections
5	Diarrheal diseases	5	COPD
6	HIV/AIDS	6	Tracheal, bronchus, and lung cancers
7	Diabetes	7	Breast cancer
8	Tuberculosis	8	Colorectal cancer
9	Hypertensive heart disease	9	Diabetes
10	Malaria	10	Chronic kidney disease

Source: IHME. Global Burden of Disease Compare. Accessed March 4, 2016. Available at: <http://vizhub.healthdata.org/gbd-compare/>.

Lower respiratory infections, which refers both to young children and older adults. Diarrheal diseases which predominantly will refer to young girls. HIV/AIDS in a world in which the epidemic has been feminized, in which more women are infected than men. TB, which is a major killer of women, and now I think the leading infectious cause of death in the world. And malaria, which is very important both for young children, but also for pregnant women as well. And of course, we don't see high-income countries in the top ten list of leading causes of death, TB, diarrheal diseases or malaria.

5.2 CHILD HEALTH:-

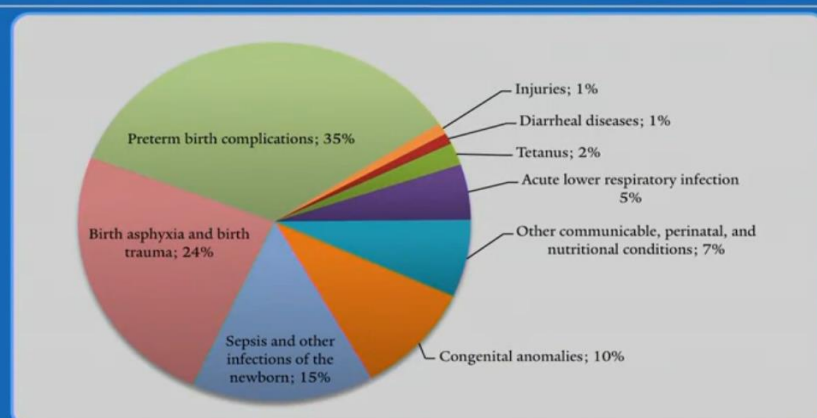
Three reasons why their health is so important to all of us. First, despite **notable progress in reducing the number of deaths** of young children, 17,000 children under the age of 5 die every day. Second, **children are vulnerable**, young children, children under 5 cannot really take care of themselves. And third, **children are the future**, it's trivial but really important. The healthier the children, the better the future will be.

Leading Causes of Under-Five Deaths, for Low- and Middle-Income Countries and High-Income Countries, 2013

Low- and Middle-Income Countries		High-Income Countries	
Rank	Disease	Rank	Disease
1	Lower respiratory infections	1	Congenital anomalies
2	Preterm birth complications	2	Preterm birth complications
3	Neonatal encephalopathy	3	Other neonatal disorders
4	Malaria	4	Neonatal encephalopathy
5	Diarrheal diseases	5	SIDS
6	Congenital anomalies	6	Lower respiratory infections
7	Neonatal sepsis	7	Neonatal sepsis
8	Other neonatal disorders	8	Road injuries
9	Protein-energy malnutrition	9	Drowning
10	Meningitis	10	Foreign bodies

Source: IHME. Global Burden of Disease Compare. Accessed March 5, 2016. Available at: <http://vizhub.healthdata.org/gbd-compare/>.

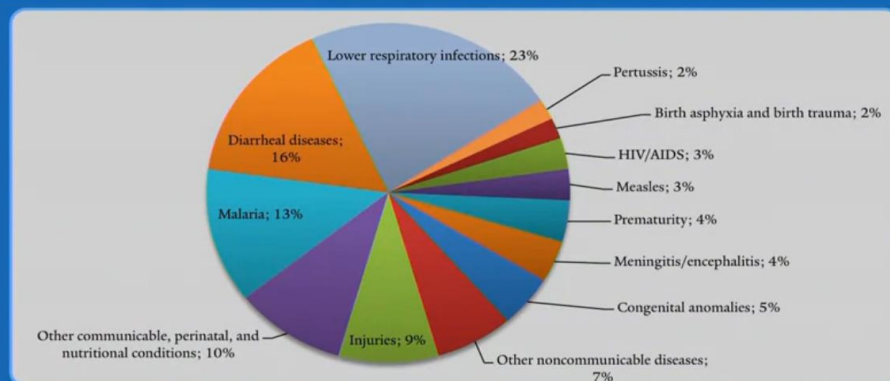
Causes of Neonatal Death, Globally, by Percentage, 2013



Notes: Estimates may not add up to 100% due to rounding.

Source: Adapted from Skolnik, R. L. (2015). Global health 101. Burlington, MA: Jones & Bartlett Learning. P.263; WHO. Global Health Observatory Data Repository: Mortality and <http://apps.who.int/gho/data/view/main.CM300WORLD-CH11?lang=en>. Accessed February 28, 2015.

Causes of Post-Neonatal Under-Five Child Deaths (1-59 months), by Percentage, 2013



Notes: Estimates may not add up to 100% due to rounding.

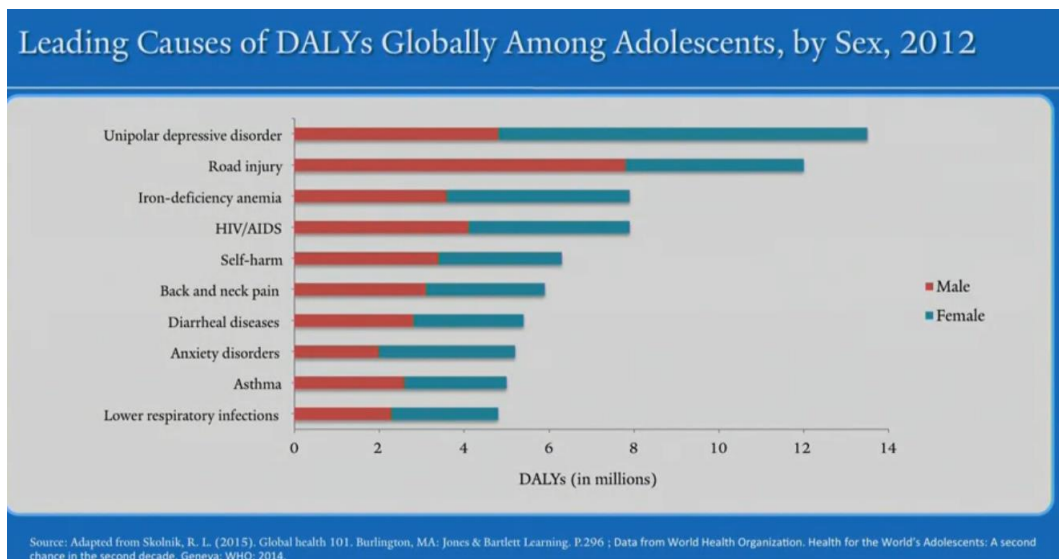
Source: Adapted from Skolnik, R. L. (2015). Global health 101. Burlington, MA: Jones & Bartlett Learning. P.263; WHO. Global Health Observatory Data Repository: Mortality and global health <http://apps.who.int/gho/data/view/main.CM400WORLD-CH11?lang=en>. Accessed February 28, 2015.

5.3 ADOLESCENT HEALTH :-

Learning Objectives

- Define adolescent and speak about the special importance of adolescent health
- Note the leading burden of disease among adolescent
- Comment on the risk factors for those burdens
- Identify measures that can be taken to address some of the key burdens of adolescent health

Adolescence the period following the onset of puberty during which a young person develops from a child into an adult. An adolescent is someone who is between ages 10 and 19 years old. There are a lot of reasons to focus on adolescent health. **One**, there are a large number of adolescents globally, especially in the developing world. And they face the health burden that's unique. **Also**, without helping protect the health of adolescents, a lot of the progress that's been made in improving child health is lost and adolescent health also lays the groundwork for healthy and productive lives as adults.



Here what we see is road injury as the leading cause of death among adolescents globally. What you see in red, not unanticipated is males and what you see in the blue is females. We also see HIV/AIDS as very, very important, usually for upper adolescents. We must never, never underestimate the importance of self-harm as a cause of death for adolescents. We still see pneumonia, lower respiratory infection, interpersonal violence, which is more important in

some regions as others, as I'm going to comment on. Injuries like drowning that occur primarily among the younger group rather than among the older group.

So there are a number of takeaways from this, but one that I'd really like to encourage you to keep in mind is the truly exceptional importance of mental health issues related to adolescents, and in here it's unipolar depressive disorder, self-harm I should also have said, and anxiety disorders.

Five Leading Causes of Death Globally Among Adolescents, by Sex and Age Group, for Low- and Middle-Income Countries, 2010

Low- and Middle-Income Countries			
Ages 10-14		Ages 15-19	
Rank	Disease	Rank	Disease
Males		Males	
1	Road injury	1	Road injury
2	HIV/AIDS	2	Interpersonal violence
3	Drowning	3	Self-harm
4	Lower respiratory infections	4	Drowning
5	Forces of nature	5	Malaria
Females		Females	
1	HIV/AIDS	1	Self-harm
2	Lower respiratory infections	2	Maternal disorders
3	Diarrheal diseases	3	Road injury
4	Road injury	4	Malaria
5	Malaria	5	Fire

Source: IHME. Global Burden of Disease Compare. Accessed May 3, 2015; Available at: <http://vizhub.healthdata.org/gbd-compare/>.

Road traffic injuries are always more important for males than they are for females. And yet here what we see for females is the exceptional importance of HIV/AIDS. Here what we see, given that these are low and middle-income countries, is in the younger group we continue to see some causes that are communicable. Lower respiratory infections and diarrheal disease and malaria. As children get older, we still see malaria, but we see less communicable disease.

6. CRITICAL CAUSES OF ILLNESS AND DEATH

6.1 HIV

Learning Objectives:-

- The burden of HIV
- The key factors for the disease
- Who is most affected by HIV
- Why HIV is so important
- What can be done to reduce the burden of HIV

HIV is a virus that can be transmitted in number of ways

But the routes of HIV transmission are **unprotected sex, mother-to-child transmission, blood transfusion or transplantation of infected tissue or organs.**

HIV virus is most infectious in the early stages infection or in the later stages as the immune system gets weaker and weaker and weaker. Without treatment, about half of the infected

people will have full blown AIDS within ten years

As your body becomes weaker and weaker from HIV and your body becomes more and more immune compromised. You become more and more subject to what we call opportunistic infections. And some of these include for example tuberculosis, a cancer

named Kaposi's sarcoma, toxoplasmosis, and a disease called cryptococcal meningitis.

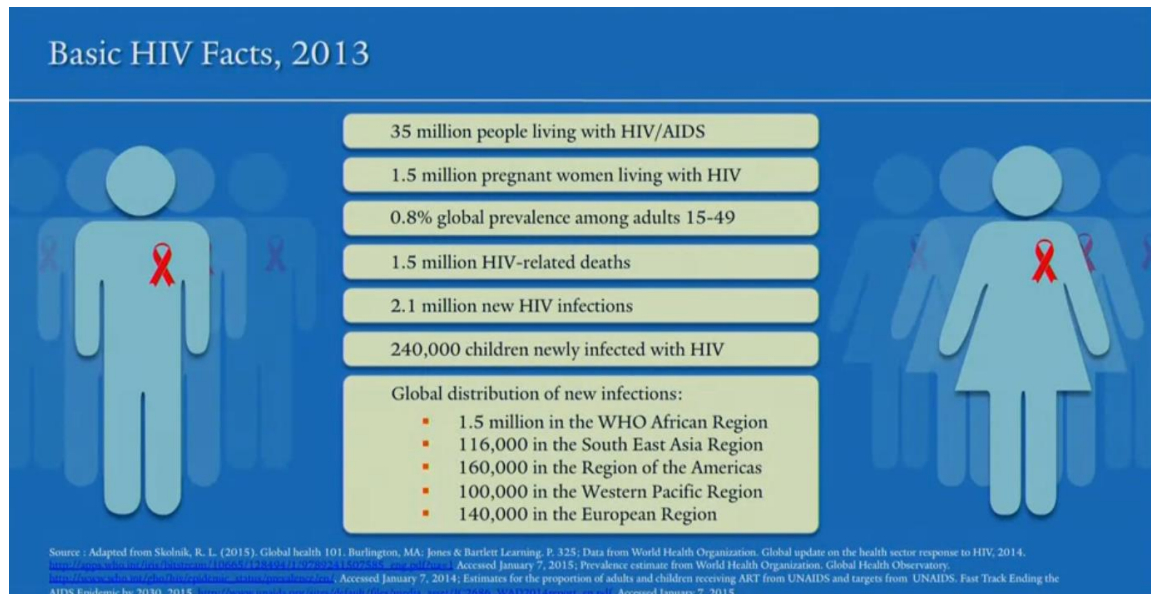
Risks of Transmission	
Type of Exposure	Risk per 10,000 Exposures
Blood Transfusion	9,250
Needle-sharing during injection drug use	63
Needle-stick	23
Receptive anal intercourse	138
Insertive anal intercourse	11
Receptive penile-vaginal intercourse	8
Insertive penile-vaginal intercourse	4
Receptive and insertive oral intercourse	Low
Biting/spitting	Negligible

Source: Data from CDC: HIV Transmission Risk. Accessed on April 3, 2016. Retrieved from: <http://www.cdc.gov/hiv/policies/law/risk.html>

The risk of blood transfusion is the highest of all, more than 9,000 for every 10,000 exposures. This is followed by the risks of receptive anal intercourse. There are other risks, as you can see, but they're substantially lower than the risks of these three types of exposures. The risks of transmission vary with these different routes.

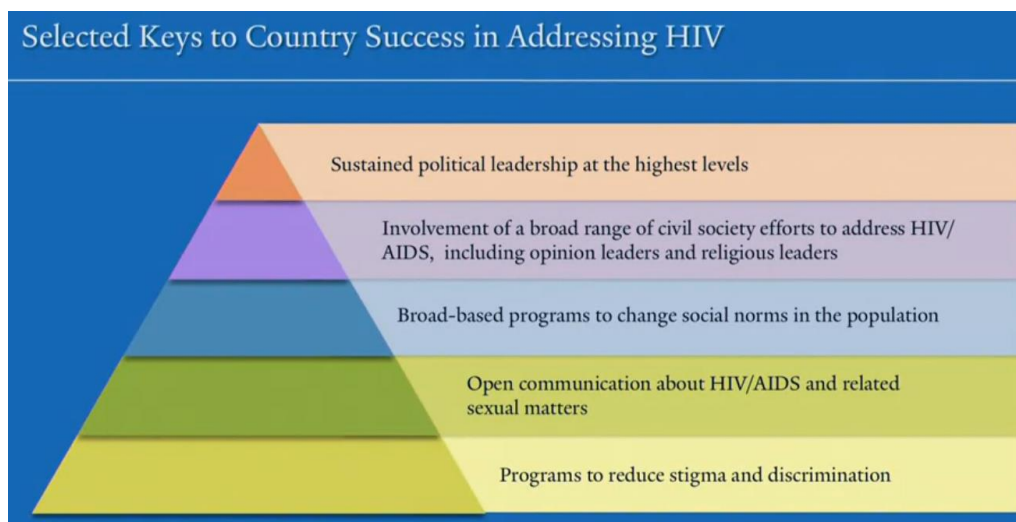
But generally, people who are at most risk include, for example, commercial sex workers, injecting drug users, those engaging in sex with multiple partners. And certain occupational groups, especially, occupational groups of men who are often distant from their partners because of their work. Such as truck drivers, such as miners or migrant men, who have gone out to seek work, are generally also at high risk. The risks are also higher if you are an uncircumcised male, females have higher biological risks than males. And having another sexually transmitted infection also increases your risk of becoming infected with HIV.

The graphic shows some basic facts about the burden of HIV.



Let's
look
at the

geographic spread and this graphic shows you HIV prevalence by country, with the countries designated by color, as being very highly effective, 15 to 28%, etc. The very highest rates of infection occur in Southern Africa. The next highest rates occur in parts of Southern and Eastern Africa and then we move on to parts of the former Soviet Union and other parts of Africa. The very highest rates of infection occur in Southern Africa. The next highest rates occur in parts of Southern and Eastern Africa and then we move on to parts of the former Soviet Union and other parts of Africa.



6.2 TUBERCULOSIS

Tuberculosis (TB) is an infectious disease usually caused by the bacteria *Mycobacterium tuberculosis (MTB)*. Tuberculosis usually affects the lungs, but can also affect other parts of the body. Most infections have no symptoms, in which case it is called **latent tuberculosis**.

Tuberculosis is now considered the leading infectious cause of death worldwide. In that year, there were an estimated 300,000 cases of drug-resistant

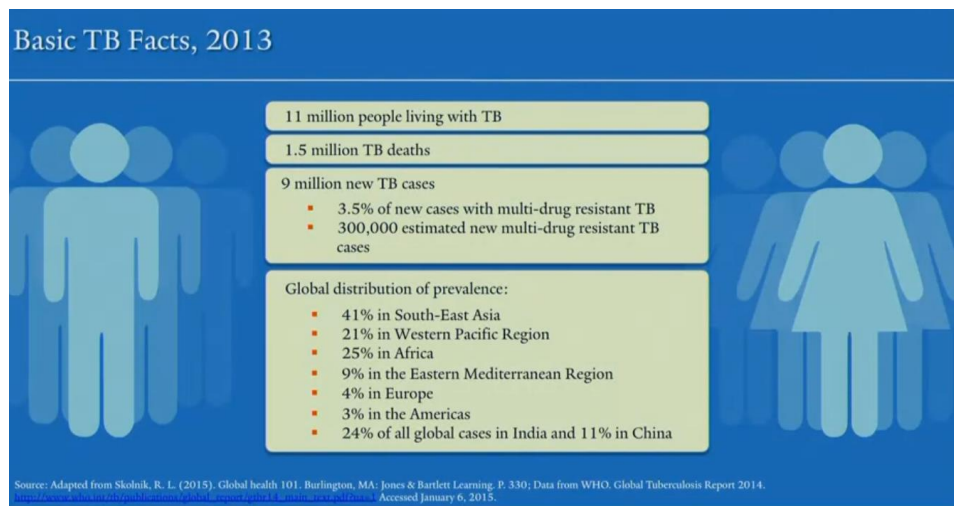
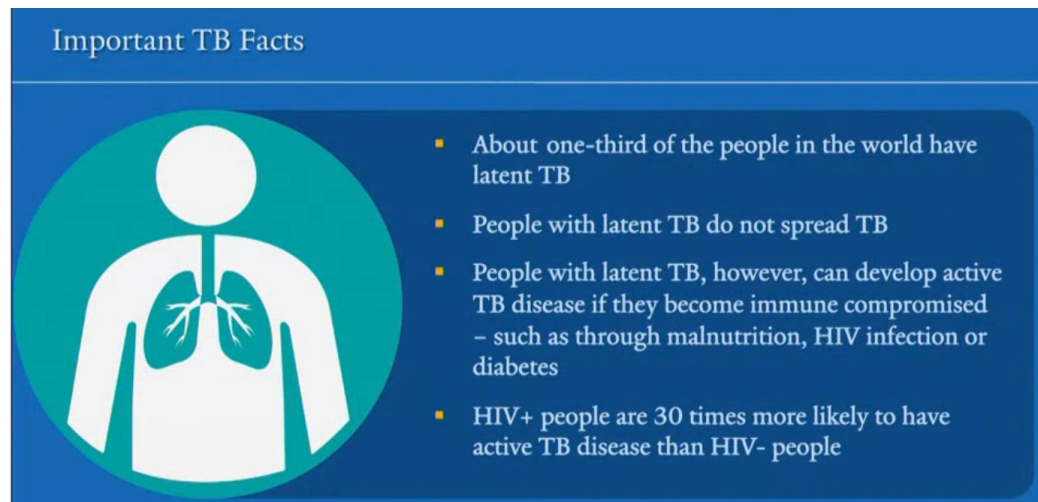
tuberculosis, of which about 3.5% were new cases.

Two large countries, India and China, contain about 35% of all people with TB in the world.

60% of people who contract active TB each year are men, although TB is also a major cause of death in women.

13% of people with new cases of active tuberculosis were HIV positive.

This image tells about the burden of tuberculosis



The World Health Organization recommends a six-month regimen for drug-sensitive tuberculosis. This is provided to outpatients, and there are four drugs that people take for two months, and then two drugs that people take for the next four months.

7. KEY CHALLENGES IN GLOBAL HEALTH

Key Challenges in Global Health



- Completing the “unfinished agenda” that relates to undernutrition, child health, maternal health, and communicable diseases
- Addressing the growing burden of noncommunicable diseases
- Making health systems work more effectively and efficiently and for the poor
- Working collectively to prevent and respond to emerging and re-emerging infectious diseases and antimicrobial resistance
- Working collectively to enable the development of the drugs, diagnostics, and vaccines needed to address the unfinished and emerging agendas