

Sustainability: HEALTH AND WELLBEING

Goals 1-3,5,9,14

Human population is not only increasing in numbers but also moving into areas which were the preserve of animals causing disruption of habitat, deforestation.

Animals serve as early warning signals and spread

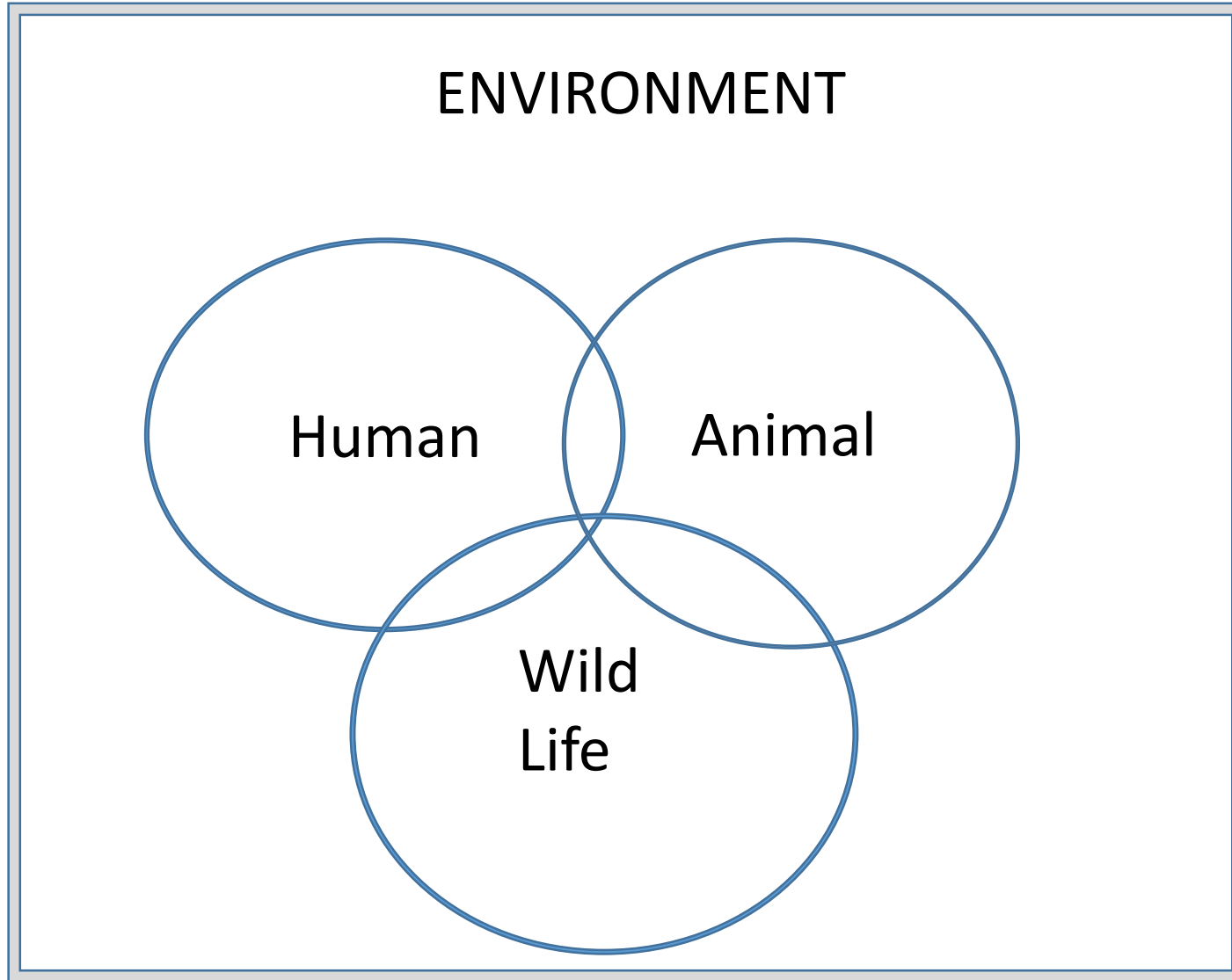
- 6 of 10 infectious diseases (rabies, salmonella) and 3 of 4 emerging new infections (avian flu) in man

ONE HEALTH

One health refers to more than zoonotic diseases and includes environmental factors such as climate and land use changes,

- It is multidisciplinary, involves physicians, veterinarians, environmentalists, behaviour scientists etc.
- Its reach is beyond borders and impinges on global health security

ONE HEALTH



SUSTAINABILITY

ONE HEALTH-implementation& challenges

- Governments require One Health approaches and policies
- Implement joint training programmes
- Increase diagnostics that are common to animals and human
- Real time surveillance of birds, bats, animals
- Improve laboratory methods to pick out early signals eg, SHERLOCK
- Multi-sectoral surveillance, reporting and research for animals and humans

Challenges:

3Cs:

Collaboration,

Coordination and Communication

at all levels and across multiple sectors

Train professionals *who work in silos*

Persuade governments not to function as separate departments

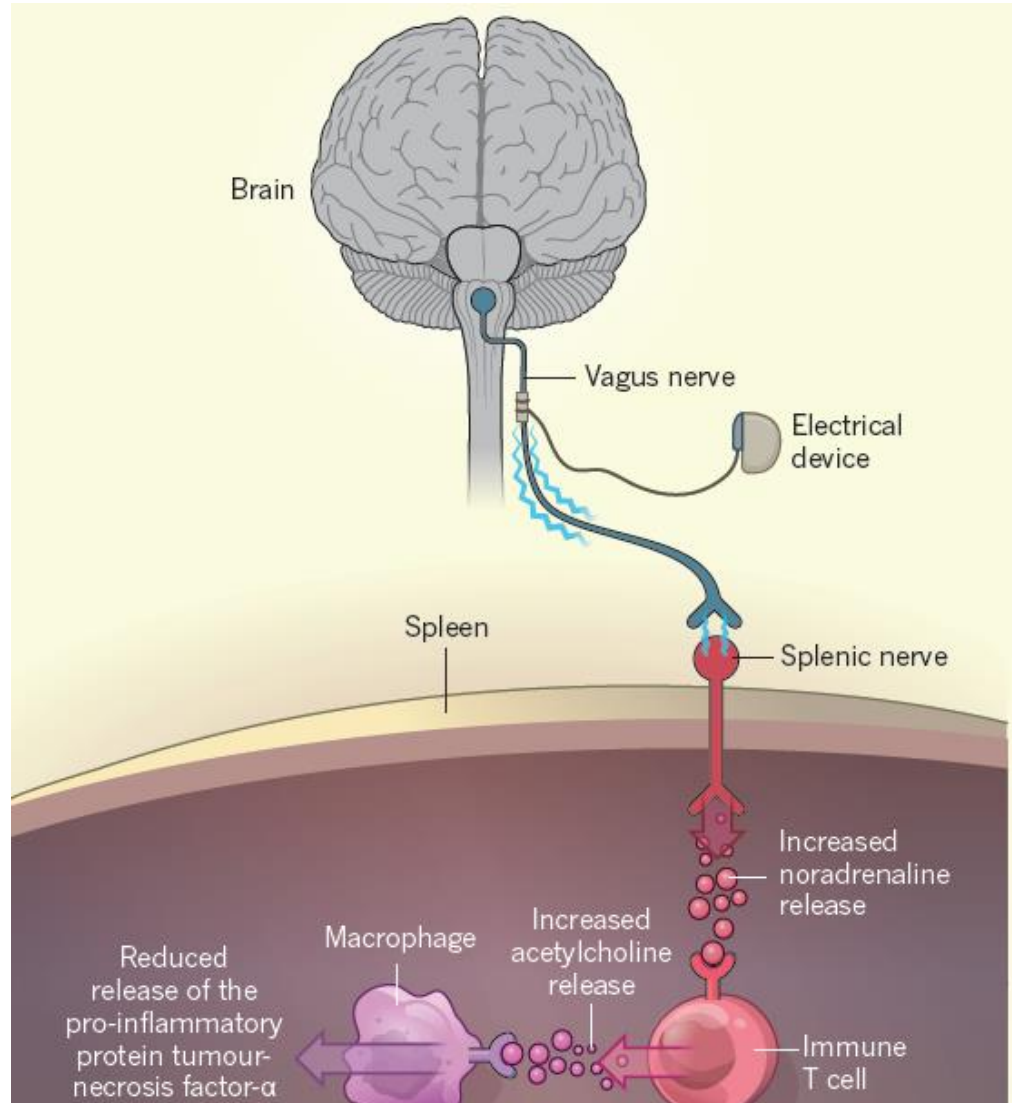
Develop road maps and formalise action points

Rural to Urban migration within countries

- Rapidly urbanising Asia, Africa see internal migration from rural areas
- 50-60-% of people are expected to live in cities by 2030
- Density also leads to proximity and increases spread of infections
- Informal settlements and slums are creators of wealth but do not have the facilities such as electricity, potable water, sanitation
- Slums often straddle rich areas spread of infections and antibiotic resistant bacteria becomes more universal
- Urban health is further compounded by climate change where increase in temperature, flooding can lead to proliferation of the disease causing vectors

TECHNOLOGIES FOR HEALTH:

1. *ELECTROCEUTICALS- TO REPLACE DRUGS ?*



Nervous system connects to the immune system through **chemicals** that **talk to** immune cells such as **T cells and macrophages** which subsequently **release biological mediators** that produce inflammation. Eg autoimmune, rheumatoid arthritis, Crohns etc.

*Implantable stimulators:
Electrodes below the skin
can stimulate nerves*



2. Wearable health monitoring technologies

Biosensors which feed into **communication** via wifi linked to PDA to a **central area/hospital**

Real time feedback information for: Ch.diseases, Elderly, Post operative patients etc.

Can measure heart rate, BP, temp., Oxygen saturation, respiratory rate, ECG

Challenges:

- Low cost, unobtrusive, aesthetic
- Smart textiles
- Make and stimulate innovation in developing countries

Technologies to combat Antibiotic resistance

Nature has the best tools in Lytic Phages- enemies of bacteria !

Challenge has been in introducing them into the body

1. Modified by CRISPER-Cas technology phages can be used to clean hospital surfaces, hand sanitisers, sprays for food contamination

KILL resistant bacteria

PROTECT sensitive bacteria

RESENSITISE Pathogens (Yosef et al PNAS 2015)



2. Lysibodies: Hybrid technology combining CRISPER technology for RNA which target carbohydrates on cell surface of pathogens with antibodies that can be identified by immune cells which engulf the resistant bacteria MRSA (Asaf Raz et al PNAS Apr 2017)

3 recommendations

1. **One Health** approach in policies and implementation for infectious diseases
2. Systems approach for tackling **urban health and climate change**
3. **STI Forum to be a fulcrum** with/within developing countries for innovative low cost technologies, vaccines, and better use of manpower and use of existing satellites for monitoring and communicating health issues.