HIV/AIDS, Malaria, and Other Borderless Diseases

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Millennium Development Goal #6


A. Halt and begin reversing spread of HIV by 2015.
B. Achieve universal access to care for those in need of HIV/AIDS treatment.
C. Halt and reverse spread of malaria and other diseases by 2015.
Borderless Diseases

• Infectious diseases with exceptional global mobility.
  – Increased speed of travel
  – More human migration
  – Larger urbanization

What are some examples of technology that might help borderless diseases move about?
Overview

• Three Borderless Diseases
  1. HIV/AIDS
  2. Malaria
  3. Tuberculosis
What is HIV/AIDS?

• Human Immunodeficiency Virus (HIV)
  – Virus that attacks and weakens the immune system
• Leads to Acquired Immune Deficiency Syndrome (AIDS)

*What exactly does our immune system do, and why is it a bad thing if it fails?*
How does one get HIV/AIDS?

• Transmission
  – Primarily spread through bodily fluids during:
    • Unprotected sex
    • Breastfeeding from infected mother to child
    • Drug use through shared needles.
How is HIV/AIDS treated?

• Currently no cure for HIV/AIDS.
• Mutates too quickly for a single vaccine to work.
• Standard treatment: Antiretroviral Therapy (ART)
  – Consists of drug cocktail of 3+ drugs
  – Attempts to slow HIV progression
• Best if caught early
Preventing HIV/AIDS

• Education
  – Teaches people to protect themselves and others

• Safe sex practices
  – Be faithful
  – Use a condom
HIV/AIDS Geographic Distribution

• Prevalent in sub-Saharan Africa
  – Estimated 25% of population afflicted with HIV/AIDS with 69% of world’s HIV cases
    • Compare this to .5-1% of Americans
  – Due to:
    • Widespread poverty
    • Crippled education structure
    • Traditional culture
Impact of HIV/AIDS

- Massive death toll

**United States: 2010**

**Botswana: 2010**

What are some differences that you can see between the two population pyramids?
Social Impact of HIV/AIDS

• Lessened economic productivity
  – Labor shortages
  – Less demand

What other economic impacts may HIV/AIDS have in Africa?
Social Impact of HIV/AIDS

• Cycle of poverty
  – 14.8 million children in sub-Saharan Africa lost a parent to AIDS
    • Leads to more broken homes, generation of orphans
  – Higher burden on already inadequate health care systems
An AIDS Orphan: Gift

- Orphan briefly documented by Christian Science Monitor
- Mother was alcoholic with AIDS.
- Adopted by South African couple and discovered to be HIV-positive at age 4.
An AIDS Orphan: Gift

• Lost foster sister through chaos of system.
• Age 7, unable to count past 5 or write name.
• Adoptive mother died in auto accident.
• Was sent to live with birth mother.
Difficulties with treating HIV in Africa

• Social stigma
  – Associated with immoral behavior, such as prostitution.
  – Keep affliction secret.

• Traditional Culture
  – Gender inequality
  – Concurrent relationships
    • AIDS superhighway
Progress against HIV/AIDS

• Much work done by UNAIDS
  – HIV incidence dropped by 20% worldwide
    • Focus on condom use and abstinence
  – Improvement concentrated in Africa
    • 7.1 million receiving antiretroviral treatment now.

• Getting worse in North Africa and Middle East

• Criticism
  – Shift focus to ending concurrent relationships and promoting male circumcision
Progress against HIV/AIDS: UNICEF

• Three primary goals to end AIDS:
  1. Reduce new HIV infections in children by 90%, especially transmissions from mother to child.
  2. Reduce new infections amongst adolescents by half.
  3. Provide universal care for those with HIV/AIDS.

unicef
What is Malaria?

• Disease caused by bacteria of the *Plasmodium* genus
  – Bacteria heads to liver before spreading to bloodstream and killing cells
How does one get Malaria?

• Primarily transmitted from person to person by means of mosquito bite.
• Can also be transmitted through blood transfusions.
What are the symptoms of Malaria?

• Symptoms
  – Fever and chills
  – Nausea and vomiting
  – Increased perspiration
  – Headaches
  – Soreness
How is Malaria treated?

• Antimalarial antibiotics
• Drug treatment based on:
  – Exact species of Plasmodium bacteria
  – Patient’s age/pregnancy
  – Malaria severity

Why might these factors matter?
How does one avoid getting malaria?

• When travelling, research malaria prevalence in intended locale

• Prevent mosquito bites
  – Nets
    • Only cost $3.
  – Bug repellant
Malaria Geographic Distribution

• Most prevalent along the equator
  – Due to higher mosquito population
Social Impact of Malaria

• Kills 660,000 a year
  – Mainly children in Africa
• Hinders economic development
• Incites cycle of poverty
  – Affects poorest of society

How might the incidence of malaria limit a country’s economic prospects?
NGO against Malaria: Against Malaria Foundation

• Raises money to purchase nets and distributes them around the world.
• Has raised $19.5 million and bought 5.6 million nets.
• Net costs $3
• Every 50-250 nets saves a life.
Progress against Malaria

- Better, longer-lasting nets being designed
- Clinical trials for malaria vaccine currently underway
  - Expected to be released in 2015.
TUBERCULOSIS
What is Tuberculosis (TB)?

• Infectious disease caused by the bacterium *Mycobacterium tuberculosis*
• Usually attacks the lungs, creating scar tissue.
• Can also spread to other parts of body in extrapulmonary cases.
• Also cases of latent TB.
  – Person carries bacterium, but is not ill or infectious.
How does TB spread?

• Airborne disease
  – Spreads when infected person coughs, sneezes, or speaks.
What are the symptoms of TB?

• Symptoms
  – Chills and fever
  – Perspiration at night
  – Lack of appetite and severe weight loss
  – Fatigue
  – Severe coughing and chest pain
How is TB treated?

• Typically treated using a combination of drugs.
• Currently ten drugs approved to fight TB.
  – Must change drug usage due to growing resistances.
• Emergence of resistant strains, antibiotic usage not keeping up.
How does one avoid getting TB?

• Easy prevention with vaccination.
• Isolation
• Use of respiratory protection devices.
Geographic Distribution

• Mainly prevalent in Africa
  – Due to lack of adequate medical facilities

Per 100,000 people.
Social Impact of Tuberculosis

• Economic Impact
  – Hinders economic development
  – Creates excess burden on many families.
  – Loss of labor capacity

• Personal Impact
  – Patients often put under quarantine.
NGO against Tuberculosis: TB Alert

• Goal: Control and ultimate elimination of TB.
• 4 key areas of work:
  1. Information and outreach.
  2. Patient support.
  3. Connecting TB organizations.
  4. Developing policy and advocating resources for TB care.
The Fight Against Disease

• Since MDG #6 creation, various NGOs have picked up the efforts.
Progress Made

• HIV incidence has dropped by 20% worldwide
• 5.5 million mosquito nets provided to prevent malaria transmission
• Various NGOs working to eradicate TB.

Questions?
Jeopardy

HIV/AIDS, Malaria, and Tuberculosis!
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HIV/AIDS Question- 10 Points

The continent in which HIV/AIDS is most prevalent.
HIV/AIDS Answer - 10 Points

What is Africa?
HIV/AIDS Question- 20 Points

The **primary** way in which HIV is spread.
What is unprotected sex?
The primary way of treating HIV/AIDS.
What is antiretroviral therapy (ART)?
HIV/AIDS Question- 40 Points

This form of relationship acts as a HIV superhighway.
What are concurrent relationships?
This organization helps provide care for those with HIV/AIDS and hopes to cut mother-to-child transmission by 90%.
HIV/AIDS Answer- 50 Points

What is UNICEF?
Malaria Question- 10 Points

This is the genus of the bacteria that causes malaria.
Malaria Answer - 10 Points

What is *Plasmodium*?
Malaria Question- 20 Points

This creature plays a vital role in the spread of malaria.
What is a mosquito?
Malaria Question- 30 Points

This cheap form of malaria prevention only costs $3.
Malaria Answer - 30 Points

What are nets?
Malaria Question- 40 Points

This NGO raises money to buy nets for those in malaria-stricken countries.
What is the Against Malaria Foundation?
Malaria Question- 50 Points

The *Plasmodium* bacteria head to this organ before destroying blood cells.
What is the liver?
Tuberculosis Question- 10 Points

This type of disease can be spread when an afflicted person coughs, speaks, or sneezes.
What is an airborne disease?
Tuberculosis Question - 20 Points

These types of drugs are used to fight bacterial infections.
What are antibiotics?
Patients are often put under this in order to prevent the spread of tuberculosis.
What is quarantine?
This NGO helps connect other organizations in the fight against TB.
What is TB Alert?
These are relatively rare cases when TB spreads to another part of the patient’s body.
What are extrapulmonary cases?