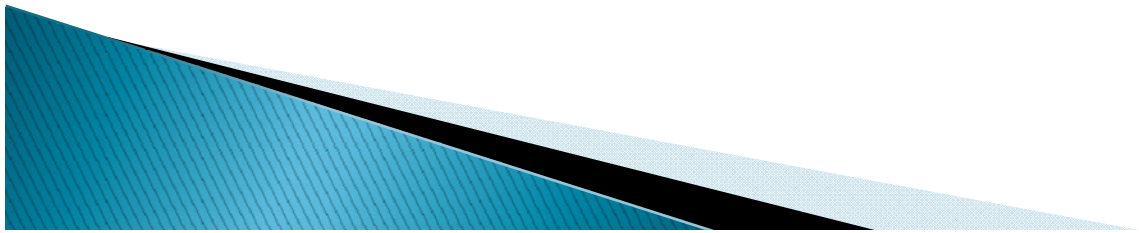
AMOEBIASIS

- Protozoan parasite Entamoeba histolytica
- Common infection of the human gastro-intestinal tract.
- 10% of infected individuals
- A potentially lethal disease
- Substantial morbidity and mortality

- Subdivided into:
- **Intestinal amoebiasis**:
  - Intestinal infection will develop invasive amoebiasis
  - Mild abdominal discomfort and diarrhoea to acute fulminating dysentery.
- **Extraintestinal amoebiasis**:
  - involvement of liver abscess, lungs, brain, spleen, skin, etc.

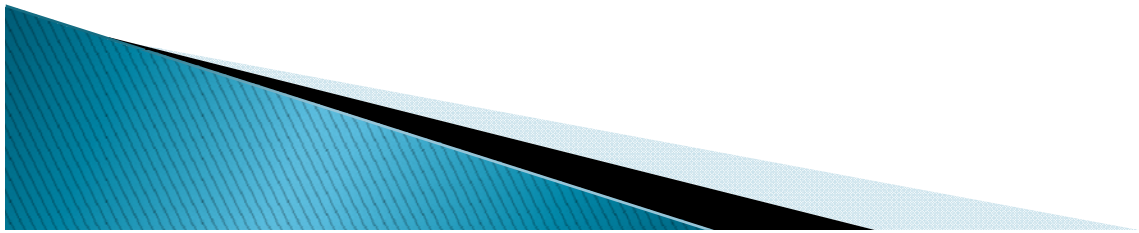


PROBLEM STATEMENT

WORLD :

- A worldwide distribution.
- Major health problem in the whole of China, South East and West Asia and Latin America, especially Mexico.
- 500 million people carry E. histolytica in their intestinal tract
- One-tenth of infected people suffer from invasive amoebiasis.
- Probable that invasive amoebiasis, accounted for about 100,000 deaths in the world.

- Prevalence rates vary from as low as 2% to 60%
- High prevalence, amoebiasis occurs in endemic forms as a result of high levels of transmission and constant reinfection
- Epidemic water-borne infections can occur if there is *heavy contamination of drinking water supply.*



INDIA :

- Amoebiasis affects about 15% of the Indian population
- Reported throughout India
- Prevalence rate is 15% ranging from 3.6 to 47.4% in different areas.
  - Variations in clinical diagnostic criteria
  - Technical difficulties in establishing a correct diagnosis and lack of sampling criteria.

EPIDEMIOLOGICAL DETERMINANTS

(a) AGENT :

- Potentially pathogenic strains of E. histolytica.
- E.histolytica can be differentiated into at least 17 zymodemes
  - (population of organisms differing from similar population in the electrophoretic mobilities of one or more enzymes)
- Pathogenic strains are all from particular zymodemes
- Quite distinct zymodemes
- Give rise to faecal cysts and the organisms breed true.

- The iso-enzyme determine why a particular zymodeme is able to invade.
- Identified 7 potentially pathogenic and 11 non-pathogenic zymodemes.
- E-histolytica exists in two forms
  - vegetative (trophozoite) and cystic forms.
- Multiply and encyst.
- Cysts are excreted in stool.
- Ingested cysts release trophozoites
- Invade the bowel and cause ulceration
- Caecum and ascending colon rectum - vein and reach the liver and other organs.

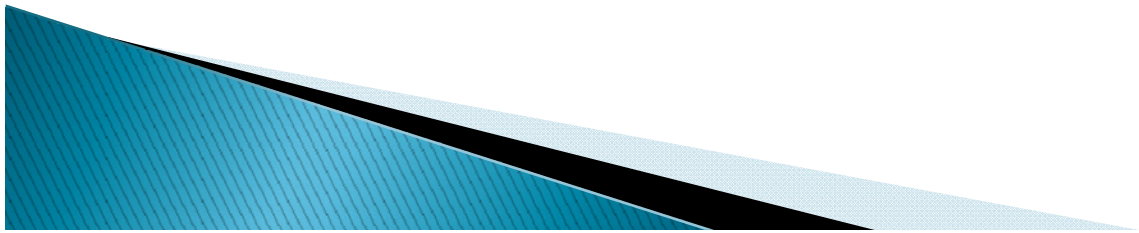
- Short-lived outside the human body
- Not important in the transmission of the disease.
- Cysts are infective to man and remain viable and infective for several days in faeces, water, sewage and soil in the presence of moisture and low temperature.
- Cysts are not affected by chlorine.
- Readily killed if dried, heated (to about 55 deg C) or frozen.

(b) RESERVOIR OF INFECTION :

- Man is the only reservoir of infection
- Immediate source – faeces containing the cysts.
- Symptom free and are healthy carriers of the parasite.
- 1.5×10^7 cysts daily.
- Carriers engaged in the preparation and handling of food.

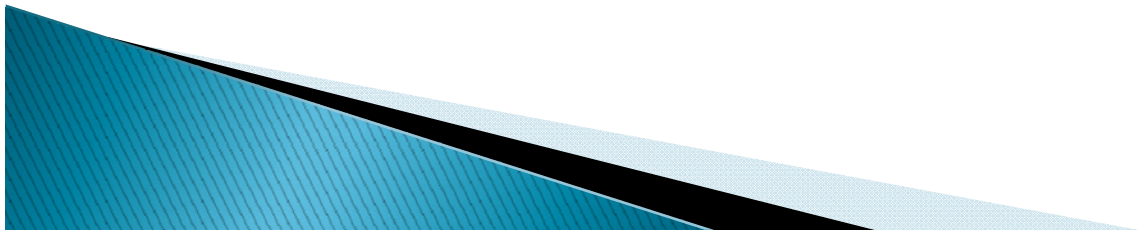
(c) PERIOD OF COMMUNICABILITY :

- As long as cysts are excreted – several years
- If cases are unrecognized and untreated.



HOST FACTORS

- Any age
- No sex or racial difference in the occurrence of the disease
- A household infection



ENVIRONMENTAL FACTORS

- More closely related to poor sanitation and socio- economic status than to climate
- Use of nightsoil for agricultural purpose favours the spread of disease
- Marked wet-dry seasons
- Higher during rains, presumably since cysts may survive longer and the potential for transmission is thereby increased
- Epidemic outbreaks-sewage seepage into the water supply

MODE OF TRANSMISSION

(i) Faecal-oral route :

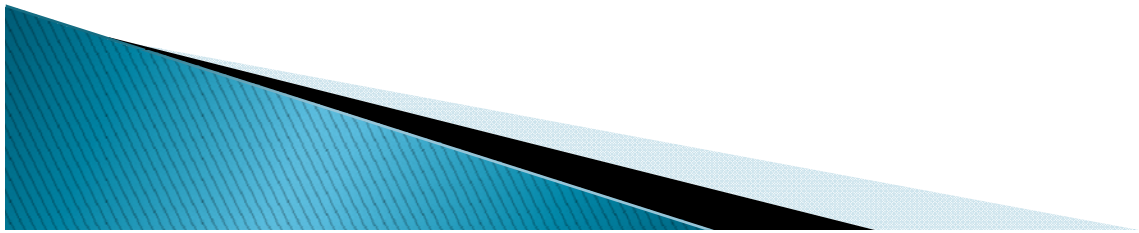
- Readily take place – intake of contaminated water or food.
- Epidemic water-borne infections
- Heavy contamination of drinking water supply
- Vegetables, especially those eaten raw, from fields irrigated with sewage polluted water can readily convey infection
- Viable cysts found on the hands and under finger nails
- Direct hand to mouth transmission

(ii) Sexual transmission :

- oral–rectal contact is also recognized, especially among male homosexuals.

(iii) Vectors :

- flies, cockroaches and rodents are capable of carrying cysts and contaminating food and drink.



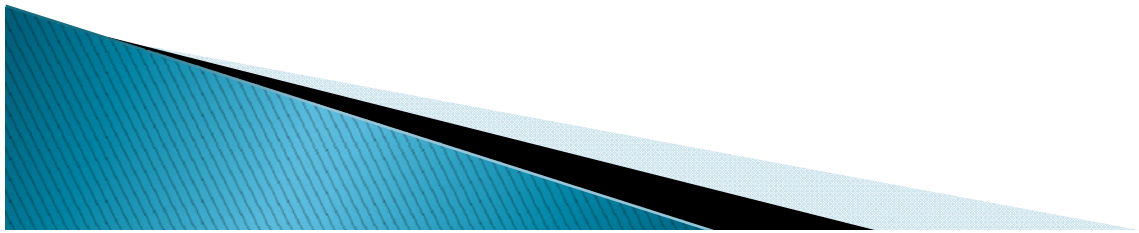
INCUBATION PERIOD

- About 2-4 weeks or longer

PREVENTION AND CONTROL

(1) Primary Prevention :

- Primary prevention centre round preventing contamination of water, food, vegetables and fruits with human faeces



(a) Sanitation :

- Safe disposal of human excreta coupled with the elementary sanitary practice of washing hands after defecation and before eating is a crucial factor in the prevention and control of amoebiasis.
- Too many hurdles (both social and economic)
- Cooperation of the local community
- The sanitary systems should be selected and constructed taking into consideration the customs and practices of the population and the available resources.

(b) Water supply:

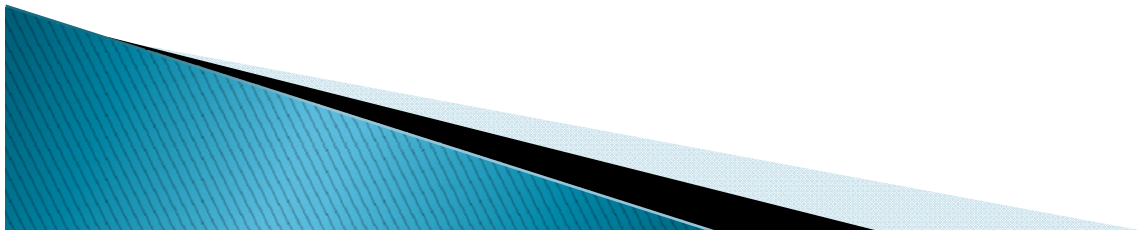
- Protection of water supplies against faecal contamination
- Amoebic cysts may survive for several days and weeks in water
- Not killed by chlorine in amounts used for water disinfection
- Sand filters are quite effective in removing amoebic cysts.
- Water filtration and boiling are more effective

(c) Food Hygiene:

- Environmental measures include the protection of food and drink against faecal contamination
- Uncooked vegetables and fruits can be disinfected with aqueous solution of acetic acid (5-10 %) or full strength vinegar
- Thorough washing with detergents in running water will remove amoebic cysts from fruits and vegetables
- Since food handlers are major transmitters of amoebiasis: Periodically examined, treated and educated in food hygiene practices such as hand-washing

(d) Health Education :

- In the long-term, a great deal can be accomplished through health education of the public.



Secondary Prevention

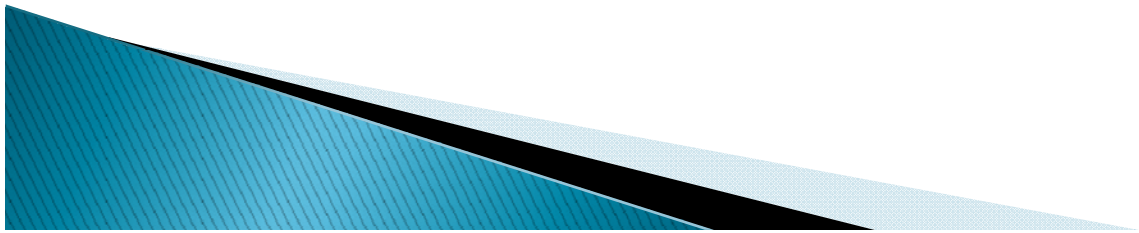
(a) Early Diagnosis :

- Demonstration of trophozoites in red cells is diagnostic
- Fresh mucus passed per rectum
- Microscopy – absence of pus cells in the stool may be helpful in the differential diagnosis with shigellosis
- Serological tests negative in intestinal amoebiasis
  - If positive- a clue to extraintestinal amoebiasis
- Indirect haemagglutination test (IHA) is regarded as the most sensitive serological test

(b) Treatment :

(i) Symptomatic cases :

- symptomatic cases can be treated effectively with Metronidazole orally and 48 hours may confirm the suspected diagnosis
- 30 mg/kg of body weight/day into 3 doses for 8-10 days
- Tinidazole
- Suspected cases of liver abscess should be referred to the nearest hospital

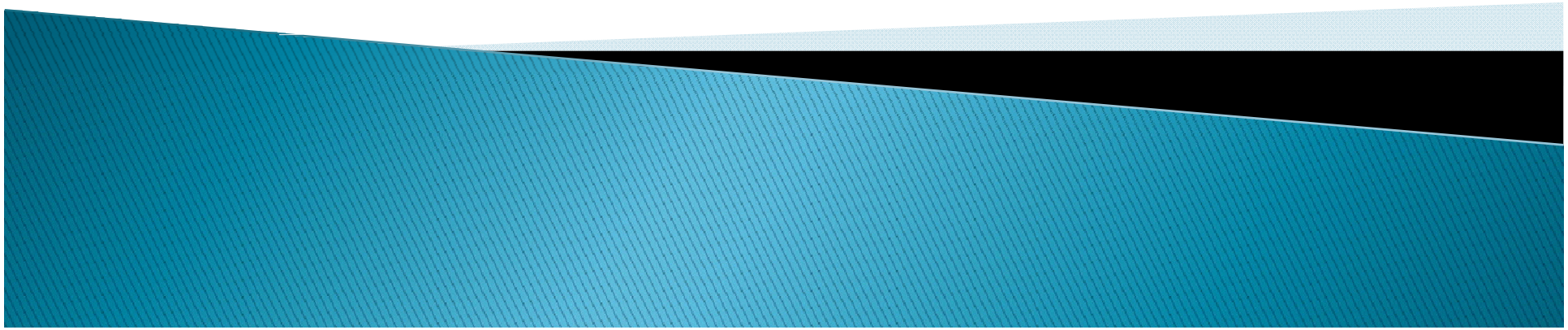


(ii) Asymptomatic infections :

- In an endemic area,
  - the consensus is not to treat
  - Probability of reinfection is very high however, be treated, if the carrier is a food handler
- In non-endemic areas
  - always likely to be treated
  - Oral diodohyroxyquin, 650 mg TDS (adults) or 30-40 mg/kg of body weight/day (children) for 20 days, or
  - Oral diloxanide furoate, 500 mg TDS for 10 days (adults)

- No acceptable chemoprophylaxis for amoebiasis.
- Mass examination and treatment cannot be considered a solution for the control of

SOIL-TRANSMITTED HELMINTHIASIS



INTRODUCTION

- Caused by intestinal:
- Roundworms (Ascariasis),
- Hookworms (Necator americanus and Ancylostoma duodenale) and
- Whipworm (Trichuris trichiura)

- About 24% of world's population or 1.5 billion people are infected.

- Over 270 million pre school children and over 600 million school age children
  - live in areas where these parasites are intensively transmitted and
  - are in need of treatment and preventive interventions.

MODE OF TRANSMISSION

- It is transmitted by eggs
  - Adult worms live in intestine where they produce thousands of eggs each day.

- Several ways :

a) eggs that are attached to vegetables and salads not carefully cooked, washed or peeled.
b) eggs are ingested from contaminated water sources
c) eggs are ingested by children who play in soil and then put their hands in their mouth without washing them.

- People become infected with hookworm primarily by walking barefoot on contaminated soil.
- No direct person-to-person transmission, or infection from fresh faeces.
- Need about three weeks to mature in the soil.
- Re-infection occurs only as a result of contact with infective stages in the environment.

ASCARIASIS

- *Ascaris lumbricoides*
- Clinically manifested by vague symptoms of nausea, abdominal pain and cough.
- Occasionally, may produce intestinal obstruction or may migrate into the peritoneal cavity.

GEOGRAPHIC DISTRIBUTION AND PREVALENCE

- Cosmopolitan in distribution.
- Common helminthic infestation.
- One billion (807-1121 million) infected
- 12 million acute cases
- 20,000 or more deaths.
- Heavy infection is common in children aged 3-8 years.

EPIDEMIOLOGICAL FEATURES

a) AGENT : ***Ascaris lumbricoides***

- Lives in lumen of small intestine.
- Female measures 20-35 cm in length and the male is12-30 cm.
- Egg production is very heavy
  - an estimated 2,40,000 eggs per day by each female excreted in the faeces.
- Infective in 2-3 weeks

- Larvae
  - penetrate the gut wall
  - carried to the liver and then to the lungs via blood stream
  - moult twice alveolar walls and migrate into the bronchioles coughed up through the trachea and then swallowed by the human host.

- Mature into adults in 60-80 days.

- Life span : 6-12 months.

b) **RESERVOIR OF INFECTION :**

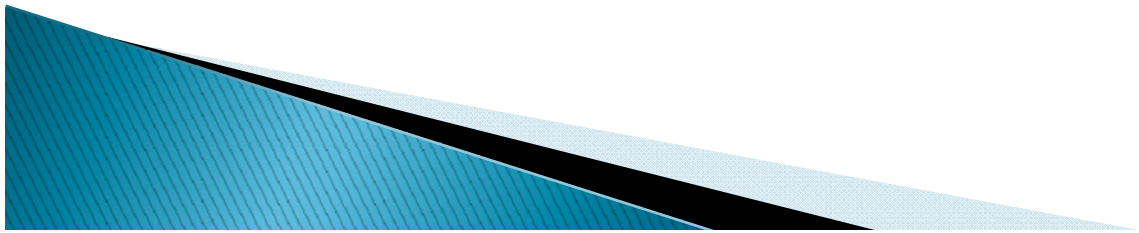
- Man is the only reservoir

c) **INFECTIVE MATERIAL :**

- Faeces containing the fertilized eggs.

d) **HOST :**

- Important disseminators of infection
- High degree of host-parasite tolerance
- Contribute to malnutrition.

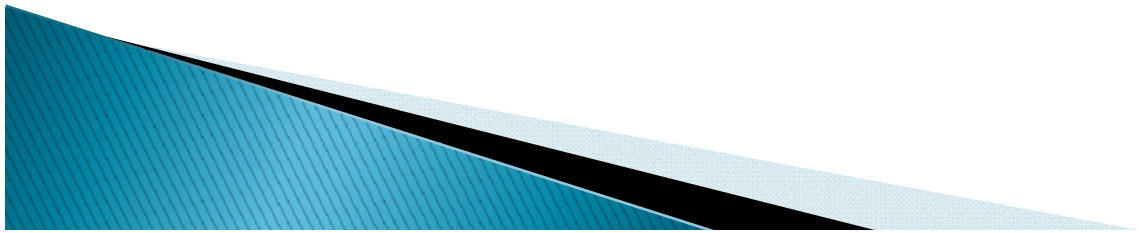


(e) ENVIRONMENT :

- Ascaris is a “soil-transmitted” helminth.
- Temperature, moisture, oxygen pressure and ultra-violet radiation from the sunlight.

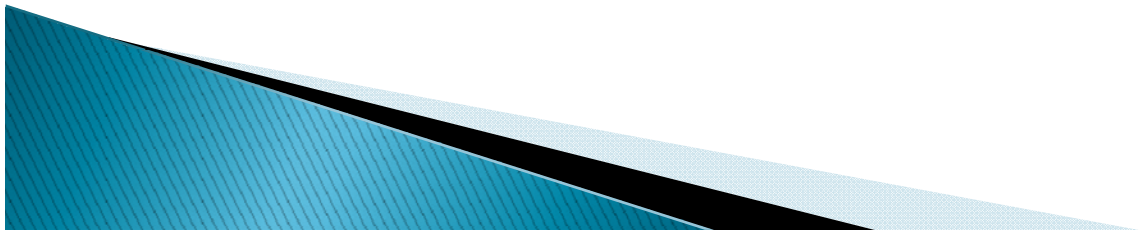
(f) HUMAN HABITS :

- Indiscriminate open air defecation.
- No regular habits pollute the house and surrounding areas.



- **Period of communicability**
  - until all fertile females are destroyed and stools are negative.

- **INCUBATION PERIOD**
  - 18 days to several weeks.



SYMPTOMS

- Light infection usually have no symptoms.
- A range of symptoms including intestinal manifestations like diarrhoea, abdominal pain, general malaise, weakness, impaired cognitive and physical development
- **Heavy infection**: more than 50000 eggs per gram of faeces.

- Larvae migration cause fever, cough, sputum formation, asthma, skin rash, oesinophilia.

- Roundworm aggregate masses can cause volvulus, intestinal obstruction or intessusception.

- Bowel perforation in the ileococcal region, blocking common bile duct or may come out with vomit.

HOOKWORM INFECTION

- Any infection caused by:
  - *Ancylostoma duodenale*
  - *Necator americanus*

PROBLEM STATEMENT

- Main nematodes causing hookworm infection in man.
- Europe and and South- western Asia, and the latter in tropical Africa and in the Americas.
- About 576-740 million cases, of these about 80 million were severely affected.

EPIDEMIOLOGICAL DETERMINANTS

Agent factors :

(a) Agent :

- Small intestine, mainly jejunum
- Males measure 8 to 11 mm and females 10 to 13 mm.
- *A. duodenale* : 10,000–30,000 eggs and
- *N. americanus* : 5000–10000 eggs
- Egg hatches after 1–2 days.

- Rhabditiform larva moults twice in the soil
- Skin penetrating third stage infective larva within 5-10 days.
- Move very little horizontally, migrate upwards on blades of grass.
- Enters the body through skin
- *A. duodenale* are also infective by mouth.

- Once inside the body, they migrate via lymphatics and blood stream to the lungs.
- Sexually mature.
- Adult *A. duodenale* and *N. americanus* are survive for 1-4 years.

(b) RESERVOIR :

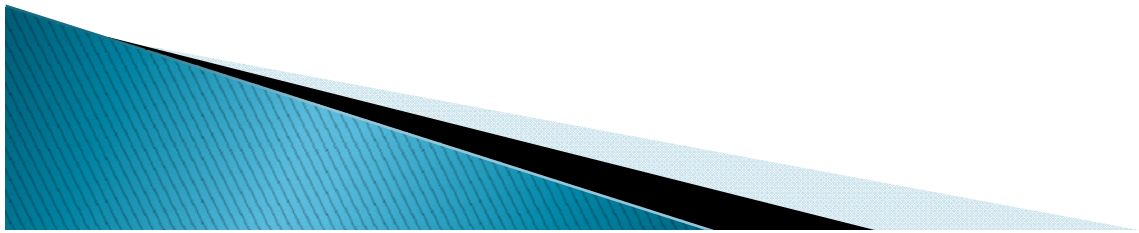
- Man

(c) INFECTIVE MATERIAL :

- Faeces containing the ova of hookworms.

(d) PERIOD OF INFECTIVITY :

- Person harbours the parasite.



HOST FACTORS

(a) **AGE AND SEX :**

- All ages and both sexes

(b) NUTRITION :

- malnutrition is a predisposing factor

(c) HOST–PARASITE BALANCE :

- a host–parasite balance worm load is limited

(d) OCCUPATION :

- a higher prevalence in agricultural than in town works, an occupational disease of the farming community.

ENVIRONMENTAL FACTORS

- Lives in upper half-inch (1.2cm) the soil.

(a) SOIL :

- damp, sandy or friable soil decaying vegetation.

(b) TEMPERATURE :

- 24 to 32 deg. C.

(c) MOISTURE :

- dryness is rapidly fatal.

(d) RAINFALL :

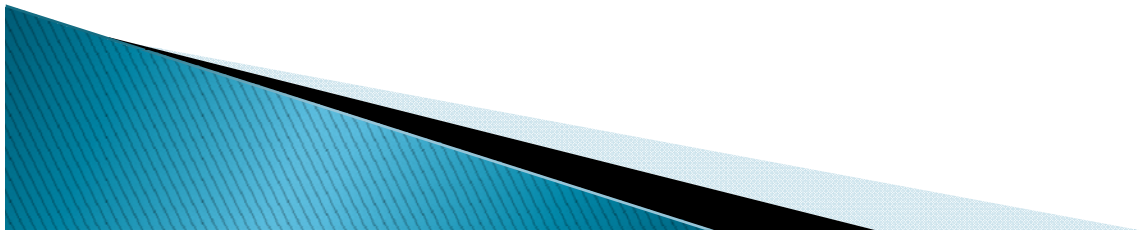
- rainfall of 40 inches (100cm) favourable environmental factor.
- Flooding is an unfavourable.

(e) SHADE :

- Direct sunlight kills the larvae

(f) HUMAN HABITS:

- Indiscriminate defecation,
- Using the same places for defecation,
- Going barefoot,
- Farming practices using untreated sewage,
- Children wading in the infected mud bare-feet and hands
- Compounded by social factors such as illiteracy, ignorance and low standard of living.



INCUBATION PERIOD (Prepatent period)

- *N. americanus* is 7 weeks
- *A. duodenale* is 5 weeks to 9 months.

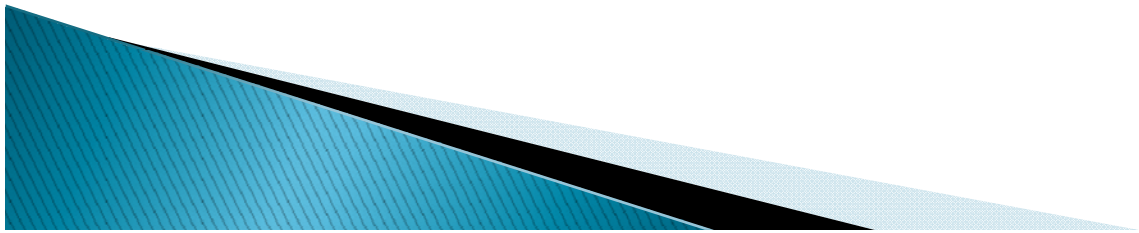
EFFECTS OF THE DISEASE

(a) INDIVIUAL :

- Chronic blood loss and depletion of body's iron stores : iron-deficiency anaemia.
- Health of mothers in terms of increase morbidity, low birth weight babies, abortion, stillbirths and impaired lactation;
- Health of adults incapacity for sustained hard work
- a loss of blood plasma into the small intestine leading to hypoalbuminaemia.

(b) COMMUNITY :

- significant and harmful effect on various aspects of economy and quality of life of a community.



WHIPWORM

- Third most common soil-transmitted.