UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

FINAL EXAMINATION PAPER -- MAY 2005

TITLE OF PAPER : EPIDEMIOLOGY AND COMMUNICABLE DISEASES

COURSE CODE : HSC 303

TIME : 3 HOURS

MARKS : 100

INSTRUCTIONS : ANSWER **FIVE** QUESTIONS IN ALL.

: AT LEAST TWO QUESTIONS MUST BE ANSWERED FROM EACH SECTION (I.E. SECTION A OR B)

: NO FORM OF ANY PAPER SHOULD BE BROUGHT INTO NOR OUT OF THE EXAMINATION ROOM

: BEGIN THE ANSWER TO EACH QUESTION ON A SEPARATE SHEET OF PAPER

: ALL CALCULATIONS/WORKOUT DETAILS SHOULD BE SUBMITTED WITH YOUR ANSWER SHEET

: CALCULATORS MAY BE USED BUT THEY MUST BE THE SILENT TYPE

DO NOT OPEN THIS EXAMINATION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR

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SECTION A : INTRODUCTION TO EPIDEMIOLOGY

ANSWER **AT LEAST TWO** QUESTIONS FROM THIS SECTION. **QUESTION 1** IS COMPULSORY.

QUESTION 1   COMPULSORY

a. MULTIPLE CHOICE

   i. Factors affecting the risk of acquiring an infection from a contaminated object or vehicle include all but which one of the following ?

      A. The presence of a suitable reservoir
      B. The presence and concentration of the aetiologic agent
      C. The presence of an appropriate means of transmission and portal of entry
      D. Variations in host susceptibility
      E. None of the above.

   ii. Diseases are usually transmitted more rapidly in urban areas than in rural areas because of :

      A. Differences in availability and utilization of medical care
      B. Greater mobility in urban areas
      C. Differences in frequency of exposure to sources of infection
      D. Differences in levels of immunity
      E. All of the above.

   iii. Characterizing an outbreak by time, place and person is done mainly to :

      A. find the facts that can lead to a hypothesis of the source of infection and mode of transmission
      B. find clues to the probable place of exposure
      C. confirm that some particular population is at risk
      D. identify situations in which secondary transmission is possible
      E. None of the above.

iv. According to the attack rate table below, the most reasonable hypothesis as to the vehicle of infection would name which one of the following foods as being responsible ?

Attack rates Among Persons Who Ate (Exposed) and Who Did Not Eat (Unexposed) Certain Foods

Food Item	Attack Rates / 100	
	Exposed Persons	Unexposed Persons
Punch	89%	92%
Rolled roast	76%	68%
Chicken	53%	59%
Jellow & Whipped Cream	88%	21%
Baked Beans	49%	63%

A. Punch
B. Rolled roast
C. Chicken
D. Jellow and Whipped Cream
E. Baked Beans

v. Which one of the following portals of exit of disease agents in the body of man is generally the most important as well as the most difficult to control ?

A. Respiratory tract
B. Alimentary tract
C. Genitourinary tract
D. Placenta
E. Mouth

vi. Which one of the following modes of transmission is direct ?

A. Vector-borne
B. Droplet spread
C. Formites
D. Droplet nuclei
E. Airborne

Use the information below to answer questions vii to ix.

Examine the following weekly statistical surveillance data for viral hepatitis (# of cases by age group and week of onset).

AGE GROUP (YRS)	Number of Cases, by Week								Average # per week for same 8 weeks last year
	1	2	3	4	5	6	7	8	
0 – 14	0	2	2	0	0	2	1	0	1
15 – 29	4	2	3	7	8	2	4	9	3
30+	0	3	4	2	0	1	1	2	2
TOTAL	4	7	9	9	8	5	6	11	6

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vii. Identify weeks having events that might plausibly represent situations that should be investigated (using the previous threshold of more than two times the average or usual frequency).

    A. Week 8
    B. Weeks 2, 3 and 6
    C. Weeks 3, 4 and 8
    D. Weeks 4, 5 and 8
    E. All the weeks

viii. The age group(s) in which the epidemic threshold is most frequently exceeded is (are) :

    A. All age groups
    B. The 0 – 14 year olds
    C. The 15 – 29 year olds
    D. The 30+ group
    E. The 0 – 14 and 15 – 29 age groups

ix. The earliest week at which a possible problem can be identified is :

    A. Week 2
    B. Week 3
    C. Week 4
    D. Week 8
    E. Week 5

x. The single most important piece of information on a case report form from the standpoint of determining what, if anything, is to be done about the case, is the case's :

    A. name
    B. address
    C. diagnosis
    D. age
    E. sex

QUESTION 2

a. Using HIV/AIDS, explain how disease may be controlled at the three
   levels i.e. Primary, Secondary and Tertiary.   (11)

b. Explain how each of the following personal attributes may affect the trend
   of disease :

      i. social class   (3)
      ii. occupation   (3)
      iii. birth order   (3)

[20 marks]

QUESTION 3

During the week beginning in October 28 and ending November 3, twelve cases of
rubeola were reported to the city health department. Subsequent investigation has
revealed that 9 of these cases reside in the same census tract and are all less than 10 years
old. The population of the city is 50 000; the population of the census tract in which the 9
cases les than 10 years old reside is 5 000. There are 900 children in that census tract who
are less than 10 years old, and an estimated 47 percent of them are immune either
because of previous rubeola infection or because they have been vaccinated against
rubeola.

a. calculate the incidence rate per 100 000 population for the following populations :

      i. the community   (2)
      ii. the non-immune census tract residence less than 10 years old.   (2)

b. During the following six weeks an additional 214 cases of rubeola were
   identified through physician and school reports and through investigation
   of cases. The age-group distribution of the cases and the estimated total
   and susceptible populations are shown in the following table :

Age Group (Years)	Number of Cases	Population	
		Total	Susceptibles
0 – 4	169	4 200	2 310
5 – 9	49	5 150	1 700
10 – 14	7	4 800	530
15+	1	35 850	1 790
TOTAL	226	50 000	6 330

Calculate, from the figures above, the attack rate per 1 000 susceptibles
for each age group and for the total of suceptibles in all age groups.

                                                                                  (8)

c. Of the rubeola case, 109 are males, as are 24 300 of the total population and 3 150 of the susceptibles.

    i. Calculate the sex-specific attack rates per 1000 for the susceptible population. (2)

    ii. Calculate the ratio of the attack rate in the susceptible males to the attack rate in the susceptible females. (1)

    iii. Interpret your ratio in (ii) above. (2)

d. During the outbreak, the usefulness of vaccine in preventing rubeola was questioned because several cases were known to have been immunized previously. Evaluation of the case history forms disclosed that 14 cases under 10 years of age had in fact been immunized at least one month prior to having acquired the disease. Of the non-susceptibles, 74 percent had no history of having had rubeola, but have been vaccinated.

Calculate the efficacy of the vaccine in persons less than 10 years old. The formula for calculating vaccine efficacy is : $\frac{u - v}{u} \times 100\%$ (3)

       where   u = attack arte in unvaccinated persons
                v = attack rate in vaccinated persons

[20 marks]

QUESTION 4

a. A study to compare the Relative Risk and Attributable Risk in Mortality from Lung cancer and from Coronary Heart Disease for Heavy Smokers and Non-smokers was conducted. The following results were obtained :

Predisposing Factor	Annual Death Rates per 100 000 persons	
	Lung cancer	Coronary Heart Disease
Heavy Smokers	166	509
Non-smokers	7	422

    i. Calculate the relative risk and the attributable risk from this data. (4)

    ii. Calculate the odds ratio. (2)

b. Define the following :

    i. generation time (2)

    ii. incubation time (2)

    iii. index case (2)

    iv. secondary attack rate (2)

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c. Over a period of a few hours, 46 people became ill with gastrointestinal
    symptoms. Inquiry revealed that all had attended a church supper the previous
    evening. The physician in charge of investigating the outbreak set out to obtain a
    history from the 75 people who had attended the supper (attack rate of 61
    percent).

    Outline the steps you would take as an Environmental Health Officer
    receiving suspicion of an epidemic from the physician.   (6)

                                                              [20 marks]

SECTION B : COMMUNICABLE DISEASES CONTROL

ANSWER **AT LEAST TWO** QUESTIONS FROM THIS SECTION. QUESTION 5 IS COMPULSORY.

QUESTION 5   COMPULSORY

A.

i. It is the most commonest type of Schistosome worm that affects specially school children in Swaziland

   a. Schistosoma mansoni
   b. Schistosoma mattheii
   c. Schistosoma haematobium
   d. Schistosoma japonicum
   e. Schistosoma bovis

ii. The intermediate host for bilharzia is

   a. rodents
   b. mosquito
   c. flea
   d. *Bulimus* snail
   e. *Biomphalaria pfeifferi*

iii. Cholera can be spread by the following <u>except</u> :

   a. contaminated water
   b. contaminated food
   c. contaminated vegetables and fruits
   d. sharing eating utensils
   e. indirectly by flies and carriers

iv. The most common type of the Plasmodium parasite in South Africa is

   a. *Plasmodium vivax*
   b. *Plasmodium malariae*
   c. *Plasmodium falciparaum*
   d. *Plasmodium ovale*
   e. *Plasmodium knowlesi*

v. The classic description of "rice water stool" with "fishy" smell is typical in the following disease :

   a. bacillary dysentery
   b. typhoid fever
   c. amoebic dysentery
   d. cholera
   e. hepatitis A

vi. Entamoeba histolytica is the causative agent for the following disease :

    a. bacillary dysentery
    b. diarrhoeal diseases
    c. paratyphoid
    d. amoebic dysentery
    e. gastro-enteritis

(6)

B. Fill in the blanks :

a. ………. Is an intestinal infection by a Shigella bacterium. (1)

b. Shigellosis is the other name for ……………………… (1)

c. Amoebic liver abscesses is one of the chronic symptoms of ………… (1)

d. ………… is an infectious disease characterised by lesion formation in tissues
and organs in the body, by far the most frequent being the lungs. (1)

e. ………….. is an acute communicable, notifiable disease, characterised by
inflammatory changes of the motor nerve cells / central nervous system
especially anterior horn cells of spinal cord. (1)

f. ………….. is an infectious, notofiable disease characterised by inflammation
of the liver and development of jaundice. (1)

g. The life cycle of the malaria parasite in man occurs in two phases which are
called ………….. and ………….. . (2)

C. True or False :
Are the following statements "True" or "False" . Indicate by writing T or F
respectively.

    a. Plasmodium vivax is also dangerous because it does not respond to usual
    anti-malarial therapy. (1)

    b. The poliovirus causes congestion and oedema in the nerve cells – especially
    the spinal cord and the brainstem. (1)

    c. Shigella produces ulcers that may be thickened by infiltration with
    neutrophilic leukocytes and fibroblast (1)

    d. The hepatitis A virus is spread mainly by oral contact with stool
    containing the virus. (1)

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e. Diarrhoea and frequency of malnutrition are common in malaria. (1)

f. Concurrent disinfection of faeces, urine and vomitus will help to prevent the spread of cholera. (1)

[20 marks]

QUESTION 6

Hepatitis means, literally, inflammation of the liver caused by hepatitis viruses A, B, C, D, E and the yellow fever virus.

a. Outline five (5) differences between Hepatitis A and Hepatitis B. (5)

b. How is Hepatitis B spread ? (5)

c. Describe ten (10) preventive measures for spread of hepatitis A and B at primary level of disease prevention. (10)

[20 marks]

QUESTION 7

Schistosomiasis is a chronic disease caused by the reaction of the body to eggs of a worm called Schistosoma. The disease is commonly known as bilharzia.

a. Name three (3) Schistosoma species that are responsible for this disease. (3)

b. Discuss the life cycle of the bilharzia parasite. (Do not include the diagram of the life cycle) (17)

[20 marks]