Background: 3 February 2009 -- On 23 January 2009, the Government of the Philippines announced that a person thought to have come in contact with sick pigs had tested positive for Ebola Reston Virus (ERV) antibodies (IgG). Ebola Reston Virus (ERV) was first described in a population of Philippine monkeys *Macaca fascicularis.* On 30 January 2009 the Government announced that a further four individuals had been found positive for ERV antibodies: two farm workers in Bulacan and one farm worker in Pangasinan - the two farms currently under quarantine in northern Luzon because of ERV infection was found in pigs - and one butcher from a slaughterhouse in Pangasinan. The person announced on 23 January to have tested positive for ERV antibodies is reported to be a backyard pig farmer from Valenzuela City - a neighborhood within Metro Manila. The investigation team reported that it was possible that all 5 individuals had been exposed to the virus as a result of direct contact with sick pigs. The use of personal protective equipment (PPE) is not common practice among these animal handlers.

From these observations and previous studies of ERV, the virus has shown it can be transmitted to humans, without resulting in illness. However, the evidence available relates only to healthy adults and it would be premature to conclude the health effects of the virus on all population groups. The threat to human health is likely to be low for healthy adults but is unknown for all other population groups, such as immuno-compromised persons, persons with underlying medical conditions, pregnant women and children.

Part I

Investigators collected swab samples from individuals whose occupation increases their risk of exposure to the virus. Blood samples from positive swab individuals were also collected. These were processed and tested for virulence. Here are the results:

Table 1: Distribution of farm workers carrying ERV in saliva and blood

Occupation	Number of Individuals sampled	Number of positives	
		mouth swab	blood sample
breeding	2	0	1
farrowing	10	1	2
weaning	8	3	3
fattening	12	1	1
handler	18	2	2
butcher	2	2	2
unspecified	1	0	0
Totals	53	9	11

1. Which group has the highest prevalence of individuals carrying Ebola Reston Virus (ERV)?

Answer (2 points)

Breeding	**½**	**%50**
Farrowing	**2/10**	**%20**
Weaning	**3/8**	**%37.5**
Fattening	**1/12**	**% 8.3**
Handler	**2/18**	**%11**
Butcher	**2/2**	**%100**

Award 1 point for correct answer and 1 point for explanation

If correct answer is given without justification award only 1.5 points

2. What is the overall prevalence of carriers of Ebola Reston Virus (ERV)?

Overall Prevalence = Total of positive blood swabs/total # of all workers sampled
= 11/53 = 0.2075 = %20.75

Award 3 points for correct response with justification

Award only 1 point if # of mouth swab data is substituted for blood swab. (%16.9 given as answer) This is incorrect response.

3. In subsequent testing none of the members of the investigating team, tested positive despite being in close contact to exposed individuals and sick pigs. Give an explanation for this finding.

3 points 1 for Use of Personal Protective equipment
2 additional points 1 for each valid reason
Not in direct contact with infected pigs
Not exposed to virus that causes ERV
Incubation period

Part II

Ebola Zaire is a strain virulent to humans. An outbreak of Ebola hemorrhagic ever (EbHF) occurred in Zaire in 1976. Epidemiologists conducted studies to investigate the modes of transmission, incubation period attack rates and relate risk factors. The cause of the epidemic was searched for attempts to find the index case and evidence of Ebola virus in some animals and insects.

The epidemiological investigations attempted to describe the outbreak of Ebola hemorrhagic fever (EbHF) by its distribution in time, in geography and amongst persons. Factors related to spread were also studied. These included possible modes of transmission, the incubation period, secondary attack rates and related risk factors. Serological surveys were undertaken to find evidence of prior Ebola virus disease in the area and asymptomatic infections occurring during the epidemic The cause of the epidemic (1) was searched for by attempts to find the index case and evidence of Ebola virus in some animal and insects (2).

DESCRIPTION OF THE EPIDEMIC AREA

The epidemic focus was in north-central Zaire. This collectivity has about 35 000 persons and the Bumba Zone has about 275 000 persons. Half of the population is less than 15 years of age. Over 75% of the population lives in forest villages of less than 5 000, most in small localities of fewer than 500. The area forms part of the Zaire River basin and is essentially tropical rainforest. The Zaire River forms the southern boundary of the zone and effectively separates geographically the most northern sectors from the remainder of the country.

Traditionally, the people are hunters and have contact with a wide variety of wild animals.

In 1976, before the epidemic, the hospital had 120 beds and a medical staff of 17 directed by a Zairian paramedical assistant. Included in the medical staff were three Belgian nursing nuns. Five syringes and needles were issued to the nursing staff each morning for use at the outpatient department, the prenatal clinic and the inpatient wards. These syringes and needles were sometimes rinsed between patients in a pan of warm water. At the end of the day they were sometimes boiled. The surgical theatre had its own ample supply of instruments, syringes and needles which were kept separately

1. Given the description above provide likely explanations for both the initial outbreak and subsequent spread of the disease.

Answer 3 points max 1 for each valid reason

Initial outbreak:	Direct contact with animals
	Hunting = blood
Spread:	small hospital
	Share needles
	Lack of training
	Small, closed community

Table 2: Age and sex distribution of EbHF cases

	Male		Female		Total	
Age	n1	%	n1	%	n	%
Newborn & Infant	10	3.1%	14	4.4%	24	7.5%
1-14 years	18	5.7%	22	6.9%	40	12.6%
15-29	31	9.7%	60	18.9%	91	28.6%
30-49	57	17.9%	52	16.4%	109	34.3%
50or>	23	7.2%	26	8.2%	49	15.4%
Unknown	2	0.6%	3	0.9%	5	1.6%
Total	141	44.3%	177	55.7%	318	

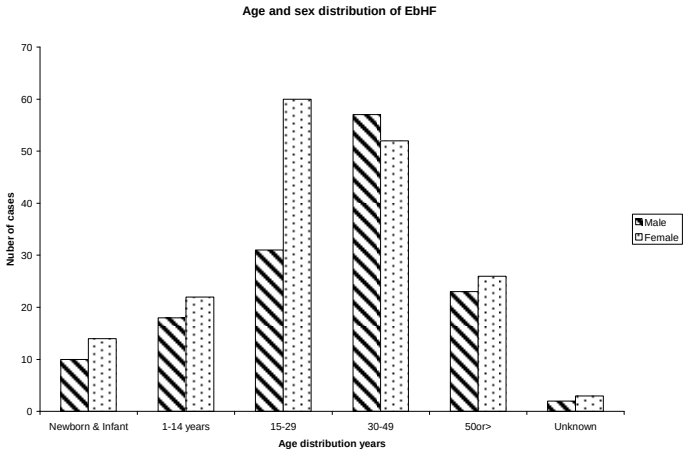
source:http://www.itg.be/ebola/ebola-24.htm

1. Give the definition of “Epidemic”.

2 points 1 for many cases
1 for within a given geographic area

2. Given the data in table 2 above construct relevant graph to display data.

1 point X (IV) and Y(DV) axis properly determined
1 point Title (indicates IV & DV)
1 point for units (years)
1 point overall shape of graph accurately depicts data
1 point legend for male female data
1 point for proper graph type selected
(discrete data = bar or column graph)
May also present % data on similar graph



3. The Ministry of Health of the Democratic Republic of the Congo (DRC) has on 16 February 2009 declared the end of a recent Ebola epidemic in the Mweka and Luebo health zones in the Province of Kasai Occidental. The last person to be infected by the virus died on 1 January 2009. The first case of Ebola in this outbreak was reported on November 23rd, 2008. Provide a justification for the Ministry of Health declaration.

2 points

Justification should include:

Initial case reported Nov. 23rd with last known death on Jan 1st is 38 days.

47 days since last death occurred.

Out of incubation period for virus.

4. If Ebola Reston Virus (ERV) become virulent in the human population provide the following:

    a. Vectors virus

    b. Reservoirs humans, pigs, other animals

    c. Modes of transmission blood-blood contact, bodily fluids, airborne

    d. Modes of control/prevention isolation, protective equipment

Award 1 point for each reasonable response maximum of 6 points

Team _____Score Sheet Disease Detective

Part I

Question 1	2 possible points	Points Awarded _____
Question 2	3 possible points	Points Awarded _____
Question 3	3 possible points	Points Awarded _____

Part II

Question 1	3 possible points	Points Awarded _____

Part III

Question 1	2 possible points	Points Awarded _____
Question 2	6 possible points	Points Awarded _____
Question 3	2 possible points	Points Awarded _____
Question 4	6 possible points	Points Awarded _____

Total points awarded _____