

# Taking sex and gender into account in emerging infectious disease programmes: An analytical framework



World Health  
Organization

Western Pacific Region





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## EXECUTIVE SUMMARY

This document demonstrates the important roles sex and gender play in understanding and controlling the transmission of infectious diseases and reducing the threat of emerging diseases.

It presents an analytical framework for understanding how sex and gender affect and interact with emerging infectious diseases. It is intended to be used as a practical tool to incorporate a gender perspective into emerging disease programmes.

The framework developed in this document outlines the pathways by which a person's sex and gender affect incidence, duration, severity, and mortality from emerging infectious diseases, both directly through effects on vulnerability of men and women to infectious diseases, exposures to infectious pathogens, and responses to illness, as well as indirectly through effects on disease prevention and control programmes.

Sex and gender differences include biological differences between males and females, biological changes during pregnancy, gender norms and behaviours, the male-female division of labour, and gender-related differences in access to and control over resources. Sex and gender differences can disadvantage males or females depending on the pathogen.

A life-cycle approach is used because biological and gender differences between males and females change over the life-cycle and have important implications for emerging infectious disease.

A gender analysis matrix and an accompanying set of model questions are presented as practical tools for carrying out systematic gender analysis. Numerous examples of how sex and gender impact emerging diseases are provided.

In-depth analyses and discussions of sex and gender issues are presented for three priority emerging disease programme areas. The first is a discussion of ways that gender influences the risk of acquiring infections during health care encounters. It includes discussion of the gendered nature of health care settings where predominantly female nurses play a pivotal role in taking care of patients and preventing the spread of infection when there is an outbreak of an emerging disease, but have little status and power within these settings. Nurses also face an occupational risk of acquiring infection in health care settings, due to their high exposure.



Second there is a discussion of ways in which gender roles and access to resources affect exposure to animals and so in the risk of acquiring diseases from animals. Gender differences related to poultry farming and avian influenza are discussed in detail.

Third, implications of sex and gender for surveillance are discussed. These implications include the need to disaggregate epidemiological and clinical data by sex and age, the need for surveillance data on pregnancy status especially for novel diseases, and the need to take into consideration potential gender biases in the use of health facilities and in surveillance data.

This document represents a first step in developing a gender perspective in emerging infectious diseases for the Western Pacific and South-East Asia Regions. This is a new and challenging area, but one which should prove to be valuable and rewarding for emerging infectious disease programmes.



# 1

## INTRODUCTION





## INTRODUCTION

This document has its roots in the need for greater global health security and the challenge presented by the emergence of new epidemic-prone infectious diseases at the end of the twentieth and the beginning of the twenty-first centuries. It demonstrates the important role of gender for understanding and controlling the transmission of infectious diseases and reducing the threat of emerging diseases.

Traditionally, little attention has been paid to sex and gender differences in infectious diseases. The general belief has been that since infectious diseases affect both males and females, it is best to focus public health attention during an outbreak on control and treatment, and to leave it to others to address social problems that may exist in society, such as gender inequalities after an outbreak has ended. While this view is understandable, this document will demonstrate that gender analysis is not a 'diversion' for the control and prevention of emerging diseases. On the contrary, it will demonstrate that understanding the interaction between gender roles and infectious disease can lead to important insights into transmission patterns and to strategies for outbreak prevention and control, thereby reducing disease transmission and increasing cooperation with public health interventions and the uptake of health promotion and protection measures. This means that considering male-female differences can increase the efficacy of disease control programmes, and the likelihood of better outcomes. At the same time, such considerations can reduce health inequalities between men and women and in some instances, reduce discrimination based on sex and thereby promote human rights.

### BOX 1: The meaning of sex and gender

There is considerable confusion about the use of the words sex and gender. In keeping with the definitions used by the World Health Organization (WHO, 2009e), the following terminology is used in this document.

**Sex** refers to the biological and physiological factors that define males and females.

**Gender** refers to the *socially constructed* roles, behaviors, activities, and attributes that a given society *considers appropriate* for males and females. Gender differences include both socio-cultural factors as well as male-female differences in access and control over resources.

#### Examples of biological differences:

1. Women can become pregnant and men cannot. Physiological changes to immune, respiratory, and cardiovascular systems during pregnancy can lead to especially severe outcomes of some infectious diseases including pandemic (H1N1) (World Health Organization, 2009c).
2. Biological differences between male and female immune systems affect vulnerability to infectious diseases (Wizemann and Pardue, 2001).

#### Examples of gender differences:

1. Many more men smoke than women. Smoking affects vulnerability to infectious respiratory diseases such as influenza and tuberculosis (Kark et al, 1982; Zellweger, 2008; Chan et al, 2010).
2. Differences in activity patterns of males and females cause them to have different patterns of exposure to infectious pathogens.
3. In many countries, gender influences access to economic resources and the lack of access to economic resources is sometimes a barrier to prompt and effective health care for women (Interagency Gender Working Group and World Health Organization, 2005).

## 1.1 Why both sex and gender are important for emerging infectious diseases

Sex and gender are both considered in the framework developed and used in this document to analyze the impact of male-female differences on emerging infectious diseases. Although sex and gender are very different concepts, they are highly interrelated, and it is sometimes difficult to attribute particular male-female differences to either sex or gender alone. Sex and gender do not exist independently of one another. Indeed, biological differences between males and females have important impacts on human behaviours, such as aggression and reproduction, which influence transmission of infectious diseases (Klein, 2000).

Gender roles and relations can be helpful or detrimental to the health of men or women depending on the situation. A major objective of gender analysis for infectious diseases is to identify those gender-related practices which put women and men at higher or lower risk of infectious diseases, to be in a position to discourage harmful practices, and encourage helpful ones.



It is widely believed that biological factors are more difficult to change than gender-related factors, and for this reason it is sometimes considered more efficient to concentrate public health efforts on gender-related factors than on biological factors. However, the fact that the basic biology of males and females cannot be easily changed is no reason to ignore biological differences when designing public health programmes. It is known that sex differences can play an important role in biological response to vaccination or treatment (Engler, Nelson et al, 2008; Klein, 2000), and that biological vulnerabilities can at times be mitigated by changing behavior, such as taking additional preventive measures or targeting treatment to those at greatest risk. For these reasons, this document focuses on male-female differences per se, so as not to get fixated on whether these differences are caused by sex or gender.

Not surprisingly, biological differences are often responsible for a more consistent pattern from place to place than gender differences. For example, there is strong evidence from a great many studies of biologically-caused excess male mortality during the first year of life. In contrast, reports of male-female mortality differences during childhood vary across countries, because of gender-related differences (United Nations, Department of Economic and Social Affairs, Population Division, 1998).

## 1.2 Why life-cycle differences in sex and gender need to be considered

Patterns of infectious diseases are often age-dependent, with specific diseases affecting specific age groups in different ways. Both sex and gender differences also change over the life-cycle from infancy to childhood, adolescence, adulthood, and old age. Biological changes over the course of the life cycle are recognized in every society and are accompanied by changes in gender norms, behaviours, roles, and responsibilities. Each society defines male and female norms associated with the various biological stages in its own way. Therefore, in order to take gender into consideration for emerging infectious diseases, it is important to consider the effects of sex and gender within age groups.

## 1.3 Outline of this document

This document proceeds as follows. Section 2 presents the framework for analysis of sex and gender in emerging infectious diseases and an accompanying gender analysis matrix meant to facilitate the analysis of gender-related issues highlighted in the framework. It can be used systematically to review the effects of sex and gender on emerging infectious diseases. Section 3 discusses the ways in which sex and gender affect infectious disease transmission and outcomes and interact with health interventions for a variety of infectious diseases. There is an emphasis on emerging diseases that are public health problems in the South East Asian and Western Pacific Regions.

Sections 4, 5, and 6 illustrate how this framework for gender analysis can be used to suggest policies for three programme areas of particular importance for emerging infectious diseases. Section 4 focuses on health care-acquired infections. This issue is a priority for emerging infectious disease programmes because of the potential for emerging diseases

and antimicrobial resistant strains to be amplified in health care settings. Section 5 focuses on animal contacts, since approximately three-quarters of newly emerging infectious diseases are zoonotic diseases (Taylor, Latham, and Woodhouse, 2001). Section 6 focuses on surveillance and response, both of which are key elements in emerging diseases programmes. General conclusions are presented in section 7. Appendix A provides an example of an application of the framework for avian influenza. Appendix B provides a series of questions for the gender analysis matrix. Appendix C illustrates how the gender analysis matrix can be modified to cover some issues in greater detail and others in less detail.

# 2

## DESCRIPTION OF THE FRAMEWORK





## DESCRIPTION OF THE FRAMEWORK

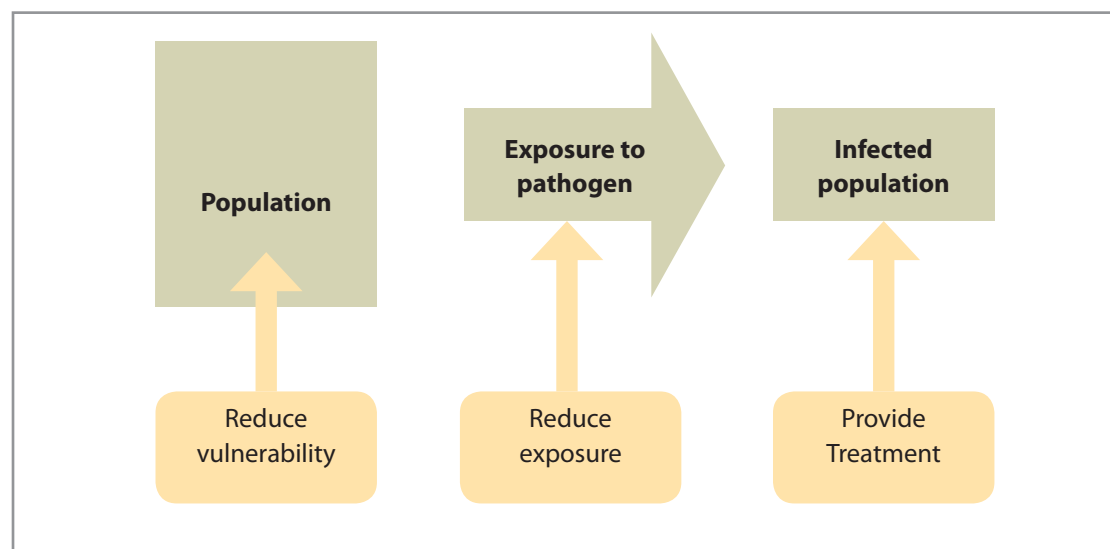
This document develops a framework for the analysis of gender and emerging infectious diseases. At the same time, it builds on previous frameworks proposed for the analysis of gender for tropical diseases (Rathgeber and Vlassoff, 1993) and tuberculosis (Uplakar et al, 2001) as well as a more general framework for infectious diseases (Tolhurst et al, 2004). It also builds on the gender analysis tools developed by the World Health Organization (World Health Organization, 2009d).

### 2.1 The transmission model

The transmission model begins with a population into which an infectious pathogen is introduced. For an outbreak to occur, some individuals must be exposed to the pathogen and a proportion of exposed individuals must become ill ( Figure 1). Health interventions can take place at any time before, during, and after an outbreak. In general, these interventions aim to:

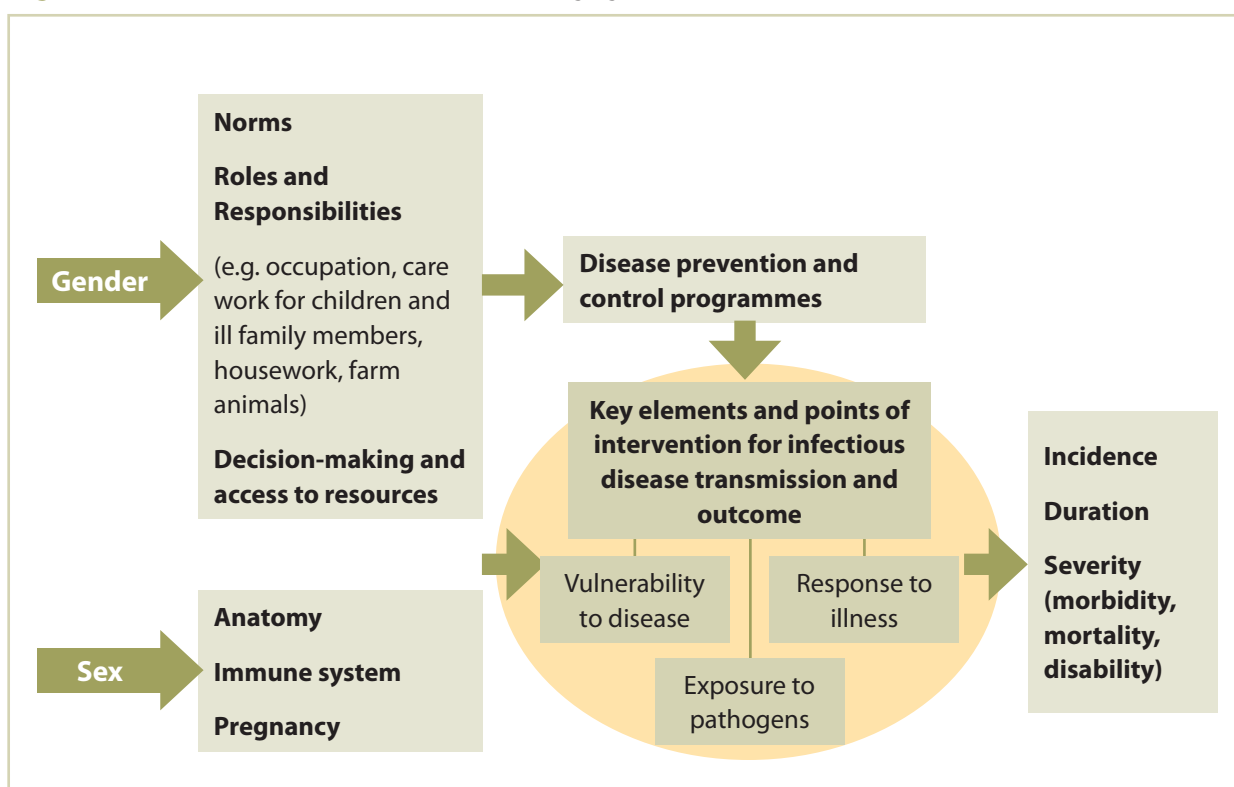
- reduce the vulnerability (and increase resistance) of people to the effects of infectious pathogens;
- reduce exposure to infectious pathogens; and
- treat people who become infected.

**Figure 1:** Transmission model and associated interventions



The reason for selecting this model as the basis of the framework is that it is familiar to infectious disease specialists, and it allows for an examination of the effects of sex and gender on disease transmission and outcome. In fact, more complex mathematical versions of this model are frequently used for designing strategies for health interventions and modeling their potential effects.

**Figure 2: Framework for Sex and Gender and Emerging Infectious Diseases**



Note: See section 3.1 for an in-depth discussion and example of how sex and gender affect vulnerability, See section 3.2 for exposure, section 3.3 response to illness, and section 3.4 for effectiveness of public health interventions.

The framework described in this document identifies the effects of sex and gender on the vulnerability<sup>1</sup> of males and females in the population, on exposure, and on response to illness. This sets the stage for analyzing how emerging disease policies, programmes and interventions respond to the different needs of men, women, girls, and boys, taking into consideration the fact that gender often plays an important role in the capacity and willingness of individuals, households, and communities to protect themselves from infection and obtain treatment when they become ill.

Figure 2 illustrates the general framework. Sex and gender appear in the left column. Three major components of gender (norms, roles and responsibilities, decision-making and access to resources) and three major components of sex (anatomy, the immune system, and pregnancy) are noted. Sex and gender influence disease incidence, duration, and severity (shown in the right column of Figure 2) in two ways. First, sex and gender directly influence each of the three key elements of the transmission model (vulnerability, exposure to pathogens, and response to illness) shown in the circle in the middle of Figure 2. These three key elements in turn help determine incidence, duration, and severity. Second, sex and gender indirectly influence incidence, duration, and severity through interactions with health interventions (shown at the top of Figure 2) which act through their effect on vulnerability, exposure, and response to illness.

<sup>1</sup> Vulnerability includes susceptibility/lack of immunity, as well as health and nutritional status which could affect outcomes of infection.



The framework is flexible and can be applied to particular infectious diseases, groups of diseases, or to particular social and geographical environments. Appendix A provides an example of how this framework can be used for avian influenza to consider inter-relationships with sex and gender.

## 2.2 Gender analysis matrix for emerging infectious disease

Figure 3 presents a gender analysis matrix for the framework described above in section 2. Each row of the matrix corresponds to an element in the analytical framework. For example, identifying ways in which sex and gender affect vulnerability in the population corresponds to row 1 of the matrix. Similarly, identifying sex and gender-related differences in exposure and in response to treatment correspond to rows 2 and 3 of the matrix respectively. How sex and gender related factors influence disease prevention and control programmes corresponds to row 4 of the matrix.

**Figure 3:** Gender analysis matrix for emerging infectious diseases

		Sex		Gender		
		1	2	3	4	5
	<b>Factors which influence disease transmission and outcome</b>	Biological factors	Pregnancy	Norms and behaviour	Male-female division of labour	Access and control over resources and decisions
1	Vulnerability <sup>2</sup>					
2	Exposure <sup>3</sup>					
3	Response to illness <sup>4</sup>					
4	Public Health interventions <sup>5</sup>					

Source: Adapted to be relevant to emerging infectious diseases from Gender Analysis Matrix in Gender Mainstreaming for Health Managers: A Practical Approach, (WHO, 2009d).

Columns in the matrix represent sex and gender-related factors. The first two columns of the matrix represent sex-related factors, namely (1) biological factors, which includes both anatomical and immune system differences between males and females, and (2) pregnancy. Pregnancy is included as a separate column because of the importance of physiological changes during pregnancy and the vulnerability of the fetus to adverse effects of illness or treatment. The next three columns represent three gender related factors, namely: (3) norms of behavior; (4) male-female division of labour; and (5) access to and control over resources and decisions.

<sup>2</sup> See section 3.1 for a discussion of how sex and gender affect vulnerability.

<sup>3</sup> See section 3.2 for a discussion of how sex and gender affect exposure.

<sup>4</sup> See section 3.3 for a discussion of how sex and gender affect response to illness.

<sup>5</sup> See section 3.4 for a discussion of how sex and gender affect the effectiveness of public health interventions.

Appendix B contains a set of questions to be used for filling out the gender analysis matrix. These questions have been adapted to be relevant for emerging infectious diseases from Gender Mainstreaming for Health Managers (World Health Organization, 2009d). The purpose of Appendix B is to stimulate thought about how sex and gender might influence the epidemiology of a particular disease or the outcome of an intervention. It is not comprehensive, since it is not possible to cover every disease or every situation. On the other hand, these questions provide a solid beginning to the analysis of sex, gender and emerging diseases.

The gender analysis matrix presented in Figure 3 can be modified for particular situations to emphasize aspects of gender analysis of particular interest in that situation and to minimize those of less interest. Appendix C presents one such modification that was used in the Regional workshop on mainstreaming gender into health security and emergencies held in Manila in September 2010 for the analysis of gender and avian influenza.

# 3

## HOW SEX AND GENDER AFFECT INFECTIOUS DISEASE TRANSMISSION AND OUTCOMES AND INTERACT WITH HEALTH INTERVENTIONS





# HOW SEX AND GENDER AFFECT INFECTIOUS DISEASE TRANSMISSION AND OUTCOMES AND INTERACT WITH HEALTH INTERVENTIONS

The next four sections discuss and give examples of how sex and gender differences influence emerging infectious diseases through their effects on: (1) vulnerability; (2) exposure; (3) response to infection; and (4) public health interventions. These are illustrated in Figure 2 and correspond to rows and columns in the gender analysis matrix presented above.

It should be noted that gender differences vary from country to country within the South East Asian and Western Pacific Regions. Gender differences also vary within countries according to a host of socio-economic variables, meaning gender differences often apply to population subgroups rather than to the population as a whole. This is particularly important for large countries and countries with considerable ethnic diversity and/or income inequality. In these situations, national averages often hide gender inequalities.

It should also be noted that the influence of sex and gender on transmission and outcome depends on the disease, the way it is transmitted, and the interaction between the host and the pathogen. This means that effects of biological and gender differences vary from disease to disease, and can result in a disadvantage for either males or females.

Discussion below illustrates the types of effects that sex and gender often have on infectious diseases. Examples are taken from a broad variety of diseases, many of which are of public health importance in the World Health Organization's South-East Asia and Western Pacific Regions. These examples are meant to familiarize the reader with typical effects that sex and gender have on the infectious disease process.

Emerging infectious diseases include a wide array of diseases that are either newly recognized in the past two decades, re-emerging or re-surging, or have bioterrorism potential. Because they are new or the epidemiology of the disease is changing, little is known about sex and gender-related risk factors for many emerging infectious diseases. When thinking about possible ways in which sex and gender relate to emerging diseases, it is useful to also consider the impacts of sex and gender on infectious diseases about which much more is known. Although an effort has been made throughout this document to use examples of emerging infectious diseases, examples of the effects of sex and gender on well-established infectious diseases are also provided when appropriate for illustrative purposes.



### 3.1 How sex and gender differences affect vulnerability to infectious disease (row 1 of gender analysis matrix)

- *Male-female biological differences in anatomy (row 1 vulnerability, column 1 biological differences)*

Anatomical differences between the sexes are particularly important for sexually transmitted diseases and for diseases that affect sexual organs.

- *Male-female biological differences in immunity (row 1 vulnerability, column 1 biological differences)*

There are biological differences between male and female immune systems at every biological level, from cell to organ to organ system to individual as a whole (Institute of Medicine, 2001). Although in general, females tend to mount a more vigorous immune response to infection than males, there are also diseases for which females are more vulnerable than males (Klein, 2000).

An example of gender differences in immunity comes from recent studies which have found biological differences between infant boys' and girls' response to breast milk. Breast milk protected infant girls from severe respiratory infection, but not infant boys (Klein et al, 2008; Libster et al, 2009; Sinha et al, 2003).

- *Pregnancy (row 1 vulnerability, column 2 pregnancy)*

A woman's body undergoes many physiological changes during pregnancy, including changes to the heart, lungs, and immune system. These changes affect vulnerability to certain pathogens. The level of risk may vary with gestational age. For example during the 2009 Pandemic H1N1, women in the third trimester were particularly at risk (WHO, 2009b). In addition during pregnancy, consideration needs to be given to possible teratogenic effects of infection, vaccination, or treatment.

- *Biological changes over the life cycle (row 1 vulnerability, columns 1 and 2 sex differences)*

Male-female biological differences change over the life-cycle. For example, during the first year of life boys have greater vulnerability to infectious diseases and higher mortality than girls, but these biological differences do not continue past very early childhood (United Nations, 1996). It is widely believed that male-female differences in concentrations of sex hormones, which begin at puberty, are at least partly responsible for the more vigorous immune responses in females than males (Klein et al, 2010). Hormone concentrations fluctuate with menstrual cycles and during pregnancy (Klein et al, 2010) and they decline during old age.



- *Norms and behaviour that enhance health and so decrease vulnerability to infectious disease (row 1 vulnerability, column 3 norms and behaviour)*

Health enhancing activities, such as immunization and good nutrition, are important for protecting the underlying population from infectious disease and should be considered in a gender analysis.

Gender-related norms in which males are valued more than females are common in several countries in the Western Pacific and South-East Asia Regions. A recent report on women's health in the Western Pacific Region reflected the situation well saying that "in some Western Pacific countries, particularly among the poor in the rural areas, the birth of a daughter is taken as the birth of another "slave", while the birth of a son is welcomed with great joy" (World Health Organization, 2001). In several countries in the Asian and Pacific regions, preference for sons over daughters is so high that there is widespread sex-selective abortion of female fetuses, resulting in abnormally high sex ratios at birth.

Son preference sometimes results in male-female differences in day to day health enhancing activities, such as good nutrition or vaccination, thereby affecting resistance to infectious disease. For example, although systematic male-female differences in routine childhood immunization coverage have not been found in many countries, in India childhood BCG, DPT and measles vaccination rates of girls have been found to be significantly lower than vaccination rates of boys (Pande and Yazbeck, 2003; Corsi et al, 2009). Also, lower rates for females have been found more often in families in which girls have older female siblings (Pande, 2003). Gender bias in childhood immunizations favouring boys over girls have also been found in Pakistan, Cambodia and Nepal and in the poorest quintile in Bangladesh (Jones N et al, 2008). Nutritional differences favoring boys over girls have been found in India (Pande, 2001; Shaikh et al, 2003) and Bangladesh (Choudhury et al, 2000). Such gender differences in health-enhancing activities are not found everywhere. However, in areas where they exist, they affect vulnerability to infectious disease.

- *Detrimental norms and behaviour that increase vulnerability to infectious disease (row 1 vulnerability, columns 3-5 norms, division of labour, resources)*

Some gender-related norms and behaviours can increase the risk factors and vulnerability to infectious diseases. For example, smoking is a masculine activity in many societies. Globally, a higher proportion of men smoke than women (Samet and Yoon, 2001; World Health Organization, 2008a). Male-female differences are particularly pronounced in the Western Pacific and South East Asian Regions in which estimates of the percentage of males who smoke are the highest in the world at 62.3% and 48.2% respectively compared to 5.8% and 8.2% respectively for women, which were the two lowest levels in the world (World Health Organization, 2003). Evidence suggests that smoking increases the incidence, severity, and mortality from infectious respiratory diseases, such as influenza and tuberculosis (Kark et

al, 1982; World Health Organization, 2007). It is likely that differences between men and women in smoking behaviour are partly responsible for large observed gender differences in tuberculosis incidence rates (Watkins and Plant, 2006). There has been speculation that smoking might have played a role in the higher observed male case fatality rates from SARS (Karlberg et al, 2004).

Solid fuels are used for cooking by a large proportion of families in the Western Pacific and South East Asian regions. In most developing countries in these regions over half the households use solid fuel for cooking, and the proportion using solid cooking fuels rises to over 75% in several countries in the Region (World Health Organization, 2006a). Cooking with solid fuel exposes especially women and children to high concentrations of indoor air pollution. There is strong evidence that indoor air pollution from solid fuels increases the risk of pneumonia and acute lower respiratory disease in children and chronic obstructive pulmonary disease among women (World Health Organization, 2006a). There is also evidence (although weaker) that links indoor air pollution to a variety of other ill health conditions including asthma, cataracts, tuberculosis, ischemic heart disease, interstitial lung disease, and nasopharyngeal and laryngeal cancers, as well as to low birth weight babies (World Health Organization, 2006a). These ill health conditions, although they are not all infectious themselves, can be risk factors for infectious diseases.

- *Male female differences in the prevalence of morbid risk factors for infectious disease (row 1 vulnerability, columns 1-5 biological factors, pregnancy, norms, division of labour, resources)*

Male-female differences in morbid risk factors in the underlying population can lead to sex differences in disease manifestations and outcomes for infectious diseases. For example, during the 2009 pandemic H1N1, many severe and fatal cases had underlying co-morbid conditions such as chronic obstructive lung disease, asthma, cardiovascular disease, and HIV infection. Many of these conditions are unevenly distributed among men and women in the Regions.

Male-female differences vary from country to country. For example, even though females are slightly more likely to have diabetes than males in the Western Pacific and South East Asian Regions (WHO, 2004), diabetes is more prevalent among males than females in Bangladesh, India, Nepal, Pakistan and Sri Lanka (White and Rafique, 2002).

### 3.2 How sex and gender differences are related to exposure to pathogens (row 2 exposure)

How people become exposed to infectious diseases depends on how the disease is transmitted. There are a wide variety of transmission pathways, and many infectious diseases have several pathways. The main mode of transmission may change as an outbreak progresses.

Males and females typically engage in different activities, which are often done at different places and with different contacts, and therefore they often have different exposures. In most societies, there are differences in male and female labour force participation rates, extensive occupational segregation in the workplace, and general female responsibility for household-related tasks, such as washing clothes and fetching water, and caring for children and sick family members. These are discussed in greater detail below.

- *Gender differences in occupational exposures (row 2 exposure, column 4 division of labour)*

Occupations such as fishing, mining, agriculture, and ranching put men at increased risk of exposure to mosquito-borne disease, such as dengue or malaria if they work or travel during peak biting hours. Differences in exposure to aedes mosquitoes during peak daytime biting hours when working or travelling to work are considered to be the likely cause of male excess in adult dengue cases in Singapore (Ooi, 2001). Outdoor activities also put men at greater risk for rabies and leptospirosis. For example, studies in India, found that over 70% of animal bite and rabies victims were to males (Ichhpujani et al, 2008; Sudarshan et al, 2007). Occupational exposure leading to greater incidence of leptospirosis in males compared to females has been found for occupations involving contact with contaminated water and soil, such as working in rice fields, and for occupations that involve frequent contact with carrier animals, such as pigs, cattle, dogs, and rats (Laras et al, 2002; Yersin et al, 1998).

- *Gender differences in exposure while caring for sick family members (row 2 exposure, column 4 division of labour)*

In almost all societies, women are responsible for the care of family members when they fall ill. Close contact with sick family members exposes them to pathogens that are spread from person to person. This can be an important transmission pathway for new pathogens. For example, caring for sick family members was a significant risk factor for outbreaks of Nipah virus and Ebola, which are both spread through direct contact (Baron et al. 1983; Blum et al. 2009).

- *Gender differences in exposure during childcare (row 2 exposure, column 4 division of labour)*

Childcare, which is primarily done by women and girls in most societies, is a source of exposure to infectious diseases. Children are often at greater risk for infectious diseases than adults because they don't have immunity from past episodes of illness. Caring for small children involves having close contact, and provides many opportunities for exposure when the child is infectious and can result in higher incidence of disease in caretakers. This pattern is seen in many different infectious diseases.

For example, in trachoma endemic areas (which include parts of the South-East Asia and Western Pacific Regions), childcare and sleeping near children have been found to increase exposure to trachoma in women (Cromwell et al, 2009). Young children are considered the primary reservoir for the pathogen *Chlamydia trachomatis* because active infection is most frequent and particularly contagious in this age group (Cromwell et al, 2009). The pathogen is transmitted through direct contact with infectious eye discharge and on fingers and fomites such as towels and sheets, and by eye-seeking flies. Repeated or persistent infections can cause blindness, causing women to have rates of blinding complications of trachoma that are several times higher than men (Courtright and West, 2004).

Careful studies in the United States suggested that caring for children increased exposure to respiratory viruses (Monto, 2002). Young children were found to have considerably higher incidence of viral respiratory infection than older children and adults (Monto, 2002). Greater incidence of viral respiratory infections was also found for adults ages 20-29, which was more pronounced in females than in males, and more pronounced in females who did not work outside the home compared to females who worked outside the home.

- *Gender differences in exposures while doing domestic household chores (row 2 exposure, column 4 division of labour)*

Women spend more time inside the home doing household chores than men in almost all societies, and they may be exposed to pathogens that are transmitted in or around the home during the day. Women may also be exposed to pathogens while undertaking domestic chores outside the home, such as doing laundry, or gathering water and firewood. In some poor countries women typically spend hours washing clothes while standing in polluted waters, exposing them to water borne diseases such as schistosomiasis (Michelson, 1993; WHO, 2010).

- *Gender differences in exposure to livestock (row 2 exposure, column 4 division of labour)*

Men and women have different roles and responsibilities related to livestock production and their roles vary from place to place. Women often take care of livestock kept close to the household and in backyard farms, and men are more likely to work with larger animals as well as in large commercial farms. Agricultural extension workers and veterinarians typically provide more support for the types of animals and farms that males tend to be responsible for (FAO, 2009a). In contrast, smaller farms with smaller animals, which are typically the responsibility of women, have fewer resources and less access to government extension services to keep animals healthy and prevent disease. Men and women also have different gender-related exposures during the slaughtering and marketing of animals (Van Kerkhove, 2008; Velasco et al, 2008). See section 5 for a more in-depth discussion of gender and livestock.

- *Gender differences in exposure in health care settings (row 2 exposure, column 4 division of labour)*

Women predominate in health care occupations in almost all countries. Nurses constitute the majority of health care professionals, and nurses are overwhelmingly female in almost all countries (Anker R, 1998). Yet, nurses are often not empowered to protect themselves from exposure. They often lack training and decision-making authority. Protective equipment is often unavailable or out of stock. This is especially important for new diseases, because the health care environment can favour the development of new resistant strains, like Methicillin-resistant *Staphylococcus aureus* (MRSA) and multi-drug resistant tuberculosis (MDRTB) and amplify epidemics like SARS and Ebola. See section 4 for a more detailed discussion.

- *Exposures of pregnant women (row 2 exposure, column 2 pregnancy)*

Pregnant women generally have more contact than usual with health care settings, and this contact might increase their exposure to diseases transmitted in health care settings under some circumstances. For example, outbreaks of SARS and Ebola have been transmitted to pregnant women in health care settings (Anker M, 2007a; Anker M 2007b). During an outbreak of a new infectious disease, maternal services may need to be reorganized so that they can continue to operate safely without disruption (Rasmussen et al, 2008).

### 3.3 How sex and gender affect response to illness (row 3 response to illness)

- *Gender differences in care-seeking for children (row 3 response to illness, column 5 resources)*

Prompt treatment is important both for mitigating the effects of illness and for shortening the duration of infectivity, thereby reducing transmission. Studies have found gender-related differences in care-seeking behavior, such as consultation with physicians, hospitalizations, and expenditures on medication, favoring boys over girls - particularly in poor areas in societies where son preference is strong (Bhan et al, 2005; Pandey et al, 2002; Hasan and Khanum, 2000; United Nations, 1998).

- *Gender differences in health-seeking behaviour for adults (row 3 response to illness, column 5 resources)*

Men and women often have different patterns of health-seeking behaviour. In some settings, women are less likely than men to make decisions to seek care on their own. For example, a study of over 6000 individuals in Chakaria, Bangladesh found that only 43% of adult female patients decided to seek health care on their own compared to 71% of adult males. Husbands were the decision-makers for 43%

of adult female patients (FHS, 2008). In this setting, women had more symptoms but sought care less frequently than men.

In some settings women are more likely to use a variety of informal local health services than men. A study of TB treatment in a rural area in China is informative in this regard (Wang et al, 2008). This study found that although women went earlier for treatment than men, they often used lower level services such as village health stations while men used higher level services such as hospitals. This caused delays for women because treatment was not available at the lower level services. The authors hypothesized that women's use of lower level health services might be related to greater time constraints as women are responsible for housework in addition to agricultural work, or to less knowledge about current TB services.

The reasons for different gender patterns of health care utilization vary with location and disease, but common reasons include: gender differences in knowledge; gender differences in stigma and discrimination which make women more fearful of diagnosis; greater constraints on women's time because they are often responsible for both housework and other work; and women often need to delay treatment until someone else makes the decision and/or provides financial resources. Insensitivity and disrespectful behaviour towards women on the part of some health staff has discouraged women from seeking care in some settings. There can also be gender differences in time to diagnosis and treatment within health care settings.

- *Gender differences in adherence to treatment in adults (row 3 response to illness, columns 2 pregnancy, 3 norms, and 5 resources)*

Adherence to treatment is a major factor in treatment outcomes for diseases that require long-term treatments such as TB and leprosy, and for reducing the potential for developing drug resistant strains such as MDRTB.

There are gender differences in adherence to treatment regimens. Alcoholism and work-related problems (including loss of income from work) have been cited as reasons for men to default from directly observed therapy, short course or DOTS treatment (Jaggarajamma et al, 2007; Allotey and Gyapong, 2005).

Fear of the effects of treatment on the fetus and belief that treatment will dry up the milk has been cited as reasons for high default rates among women who become pregnant for treatment of TB and leprosy (Allotey and Gyapong, 2005). There are also gender differences in the willingness of men and women to engage in treatment for stigmatized diseases when treatment is difficult to keep secret (Allotey and Gyapong, 2005).



- *Pregnancy and treatment (row 3 response to illness, column 2 pregnancy)*

Treatment of pregnant women can be challenging because biological changes in women at this time may change the safety and efficacy of medications and prophylaxis (Cono et al, 2006) and because the potential effect of medications on the fetus must also be considered. These effects change with gestational age. Because of ethical concerns, pregnant women are normally excluded from clinical trials of new medications, so that available information on the effect of medication in pregnant women or the fetus is often based primarily on studies of animal reproduction. For example as of September 2009, there were still no studies in pregnant women assessing the safety of oseltamivir and zanamivir, two treatments recommended for use in pregnant women during the 2009 pandemic H1N1 – although no adverse effects have been reported so far (CDC December, 2009).

### 3.4 How sex and gender affect the effectiveness of health interventions (row 4 public health interventions)

The gendered structure of societies, communities, and households can enhance or diminish the effectiveness of health interventions. As noted in a review of gender and tropical disease, “Scientific knowledge cannot be applied without community participation because the transmission and maintenance of these (tropical infectious) diseases are reliant on human behaviours, poor living conditions, and socio-cultural factors that support the continued existence or re-emergence of the conditions” (Allotey and Gyapong, 2005).

Women play a pivotal role in maintaining the health of their families. In almost all societies they are responsible for cleaning and maintaining hygiene within the home, cooking food, fetching water in poor areas without water on the premises, washing clothes, caring for children, and caring for other family members when they are ill (UNIFEM, 2009).

Therefore, if interventions that do not take gender into consideration are put in place, there is a risk that they will not be fully supported. Key factors to consider are whether males or females will be chiefly responsible for actions proposed, the extent to which interventions interfere with other activities which males or females typically do, and whether the males or females who will carry out the activity have the capacity and access to resources to do so.

- *Gender and interventions in and around the home (row 4 public health interventions columns 3-5 norms, division of labour, resources)*

Many vector control activities, such as residual spraying for malaria, use of bednets, and eliminating larval breeding spots for dengue-carrying mosquitoes take place in and around women’s traditional domestic domain – the home. Unless the health service workers and their messages are respectful of women, they may meet with resistance. For example, some dengue control programmes met resistance, because

health messages “called into question the woman’s ability to preserve health by maintaining a household free of disease” (Winch et al, 1994).

- *Gender and communication (row 4 public health interventions, columns 3-5 norms, division of labour, resources)*

Communication is a vital tool in changing health-related behavior. Gender-sensitive communication takes into consideration differences between males and females in their needs, constraints, roles and responsibilities, and in their relationships pertaining to decision-making and access to resources for health.

Health-related messages should take into consideration the needs of men and women for the information they are providing as well as the affect that the message may have on the audience. This means that messages should reinforce gender equity wherever possible.

Understanding the audience profile and assuring that messages reach their intended target is an important part of the process. One needs to decide which communication channels would be best to use in order to reach men and women according to their access and capacity. The need for communication to be consistent with educational levels deserves special consideration in areas with low female literacy.

Risk communication during outbreaks is of particular importance for emerging diseases, especially for an outbreak of a new disease. However, very often women are left out of communication strategies when there is an outbreak because women may not be as active in the public sphere as men. For example, an anecdotal report by international staff during an Ebola outbreak noted that men predominated during informational meetings for outbreak control, even though women were the main caregivers for sick family members and therefore the most at risk. (Formenty personal communication, 2003). There are also reports of agricultural extension workers for avian influenza who interacted almost exclusively with men, even though it was the women who did the bulk of work and management of backyard farms (Velasco et al, 2008).

- *Gender and interventions for healthy animals (row 4 public health interventions, column 4 division of labour)*

As mentioned above, caring for livestock is carried out by both men and women, but in generally very different settings. Women are usually responsible for small backyard farming activities, such as poultry. The avian influenza pandemic has brought backyard poultry farms and wet markets into greater focus. Interventions to reduce the risk of avian influenza should consider the special role that women play in these activities. See section 5 for a more in-depth discussion of this.

# 4

## GENDER AND THE RISK OF ACQUIRING INFECTION IN HEALTH CARE SETTINGS AND ENCOUNTERS







# GENDER AND THE RISK OF ACQUIRING INFECTION IN HEALTH CARE SETTINGS AND ENCOUNTERS

In this section the framework presented earlier is used to examine the effects of sex and gender on disease transmission in health care settings. Reducing the risk of infections acquired during health care encounters is a key element for emerging infectious disease programmes. Health care settings form the first line of defense against emerging infectious diseases, and at the same time, pose a risk of further transmission, such as happened with SARS and new forms of antimicrobial resistant pathogens, such as MRSA.

Sex and gender are not often considered in this context because prevention methods are generally the same whether the patient is male or female. However, it will be argued in this section that sex and gender do play a role in the transmission of infection in health care settings.

To begin, there are two important predominantly female groups in health care settings, namely health care workers and pregnant women. Health care workers are included because the majority of them are female; there are high levels of occupational sex segregation among health care workers; they play a major role in controlling emerging diseases; and they have heightened risks of exposure. Pregnant women are included because they form a sizable group of patients, are entirely female, and are particularly vulnerable to some infectious diseases during pregnancy. In addition, nosocomial outbreaks in maternity settings have occurred for previous emerging diseases, such as Ebola and SARS (Anker, 2007a).

## 4.1 Gender and health care workers in the health care setting

Modern health care settings have been shaped by a long history of gender stereo-typing and occupational sex segregation. This has affected the organizational cultures and norms, power relationships, and roles and responsibilities within the health care setting. This section begins by examining the level of occupational sex segregation among doctors and nurses in the two Regions (section 4.1.1), and the occupational risk of infection of the mostly female health care worker staff (section 4.1.2). How gender relationships affect infection control is discussed in section 4.1.3. The need for gender-specific support mechanisms for health care workers during outbreaks is discussed in section 4.1.4.

### 4.1.1 Sex composition of health care workers

A high degree of occupational sex segregation exists in health care settings. In almost all countries, the vast majority of health care workers, especially nurses and midwives, are female. The sex distribution of physicians and nurses in a number of countries in the two Regions are presented in Table 1. Nurses are predominantly female in all 13 countries for which data are available. Nurses were over 90% female in 10 of the 13 countries, between

85% and 89% female in two of the 13 countries, and 74% female in one country. This is in contrast to physicians who are predominantly male in 13 out of 14 Asian countries with data. Mongolia is the only exception as 77% of physicians in Mongolia are female. Nurses also outnumber physicians in the Western Pacific and South-East Asian Regions by three to two (WHO, 2010b)<sup>6</sup>.

**Table 1:** Percent of nurses and physicians who are female in selected countries in SEARO and WPRO

Country	Nurses (percent female)	Physicians (percent female)
Australia	91 <sup>a</sup>	Na
Bangladesh	92 <sup>b</sup>	24 <sup>b</sup>
Bhutan	97 <sup>b</sup>	25 <sup>b</sup>
China	95 <sup>a</sup>	43 <sup>d</sup>
Hong Kong	89 <sup>a</sup>	Na
India	74 <sup>b</sup>	40 <sup>e</sup>
Japan	97 <sup>a</sup>	16 <sup>b</sup>
Maldives	99 <sup>b</sup>	23 <sup>b</sup>
Mongolia	98 <sup>b</sup>	77 <sup>b</sup>
The Philippines	92 <sup>a</sup>	Na
Myanmar	98 <sup>b</sup>	20 <sup>b</sup>
New Zealand	94 <sup>a</sup>	Na
Thailand	86 <sup>b</sup>	37 <sup>b</sup>
Timor-Leste		16 <sup>b</sup>
SEARO	>80 <sup>c</sup>	<10 <sup>c</sup>
WPRO	>80 <sup>c</sup>	<20 <sup>c</sup>

Sources: <sup>a</sup> Anker R, 1998; <sup>b</sup> WHO 2010b; <sup>c</sup> WHO, 2006b; <sup>d</sup> Anand et al, 2008; <sup>e</sup> Baru, 2005.

Notes : na indicates not available in any of these sources.

Thus, health care professions are typically gendered settings. Males typically have higher status positions requiring more specialized knowledge and education as well as greater autonomy and decision-making power. Women are typically in subordinate, lower status positions. This means that relationships between nurses and doctors in health care settings are affected by both gender relations between males and females as well as by professional considerations (Zelev and Phillips, 2003). However, these relationships are changing over time along with changes in gender relationships in society (Sweet S, 1995).

#### 4.1.2 Power relationships and gender in health care settings and infection control

Nurses play a pivotal role in infection control on a day-to-day basis, a role that is even more critical during outbreaks of emerging diseases. Implementation of patient care practices for infection control is generally considered to be the role of the nursing staff (WHO, 2002c).

Several studies of infection control within hospital settings have found barriers to better

<sup>6</sup> An exception is China where doctors outnumber nurses (Anand et al, 2008).



infection control in the power structure of hospitals. For example, findings from a qualitative study of hand hygiene in eight urban Chinese hospitals cited lack of power and influence by infection control departments (who were often staffed by nurses or junior physicians) as a major barrier to better hand hygiene in these hospitals. This resulted in shortages of some basic equipment, such as running water, soap, clean towels and gloves (Yuan et al, 2008). As the authors stated, “Our study suggests that the core issues are about the degree to which the infection control department and its staff are given adequate attention, priority and influence within the hospital with a clear line of authority to senior management” (Yuan et al, 2008). The authors of a study of operating scrub nurses from seven large Republic of Korea hospitals suggested greater training and greater participation by nurses in developing infection control policies to improve compliance with standard precautions (Jeong et al, 2008). They recommended that “each operating room (OR) nurse should share their opinion, be part of a consensus, and be involved in the process of developing policies at the unit level under the guidance of OR head nurses.” Although neither of these studies suggests gender differences as a cause of the problems related to infection control, each called for the (predominantly female) nursing staff to have greater influence over the development of infection control policies.

Similarly, lack of power and influence of nurses was linked to infection control deficiencies by Canadian studies in the aftermath of SARS (Tyshenko, 2010). One study cited that nurses “expressed their resentment at their lack of professional authority to directly challenge physicians who were not following infection control protocols during SARS” (Tyshenko, 2010). In another study nurses expressed concern about the lack of resources to purchase supplies needed for infection control (Tyshenko, 2010). In a third study, nurses voiced stronger concerns about infection control than other health professionals. At the same time according to Tolomiczenko and colleagues (2005), nurses felt less involved in decision-making than doctors, and were more critical than doctors regarding communication to them about SARS during the outbreak.

Research has shown that poor nurse-physician relationships are common in hospital settings, pose a potential threat to patient safety - including the risk of infections, and have a negative impact on nurse satisfaction and retention (Saxton et al, 2009; Rosenstein, 2002). Some of these problems stem from “deeply entrenched ... male-dominated physician and administrative cultures of hospitals in which nursing is viewed as a subservient role,” according to [Alan H Rosenstein (2002)]. A newly released Institute of Medicine [USA, Washington DC IOM] report on the future of nursing (IOM, 2010) calls for a transformation of the overall culture of health care settings so that nurses would be “full partners with physicians and other health professional, in redesigning health care in the United States” (IOM, 2010).

It should be noted that it is very difficult to differentiate between the effect of gender differences and nurses’ low status on infection control policies and practices because of the confounding of the lower status of women in society and the lower status of nurses in the medical hierarchy. In addition, the status of male nurses is affected by the fact that they are in an occupation that is stereotypically female. Nonetheless it appears likely

that gender relations in society reinforce the low status of nurses within the medical hierarchy, further diminishing their status and decision-making capacity. Recent efforts to reorganize health care settings so that full partnership and mutual respect among health professionals are achieved will need to overcome the deep seated gender-related attitudes that view nurses as subservient.

#### 4.1.3 Gender and exposure of health care workers

Concern for the protection of health care workers during outbreaks of emerging diseases has increased in the wake of Ebola and SARS, both of which entailed highly publicized transmission to health care providers. Health service providers are a sizable occupational group, estimated to be close to 40 million workers worldwide with 4.7 million health service providers in the South-East Asia Region and 7.8 million in the Western Pacific Region (WHO, 2006b).

The risk to health care workers of respiratory infections such as TB and SARS, and the risks of needle stick injuries resulting in blood-borne diseases, such as HIV, hepatitis B and C (HBV and HCV), have been well documented and can serve as examples of occupation risk that health care workers face in their work and during disease outbreaks (Menzies, Joshi and Pai, 2007; Maunder 2004; Tolomiczenko et al. 2005; Tyshenko 2010; Pruss-Ustin et al, 2005). Although studies rarely provide sex breakdowns of health care worker exposures and infection, given the number of males and females in the health care workforce, it is safe to assume that most health care workers infected in health care settings are female.

Two studies that provide gender breakdowns of health care provider infections and needle-stick injuries acquired in health care settings found far more infections and injuries among females. A review of infectious diseases in the Republic of Korea between January 1998 and December 2004 for which compensation was received from the Industrial Accident Compensation Insurance found that women accounted for 83% of compensated cases (Ahn and Lim, 2008). A study of needle stick injuries resulting in work loss of one or more days reported to the United States Bureau of Labor Statistics from 1992-2003 found that females comprised 73.3% of injured persons (Leigh et al, 2008). Such high percentages are not surprising given the preponderance of females among health care providers.

#### 4.1.4 Gender-specific support mechanisms during outbreaks of emerging infectious disease

It is important to have gender-specific family support mechanisms in place during outbreaks of emerging infectious diseases when health care workers face increasing stress stemming from long hours of work and possible quarantines, coupled with fear of infection, conflict between their work roles and their family responsibilities, and stigma. In almost all cultures women tend to be the main care givers at home for children, the elderly, and sick family members. Therefore, it is not surprising that during the SARS outbreak in Canada, nurses (who were predominantly female) reported greater negative impact in terms of stress than medical doctors who were primarily male (Maunder, 2004).

Nurses also reported lower morale and job satisfaction (Tolomiczenko et al, 2005). Focus group discussions with nurses following the SARS outbreak in Canada found participants experienced “substantial personal and professional dilemmas” between their workplace and family obligations (O’Sullivan et al, 2009). Nurses in these focus groups also expressed the need for assistance with child-care and elder-care if they were expected to work very long hours or face quarantine during infectious disease outbreaks as well as the need to protect family members from infection.

More work is needed to mitigate the stress and stigma experienced by nurses related to health care acquired infections – both potential and actual. Increasing the attention and resources given to infection control procedures and enabling health care workers to protect themselves and others from infection are crucial.

#### 4.2 Pregnant women and infection control

Pregnant women have special risks of infection and special needs for infection control. There is a vast literature on infection control during obstetrical interventions that will not be repeated here. It is worth pointing out that maternal mortality rates are high in some countries in the two Regions.

What is not sufficiently recognized is the added risk of infection in maternity care settings during outbreaks of emerging disease. Maternity care settings are of special interest during outbreaks because:

1. Some emerging diseases such as influenza have a particularly severe course during pregnancy.
2. Some emerging diseases adversely affect the fetus.
3. Some treatments or vaccines are known to adversely affect the fetus, while others have not been thoroughly tested on pregnant women. Therefore, prevention and treatment options may be limited.
4. Some emerging diseases cause pregnancy-related complications and miscarriage, leading to treatment in a maternity care setting rather than an infectious disease setting. The level of suspicion for an infectious disease as a cause of miscarriage may be low in a maternity care setting, and yet the risk of spread from obstetrical procedures may be high.

For these reasons, infection control in maternal care settings should get special consideration in pandemic plans. Extra precautions may be needed to provide obstetrical care to pregnant women who are ill during outbreaks, and to keep exposures of healthy pregnant women to a minimum. During the 2003 SARS outbreak, for example, obstetrical services in Toronto and Hong Kong were reorganized (Rasmussen, Jamieson, and Bresse, 2008). Some of the steps taken in Toronto included:

- Obstetric services were moved into a new facility to separate healthy pregnant women from other ill patients.
- Increased staff use of personal protective equipment, including N95 respirator

masks, face shields, eye protection, gowns, and non-latex gloves.

- More frequent hand washing with ethanol-based gels.
- Number of visitors reduced.
- N95 respirator masks worn by patients and visitors.
- Length of postpartum stay reduced
- Nonessential obstetric services suspended.

Pandemic planning in countries in which maternity care is typically handled by midwives outside formal settings poses additional challenges. Pandemic plans should include mechanisms for communicating with traditional midwives and other traditional practitioners, keeping them fully informed and involved, and enabling them to adequately protect themselves and their patients during outbreaks.



# 5

## GENDER AND DISEASES ACQUIRED FROM ANIMALS







## GENDER AND DISEASES ACQUIRED FROM ANIMALS

Three-fourths of all emerging pathogens during the past decade and more than half of all human pathogens have their origins in zoonotic diseases that are transmitted between vertebrate animals and humans (World Health Organization website, 2009a). These include such highly publicized pathogens as HIV, SARS corona virus, leptospirosis, avian influenza virus (H5N1), Nipah virus, and Ebola virus. Reducing the risk of acquiring pathogens from animals (either wild or domesticated) is important for reducing the threat of emerging diseases.

Males and females differ in their exposures to zoonotic diseases which can be acquired from either domestic or wild animals. They differ as regards direct exposure to animal pathogens as well as indirect exposures through vectors. Occupations that involve close contact with wild animal habitats, such as hunting, forestry, and mining are usually male-dominated. Occupations on large commercial farms also tend to be male-dominated. In contrast, work that involves the care and feeding of animals kept close to home or in small backyard farms is often done by women and children.

It is important to keep in mind that exposure to animals is not the only way that zoonotic diseases spread. Although zoonotic diseases are first introduced into human populations from animal populations, these diseases often develop multiple modes of transmission which change over time. In fact it is very often human to human transmission of zoonotic disease that is responsible for the greatest incidence of zoonotic diseases. HIV for example, was first introduced into human populations from primates, but HIV is now transmitted from person to person.

For emerging zoonotic pathogens that have not yet established themselves as human pathogens (avian influenza is the most obvious example), it is important to reduce exposures to the virus so that the pathogen is unable to become more easily transmittable among humans. Key to these efforts are early detection of outbreaks among poultry, aggressive efforts to limit exposure to the virus among poultry and to limit human exposure to the virus, and early recognition and treatment of disease among humans so as to minimize chances of further transmission. It is important to recognize that should avian influenza or a similar disease become a human pathogen, it would most probably develop alternative modes of transmission and so risk factors would be likely to change over time for men and women.

### 5.1 Gender and farm animals

The gender division of labour in the care and marketing of farm animals warrants special attention in the Regions in view of the large proportion of families who keep farm animals and the importance of the nutritional contribution of small animal husbandry to poor families.

Although societies differ, women in Asian countries by and large tend to care for small

animals and poultry kept in the backyard or in the vicinity of the home as well as animals kept for milk. Men more often manage and herd the larger more expensive animals, and are more likely to manage and work on larger more commercial farms. Unfortunately, there are few detailed statistics about who cares for specific species of farm animals and poultry mainly because labour force surveys do not often separately list activity rates by sex for the care of different types of animals.

Women have a number of disadvantages compared to men in access to financial and government resources for livestock. Veterinary and agricultural extension services tend to focus relatively little attention on the small animals and backyard poultry operations in which women are typically involved (World Health Organization, 2002a). Extension services have typically focused on farmers who own land, and who are able to invest in new technologies and innovations, particularly for commercial production rather than for subsistence farming in which women typically engage. FAO has estimated that globally only 15% of the agricultural extension workers are female, and that female farmers receive less than 5% of all agricultural extension services (FAO, 2009b). This can exacerbate gender-related differences in access to scientific knowledge, access to veterinary services and agricultural extension services, and access to financial resources and decision-making power within the family and community. These factors are crucial for determining which animals are kept, the basic living conditions of the animals, and the nature of livestock.

Recently there have been several studies that describe the division of labour in poultry farms related to highly pathogenic avian influenza (H5N1) and fears of an impending pandemic should the virus gain the capacity for efficient person-to-person transmission (Agronomes et Vétérinaires sans Frontières, 2006; CIVAS, 2006). The next section describes some of the gender differences in the care and management of poultry farms found by these and other studies, and discusses how strategies used to control highly pathogenic avian influenza may affect males and females differently because of their different roles in poultry production and marketing.

## 5.2 Gender and poultry

The size and nature of poultry farms varies greatly within Asia and the Pacific. The farms range from large industrial integrated systems that produce poultry and poultry products for domestic and international markets and have high levels of bio-security (known as sector 1 farms), to smaller sized commercial production systems with moderate levels of bio-security (sector 2), to semi-commercial farms with low bio-security levels (sector 3), and finally to small village or backyard productions with minimal or no bio-security that produce birds and products for local and self-consumption (sector 4). Other poultry include free-ranging ducks which are moved by their keepers from one paddy rice field to another every few days to feed on rice left over after harvesting as well as insects and snails.

In the richer and more urbanized countries, the large industrialized models (sectors 1 and 2) are more common, while in poorer, more rural countries, sector 3 and sector 4 farms are more prevalent. However, in most Asian countries there is a mix of poultry

farming models. For example, Thailand is a major producer of chicken for international markets, producing about 1 billion chickens per year in sector 1 industrial production settings. Nonetheless, sector 4 farms are still common in the Northeast and Southern regions of Thailand. Although only 10% of the poultry production is done on backyard farms, these farms represent 98% of poultry and poultry product producers (McLeod, 2007). In contrast, Viet Nam,<sup>7</sup> Indonesia, China, and the Lao People's Democratic Republic have relatively large proportions of poultry production in sector 4 farms. Cambodia has relatively few large farms and many small backyard farms (World Bank, 2006).

Activities common to all four sectors include feeding the poultry, collecting eggs, and cleaning cages. On commercial farms, manure is also collected and sold, and poultry is transported and sold at markets.

The small backyard poultry farms play an important role in the lives of poor families, and they have been seen by NGOs and development agencies as a pathway out of poverty, a tool for rural development, and an income-generating activity to improve the status of women. Poultry and eggs are important for supplying nutrients to poor families and they can be sold in times of need to pay for medical bills and school fees. Although rarely the main source of family income, poultry is an important and flexible supplemental source of income and often the only income that is controlled by women. Women and children tend to be responsible for the chores on these backyard farms. The farms are inexpensive to operate and require little investment. The low financial input required is one reason that poor women are able to afford these poultry. Poultry are free-range and scavenge for food as well as kitchen leftovers. It is not unusual for poultry to stay in the family dwelling at night or to roost in nearby trees. However, low input also results in low output in terms of egg production and growth. Poultry from these farms have high rates of illness and mortality.

### 5.3 Gender and Avian Influenza

Avian influenza is a viral disease that affects both wild and domestic birds. As with other influenza viruses, periodically new strains appear. The most recent strain of highly pathogenic avian influenza (H5N1) was first isolated from a farmed goose in Guangdong China in 1996, and the first outbreaks were reported from poultry farms and animal markets in Hong Kong in 1997. The first known instances of human infection were reported in Hong Kong in 1997. Most human cases involve exposure to sick or dead poultry, but there is also some evidence that suggests limited human-to-human transmission in a small number of cases. The fear is that avian influenza virus H5N1 can develop the capacity for easy human-to-human transmission and begin a pandemic.

Most human cases have occurred in rural and peri-urban areas that have free roaming poultry farms. Poultry infected with avian influenza H5N1 excrete large amounts of virus in their faeces, which can contaminate the areas in which they roam, and expose children

<sup>7</sup> It is estimated that 70% of households in Vietnam raise poultry and that 95% of the ducks in the Mekong Delta are kept on a small-scale household basis (Agronomes et Vétérinaires sans Frontières, 2006).

who often play in these same areas. As of May 2008, 28% of cases occurred in children younger than 10 years old (World Health Organization, 2008b).

Transmission pathways are not yet fully understood. Studies suggest that free-grazing ducks who are transported from paddy to paddy to feed after rice harvests played an important role in highly pathogenic avian influenza (HPAI) persistence and spread in 2004 (Gilbert et al, 2006). Ducks may be able to transmit the virus to other birds without becoming sick themselves. Migratory waterfowl seem to have played a role in spread to poultry and to other species in which H5N1 virus has been found such as pigs and cats. Other risk factors include large duck populations and live bird markets.

Methods for containing outbreaks include improving surveillance to detect outbreaks in poultry, culling poultry populations when an outbreak is detected, and compensating poultry owners for their losses, vaccination of poultry, changing production and marketing practices to increase bio-security, and reducing the risk of spread in live poultry markets (FAO and OIE, 2008). As will be discussed below, many of these methods have gender implications.

### 5.3.1 Sex distribution of cases and deaths from avian influenza

The proportion of female avian influenza cases differs from country to country. Overall, 51% of cases have occurred in females. However, this proportion varies considerably among countries. It is much lower in Thailand where 36% of cases are females, and much higher in Egypt where 68% of the cases are female (Table 2). In contrast, China, Indonesia and Viet Nam have similar numbers of male and female cases. There are also differences across countries in the ages of males and females. While male and female cases had similar ages in China, Indonesia and Viet Nam, males were considerably younger than females in both Egypt and Thailand. In Egypt the mean age of males was 11.7 and the mean age of females 20.1, and in Thailand the mean age of males was 16.0 and mean age of females 33.6. Male and female age differences in Thailand were statistically significant, but these differences in Egypt were not.

**Table 2:** Proportion female of reported cases of influenza A(H5N1) infections for countries with at least 25 cases, November 2003–May 2008

Country	Proportion female	Total cases
China	.50	30
Egypt	.68	50
Indonesia	.49	133
Thailand	.36	25
Viet Nam	.47	106
<b>All countries reporting</b>	<b>.51</b>	<b>383</b>

Source: Adapted from WHO (2008b).

There are also gender differences in mortality from avian influenza. A review of reported

H5N1 cases until May 2008 found that the risk of dying from H5N1 was significantly higher in females with an odds ratio of 1.6 (World Health Organization, 2008b). Female mortality was unevenly distributed across countries, and approximately half of the excess female deaths occurred in Egypt where females were ten times more likely to die compared to males. The higher female mortality in Egypt has been attributed to greater treatment delay for adult women (Lambert and Radwan, 2010). There was also a significant excess of female deaths in Indonesia, with case fatality rates of 89% for females and 73% for males (Sedyaningsih, 2008).

### 5.3.2 Gender and control strategies for avian influenza

Countries with poor veterinary services and with high densities of poultry in backyard farms and large populations of ducks have had the most difficulty in eliminating avian influenza virus H5N1. The main control and containment strategies for avian influenza include: disease surveillance to enable early detection of outbreaks in poultry; stamping out outbreaks by massive culling of poultry within an infected area; enhanced bio-security; and vaccination of poultry.

A very important but potentially costly tool to contain outbreaks is culling all poultry within a radius around an infected area. Of course this is a drastic measure, which can cause considerable hardship on farmers unless they are properly compensated. In order for containment strategies based on culling to work, they should be well understood and well supported by the farmers. This is perhaps even more crucial when those “farmers” are invisible women with backyard “farms.”

A key ingredient is early detection and reporting. This means that farmers should be able to recognize symptoms in poultry and willing to report them to the authorities, without fearing large economic losses. Special attention should be given to sector 4 farms where many of the human cases have originated. However, since these farms are generally run by women (who are in the best position to recognize when poultry are unwell), it is important that information, education, and communication (IEC) messages are designed for women so they understand when and where to report potential HPAI poultry cases, and are encouraged to do so by fair compensation practices.

However, several studies of the effectiveness of government services in the wake of outbreaks of highly pathogenic avian influenza noted that government officers rarely concern themselves with women because these women are not considered to be the owners of the farm (Velasco, 2008, Phuong et al, 2008).

A study of compensation plans indicates that sector 4 poultry farms are the most likely to be excluded from compensation schemes (World Bank, 2006). Yet these farms are very important to include. First, the risk of exposure on these farms is high in view of the close contact that family members have with poultry. Second, sector 4 farms have little or no biosecurity. Third, if there is no compensation, birds are likely to be sold or eaten in advance of the culling operation. Compensating sector 4 farms must be done

with the situation faced by poor farmers in mind. Poor farmers are unlikely to have good records of the poultry they own, and therefore may have difficulty proving ownership to authorities. In Viet Nam, there were problems determining the number of poultry actually culled due to difference between government figures and those reported by farmers. As a result, the supervision of culling was changed to include representatives of the village, the veterinarian covering the village, representatives of women's organizations, and representatives of the farmers whose animals were being culled (World Bank, 2006).

In addition, poultry farmers in sector 4 usually need to be paid in cash because of limited availability of banking facilities, and because delays in payment may cause undue hardships. In addition, special efforts should be made to ensure that the women who are the owners are compensated, rather than the males who are heads of households. This is important, because failure to compensate women may lead to poor cooperation.

The methods to upgrade the bio-security of backyard farms can have negative impacts on women and poor households if they require greater investment because they may make such backyard farming too expensive for many women now actively engaged in such activities. Such an outcome would have adverse effects not only on the women who would lose an important source of income and independence but also on the health and nutrition of poor families who would lose an important source of nourishment. These possible adverse consequences imply the need to simultaneously consider microcredit and poverty alleviating activities which would enable women and poor families to make the necessary improvements without ceasing activities.







# GENDER AND SURVEILLANCE

The current section examines ways in which infectious disease surveillance systems can take sex and gender into account in their systematic collection, collation, analysis and dissemination of infectious disease data.

Issues discussed in this section include:

- need for disaggregated data by sex
- need for data on pregnancy status
- gender biases in surveillance data
- gender issues in analysis

## 6.1 Need for disaggregation of epidemiological and clinical data by sex

Surveillance systems typically collect data on epidemiological variables such as incidence, prevalence, severity, and deaths, as well as clinical data on typical signs and symptoms of disease. Data are usually collected from health facilities where they are aggregated and sent to the next higher level. This means that although the sex of individuals is almost always recorded on health facility records, separate tallies for males and females are not often included in reports to higher levels or in the epidemiological literature, making it difficult to obtain information on male/female differences.

One reason typically given for the absence of sex disaggregated data is the need for parsimony, given the concern about overburdening health care workers with data reporting. A system that requires too much detail could be counterproductive and lead to non-compliance and sloppy reporting. It is obviously better to have a well-functioning reporting system with fewer data requirements than a dysfunctional system that could theoretically provide all relevant variables, but is so burdensome that reporting is either not done or is error-prone.

The argument against reporting sex disaggregated data is, however, based on the erroneous assumption that sex and gender are not crucial for emerging infectious diseases and therefore requiring breakdowns by sex is not sufficiently important given the additional work required. There are two major weaknesses with this argument. First, sex and gender have an important influence on infectious diseases as demonstrated in this document. Their omission from surveillance system reports means that their influence and impact cannot be taken into consideration. Second, the advent of computers means that it is much easier now to report disaggregated data as well as to send disaggregated data on to the next higher level than it was in the days of hand tallies.

## 6.2 Need for surveillance data on pregnancy status, especially for new diseases

Pregnancy is an especially vulnerable time. Many diseases, both well-established and emerging ones, have particularly serious consequences for pregnant women or can harm the fetus. For example, some strains of influenza virus (including pandemic influenza (H1N1) 2009 virus) have particularly severe symptoms during pregnancy, and there is some evidence that SARS was more severe during pregnancy than at other times (Jamison et al, 2006; Anker 2007a). Chikungunya, leptospirosis and dengue fevers are examples of emerging diseases in the Regions that can be vertically transmitted during pregnancy and lactation. As discussed in section 2 above, treatment during pregnancy may pose additional problems. Information about the safety and efficacy of medications during pregnancy is not always available due to the exclusion of pregnant women from clinical trials, and there may be drugs that cannot be used during pregnancy because they harm the fetus.

During outbreaks of new diseases, there may be no knowledge about the course and outcome during pregnancy. Since pregnant women are at greater risk for many diseases, it is important that pregnancy status be systematically reported, and that the course and outcome of disease during pregnancy be described as fully as possible. During the SARS epidemic, information on pregnancy status was not systematically recorded, and consequently it was not possible to fully characterize the course and outcome of SARS during pregnancy (Anker, 2007a).

It would also be useful to make plans to be able to share data on pregnant women with other countries, because no country may have a sufficient number of pregnant cases for a robust analysis, particularly at the beginning of an outbreak of a new disease. During the SARS outbreak there were legal barriers in some countries which prevented them from sharing data on pregnant women with other countries.

## 6.3 Gender biases in surveillance data

Most of the data used by surveillance systems comes from health facilities including incidence data on reported numbers of cases, clinical data on symptoms, and case-fatality rates. This means that reported incidence and case-fatality rates do not include all cases, but only cases seen and diagnosed in health facilities that report cases to the next higher level. The current section discusses two potential sources of gender biases in health facility reports namely: (1) gender biases in diagnostic criteria used to identify cases, and (2) male-female differences in health service utilization.

### 6.3.1 Male-female differences in symptoms and diagnostic criteria

It is often taken for granted that males and females have the same symptoms of infectious diseases. However, experience has shown that this cannot be automatically assumed and it is important to analyze male and female symptom profiles separately. Symptom profiles form the basis for the development of diagnostic criteria. Therefore, the use of symptom profiles drawn primarily from one sex can lead to misclassification and diagnostic delays.

A frequent mistake is to undercount the relative importance of symptoms that can only occur in one sex, such as vaginal bleeding in dengue. The importance of such symptoms is masked when symptoms are listed in order of frequency for all patients rather than only for female patients (Anker, 2007b).

The presence of cough and sputum expectoration has recently been found to be more frequent in male tuberculosis cases than in female cases. These symptoms are used as diagnostic criteria for tuberculosis and their less frequent presence in female cases may delay diagnosis and treatment for women (Long, 2002)<sup>8</sup>. There is also evidence of sex differences in the sensitivity of tuberculin-tests which are commonly used in some countries for screening (Thorson and Diwan, 2001). In addition, different HIV prevalence rates among males and females can bias the results of sputum testing which is known to be less sensitive in HIV positive cases.

### 6.3.2 Gender differences in use of health facilities

There is considerable evidence in some settings that males and females differ in their use of health facilities both as children and adults (Stallings, 2004; Wang, 2008; Bhan et al, 2005). In societies in which son preference is common, there is considerable evidence of gender differences in care-seeking behaviour among poor families. A study of hospitalization for childhood illnesses in New Delhi, India that followed over 85,000 children in low-income communities found significantly lower hospitalization rates for girls compared to boys (65% of hospitalizations and 35% for girls), despite greater female mortality (girls comprised 57% of deaths).

There are also gender differences in health facility use among adults, especially in poor areas. Some studies have found that women are more likely to frequent local healers before visiting more modern facilities (Wang, 2008). This can happen when health facilities are far away from where people live. It is more convenient, less costly and more socially acceptable for women to consult local traditional healers rather than travel to health clinics. It can happen when health clinics charge money and women do not have access to financial resources. In some traditional societies, women are unable to go to health services without a chaperone or to spend money on health services without male permission, even in emergencies. Men on the other hand generally have greater access to financial resources and are more likely to be in a position to travel to clinics.

Another possible cause of gender bias in reported cases is the requirement for workers to get medical certificates in order to take time off from work when ill. This has been suggested as a possible cause of more reported adult male dengue fever cases than female cases in Singapore, despite the fact that no differences were found between males and females in serological studies of recent infection for the same year (Yew et al, 2009). In Singapore, more adult males than females are in the labour force, and thus the necessity for workers to obtain medical certification to use their sick leave may result in more male cases being reported.

<sup>8</sup> These delays do not negate the consistently lower female notification rates for tuberculosis which are thought to reflect a difference in incidence rates (Borgdorff, 2000).



Gender differences in the use of health facilities should be taken into consideration when interpreting sex disaggregated surveillance data. Currently, however, analyses of gender differences in surveillance data almost always ignore this possibility. Those studies which mention gender differences in using health facilities cited this as possible causes of differences in reported incidence rates but rarely investigated further. An exception has been recent studies of male-female differences in reported tuberculosis incidence rates. These studies have pointed to sex and gender differences in case detection rates and delays in diagnosis and treatment of women which may partly but not fully explain male-female differences in incidence (Long et al, 2002; Borgdoff et al, 2000).

It is important to consider male-female differences in health facility use even when equal numbers of male and female cases are reported because there may be underlying male-female differences that are masked by differences in the use of health services. However this is rarely done, and differences in use of health facilities are almost never mentioned when reported male and female incidence or case fatality rates are similar.

Overall there is a lack of information on gender differences in health facility utilization. In addition, when data on sex differences in health care utilization are collected this is usually undertaken in the context of a specific disease or vertical control programme and so not easily generalizable to other diseases.<sup>9</sup> More information on these differences is needed in order to better understand the limitations and biases of surveillance data. Such information would also be useful for outbreak response, and for targeting communication to people in greatest need.

## 6.4 Issues in analysis of sex and gender differences

This section discusses important issues in the analysis of sex and gender differences and their influence on emerging infectious diseases.

### 6.4.1 Sex and gender differences change over the life cycle

As mentioned above, the interactions between sex and gender and infectious diseases changes over the course of the life cycle. It is important to recognize these differences and take them into account in surveillance. One implication is that sex disaggregated data should be analyzed within age categories in order to identify male and female differences. Combined analysis of all age categories can mask important differences that affect particular age groups, particularly when sample sizes are small.

### 6.4.2 The proportion of males and females in the population varies with age

Surveillance data often compare the numbers male and female cases reported in particular population sub-groups. The usual assumption is that the number of males and females in those population subgroups is equal. However, this might not be the case. Globally, the

<sup>9</sup> An important exception is a study by Bhan et al (2005) which examines hospitalizations for major childhood diseases rather than particular diagnoses or conditions.



sex ratio at birth is approximately 1.07 (Central Intelligence Agency, 2009) with much higher numbers reported in some countries in which selective abortion of female fetuses is common. This means that more males than females are born, and there are more boys than girls in infant age groups. Therefore, a finding of more male infant cases than female infant cases might not mean that infant males have higher incidence rates because there are more boy infants than girl infants. As the population ages the proportion of females generally increases since males generally have shorter life expectancy. This is particularly apparent at older ages. Worldwide approximately 58% of adults over age 70 and 63% of adults over age 80 are women (United Nations, 2009). Therefore analysis of male-female differences should adjust for age distributions, particularly at the youngest and oldest ages.

#### 6.4.3 Gender differences are not generalizable from place to place

Unlike biological differences, gender differences are not the same from place to place. This means that averages often hide differences rather than reveal them. This is especially true for large countries and cross-national analyses. It is all too common to conclude that gender differences are absent based on aggregate data in which male-female differences did not achieve statistical significance. In-depth analysis by location is often required to reveal gender differences, and the absence of male-female differences at the aggregate level does not negate the possibility that such differences exist.

For example, the overall incidence rate of avian influenza around the world is approximately equal for males and females. This could lead to the conclusion that gender differences do not affect the incidence of avian influenza. However, as discussed earlier, there are marked gender differences in exposure patterns and incidence rates across countries. A more detailed analysis indicates that there are indeed substantial differences in the proportion of female cases across countries, ranging from 38% in Thailand to 68% in Egypt (WHO, 2008). This finding suggests that gender differences in exposure within some countries cannot be ruled out, even though these differences are not statistically significant given the relatively small numbers of cases.



# 7

## CONCLUSIONS





## CONCLUSIONS

This document has presented a comprehensive framework for considering how sex and gender affect and interact with emerging infectious diseases. Examples from a wide variety of infectious diseases were presented to show the influence of sex and gender on disease transmission and outcome, and why it is important to integrate a gender perspective into emerging disease programmes and policies. Tools for gender analysis were also provided including a gender analysis matrix and a list of suggested questions for gender analysis for a specific disease in a specific setting or for a programme, such as ESR (Emerging Diseases Surveillance and Response). The document takes into consideration that the Western Pacific and South-East Asia Regions are vast areas with a wide diversity of countries and cultures. As a result, there are large differences in gender norms and relations within the Regions. It also takes into consideration that by their nature, emerging infectious diseases are either new or have recently spread to new areas, so that the situation is quickly evolving and there may be key knowledge gaps about their etiology, epidemiology, treatment, and prevention.

Despite challenges, some key issues appear to be generalizable. First, gender differences in behaviours, activities, and access to resources and decision-making affect disease transmission and outcome for many different emerging infectious diseases. Although more research is needed to better understand these interactions, there is enough evidence available to conclude that gender is an important factor. Second, biological differences between males and females are important for some infectious diseases, which should be recognized and considered by emerging disease programmes. Third, there is an urgent need to disaggregate data by age and sex. Fourth, pregnant and lactating women should be given special consideration because they represent a high-risk group for many emerging diseases and because of the potential impact on the next generation. Finally, this document argues that gaps in knowledge should not detract from the fact that much is already known about the importance of including a gender perspective in all aspects of work and programmes concerned with emerging diseases.

In conclusion, this document represents a first step in developing a gender perspective in emerging infectious diseases for the Regions. This is a new and challenging area, but one which should prove to be valuable and rewarding for emerging infectious disease programmes.





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# APPENDICES

## APPENDIX A: Use of Framework for Avian Influenza

Fig A1 illustrates how the framework developed in this document can be used to examine the effects of gender differences with regard to avian influenza A (H5N1). These differences are discussed in greater detail in section 5.3 above.

Biological differences have not been found for avian influenza despite sex differences in mortality. Although the experience of the six pregnant women with avian influenza reported so far indicates that pregnant women may have more severe outcome, the number of pregnant women infected has been too small to draw any conclusions.

Gender differences that can influence outbreaks of avian influenza include among others:

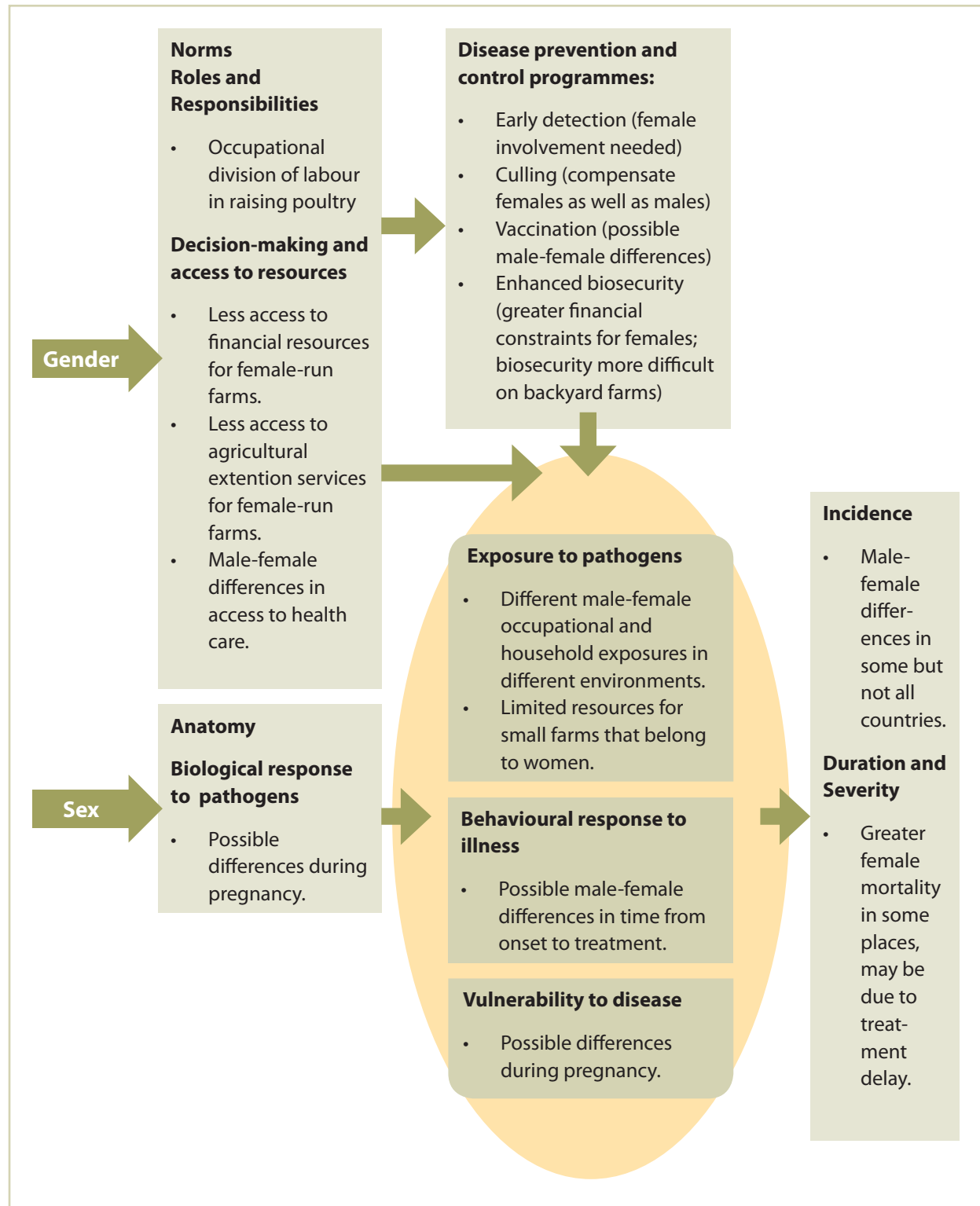
- Gender differences in the division of labour mean that exposure of males and females to poultry occurs in different environments – women and children in often in small backyard farms and men often in larger commercial enterprises. These differences in exposure affects male and female incidence.
- Differences between men and women in access to resources (financial, government, information) affect conditions in how poultry are raised by men and women. Backyard “farms” often run by women have little or no infrastructure or access to government extension services. These conditions affect the health of the poultry and their exposure to the H5N1 avian influenza virus, which in turn affects human exposure to the H5N1 virus which affects incidence of disease in humans.
- In societies where barriers to health treatment exist for women, there is a risk of treatment delay which is particularly important for avian influenza because treatment needs to be begun promptly to be effective. There is some evidence of treatment delay in Egypt for example, which may explain the higher case fatality rates for women compared to men in Egypt.

Gender differences influence disease outbreaks through their influence on control strategies. Control strategies mentioned below prevent exposures to sick poultry thereby reducing incidence.

- Detection - Both men and women are needed for early detection of outbreaks. Women currently are often ignored by government agricultural extension workers – yet their cooperation is needed for detection because they are in the best position to know when animals on backyard farms are sick.
- Culling - Women who own most of the small backyard farms need to be better informed about and compensated for animal culling than they are today to ensure their cooperation.

- Vaccination and Biosecurity - Women may not be able to vaccinate poultry or increase biosecurity because of their limited access to financial resources.

**Figure A:** Application of Framework to Avian Influenza



## Appendix B: Questions for gender analysis for an emerging infectious disease<sup>10, 11</sup>

**Table A.** Background information about disease and gender relations in the culture

Topic	Questions	Place in gender analysis matrix	Comments
1. What is known about the pathogen	1.1 What is the infectious agent? 1.2 What are common clinical presentations in males and females? 1.3 How is diagnosis made? 1.4 What are treatment options? 1.5 Are prevention and treatment methods safe and effective during pregnancy and lactation? 1.6 What preventive measures are available?	<ul style="list-style-type: none"> <li>• Background</li> <li>• Pregnancy</li> </ul>	
2. What groups are affected	2.1 Are age groups differently affected? 2.2 Are males and females differentially affected within age groups? 2.3 Are ethnic groups differentially affected? 2.4 Are lower income groups differentially affected? 2.5 Are pregnant women especially vulnerable?	<ul style="list-style-type: none"> <li>• Background</li> <li>• Pregnancy</li> </ul>	Gender analysis should consider age differences in affected groups.
3. Modes of transmission	3.1 How is the disease transmitted?	<ul style="list-style-type: none"> <li>• Background</li> </ul>	A pathogen may have several routes of transmission.
4. Education	4.1 What are the educational levels of males and females in the community?	<ul style="list-style-type: none"> <li>• Background</li> <li>• Norms</li> </ul>	Education of mother is an important factor in health of children.
5. Family structure	5.1 Do children usually live with their families after they are married? Whose family do they live with?	<ul style="list-style-type: none"> <li>• Background</li> <li>• Norms</li> </ul>	Family structure is an important factor in decisions.

<sup>10</sup> These questions are intended to stimulate thought about how sex and gender might influence the epidemiology of a particular disease or the outcome of an intervention. The questions represent a starting point – they are not comprehensive, as one set of questions cannot cover every situation or every disease.

<sup>11</sup> Source: These questions have been adapted to be relevant for emerging infectious diseases from Gender Mainstreaming for Health Managers: A Practical Approach (WHO, 2009d).

6. Mobility	6.1 Are there any cultural norms that restrict the mobility of women and girls outside the home?	<ul style="list-style-type: none"> <li>• Background</li> <li>• Norms</li> </ul>	In some cultures women have restricted mobility.
7. Male-female division of labour	7.1 What is the division of labour in terms of work outside the home, work for wages, unpaid family work, housework, and caring for children?	<ul style="list-style-type: none"> <li>• Background</li> <li>• Division of Labor</li> </ul>	Gender helps determine the sexual division of labour.
8. Male-female power relations and health care decisions	8.1 How are decisions made within the family?  8.2 How are health care decisions made for the wife, the husband, the children, other family members?	<ul style="list-style-type: none"> <li>• Background</li> <li>• Decision making</li> </ul>	UNIFEM reported that 54% (7%) of married women in South Asia (Asia and Pacific) had no say over decisions over matters of their own health (UNIFEM 2008/2009).
9. Child bearing	9.1 What is the average number of children for per woman? 9.2 Are baby boys and baby girls valued equally? 9.3 What is the maternal mortality ratio? 9.4 What is the sex ratio at birth?	<ul style="list-style-type: none"> <li>• Background</li> <li>• Norms</li> </ul>	
10. Health facilities	10.1 What are the available health facilities? 10.2 Are there any barriers to men or women getting to and using the health facilities? 10.3 What are the costs (both direct and indirect)? 10.4 Is the attitude of the health staff respectful and responsive to the needs of both men and women?	<ul style="list-style-type: none"> <li>• Background</li> <li>• Access to care</li> </ul>	
11. Migration	11.1 Have there been large migrations of men or women into the area? From where? For what purpose?	<ul style="list-style-type: none"> <li>• Background</li> </ul>	Migrants may have special needs and/or different patterns of immunity.



**Table B. Health status of population**

Topic	Questions	Place in gender analysis matrix	Comments
1. Vaccination	1.1 Are there differences in male and female vaccination rates?	<ul style="list-style-type: none"> <li>• Susceptibility</li> <li>• Norms</li> </ul>	
2. Pre-existing immunity or vulnerability	2.1 Are there groups of males or females (e.g. migrant workers, refugees) who are particularly vulnerable or likely to have greater immunity?	<ul style="list-style-type: none"> <li>• Susceptibility</li> <li>• Biological factors</li> </ul>	Migrants may have different levels of immunity than non-migrants depending on where they come from.
3. Breastfeeding	3.1 Are there any differences in breastfeeding practices for girls and boys? 3.2 Are there any biological reasons why girls or boys would benefit more from breastfeeding?	<ul style="list-style-type: none"> <li>• Susceptibility</li> <li>• Norms</li> <li>• Biological factors</li> </ul>	Recent research has shown that breastfeeding may afford greater protection from acute respiratory diseases for girls compared to boys (Libster et al, 2009).
4. Nutrition	4.1 Are there differences in nutritional needs of males and females in affected age categories? 4.2 Are there differences in nutritional status of males and females such as nutritional deficiencies, malnutrition or obesity? 4.3 Are some nutritious foods not eaten by either males or females? 4.4 Are there customs that would cause women or men to have poor nutrition, such as women eating after men? 4.5 Are nutritional deficiencies common in pregnant women?	<ul style="list-style-type: none"> <li>• Susceptibility</li> <li>• Norms</li> <li>• Biological factors</li> <li>• Pregnancy</li> </ul>	<p>Male-female differences in body size, growth spurts, menstruation, pregnancy and lactation all affect nutritional requirements.</p> <p>Nutritional status of pregnant women is of particular importance because it has implications for children as well as women.</p>
5. Morbidity risks	5.1 Are the morbid conditions that are risk factors for severe outcome more common in males or females?	<ul style="list-style-type: none"> <li>• Susceptibility</li> <li>• Biological factors</li> </ul>	Morbid risk factors include co-infection and chronic diseases.
6. Age	6.1 What is the age and sex distribution in the population, especially in groups most at risk?	<ul style="list-style-type: none"> <li>• Susceptibility</li> <li>• Biological factors</li> </ul>	Since men have lower life expectancy, the proportion of females in the population increases with age.

Notes: Vector borne infectious diseases such as dengue and malaria are of public health importance in WPRO.

**Table C. Vector borne infectious diseases**

Topic	Questions	Place in gender analysis matrix	Comments
1. Where exposure takes place	1.1 Where do vectors live? 1.2 What are peak biting hours? 1.3 Does clothing or perfume worn by males or females make a difference in exposure? 1.4 Which activities of males and females bring them into contact with vectors during peak biting hours?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Division of labour</li> <li>• Norms and behaviours</li> </ul>	<p>Clothing may afford some protection from some vectors/insects.</p> <p>Some vector insects are attracted by perfume or dark clothing.</p>
2. Personal protective measures to prevent exposure	2.1 Are there protective measures that men and women can use to prevent exposure? 2.2 Are these methods used appropriately by both men and women? 2.3 Do males and females have equal knowledge about these methods? 2.4 Do males and females have equal access to these methods? 2.5 Are there any socio-cultural reasons why these methods may be used or avoided by either males or females	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Resources and decisions</li> <li>• Norms</li> </ul>	<p>Examples of protective measures include bednets and insect repellent.</p> <p>A study in India found use of bednets positively related to decision-making power of women (Talik, 2007).</p>
3. Ways for households to prevent exposure inside and around the home	3.1 Who is responsible for using the method in the household? 3.2 Does using this method place a burden on either males or females? 3.3 Do households have to pay for use of method? If so, who pays? 3.4 Who makes the decision to use the method?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Resources and decisions</li> </ul>	<p>Insect control inside the home (such as eliminating breeding sites of dengue carrying mosquitoes inside home, and covering water containers) is usually done by women. Although some outdoor tasks were found to be done by men (Whiteford, 1997).</p>

**Table D.** Diseases transmitted through contact with soil and water

Topic	Questions	Place in gender analysis matrix	Comments
1. Males-females differences in contact with contaminated soil and polluted water during occupational activities or housework	1.1 Are there occupational or household activities that bring males or females in contact with contaminated soil and polluted water?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Division of labour</li> </ul>	Farmers have been found to be of increased risk of schistosomiasis and leptospirosis.
2. Options for prevention and control	2.1 Are there gender issues at community level which impact environmental decisions? 2.2 Are there additional benefits of environmental decisions made beyond disease prevention and control for males or females? 2.3 Do control measures entail any burden for either males or females? 2.4 Are there gender issues in community mobilization?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Resources and decisions</li> </ul>	Prevention and control measures include personal protection such as wearing boots, and environmental measures such as improved hygiene and sanitation, and access to clean water.

Notes: Schistosomiasis is endemic in China, the Philippines, Cambodia, and the Lao People's Democratic Republic. In areas where prevalence is low, there is a risk of reemergence associated with water resource development and population movement.

Leptospirosis is a zoonotic disease resulting from exposure to urine of carrier animals. It can be indirectly transmitted through water, especially during floods.

**Table E.** Diseases transmitted by close contact

Topic	Questions	Place in gender analysis matrix	Comments
1. Caring for other family members	1.1 Is infection transmitted while caring for other family members?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Division of labour</li> </ul>	Women are often the family caregivers.
2. Occupational exposure	2.1 Are males or females likely to be exposed during work?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Division of labour</li> <li>• Norms</li> </ul>	Occupational exposure is likely to affect males and females differently.
3. Exposure during leisure	3.1 Are males or females exposed during leisure activities?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Norms</li> </ul>	Males and females have different social activities and networks.
4. Burial customs	4.1 Are there any cultural customs at the time of death which expose males or females?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Division of labour</li> </ul>	Burial traditions were involved in transmission of Ebola in Africa.

Notes: Diseases spread by close contact include many childhood diseases like measles and chickenpox as well as acute respiratory infections such as influenza and SARS. These diseases may be spread by respiratory droplets dispersed in the air during coughing. Droplets may remain airborne for a period of time, or they may fall on surfaces around the infected individual and contaminate those surfaces. Other secretions from infected individuals may also spread to others in close contact with them.

**Table F. Foodborne and waterborne diseases**

Topic	Questions	Place in gender analysis matrix	Comments
1. Contamination during food production, distribution and sales	<p>1.1 Do males or females work in food production or in food markets where they might be exposed to infection while handling food?</p> <p>1.2 Are safety precautions available for workers?</p> <p>1.3 Are the safety precautions burdensome to males and females?</p> <p>1.4 Who makes the decision on implementation of safety precautions?</p>	<ul style="list-style-type: none"><li>• Exposure</li><li>• Division of labour</li><li>• Resources and decisions</li></ul>	Safety precautions include protective equipment and hygienic environment, as well as staying away from work when ill.

2. Transmission in household caused by contamination of food during storage or preparation	2.1 Who purchases food and stores? 2.2 Who fetches, treats, and stores water? 2.3 How is food and water stored? 2.4 Who is responsible for cooking? 2.5 Are those who fetch, store and cook aware of safety precautions and able to apply them? 2.6 Are there constraints for males and females to safe storage and preparation of food?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Division of labour</li> <li>• Resources and decisions</li> </ul>	Food safety includes hand washing, safe surfaces, separation of raw and cooked food, thorough cooking, safe storage, treating water, washing fruits and vegetables.
3. Transmission by contamination of food eaten away from home	3.1 What is the source of contamination? 3.2 Do males or females consume food away from home prepared under unsanitary conditions?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Norms</li> </ul>	In some societies men eat away from home more than women.
4. Pregnancy	4.1 Do pregnant women face additional risk? 4.2 Are pregnant women aware of foods to avoid?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Norms</li> </ul>	Some pathogens such as <i>Listeria monocytogenes</i> found in soft cheese and processed meats can cause abortion and still birth.

Notes: The incidence of some well known foodborne illnesses such as salmonellosis is increasing worldwide. There is greater potential for contamination of food, with the globalization of food production and distribution, greater numbers of people who processed food at home and meals away from home in restaurants, canteens, fast food outlets, and at street food vendors, especially in countries where unhygienic conditions are common.



**Table G. Zoonotic diseases**

Topic	Questions	Place in gender analysis matrix	Comments
1. Contact with animals in the wild	1.1 Which animals transmit the disease? 1.2 What is the nature and frequency of male and female contact with infected animals?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Division of labour</li> <li>• Resources and decisions</li> </ul>	
2. Raising live-stock	2.1 Which livestock animals transmit the disease? 2.2 What is the nature and frequency of male and female contact with animals and especially with infected animals? 2.3 What can be done to protect men and women during contact with livestock?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Division of labour</li> <li>• Resources and decisions</li> </ul>	<p>Males and females often raise different types of livestock with women more likely to care for smaller animals and men more likely to work on commercial farms.</p> <p>Males and females often do different tasks related to livestock.</p>
3. Keeping livestock healthy	3.1 Who owns of the livestock men or women? 3.2 Are there ways to improve the health of livestock (such as purchasing healthy stock, protecting livestock from exposure, vaccination)? 3.3 Do agricultural extension workers provide support for raising animals traditionally owned and cared for by women and men? 3.4 Do men and women have the resources to use improved methods to keep livestock healthy?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Division of labour</li> <li>• Resources and decisions</li> </ul>	<p>Agricultural extension workers and veterinarians typically provide more support for the types of animals and farms that males tend to be responsible for.</p>

4. Transport, marketing, and slaughtering	<p>4.1 Which tasks during transport, marketing and slaughtering involve the highest risk of exposure?</p> <p>4.2 How is the work divided between males and females?</p> <p>4.3 Do males and females have the ability and resources to protect themselves and others from exposure during transport and marketing?</p> <p>4.4 If methods are introduced to change conditions, how will the changes affect males and females?</p>	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Division of labour</li> <li>• Resources and decisions</li> </ul>	In some societies men are more likely to be involved in transport and slaughter.
5. Culling of animals during outbreaks	<p>5.1 Who owns and cares for the animals to be culled?</p> <p>5.2 Are there any differences in compensation for animals that tend to be owned or cared for by males and those that tend to be owned or cared for by females?</p>	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Division of labour</li> <li>• Resources and decisions</li> </ul>	Gender issues are important for compensation as men may be considered the owners of livestock even when women do all the work.
	4.3 3.4 Do men and women have the resources to use improved methods to keep livestock healthy?		

Notes: It is important to distinguish between backyard production and commercial production – since conditions and risk factors for men and women are different in each of these settings.

**Table H. Sexually transmitted disease**

Topic	Questions	Place in gender analysis matrix	Comments
1. Biological differences	1.1 Are there biological differences between men and women in risk of infection during sexual contact?	<ul style="list-style-type: none"> <li>• Exposures</li> <li>• Biological factors</li> </ul>	<p>Females have larger surface areas exposed during sexual intercourse.</p> <p>Infectivity rates of HIV per sexual act is higher from male to female than from female to male.</p>
2. Safe sex	2.1 At what ages do males and females generally initiate sexual activity? 2.2 How many partners do men and women have? 2.3 Do they have several partners at the same time or serial partners? 2.4 What is the level of knowledge, attitudes and practices of safe sex? 2.5 What are the social, cultural and economic issues involved in negotiating and practicing safe sex? 2.6 Which groups of males and females are at highest risk?	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Division of labour</li> <li>• Resources and decisions</li> </ul>	Describing sexual contact networks is important for understanding transmission patterns.

Notes: There are many sex and gender related aspects that influence exposure to sexually transmitted disease. Above questions provide examples, since a complete gender analysis of these factors is beyond the scope of this document.

**Table I.** Diseases that can be transmitted vertically from mother to child during pregnancy, delivery or lactation

Topic	Questions	Place in gender analysis matrix	Comments
1. Care for pregnant women	<p>1.1 Are pregnant women protected against infectious disease and/or treated promptly and effectively?</p> <p>1.2 Do infected pregnant women have reproductive choices in case of infection with a disease that could harm the fetus?</p> <p>1.3 Do infected pregnant women have psychological and social support?</p>	<ul style="list-style-type: none"> <li>• Exposure</li> <li>• Resources and decisions</li> <li>• Response to illness</li> <li>• Pregnancy</li> </ul>	Vertical transmission needs attention during outbreaks of new diseases when risks are not known.

**Table J. Bloodborne transmission**

Topic	Questions	Place in gender analysis matrix	Comments
1. Intravenous drug use	1.1 What is the age-sex distribution of intravenous drug users? 1.2 Which groups of males and females become intravenous drug users? 1.3 What are the determining factors for unsafe sharing of needles? 1.4 Are needle exchanges available to men and women?	<ul style="list-style-type: none"> <li>Exposure</li> <li>Norms</li> <li>Resources and decisions</li> </ul>	6.6 million intravenous drug users in the South-East Asia and Western Pacific Regions estimated by WHO.
2. Unsafe injections	2.1 Which groups of people are most likely to receive unsafe injections? Under what circumstances? 2.2 Which health professionals are most likely to administer unsafe injections? Under what circumstances? 2.3 Are there social or economic barriers to the avoidance of unsafe injection practices by male and female healthcare professionals?	<ul style="list-style-type: none"> <li>Exposure</li> <li>Division of labour</li> <li>Norms</li> <li>Resources and decisions</li> </ul>	Unsafe injection practices are common in the South-East Asia and Western Pacific Regions.  Injections are most frequently provided by nurses.
3. Needle stick injuries	3.1 Are there circumstances under which needle stick injuries are most likely to occur? 3.2 Are the needs of male and female healthcare workers who become injured adequately met? 3.3 What are the barriers to reduction in the number of needlestick injuries? 3.4 What can be done to improve the treatment of needle stick injuries? 3.5 Are there any negative consequences of reporting needle stick injuries?	<ul style="list-style-type: none"> <li>Exposure</li> <li>Division of labour</li> <li>Resources and decisions</li> </ul>	Most needle stick injuries happen to nurses who are predominantly female.  Nurses often have less control over working conditions as they are in subordinate positions.
4. Other sources of bloodborne infections	4.1 What other groups of males and females are infected through contaminated blood?	<ul style="list-style-type: none"> <li>Exposure</li> </ul>	Hemophilia is a high risk condition that affects males only.

Notes: Common transmission mechanisms include transfusion of blood or blood products, sexual contact, contaminated IV drug use paraphernalia, and accidental exposure through unsafe injections or needle-stick injuries.

**Table K. Manifestations of illness**

Topic	Questions	Place in gender analysis matrix	Comments
1. Symptoms	<p>1.1 Are there any differences between males and females in clinical symptoms?</p> <p>1.2 Are there any male-only or female-only symptoms?</p>	<ul style="list-style-type: none"> <li>• Response to illness</li> <li>• Biological factors</li> </ul>	Separate symptom profiles for males and females should be examined, but are often not available. <sup>12</sup>
2. Severity	<p>2.1 Are symptoms more severe in males or females?</p> <p>2.2 Male-female differences in hospitalization rates?</p> <p>2.3 Male-female differences in ICU admissions?</p> <p>2.4 Are risk factors for severe disease different for males and females (e.g. smoking, comorbid conditions)?</p> <p>2.5 Is pregnancy a risk factor for severe disease?</p> <p>2.6 What are risks for the fetus?</p>	<ul style="list-style-type: none"> <li>• Response to illness</li> <li>• Biological factors</li> <li>• Pregnancy</li> </ul>	Possible gender bias in hospitalization and treatment rates can be caused by differential use of health services.
3. Fatality rates	<p>3.1 Are males or females more likely to die?</p> <p>3.2 How are risk factors for fatality distributed among males and females?</p> <p>3.3 Is pregnancy a risk factor?</p>	<ul style="list-style-type: none"> <li>• Response to illness</li> <li>• Biological factors</li> <li>• Pregnancy</li> </ul>	
4. Consequences of illness	<p>4.1 Are disabilities the same for males and females?</p> <p>4.2 Do socio-cultural consequences of illness affect males and females differently?</p> <p>4.3 Do social consequences of disability affect males and females differently?</p> <p>4.4 What are costs of illness to men and women (e.g. lost wages, inability to perform household chores and/or childcare)?</p> <p>4.5 Does someone else do the household and/or occupational work of the man or woman when they become ill?</p>	<ul style="list-style-type: none"> <li>• Response to illness</li> <li>• Biological factors</li> <li>• Norms</li> <li>• Division of labour</li> </ul>	Different consequences of illness may lead to different use of health services. For example, fear of stigma often delays seeking treatment.

<sup>12</sup> Failure to analyze male and female symptom profiles separately early in the HIV/AIDS pandemic delayed the recognition of vaginal thrush as a typical opportunistic infection associated with HIV/AIDS in females (Anker, 2007).



**Table L. Treatment**

Topic	Questions	Place in gender analysis matrix	Comments
1. Use of health services	1.1 Where do men and women go for health services if they are ill? Are there differences? 1.2 Are both men and women seeking services appropriately for this illness? 1.3 Do gender norms and relations affect willingness or ability to recognize illness and to seek treatment? 1.4 What are the fees paid for health care services and treatment and how affordable are they to different groups of men and women? 1.5 What are the indirect costs that could affect men and women differently (e.g. transport costs, childcare costs, time lost from work)? 1.6 Do women have the ability and access to resources to seek treatment for an illness? 1.7 Are there socio-cultural or economic barriers that could delay or discourage seeking treatment? 1.8 Are there differences in quality of care for men and women? 1.9 Are there differences in attitude toward men and women by the health service staff?	<ul style="list-style-type: none"> <li>• Response to illness</li> <li>• Resources and decisions</li> <li>• Division of labour</li> </ul>	
2. Treatment options	2.1 2.1 Are treatments equally effective for males and females? 2.2 2.2 Are either males or females more affected by side effects of treatment? 2.3 2.2 Are treatments safe and effective for pregnant women?	<ul style="list-style-type: none"> <li>• Response to illness</li> <li>• Biological factors</li> <li>• Pregnancy</li> </ul>	Knowledge about treatments during pregnancy is often lacking because clinical trials do not test new drugs on pregnant women.

**Table M. Public health interventions<sup>13</sup>**

Topic	Questions	Place in gender analysis matrix	Comments
1. Sex disaggregated data	1.1 Is the intervention based on evidence and data collected and reported by sex?	<ul style="list-style-type: none"> <li>• Health intervention</li> <li>• Background information</li> </ul>	
2. Interventions within and around the home	2.1 Are males or females mainly responsible for health related actions inside and around the home? 2.2 How much time and effort do interventions require for men and women? 2.3 To what extent do interventions interfere with other activities which males or females typically do? 2.4 Do males or females who will carry out the activity have the capacity and access to resources to do so?	<ul style="list-style-type: none"> <li>• Health intervention</li> <li>• Norms</li> <li>• Division of labour</li> <li>• Access to resources</li> </ul>	Women typically have the primary responsibility for these activities inside the home.
3. Environmental interventions	3.1 What environmental measures are taken in and around affected areas? 3.2 Do these measures affect men and women differently? 3.3 Are there any harmful effects on pregnant women? 3.4 How are decisions made regarding environmental interventions?	<ul style="list-style-type: none"> <li>• Health intervention</li> <li>• Pregnancy</li> <li>• Resources and decisions</li> </ul>	

<sup>13</sup> These questions are adapted from materials presented in Gender mainstreaming for health managers: A practical approach (World Health Organization 2009d).

<p>4. Health education and community mobilization</p>	<p>4.1 Do community mobilization efforts meet the needs of both men and women?</p> <p>4.2 Do community mobilization efforts intentionally target specific groups of women or men to achieve certain goals or meet certain needs?</p> <p>4.3 Do community mobilization efforts take into account different norms and roles for women and men and their impact on access to and control of resources?</p> <p>4.4 Do educational materials reinforce gender stereotypes?</p> <p>4.5 Is there a communication strategy that considers the avenues of communications females and males prefer, use and have access to?</p> <p>4.6 Do community mobilization efforts affect gender-related norms, roles and relations to improve gender equality?</p> <p>4.7 Are men and women equally consulted at all stages of planning?</p> <p>4.8 Do any interventions ignore the importance of gender or reinforce discrimination against men or women?</p> <p>4.9 Is gender included in the evaluation component of the mobilization effort?</p>	<ul style="list-style-type: none"> <li>• Health intervention</li> <li>• Norms</li> <li>• Division of labour</li> <li>• Resources and decisions</li> </ul>	
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## APPENDIX C:

**Table N.** Modified gender analysis matrix from WPRO workshop on mainstreaming gender into health securities and emergencies

	Sex	Gender	
Factors which influence exposure to the disease, incidence and mortality	Biological factors (including pregnancy)	Sociocultural factors	Access to and control over resources and decisions
Susceptibility and vulnerability	•	•	•
Exposure to the pathogen		•	•
Risk Perception / Information / Communication	•	•	•
Access to health services		•	•
Health-seeking behaviour			•
Clinical care and case management	•	•	•
Physical, psychological, and social outcomes of illness or disability	•	•	•



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