

Chapter 4

Infectious Diseases and Livelihoods

4.1 Agriculture and Health

Agriculture has been the most common form of livelihood for rural communities in developing countries for centuries. Growing crops for subsistence and selling the extra produce as a source of income, agriculture has been a common way of earning a living in these regions. Livestock farmers have also improved their livelihoods by selling livestock products such as milk, eggs, meat and hides to earn income. For those farmers who have animals that can be used for transport, for example, oxen that can pull carts, donkeys, horses, camels, buffalos and any animals that can provide service have also earned income by providing transportation and other services in their communities. Transportation services include taking farm produce to the markets, carrying farm inputs, as well as emergency services where the sick and pregnant women are transported to the nearest health facilities. Other services include using the animals in ploughing the land and pulling equipment for agricultural production.

Apart from providing a livelihood, agriculture affects the health of rural communities. People find food and nutrients necessary for their survival and well-being from their crops and livestock but infectious diseases have also been associated with these (Gillespie 2005; Unnevehr et al. 2003). With farm activities also comes the abundance of water pools, close proximity of humans to animals, both wild and domesticated, and consumption of food that could be contaminated by disease causing pathogens. With close proximity to animals, the population is at risk of contracting zoonotic diseases and other infectious disease pathogens that spend part of their lifecycle in domesticated animals. With water pools, including rice paddies and fish ponds, come the risk of vector-borne diseases, where these pools could be potential breeding grounds for mosquitoes and other vectors such as snails that carry parasites harmful to man. People who work on large commercial farms are also at risk of contracting and spreading infectious diseases such as HIV/AIDS through migration and lifestyle practices (Gillespie 2005) (Figs. 4.1 and 4.2).

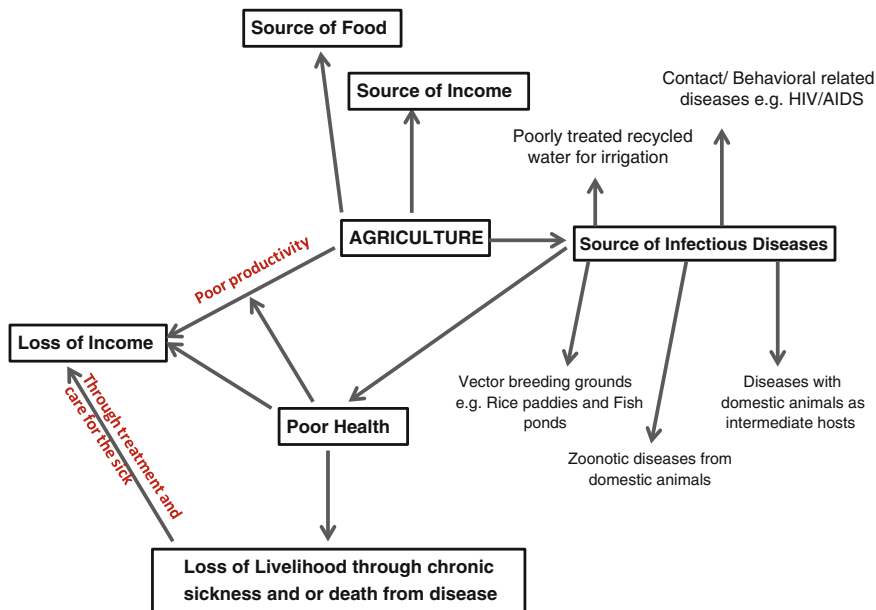


Fig. 4.1 Agriculture and infectious diseases. Agriculture, a common source of livelihood in rural populations of developing countries, can be a source of food and income but at the same time a source of infectious diseases, leading to poor health and loss of livelihood

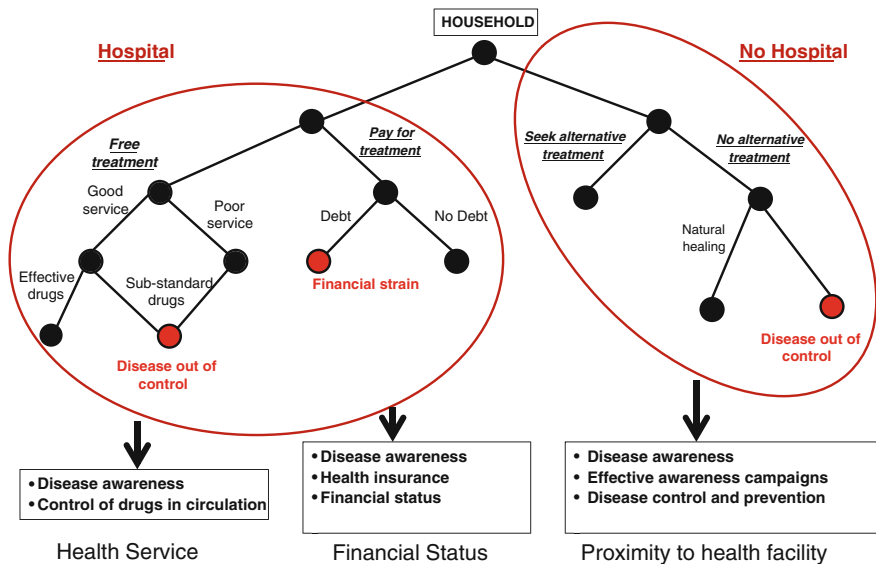


Fig. 4.2 Treatment seeking behaviour and livelihoods, Households will choose what sort of treatment to seek for depending on their financial status, proximity to the health facility and the health service provided

4.1.1 Rural Populations and Disease

With the rural communities in developing countries drenched in poverty, and with few or no healthcare facilities available, infectious diseases have an overwhelming effect on their livelihoods. With minimal resources available to sustain their livelihoods, presence of an illness in a household brings considerable financial stress.

With chronic diseases such as HIV and tuberculosis, which can go on for months and years, these ailments bring a huge burden on the family. The household has to find ways and means of coping with new responsibilities that come as a result of the ailment. These include caring for the sick, cost of treatment including hospital visits, hospitalization, drugs and transportation. These costs come on top of the regular household expenditure. To meet these additional needs the household could resort to suspending some of their regular work and if the sick individual is the breadwinner, this puts a lot of pressure on children in the household to take up adult roles, which may involve quitting school in order to search for work to support their families. With diseases such as HIV where if one parent is infected there is a likelihood that the other could be infected as well, premature deaths of both parents result in orphans and households that are led by children as young as 10 years of age. Death of both parents results in complete loss of livelihoods and if children are left behind, there is a high risk that these orphans will not be able to go to school, and will miss out on their basic needs.

4.1.2 Livelihoods and Disease

Depending on their livelihood, people are exposed to different situations which increase their risk of contracting and transmitting infectious diseases (Table 4.1).

4.2 Conflicts and Infectious Diseases

Social factors including wars and conflicts influence livelihoods, health, social and economic status of an individual, community, society and a nation. Wars and conflicts affect livelihoods with the rural poor being the most affected. During conflicts there is failure of systems put in place to prevent and control the spread of infectious diseases (Fürst et al. 2010). This breakdown in health systems results in inadequate surveillance and poor response to disease outbreaks. Conflicts lead to destruction of infrastructure, collapsed healthcare system, disruption of disease control programmes, insecurity, inadequate infection control practices and poor coordination among humanitarian agencies. Disruption of vaccination campaigns such as measles and polio due to conflicts has led to outbreaks of these diseases in conflict zones and surrounding areas.

Table 4.1 Infectious diseases and livelihoods

Circumstance	Associated disease	Risk livelihoods/populations
Water pools/ stagnant water, slow moving water	Schistomiasis/bilharzia, drancunculitis, liverfluke/fascioliasis, cholera, leptospirosis, diarrhoea, guinea worm disease	Agriculture, fishermen, pig farmers, tourists/recreation, rural communities
Proximity to domestic animals	Rabies, tapeworm, leptospirosis, tuberculosis	Agriculture, diverse livelihoods, rural communities
Proximity to wild animals	Rabies, ebola, zoonotic diseases, SARS, avian flu, MERS	Hunters/gatherers, livestock/animal herders, pastoralists/nomads, tree cutters/forest workers, diverse livelihoods, tourists, game rangers, rural communities
Human behaviour	HIV/AIDS, sexually transmitted infections, hepatitis, other diarrhoeal diseases, cholera, ebola	Sex workers, long distance drivers, tourists, farmers, diverse livelihoods, rural communities
Vectors (Flies/ Mosquitoes)	Onchocerciasis, African sleeping sickness (trypanosomiasis), American sleeping sickness (chagas disease), Leishmania, malaria, dengue, filariasis, drancunculitis	Agriculture, livestock herders, pastoralists/nomads, tourists/recreation, diverse livelihoods, migrants, refugees, slum dwellers, rural communities
Poor sanitation	Soil transmitted helminths (round worms), yaws disease, trachoma, cholera and other diarrhoeal diseases	Diverse livelihoods, refugees, slum dwellers, rural communities

Circumstances that perpetuate and/or increase the risk of acquisition and transmission of infectious diseases, diseases that could be transmitted or acquired due to the circumstances, livelihoods and populations at risk of acquiring these diseases

4.2.1 *The Polio Case*

Polio or poliomyelitis was recognized as a condition in the 1840s and the causative agent was identified in 1908. The disease well known for its paralyzing effect on limbs, has affected populations from Asia and Africa to the Americas and Europe. Efforts to control and eradicate the disease led to the development of the polio vaccine in the 1950s. Since then, vaccinations have been administered to vulnerable populations worldwide. By the year 2000, the continents of America were declared polio free, and in 2002, Europe was declared polio free.

Polio is caused by three virus types/strains: these are wild polio virus 1, 2 and 3 (WPV1, WPV2 and WPV3 respectively) (Aylward and Tangermann 2011; Genêt et al. 1987; Lien and Heymann 2013; Miller and Sentz 2006; Roberts 2009). Wild polio virus type 2 was eradicated worldwide in 1999, while WPV1 and WPV3 still remain in circulation. As of January 2012, polio was endemic in four countries, Afghanistan, India, Pakistan and Nigeria, but India was removed from the list by

the Global Polio Eradication Programme after being free of any polio cases for 1 year. If there are no other polio cases in India for another year, that is two continuous years, then India will be declared free of polio.

Despite this milestone for India, there are still outbreaks of polio in Afghanistan, Pakistan and Nigeria. In mid-2015, Nigeria had clocked 1 year polio free but Ukraine had recorded two cases of a circulating vaccine-derived polio virus (cVDPV1) (WHO|Circulating vaccine-derived poliovirus—Ukraine, n.d.). Re-established transmission and imported transmission cases of polio have been observed in neighbouring countries of the endemic areas as well as surrounding countries. For example in Africa, in Angola, Chad and DRC there has been re-established transmission of the disease. The virus has been imported to Central African Republic, Congo, Cote d'Ivoire, Gabon, Guinea, Kenya, Liberia, Mali, Niger and Uganda. In Asia, imported cases have been reported in China.

What is the difference between re-established transmission and imported transmission? Re-established transmission is when the virus re-emerges within the population due to either missed booster vaccinations and/or reintroduction of the virus within a population that was previously free of the virus. Imported transmission is usually when the virus is brought in from endemic countries to other areas through migration of infected individuals.

Advances in science have allowed for easier identification and tracking of the origins of the virus during outbreaks. This has been made possible through genome sequencing of polio virus from patients in outbreak zones. By comparing the results with previously sequenced polio viruses from different regions, it is possible to track where the virus might have originated from.

Is it possible to eliminate Polio globally?

This is the question that was posed many years ago and since the onset of the disease, people have been working hard to eradicate the disease. The development of the polio vaccine helped accelerate the efforts of control and eradication of the disease. Despite the milestones in polio eradication in Europe and the Americas there are still challenges to the eradication of the disease in parts of Africa and Asia.

Re-emergence of Polio in countries and areas where the disease was eliminated has raised fears especially in the continents where there are still countries where the disease is endemic.

Porous borders have contributed to some of the outbreaks in areas which were previously declared Polio free. Free movement of people from endemic areas who have not been vaccinated against the disease into disease-free zones increase the risk of infection or reinfection, hence countries have to be aware of this risk.

Responses to outbreaks and administration of the polio vaccine control the spread and pave way to elimination of the disease. In India door-to-door vaccination helped to vaccinate at least 1 million people per month and proved to be a great success. Although this method worked for India, vaccination campaigns have been challenged in parts of Pakistan and Afghanistan due to political unrest, which present a security risk to both health workers and the people living in the region. Misconceptions such as those that the polio vaccine is meant to sterilize people have also contributed to non-compliance in certain communities. It has also been

reported that people in the regions where there is war and political unrests, many children have missed out on their polio vaccine and booster vaccine, putting the population at risk of contracting the disease (Ganapathiraju et al. 2015; Kamadjeu et al. 2014; Owais Khowaja et al. 2013; Tangermann et al. 2000).

With Nigeria being the only remaining country in Africa where polio is endemic, migration and cross-border trade with neighbouring countries offers a high risk of transmission of the disease. There are still many areas where health workers cannot reach to administer the vaccine due to security risks. Non-compliance by certain groups of people also increases the danger of reinfection and affecting the eradication process.

So what should be done to eradicate this disease?

Governments and organizations working towards eradication of polio should provide resources and set up measures for surveillance to monitor and administer the polio vaccine. Most important is the involvement of the community through civic education on the dangers of polio and the importance of vaccination. In several communities, it has been observed that people listen more to their local authorities than their health workers, especially when there are some negative myths associated with the intervention. Village chiefs, religious leaders, tribal leaders, business leaders and other people with authority in the communities are a valuable resource in disseminating information to the communities.

In refugee camps, the UN and their partner Rotary international are working hard to vaccinate children against polio in conflict zones including Somalia (Kamadjeu et al. 2014).

There is still hope that polio will be eradicated, but joint efforts between governments, non-governmental organizations and the population at large is required for this to happen. It is the responsibility of each and everyone to ensure that polio is eradicated globally by ensuring that everyone is vaccinated against polio.

4.3 Lifestyles and Transmission of Infectious Diseases

4.3.1 Measles

A viral disease spread through droplets, it is highly contagious and crowded places put people at a high risk of contracting the disease. Children below the age of five are at high risk of the disease (Brenzel et al. 2006; Goodson et al. 2011; Sniadack et al. 1999; WHO|Measles, n.d.). In 1980 measles caused estimated 2.6 million deaths globally. Intensive vaccination campaigns have contributed to reduction in deaths attributed to measles to an estimated 544,200 deaths in the year 2000, and 145,700 in 2013. Due to the decrease in the number of deaths due to measles, certain individuals in developed countries have chosen not to be vaccinated. In developing countries where there are still measles outbreaks occurring, parents are encouraged to have their children vaccinated against measles. Booster campaigns, including outbreak response immunizations (ORI) are carried out whenever there is

an outbreak. During the ORI both individuals previously vaccinated and those who have never been vaccinated receive the vaccination. In areas where people are not vaccinated, there is a high risk of contracting the disease and the unvaccinated population can transmit the disease to others including those already vaccinated. Despite the vaccination campaigns in developing countries, there are still populations that have not been vaccinated. This could be due to lack of access to clinics where these vaccinations are offered, and/or poor road access which make it difficult for health workers to reach these populations.

The two cases presented below show how measles can easily spread within a population. One example is of the California Disneyland measles outbreak in 2015 in the United States of America (USA) a developed country, where some individuals had chosen not to be vaccinated against measles. The other is the case of an outbreak in a rural village in the Peruvian Andes where vaccination against measles is compulsory but people may not have been vaccinated due to poor access to health facilities where the vaccinations are offered.

4.3.1.1 The California Disneyland Case

A visitor comes to Disneyland in California end December 2014 and on December 28 the first cases of measles are reported; 10 days later seven cases of measles are confirmed in the states of California and Utah and are linked to the visitor who had measles. The days that followed saw five Disneyland employees contracting the disease and by the end of February 2015, there were 73 confirmed cases in seven states of the United States of America. The outbreak was controlled.

4.3.1.2 The Espindola Case

A family arrives from Ecuador with their two children, to visit another family. The children develop a fever 2 days prior to arrival. They are confined in bed upon arrival. The following day the host family prepares a welcome party and invites several people from the neighbourhood. 7–14 days later 10 people who attended the welcome party develop a fever and rash. Several of these 10 went for either a funeral or a baptism at the local church. Twelve days later 11 people who attended the funeral and baptism developed the same symptoms, fever and rash. And there began a measles outbreak in a village in the Peruvian Andes (Sniadack et al. 1999). An ORI was carried out and the outbreak was controlled.

4.3.2 HIV/AIDS

UNAIDS, WHO and UNICEF estimate that 30 million people have died from HIV/AIDS and HIV/AIDS-related causes since the beginning of the epidemic three

decades ago. As of 2013, it was estimated that 35 million people were living with HIV globally and 24.7 million of these were living in sub-Saharan Africa. Developing countries especially sub-Saharan Africa are the worst hit with the HIV and AIDS pandemic (Global report UNAIDS report on the global AIDS epidemic: 2012). It is estimated that approximately 70 % of people living with HIV/AIDS are in sub-Saharan Africa and most of the affected population live in rural areas with minimal resources. Between 2005 and 2012, the prevalence of HIV has been decreasing in sub-Saharan Africa and the least developed countries. But the percent prevalence in South Asia and globally has remained constant. It is estimated that women constitute 50 % of the adult population infected with HIV/AIDS. In sub-Saharan Africa, about 70 % of the population lives in rural areas where women traditionally carry out all the domestic work, including fetching water, gathering firewood, searching and preparation of food and taking care of children. This heavy workload is complicated further when there is a chronic illness such as HIV/AIDS. The woman bears the burden of caring for the sick members of the household, a husband, children and other relatives; her livelihood and that of her household are heavily impacted by the illness (Mutangadura 2005).

The statement by the former Secretary-General of the United Nations, Kofi Annan, sums up the plight of women with the HIV/AIDS pandemic and I quote:

...Today, as AIDS is eroding the health of Africa's women, it is eroding the skills, experience and network that keep their families and communities going. Even before falling ill, a woman will often have to care for a sick husband, thereby reducing the time she can devote to planting, harvesting and marketing crops. When her husband dies, she is often deprived of credit, distribution networks or land rights. When she dies the household will risk collapsing completely leaving children to fend for themselves. The older ones especially girls, will be taken out of school to work in the home or a farm. These girls deprived of education and opportunities will even be less able to protect themselves against AIDS.... If we want to save Africa from two catastrophes (HIV/AIDS and famine), we will do well to focus on saving Africa's women.

In some developing countries including some sub-Saharan countries, women are not able to own land as land is only passed on to the male members of the family. Through this patrilineal customary system, women who have lost their husbands through HIV/AIDS or other related illnesses run the risk of losing their only source of livelihood, their land. Without land the woman has no home base, no farmland and no property. Some cultures also grab property from the women, leaving the widow and her children with nothing. Lack of farmland and a home base implies that these women are deprived of their source of income. Without land or property the women find it hard to obtain loans due to lack of collateral. Without these loans the woman is less able to start up or run a small-scale business to support her household (Mutangadura 2005). This leads to children dropping out of school and utter poverty for the household.

4.4 Disease Impact and Case Scenarios

4.4.1 HIV/AIDS

Human immune deficiency virus (HIV), the virus that causes AIDS (acute immune deficiency syndrome) has caused havoc all over the world. For over three decades the disease has claimed many lives all over the world. Scientists, researchers and medical practitioners are trying different ways to find a cure for the disease. One major breakthrough in the past decades was the discovery of anti-retroviral drugs that have helped to slow down the replication of the virus thereby prolonging the life of the person carrying the virus.

Malawi is one of the poorest countries in the world and is highly impacted by infectious diseases such as malaria and HIV/AIDS. It is estimated that over one million people are living with HIV with an adult prevalence of 10.3 % (9.3–10.8 %) (“Malawi,” n.d.). HIV/AIDS has affected many households in Malawi and has resulted in loss of livelihoods, loss of lives and has left thousands of children orphaned. Most of these orphaned children are denied their basic needs such as good health and education and most of them live in poverty. This has resulted in children dropping out of school to find piecemeal work to support themselves and their siblings. In sub-Saharan Africa, there are many countries which are facing the same plight as Malawi and it is for this reason that the Malawi HIV/AIDS case is discussed below.

The Malawi HIV/AIDS Case

The first case of HIV was discovered in Malawi in 1985. As of 2014 it is estimated that 1,100,000 people were living with HIV in Malawi. Of these 930,000 were adults aged 15 years and above and the rest are children between 0 and 14 years (“Malawi,” n.d.)

What are the major factors of HIV transmission in Malawi?

Some of the **major factors contributing to HIV transmission in Malawi are:**

- Poverty
- Low literacy levels
- High levels of casual and transactional unprotected sex in the general population particularly among youth between the ages of 15 and 24
- Low level of male and female condom use
- Cultural and religious factors
- Stigma and discrimination

In 2004, a National AIDS and HIV framework (NAF) was established as a tool to mobilize response to the HIV epidemic. Some of the goals of NAF are:

1. To prevent the spread of HIV
2. To provide access to treatment for people living with HIV
3. Mitigate the health and socioeconomic and psychosocial impact of HIV on individuals, families, communities and the nation

4. Impact mitigation
5. Mainstreaming, partnerships and capacity building
6. Research and development
7. Monitoring and evaluation
8. Resource mobilization and utilization
9. Policy coordination
10. Programme planning

To reduce sexual transmission, a model for behaviour change was set up, which comprised of three attributes:

1. Sexual abstinence.
2. Mutually faithful monogamy between HIV negative partners.
3. Condom (male and female) use for people not practicing abstinence.

Common Misconceptions About HIV and AIDS

A misconception can be defined as simply an ideology or belief that does not reflect the true facts OR a view or opinion that is incorrect because it is based on faulty thinking or understanding.

Here are some of the **common misconceptions** in Malawi:

1. A healthy person does not have AIDS
2. HIV is transmitted by mosquito bites
3. HIV is transmitted through supernatural means
4. AIDS is transmitted through sharing food with a person who has HIV or AIDS.

As funny as these may sound, these misconceptions present a problem in the knowledge and understanding of the disease and its transmission.

A widespread stigma and discrimination against people living with HIV has generated fear, anxiety and prejudice not only in Malawi but worldwide. Despite this, there are still attitudes and practices that people still indulge in which are risky and may propagate the spread of HIV and AIDS. These practices include:

Attitudes Towards Condom Use

Some people believe that sex education and condom use for the youth promotes early sexual initiation. In as much as there could be some truth in this which is better; let the youth contract HIV and AIDS blindly or educate them so they have a chance to make the right decision regarding their sexuality? Advertisements are being used to educate the youth regarding condom use. These adverts suggest that the youth are likely to engage in sexual intercourse when they travel, hence they have to carry condoms at all times. These adverts are so enticing and have in some ways created curiosity among the youth to try sex. But there are some Christian groups that encourage abstinence as a way to reduce the risk of contracting HIV.

It has also been suggested that condom use between married couples or sexual partners is difficult. How do you negotiate with your partner for safer sex? According to the 2010 Malawi Demographic Health Survey, it was reported that over 90 % of men and women believe that a wife is justified in taking some action

to protect herself from HIV either by refusing sexual intercourse or by requesting that her husband or partner use a condom. In as much as this is the belief, is this what takes place in reality? Culture and tradition have always been respected in most communities and societies; there are some underlying issues regarding how a wife should behave towards her husband and/or partner which makes it difficult for some women or wives to say no or ask their husbands to use a condom even when they have evidence that their husbands have sexually transmitted infections (STIs) or have been promiscuous. This has led to spread of STIs, including HIV and AIDS.

Multiple Sexual Partners

As unreal as it may sound, there is a growing tendency where people think that having multiple partners is “cool”. Some have multiple partners because they want to make some extra money while for others it is just a habit which could be costly in the long run.

There are two types of multiple sexual partners. These are concurrent and serial sexual partnerships.

1. **Concurrent sexual partnerships:** this is where a person has multiple partners and has sexual intercourse with one partner between two acts of intercourse with another partner (overlapping partnerships) (UNAIDS 2009).
2. **Serial sexual partnership (serial monogamy):** this is the opposite of concurrent partnerships; an individual may have multiple sexual partners without any overlapping partnerships.

Payment for Sex

This is also known as transactional sex, where there is **exchange of money, gifts or favours for sexual intercourse**. This practice is fast growing and a cause of concern especially among the youth. Before it used to be older men enticing young girls with money and gifts, but now it is also older women enticing young boys with the same. This practice is dangerous as there are hidden sexual networks which are formed. The young girls or boys that are involved with older partners for favours, also have other sexual partners (of their own age or other older people) and if one of them is infected with HIV or STIs this becomes a network for spreading the disease.

HIV and AIDS-Related Knowledge for the Youth

With the initial age for first sexual intercourse assumed to be between **15 and 18 years** (with some even earlier) for both boys and girls, there is a strong need for sex education and condom use. The youth need comprehensive knowledge of HIV and AIDS, to reduce the spread of the disease.

This comprehensive knowledge includes:

1. Knowing that abstinence, condom use and having just one HIV-negative faithful partner can reduce the chances of contracting HIV.
2. Knowing that a healthy looking person can have HIV.

3. Rejecting the most common misconceptions about HIV transmission, that is;
 - (a) HIV can be spread by mosquitoes and
 - (b) HIV can be spread by supernatural means.

AIDS continues to cause havoc around the world, so let us work together to combat this disease and help others know more about HIV and AIDS.

4.4.2 The West Africa Ebola Epidemic 2014

The Ebola Case

Guinea, Sierra Leone and Liberia

It all started with one infected 18-month-old boy in a remote village of Meliandou in Gueckedou district in Guinea. On 26 December the boy presented with fever, black stools and vomiting and he died 2 days later. Though the exact source of the infection was not identified, this little boy's death was the beginning of an infectious disease outbreak that would challenge the healthcare systems of the three major affected countries; and an eye-opener to the whole world of how an infectious disease could easily get out of control if ignored. The outbreak brought crisis to the livelihoods and social, economic and security of inhabitants. It was an example of how an infectious disease can spread across borders and affect people from any continent. The epidemic showed that infectious diseases affecting poor populations are not only a problem of the poor but are a threat to every human being irrespective of colour or race.

Though the boy and his immediate family including health workers who treated him died, the first alert of an unidentified disease was issued on 22 January, 2014 almost a month later. By this time many who came into contact with the people who died from the disease were probably infected and spreading the disease. An investigation team analysed the situation but only concluded that it was cholera, after using microscopy methods that could not detect viruses. It was only in March after the disease had crossed into Conakry the capital of Guinea and many people were infected and dying that the Ministry of Health issued an alert and notified WHO Africa Region office. By this time the disease had been spreading in Conakry for a month. An extended member of the family where the initial case occurred arrived in the city on 1 February 2014 and died 4 days later.

Meanwhile, a lady who had visited the family in Meliandou, where the initial case of Ebola started in Guinea, left in early January 2014 and returned to her home in Sierra Leone. There she developed symptoms and later died. By end of January the disease that had started in a remote village of Meliandou in Guinea, had already reached Conakry the capital of Guinea and had crossed the border into Sierra Leone. Since the mysterious disease was not identified and the health workers both in Guinea and Sierra Leone had no idea what the disease was, they

did not take the necessary precautionary measures to prevent and control the spread of the disease.

4.4.2.1 A Disease Out of Control

By the time the disease was identified to be Ebola it was 22 March 2014, almost three months after the disease had started in Guinea and Sierra Leone. WHO sent out an alert on 23 March 2014 but by this time the virus had spread within the population in the two countries. By 30 March 2014 almost a week after the alert was issued by WHO, Liberia had its first case.

Looking at the timeline for the initial patient or index case in each of these three countries:

1. These countries had no time to prepare for the disease.
2. They did not expect or suspect that the disease they were dealing with was highly infectious, hence they did not take any precautions while dealing with the patients.
3. Even after being told that the disease was Ebola the governments and the population had little or no existing strategies to deal with a disease outbreak of such magnitude.

The disease challenged the health systems in Liberia, Sierra Leone and Guinea; they did not have enough beds, protective equipment and trained personnel to handle the cases. Due to this there were fatalities among the trained personnel due to Ebola infections either from the clinic or from their neighbourhoods which led to even more shortages of the most needed healthcare workers.

The disease which was killing several members of a household brought so much fear to villagers and anxiety among the population that people started running away from their homes to areas where they knew or thought there was no Ebola. In doing so, those running who were already infected spread the disease in new areas, triggering new outbreaks. People with symptomatic and/or sick loved ones used public transport such as taxis moving around the cities in search for medical assistance. In doing so the virus was spread not only to the relatives caring for the sick but also to the taxi drivers and anyone who was in that public vehicle. As these people returned home they took the virus with them to their families.

Due to lack of information about the disease, as well as misinformation which scared people instead of helping them to understand the concept of prevention and control, the disease spread further and further. It was only after the governments and other stakeholders took measures to reach out to communities and educate them about the true facts of the disease and the measures for control and prevention that the situation started changing. Community involvement helped control the spread of the disease and assisted the health workers to deal with the cases at hand. This led to the reduction in cases and slowly countries began to win the battle over Ebola (WHO|One year into the Ebola epidemic: a deadly, tenacious and unforgiving virus, n.d.).

Nigeria, Mali and Senegal

Three countries which also had imported cases of Ebola were able to contain the disease and prevent further spread in their major cities and other places. So why did Nigeria, Senegal and Mali not have the same magnitude of Ebola disease outbreak as did Guinea, Sierra Leone and Liberia? One big advantage that these three countries had over the worst affected Guinea, Liberia and Sierra Leone was that the first case of Ebola in each country was found after the alert was already issued. This gave the countries time to prepare and set up prevention and control strategies, including training personnel on how to handle the disease and setting aside infrastructure that will be used in case of disease.

The first case in Nigeria was on 20 July 2014, 3 months after the alert was issued by WHO and was imported from Liberia. Though the infected patient flew from Liberia into Lagos, Nigeria, and vomited on the plane as well as in the taxi that took him to the hospital, no one else on the plane and/or airport got infected; the person who took him to the hospital later died of the disease. Three days after the patient arrived in Nigeria, on 23 July, it was confirmed that he had Ebola and aggressive contact tracing began. On 1 August a contact with the first patient entered the city of Port Harcourt in Nigeria and sought treatment. Ten days later, the doctor who treated him developed symptoms and later died. Aggressive contact tracing also began in Port Harcourt.

The aggressive real-time contact tracing using GPS, effective coordination of an aggressive response, strong leadership and availability of resources to test samples and identify Ebola virus as the cause of death for the initial patient, prevented explosion of cases in both cities in Nigeria. Nigeria was declared Ebola virus free on 20 October 2015, 2 months after the index case was reported.

In Senegal, a man travelled from Guinea where he had direct contact with Ebola patients to Dakar by road. The man was promptly tested for Ebola and was found positive. This was the only single Ebola case in Senegal and the patient recovered. Senegal has the world class Pasteur Institute; its laboratories are approved by WHO to test for viral diseases including haemorrhagic fevers such as Ebola. Since the first case in Senegal occurred in August, 5 months after the Ebola disease alert was issued, Senegal was well prepared for the diseases. The government had set up a separate centre devoted to Ebola emergency measures. This allowed the healthcare system to operate normally dealing with routine services, contrary to the healthcare systems of Guinea, Sierra Leone and Liberia which crumbled from the shock of Ebola. Senegal had set up massive public information campaigns which encouraged compliance with control measures and reduced anxiety. Urgent and thorough contact tracing was carried out and the contacts were monitored on a daily basis and those that developed symptoms were immediately tested. Senegal had only this single case and was declared virus free on 17 October 2014.

For Mali the first case was reported on 23 October, a 2-year-old child from Guinea, who later died in Mali. On 25 July a grand Imam from Guinea was admitted in Bamako and later died of kidney failure 2 days later. The Imam case led to seven other Ebola cases including the nurse and the doctor who treated the Imam.

Just like Nigeria and Senegal aggressive contact tracing and monitoring of close contacts as well as availability of high quality laboratory facilities, Mali was able to contain the Ebola virus and prevent further spread (WHO|One year into the Ebola epidemic: a deadly, tenacious and unforgiving virus, n.d.).

4.4.3 Malaria and Other Infectious Diseases

Apart from Measles, Ebola, HIV/AIDS and other outbreak-prone diseases, other infectious diseases that cause high mortality in children and incapacitate adults are common in developing countries. These diseases occur frequently during certain seasons or follow certain weather, or human behavioural patterns. These diseases including malaria, Dengue, diarrhoeal diseases, parasitic skin diseases and other neglected tropical diseases, have huge effects on livelihoods, especially in rural areas.. People live with these diseases that lead to poor health and/or disability if not treated. Severe forms of some of the infectious diseases can lead to crippling effects, including mental illnesses and blindness.

The Case of Malaria and Malawi

With reports of malaria incidences declining in other parts of the world, in Malawi, the number of admissions due to cerebral malaria still remains with no significant changes in the past decade (Roca-Feltrer et al. 2012). Autopsy studies conducted on children, who died from severe malaria in Blantyre Malawi, have shown that malaria parasites can hide in different organs further complicating the disease outcome (Montgomery et al. 2007). These parasites contain information that allows them to go undetected by the human immune system. The studies in Malawi have shown that what causes severe disease is not just the presence of the parasites, but also the modifications that occur due to the presence of the parasite in the body that contributes to disease outcome (Beare et al. 2011; Milner et al. 2012, 2013; Montgomery et al. 2007; Taylor et al. 2004). Malaria is one of the leading causes of death in children under the age of 5 in Malawi and globally.

The Case of Multi-drug Resistance TB, a Global Threat?

How did a disease that is treatable suddenly become unresponsive to treatment? With the long course of treatment and side effects, most people in the affected regions stopped taking medication when they started feeling well without completing the required dosage (Hedt et al. 2011; Rahman et al. 2014). This behaviour resulted in development of bacteria that were able to withstand the drugs used for treatment (Almeida Da Silva and Palomino 2011; Chadha et al. 2011; Daniel and Osman 2011; Hoek et al. 2009; Nagaraja et al., 2011; States et al. 2006; Tang et al. 2013; WHO, 2010). By cutting short the course of treatment, it meant that there was reduced drug pressure on the disease causing bacteria, which were then able to survive the treatment, and became more resilient. Since TB is an infectious disease, it meant that people started spreading the resilient form of bacteria which

would not respond to treatment (Farmer 2013; Minnery et al. 2013; Vernet et al. 2014).

4.5 Through the Lens on the Case Scenarios

From the different case scenarios that have been presented above, it is clear that infectious diseases do affect livelihoods.

1. Health Status

The health status of the sick individual is compromised by the disease leading to loss of energy and sometimes capacity to reason properly. A sick individual may be bedridden for days, weeks or months thereby failing to continue with their normal life, including work and other social activities. In the worst case the individual may die leading to complete loss of livelihood. At the household level, poor health of a member of the household or members of the household could mean complete disruption of livelihoods as people have to focus on getting better than trying to continue with their livelihood. Both the sick individual and the members who are taking care of the sick will stop their work in order to find treatment and this directly affects their livelihoods.

2. Loss of Assets

Households will do whatever they can to find treatment for their sick relatives. This includes selling of assets, to earn extra income. Taking long-term leave from work in order to take care of their loved ones with a chronic illness due to long-term hospitalization and/or long-term home-based care. This leave of absence may be paid or unpaid, leading to loss of talented people from the workforce, resulting in poor productivity of businesses and loss of income both to the affected individual and the business. Infectious diseases affect the economic status of the household not only through loss of income and loss of livelihood, but also loss of income through healthcare expenses. Most developing countries lack health insurance schemes especially for the rural poor making the healthcare expenditures out of pocket. Depending on the illness, the sick individuals may require special dietary needs, including supplements to boost their immune system, as well as anti-retroviral drugs which are not free in most developing countries, thus putting more pressure on the household's income.

3. Social Discrimination

If an individual is diagnosed with certain infectious diseases, there is an element of stigma attached to it. Diseases such as HIV/AIDS, Ebola virus disease, TB and STIs have always carried huge negative social reaction. This has led to people hiding the disease in order to avoid being marginalized within their community. Hiding the disease not only affects their health but also allows for the spread of the disease to other members of the community. The infected individual's health is also highly

compromised due to disease progression leading to poor health and most likely loss of livelihood due to ill health. In most countries people with infectious diseases such as TB, HIV/AIDS and other STIs are perceived as promiscuous, hence people would rather hide their health status in order to preserve their social status. Stigma has led to people being relieved of their duties, leading to complete loss of livelihood. Stigma has caused people to move from their homes into new territories, leading to a complete loss of a livelihood.

4. Livelihood Capabilities

A sick person is restricted in what they can perform and achieve due to poor health. This in turn affects the state of their livelihoods. Due to their poor health that may also affect their economic status, these individuals may be denied loans or credits that could assist them to develop their livelihoods. Their health status could also restrict their ability to move from place to place to find better markets for their produce, find advice that could assist in developing their businesses, as well as get further training to improve their livelihoods. In cases of outbreak-prone diseases, sick individuals and their immediate contacts may be placed in quarantine. This means these people cannot transact or interact with other individuals as they pose a risk of spreading the infection. Quarantine including curfews leads to partial or complete loss of livelihoods.

4.6 Treatment Seeking Behaviour

Individuals and households may present different forms of treatment seeking behaviour. Households will seek treatment depending on their economic, social and health status including transportation (Abbot and Pollard 2004) (Fig. 4.2). Households will easily seek treatment if the health facilities are at a convenient distance and whether or not the treatment is free. For those who decide to seek for paying treatment, they have to decide whether they are willing to accumulate debt in order to get treatment and face financial hardship or not. Those seeking free treatment may also find themselves in a situation where they receive good treatment, including safe and effective drugs and/or poor service and sub-standard drugs that may worsen the disease. There are also certain communities in developing countries that would have to decide as to whether to visit the hospital or clinic or go to a traditional healer depending on their beliefs. During the 2014 Ebola outbreak in West Africa, due to the mystique behind the unknown disease that was wiping out households and villages, some people run to traditional healers for help leading to further disease spread. In as much as traditional medicine is effective in certain circumstances and that some of the modern drugs on the market today have been derived from traditional medicine, there is need for information regarding infectious disease prevention and control.

The service provided in public hospitals and clinics is important in tackling the communities' health needs. It is the duty of the health service providers to bring awareness to the community on the existing diseases within the communities, including those diseases that could arise due to their environment and surrounding. Alerting the communities on how their livelihoods could expose them to certain types of infectious diseases will instil knowledge and provide insight on finding lasting solutions. Primary healthcare providers should cultivate confidence within the community by ensuring that safe and approved drugs are used to ensure compliance. Sub-standard drugs may worsen instead of improving the health of the affected individual; this may lead to poor compliance as people will associate health services with worsening disease. In the 2014 West Africa Ebola outbreak, there was poor compliance to getting treatment as communities associated treatment centres with death (WHO|One year into the Ebola epidemic: a deadly, tenacious and unforgiving virus, n.d.). Treatment centres were looked at as places where loved ones go and never come back. The situation was further worsened when relatives were not allowed to visit and/or care for their loved ones in the hospital. Although this was an important preventive and control measure to reduce the spread of the disease, it was taken negatively by a community with a culture of caring for their sick. Above all, poor communication on the updates on the conditions of their loved ones further complicated the matter. Some people only learned that their relatives had died and had been safely buried without their knowledge, completely going against the people's cultures and Traditions (Boscarino and Adams 2015; Cenciarelli et al. 2015; Shaw et al. 2009). This led to poor compliance to treatment and people hiding their loved ones in homes where they could die comfortably and be buried honourably. The problem here was poor communication between the health service and the community and lack of disease awareness on the part of the population.

If communities are aware of the diseases that surround them, and if this information is communicated effectively without infringing on the cultures and traditions, there is a better chance of compliance. Many parts of the world have deep-rooted cultures that cannot be changed in a day just because there is a shock such as a disease outbreak. Cultures and traditions of communities should be seriously considered when implementing disease control and prevention strategies.

Depending on the household's financial status and the information they have on infectious diseases, families are able to make an informed decision on what sort of treatment to seek. Lack of health insurance in rural populations of most developing countries already puts the rural poor at the mercy of disease as they may not be able to afford the needed treatment.

Depending on the proximity to the health facility, households are sometimes forced to seek the help of a traditional healer first, before they make the long commute to a hospital which will need more money and resources.

4.7 Conclusion

Agriculture provides a source of livelihoods, source of income and determines the health of a population. Presence of infectious diseases in a household disrupts livelihoods and may result in loss of livelihoods if death occurs. With livelihoods ranging from farming, livestock herding, hunting, gathering, fishing, artisan work and many more, populations are exposed to circumstances which render them vulnerable to different types of disease causing pathogens. Other situations that play a role in infectious diseases and affect livelihoods include conflicts, lifestyles, human behaviour and emerging infectious diseases. Depending on the livelihood and health status, success of infectious diseases not only affects the decisions taken by a household but also survival of a household. Providing health services in rural populations of developing countries could change the populations' perception on health and improve livelihoods. Infectious diseases have both direct and indirect impacts on livelihoods. The direct impacts include poor health and loss of lives, which leads to partial and complete loss of livelihoods. Indirectly, infectious diseases lead to loss of income through poor performance of livelihoods as well as diversion of resources that could have been used to improve livelihood in order to seek for medical treatment. Stigma is also another outcome of infectious diseases that indirectly affects livelihoods. Due to the effects of disease, individuals become marginalized socially affecting their businesses and ways of earning a livelihood.

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