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Administration**

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Economic Analysis of HIV/AIDS Pandemic in Sub-Saharan Africa

Diploma Thesis

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Zásady pro vypracování:

1. Před 25 lety byly v Africe objeveny první případy AIDS. V 90. letech se nemoc změnila v pandemii. 90 % z 38 milionů lidí nakažených virem HIV žije v rozvojovém světě, nejhůře postižená je Afrika, zejména v oblasti Velkého afrického zlomu. Cílem diplomové práce je poskytnout pohled ekonomů na tuto problematiku. V úvodu se práce zaměří na stručný medicínský popis viru HIV, jeho následku AIDS a vlivu na očekávanou délku dožití po nakažení. Další část se zaměří na ekonomické a sociologické aspekty pandemie AIDS. Odpoví na otázku, proč je pandemie rozšířena nerovnoměrně, proč je riziko nákazy v některých sociálních skupinách mnohonásobně vyšší než v jiných. V této části práce bude provedena ekonomická analýza chování lidí. Následně se práce zaměří na analýzu ekonomických dopadů pandemie AIDS. Mezi mikroekonomické dopady patří destabilizace ekonomické pozice rodin nakažených, dopady na soukromé firmy a dopady na rentabilitu investic do lidského kapitálu. Mezi makroekonomické dopady patří narušení demografické struktury populace, zvýšení veřejných výdajů do zdravotnictví, snížení produktivity práce, snížení HDP a snížení hodnoty lidského kapitálu. V poslední části se práce zaměří na možná řešení pandemie. Budou analyzována různá řešení a jejich efektivnost.

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I declare on my honour that the thesis was written by me solely based on quoted literature and own calculations.

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In Prague, 13th May AD 2010

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Abstract

HIV/AIDS is a real threat for Sub-Saharan Countries. It increased adult mortality substantially. HIV/AIDS pandemic causes the death of the most productive part of affected population. Human capital passing on to future generations is limited. Low economic performance and income inequality induce higher HIV vulnerability. Contra wise HIV/AIDS has significant negative effect on the welfare of affected population. The sources of pandemic in Sub-Saharan Africa are not only social and cultural. Health and nutrition situation play considerable role. Holistic approach based on education, fidelity, abstinence and improvement of economic situation and moderate condom use (as the last way of prevention) seems to be an effective way of pandemic elimination.

Key words: economic analysis of HIV/AIDS pandemic, Sub-Saharan Africa, economic impacts of pandemic, Catholic social teaching;

JEL Classification: I19, J17, O10, O55;

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Foreword

The thesis describes HIV/AIDS pandemic in Sub-Saharan Africa from economic point of view. Firstly, medical aspects of HIV/AIDS are described. Secondly, demographic aspects of the pandemic are shown. In the following part medical, economic and structural adjustment and biomedical sources of pandemic are discussed. Fourth part is focusing on the impact of the pandemic on households, private businesses, GDP and welfare. In the last part possible explanations of pandemic are discussed. The emphasis is placed on particular Salesian project run in South Africa.

Note: in the whole thesis symbol for decimal point is “,” not “.”; HIV/AIDS are used as equal terms if context does not require otherwise.

1 Medical introduction of HIV/AIDS

1.1 Information about the virus HIV and the disease AIDS

AIDS is an abbreviation for Acquired Immune Deficiency Syndrome. „AIDS constitutes a set of diseases, induced by a destruction of an immune system by the virus called HIV.“ (Montagnier, 1996)

The environment where human beings live is full of microorganisms. Some of them represent a danger for human health. Microorganisms can be divided into several categories, such as virus, bacillus, fungi and yeast. Human organism defends itself against microorganisms with its immune system. The immune system has a goal to destroy these microorganisms and stop malign proliferation of some cellules which can evolve in organism. The immune system is based mainly on lymphocytes (white blood cells). They can be divided into two main groups - B lymphocytes and T lymphocytes. They protect the organism in different ways. T lymphocytes “attack” the parasitic microorganism directly, B lymphocytes produce antidotes and these antidotes destroy germ (also called pathogenic germ). The “decisive body” of the immune system is one of T lymphocytes called T4 lymphocyte.

HIV virus attacks T4 lymphocytes and the danger and an insidiousness of HIV virus rests on this fact. In other words, it harms the centre of the whole immune system. In fact, the immune system is eliminated before it is prepared to defend the organism against parasitic microorganism. The main consequence is the inability of a human organism to protect itself against common infections and some types of tumours.

HIV virus (Montagnier, 1996):

HIV virus (human immunodeficiency virus) was first described by professor Luck Montagnier and his team in Pasteur Institute in Paris in 1993. Later this virus was named HIV1, because the HIV2 virus was discovered in Africa in 1986. However, it has the same symptoms and attributes as the HIV1 virus.

HIV1 virus was considered to occur in some groups of people, although it was well tolerated and it did not bring any health risks. HIV2 is supposed to have been transmitted from a monkey to human.

1.2 The origins of HIV pandemic

Currently it is not obvious why HIV virus has attacked so strongly and rapidly. However, there are some possible explanations (Montagnier, 1996):

- Virus has mutated. This hypothesis is not very likely since two viruses will have to mutate at the same time which is almost impossible.
- Virus has been developed by humans. Scientists claim that at the beginning of 1980s, when HIV epidemic started to spread, the scientific knowledge was not developed to the level that humans could produce such kind of virus. Nevertheless, if we consider the level of knowledge of secret services or armies, this hypothesis is not totally eliminated.
- The most likely possibility is that the virus existed in nature for a long time; new phenomenon is just its spread on the level of pandemic.

According to Montagnier (1996) the main sources of HIV spread as a pandemic are:

- Expansion of tourism, which enabled the spread of microorganism.
- Unrestrained sex life.
- Expansion of transfusions and blood derivative into the whole world.
- Sharing of needles and syringes by drug users.
- Increase of HIV virulence (the increase of ability of virus to cause an infection).
- Because of the population growth in Africa and other developing countries, the disintegration of traditional structure of society (mainly families) occurred, which lead to an increased promiscuity.

1.3 HIV transmission

HIV virus is transferred by blood and genitalia secretion. The most frequent HIV transmission is through vaginal or anal sexual intercourse. Sexual transmission concerns either heterosexual or homosexual partners. However, anal sexual intercourse (it means sexual intercourse of homosexuals) is more dangerous concerning HIV transmission, because more wounds can occur, which increases the risk of the infection. The risk of infection is positively

related to the number of sexual intercours with infected person. Nevertheless, one sexual intercourse is sufficient to cause the infection. It was proven that the risk of transmission is higher from man to woman, compared to woman to man transmission.

The other frequent way of transmission is through blood, mainly by needle sharing and blood transfusion. A blood transmission of HIV virus can be eliminated by blood testing, although tests are not absolutely reliable. Newly infected donor can be interpreted as negative by tests result (Montagnier, 1996).

HIV transmission from mother to child is a special case. Infection can be passed through placenta during pregnancy or child can be infected during childbirth. The risk of mother to child transmission is about 20 - 30 % when mother is serum positive, this risk can be decreased by suitable medical measures to 8 % (Montagnier, 1996).

HIV is **not** transmitted through:

- Ordinary kissing;
- Common interpersonal contact: in showers, using the same cutlery, same toilet, in public transport, at work, in restaurant etc;
- When standard rules are fulfilled the transmission will not occur at the dentist or during acupuncture.

1.4 HIV proving

The occurrence of HIV in human body can be proven by direct or indirect methods. Indirect methods are based on the presence of particular antidotes in the body and direct methods are based on HIV isolation (Montagnier, 1996). Indirect methods are used more frequently, especially the method called ELISA. The procedure of medical examination is as follows: Patient's blood is taken and ELISA test is performed twice with the same blood sample. If the both tests are negative, patient is serum negative. When both tests are positive, or if they diverge, next test is performed with the use of Western Blot method. When the result of this test is negative, patient is serum negative. If the result is positive, new blood is taken and the test is performed again. In case of the positive result, patient is serum positive.

It is essential to consider that patient who is called serum positive is infected by HIV. Nevertheless, it does not mean that this person suffers from AIDS.

1.5 Infection, course of disease and treatment (Montagnier, 1996)

Firstly, HIV infection does not automatically mean that infected person will suffer from AIDS. In other words, man can be infected by HIV without AIDS breaking out. According to the World Health Organization (WHO) 60 % of serum positive persons will suffer from AIDS in 10 years from getting infected. 20 % of infected persons will suffer from minor symptoms and 20 % of infected persons will have no clinical symptoms.

Minor symptoms of infection outbreak are: lymphatic nodules enlargement for more than 3 months, decrease of weight, persistent fever and serious diarrhoea. After mentioned 10 years, 60 % of infected persons will suffer from infection which will be accompanied by: long persistent cough, serious diarrhoea and visual sense failure. Moreover, there can be tumorous diseases and impact on the central nervous system.

Life expectancy without antiretroviral drug use is 12 years after the time of person's infection. In other words, it takes about 10 years after HIV infection for AIDS to occur and as soon as AIDS occurs, life expectancy for patient is about 1 to 2 years (HIV InSite, 2009).

It is necessary to say that there is not any known cure of HIV. Currently, therapy is focused on elimination of virus reproduction in the body, prevention of symptoms, strengthening of immunity. At the end of 2008 about 4 million people in low and middle income countries were receiving HIV antiretroviral therapy (WHO, 2009).

1.6 Prevention (Montagnier, 1996)

The most frequent way of HIV transmission is through sexual intercourse. As was already mentioned, there is a higher probability of infection in the case of homosexual intercourse. However, if we consider significantly lower percentage of homosexuals in population, the most frequent source of transmission is heterosexual intercourse. From that point of view, the most important core of prevention is prohibition of sexual transmission.

These methods of prevention are often mentioned:

- Responsible partner choice;
- Fidelity;
- Condoms use;

People in the vicinity of infected person can be additionally protected by these basic measures:

- NO needle sharing;
- Responsible behaviour of medical workers during blood transfusion.

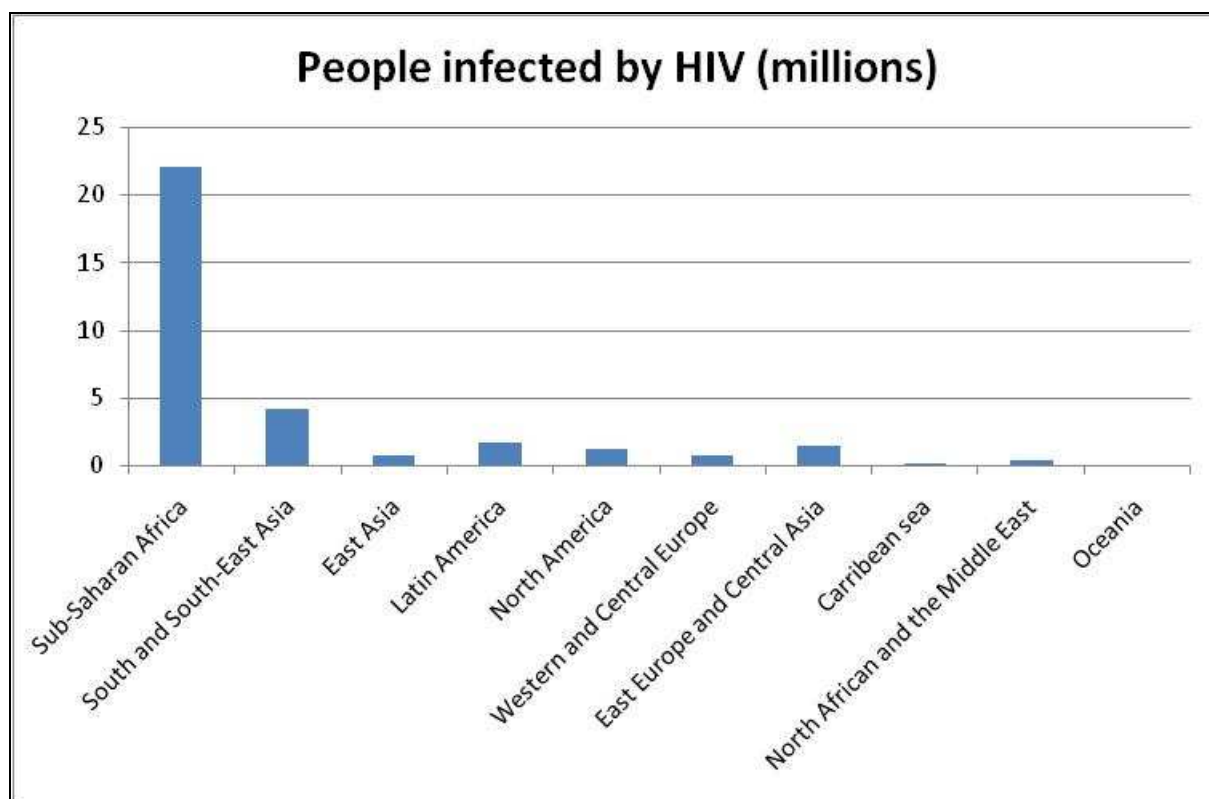
Nowadays, there are adequate measures which decrease the probability of HIV transmission through blood transmission to almost zero, although the problems occur when not all transfused blood is tested.

2 Demographic aspects

2.1 Basic demographic data

It was estimated that in 2007, 30,3 – 36,1 million people in the world were infected by HIV (UNAIDS, 2008). In the same year it was estimated that 2 million people died because of HIV/AIDS and 2,7 million were newly infected (UNAIDS, 2008).

Graph 1: People infected by HIV, situation in 2007, millions.



Source: Created by author from UNAIDS, 2008 data

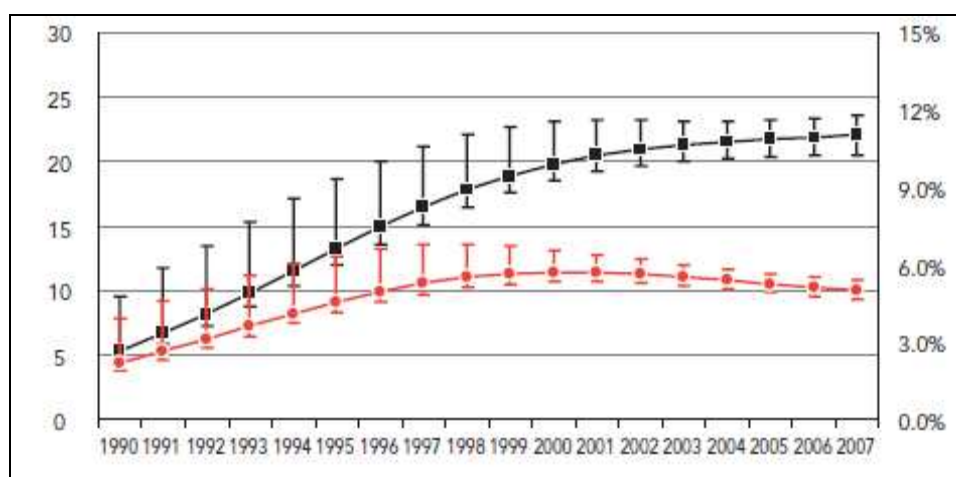
Table 1: Number of people infected by HIV, situation in 2007, median value.

Area	People infected by HIV (millions)	percentage from totally infected
World	33	100,00%
Sub-Saharan Africa	22	66,67%
South and South-East Asia	4,2	12,73%
East Asia	0,74	2,24%
Latin America	1,7	5,15%
North America	1,2	3,64%
Western and Central Europe	0,73	2,21%
East Europe and Central Asia	1,5	4,55%
Caribbean	0,23	0,70%
North Africa, Middle East	0,38	1,15%
Oceania	0,074	0,22%

Source: UNAIDS 2008, author's calculations

Table 1 and Graph 1 clearly show that most people infected by HIV are living in Sub-Saharan Africa. The median value of estimated number of infected persons is 33 million for the whole world, from that 22 million of infected fall on Sub-Saharan Africa. In other words, 66,67 % of infected persons are living in Sub-Saharan Africa.

Graph 2: The number of people infected by HIV, millions (left vertical axis) and percentage of infected adult population (right vertical axis) in Sub-Saharan Africa with pictured intervals around estimated value.



Source: UNAIDS, 2008

Graph 2 shows the time series of infected people in Sub-Saharan Africa. The left axis denotes absolute number of infected persons by HIV and the right axis depicts the percentage of infected adult population. It is evident that the absolute number of infected persons is permanently increasing since 1995, although with decreasing rate. However, the percentage of infected adult population (15 - 49 years) is decreasing. The decrease of the absolute number of infected persons is usually explained by the larger accessibility of drugs, which substantially extend lives of infected people, and by the increasing number of newly infected persons. The percentage of infected adults is decreasing. Worldwide, the number of newly infected in 2007 is higher than the number who died because of HIV infection, so the question is, how it is possible the percentage of infected adult population is decreasing. It can be explained by three possible factors:

- a) In studied countries adult population 15 - 49 years is growing faster compared to the number of newly infected in the population.
- b) The structure of infected persons is distributed so that larger number of the infected persons of the age of 49 cross the border compared to the number of newly infected at the age 15 - 49 years.
- c) A large percentage of newly infected persons are outside the interval 15 - 49 years. In other words, there are large numbers of children infected through mother to child transmission or children infected by sexual intercourse before 15 years of age. The possibility of infection after 49 years can not be considered as crucial because of lower sexual activity and more “stay at home” life.

Finding the explanation:

- a) This statement seems to be the most satisfactory since in most of the countries of Sub-Saharan Africa there is a long-term increase of the number of population. In other words younger and larger generations enter the age 15 - 49 years, thus in spite of an absolute increase of the number of persons, there is a percentage decrease of these persons in the population. So the number of infected persons is “diluted” in a larger population. The increase of population 15 - 49 is faster than the increase of newly infected. In conclusion, there is a difference in the rates of growth. That is the reason why the percentage of infected adult population is an inappropriate indicator for the comparison of the pandemic trend in time. E.g. consider the Graph 5, some can conclude that there is a remission of pandemic in Sub-Saharan Africa, which is not

true, as shown in Graph 2. In spite of this fact, UNAIDS uses this indicator for countries comparison and for comparison in time.

b) UNAIDS (2008) regards the source of the absolute increase of infected persons in larger accessibility of drugs, which slows the spread of HIV in the body, meaning the drugs which extend lives of infected persons. Additional source is seen in the arrival of newly infected. Overall, according to UNAIDS (2008) the absolute number of infected persons is increasing, since they live longer. Less people die and new are infected. This explanation is definitely based on accurate data. However, there is still the question of pandemic stabilization, since the percentage of infected in the whole adult population is not a suitable indicator of the progress of pandemic studies. Moreover, according to WHO (2009), 4 million people were receiving antiretroviral drugs in low and middle income countries at the end of 2008. Considering that 90 % of infected persons live in developing countries (Epstein, 2004), it means that 29,7 million of infected persons come from developing countries and only 13,5 % of whom receive antiretroviral drugs. In conclusion, there is no reason to claim that the increase of the absolute number of infected is explained only by longer life expectancy caused by wider antiretroviral drug use, as UNAIDS (2008) claims.

c) This statement can be disproved by studying the age structure of population in countries of Sub-Saharan Africa. This thesis is focused on data from Demographic world yearbook (2004). From the data, it can be clearly concluded that there is the increase of the population in most countries of Sub-Saharan Africa. In other words, younger generations are larger in numbers. It can not be said, that the explanation of a percentage decrease of infected persons in adult population 15 - 49 years of age is the aging of infected population.

d) According to Kengeya-Kayondo et al., 1995; Mulder et al., 1996; Hauri, Armstrong & Hutin 2004; Kiwanuka et al., 2004; Schmid et al., 2004 almost 90 % of HIV infection of children are caused during pregnancy, during childbirth or by breastfeeding. This means, that the relevant way of transmission to children is mother to child transmission. According to UNAIDS (2008) there were 380 000 children newly infected by HIV in 2007 in the world. That is 12,7 % of newly infected in 2007. This share does not change the relation between the numbers in various age groups. In other words, this explanation is not relevant.

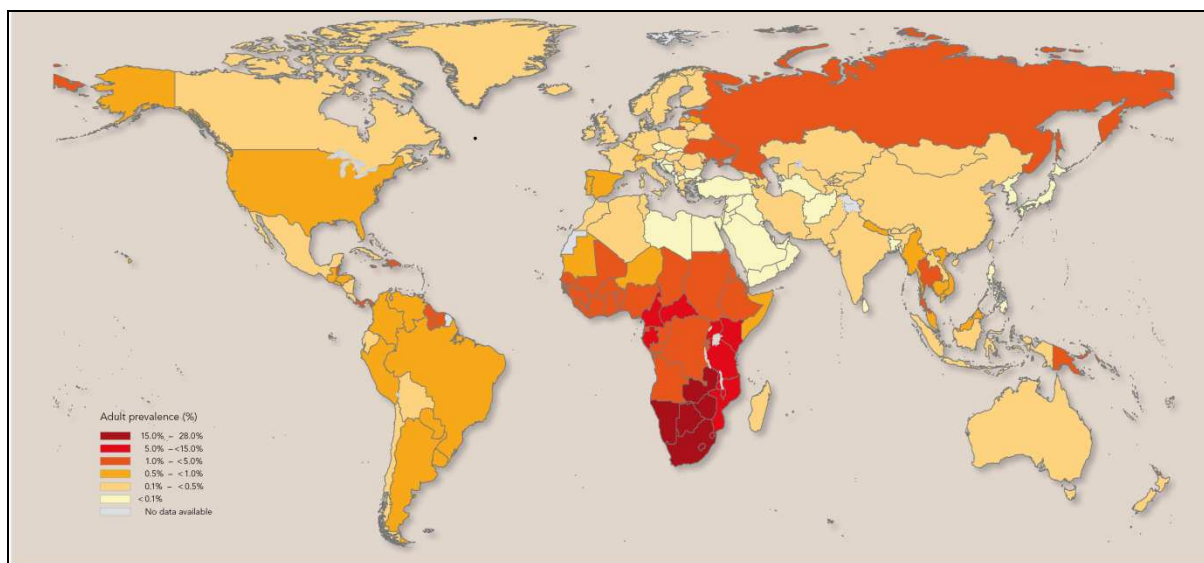
Table 2: People infected by HIV in selected countries of Sub-Saharan Africa.

	Adults and children, 2007	Adults and children, 2001	Adults (15+) 2007	Percentage of infected adult population (15-49) 2007
Country	Median estimation	Median estimation	Median estimation	Median estimation
World	33 000 000	29 500 000	30 800 000	0,8
Sub-Saharan Africa	22 000 000	20 400 000	20 300 000	5
Angola	190 000	120 000	180 000	2,1
Botswana	300 000	280 000	280 000	23,9
Burkina Faso	130 000	140 000	120 000	1,6
Burundi	110 000	150 000	90 000	2
Cameroon	540 000	530 000	500 000	5,1
Centaral African Republic	160 000	130 000	140 000	6,3
Chad	200 000	150 000	180 000	3,5
Congo	79 000	84 000	73 000	3,5 *
Cote d'Ivoire	480 000	590 000	420 000	3,9
Democratic Republic of Congo	450 000	465 000	405 000	1,35
Eritrea	38000	27000	35000	1,3
Etiopia	980000	920000	890000	2,1
Gabon	49000	38000	46000	5,9
Ghana	260 000	260 000	250 000	1,9
Guinea	87 000	55 000	81 000	1,6
Kenya	1 750 000	1 500 000	1 600 000	7,8
Lesotho	270 000	250 000	260 000	23,2
Madagascar	14 000	8 100	13 000	0,1
Malawi	930 000	850 000	840 000	11,9
Mali	100 000	82 000	93 000	1,5
Mauritius	13 000	18 000	13 000	1,7
Mozambique	1 500 000	1 000 000	1 400 000	12,5
Namibia	200 000	150 000	180 000	15,3
Nigeria	2 600 000	2 200 000	2 400 000	3,1
Rwanda	150 000	190 000	130 000	2,8
South Africa	5 700 000	4 700 000	5 400 000	18,1
Svaziland	190 000	160 000	170 000	26,1
Togo	130 000	110 000	120 000	3,3
Uganda	940 000	1 100 000	810 000	5,4
Tanzania	1 400 000	1 400 000	1 300 000	6,2
Zambia	1 100 000	940 000	980 000	15,2
Zimbabwe	1 300 000	1 900 000	1 200 000	15,3
SUMA	22 710 400			

Source: data UNAIDS 2008, own calculations; * UNAIDS data show only interval rage, median estimation is author's calculation

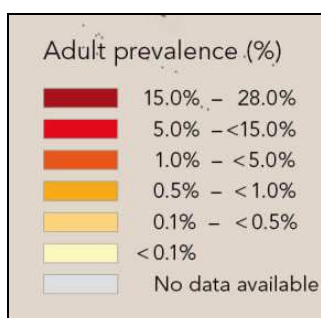
Table 2 shows the numbers of persons infected by HIV in selected countries of Sub-Saharan Africa. The absolute number of infected increased between 2001 and 2007 by 1 600 000 people. In Sub-Saharan Africa there are 5 of 100 people infected by HIV. It is obvious that pandemic is not spread evenly. Considering the percentage of infected adult population, among the worst affected countries is for example Botswana, where 1 of 5 adults is infected by HIV. The same situation is in Lesotho and the worst situation is in Swaziland, where almost 1 of 3 adults is infected by HIV. For illustration Graph 3, which shows the spread of HIV epidemic in the World in 2007, is enclosed.

Graph 3: HIV prevalence in adult population in particular countries in the World (2007).

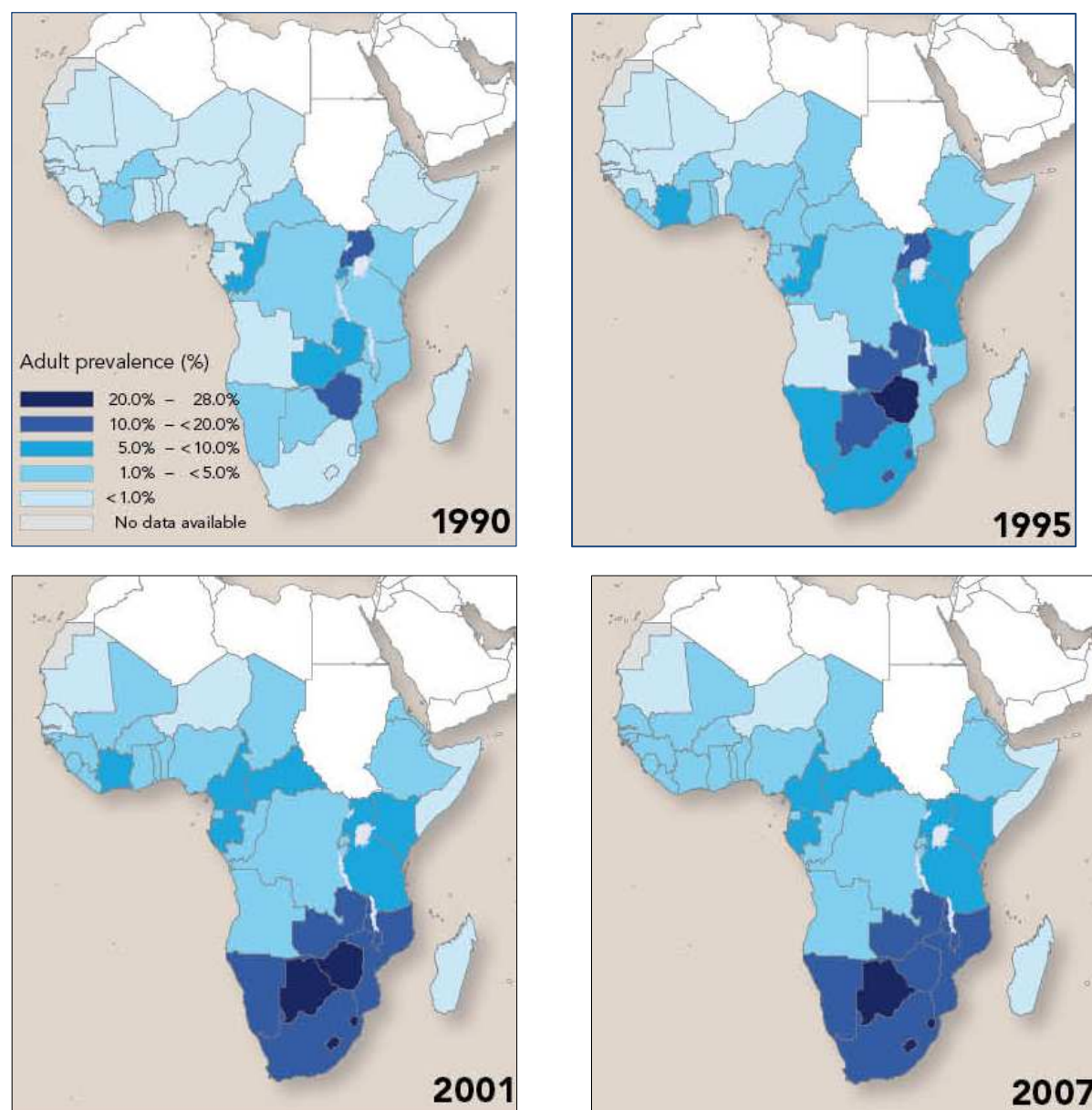


Source: UNAIDS, 2008

Graph 4: Legends for Graph 3 - The percentage of adult population living with HIV in particular country.



Graph 5: Trend of HIV pandemic in Sub-Saharan African, percentage shows a share of adult population infected by HIV in particular country.



Source: UNAIDS, 2008; by adults we still mean people in the age between 15 - 49 years

2.2 Treatment and HIV life expectancy in Sub-Saharan Africa

Antiretroviral drugs can significantly extend lives of infected persons, as mentioned in the first chapter of this thesis. It has to be considered that in developed countries antiretroviral drug use is a standard. The situation is different in developing countries. According to the World Health Organization (2009), 4 million people in low and middle income countries were under antiretroviral drugs at the end of 2008. According to UNAIDS, this number is a

significant improvement. In other words, this number was significantly lower in the past. But as was already mentioned, these 4 million are just 13,5 % of infected persons. It means that 25,7 million people in low and middle income countries do not have appropriate medical care for HIV, they do not receive antiretroviral drugs. The life expectancy of these almost 26 million people is 11 -12 years from the day they were infected. According to UNAIDS (2008), 2,7 million people were newly infected in 2007. Taking into account the same proportion of newly infected in developing and developed countries and the same percentage of people under treatment in developing countries, there were 2,43 million infected in developing countries. It means that only 327 thousand of them will be treated and 2,1 million people infected in developing countries in 2007 will die approximately 11 -12 years after the year 2007.

Considering Sub-Saharan Africa, there are 22 million people infected by HIV. It is 66,7 % of people infected by HIV in the world, see table 1. Considering infected persons in low and middle income countries there are 74 % living in Africa. Taking into account the same proportions of treated and untreated 2 million 900 thousand infected people take antiretroviral drugs in Sub-Saharan Africa. It means 19 million 37 thousand of 22 million infected are not treated in appropriate means. Again we have to say that for these 19 million people there is a life expectancy 11-12 years from the time of being infected. Moreover we have to take into account that for these untreated people there is larger risk of mother to child transmission. This risk is between 20 and 80 % (Montagnier, 1993).

2.3 Mortality

The impact of HIV on mortality was studied by U.S. Census Bureau particularly in the project HIV/AIDS Surveillance Data Base. Data describing the numerousness of HIV infection, epidemiological models of WHO and UNAIDS were incorporated in the model. Model shows the current situation and predicts the progress of AIDS related mortality and shows various demographic indicators. It is capable of comparing mortality and its trends with pandemic and non HIV/AIDS scenario. Non HIV/AIDS scenario takes into account lower number of deaths and associated changes in age and a sexual structure of the population. Including these variables, it derives the impact on the whole demographic situation.

U.S. Census Bureau publishes some data, although it does not publish all the data. That is why the study of B. Epstein (2004) is used in this thesis. He uses public U.S. Census Bureau data and also some unpublished tables. In this thesis there is a list of some findings of the Epstein (2004) model. Particular demographic indicators are discussed in the following sections.

2.4 Sex related impacts

The probability of transmission is higher from man to woman than from woman to man transmission. It is based on biology - woman is more vulnerable to transmission during the time of menstruation (Montagnier, 1993). Additionally, there are cultural factors in play. Women do not have equal access to information and even if they reach information their role in the family is often submissive. It means that they do not have enough power to use their information about HIV (UNAIDS, 2008). In such case they are not able to refuse sexual intercourse even if they are aware of the promiscuity of their partner. According to WHO (2007), the role of man in some societies is significant for HIV spread, since in some areas changing girlfriends is considered to be the masculine behaviour. Some of these topics will be discussed in sociological part. Overall we can say that there are more infected women than men what is shown in following the table.

Table 3: Infected population in selected countries of Sub-Saharan Africa according to sex

	Women (15+) 2007	Men (15+) 2007	Percentage of young infected women (15-24) 2007	Percentage of young infected men (15-24) 2007
Country	Median estimation	Median estimation	Median estimation	Median estimation
World	15 500 000	15 300 000	0,6	0,4
Sub-Saharan Africa	12 000 000	8 300 000	3,2	1,1
Angola	110 000	70 000	0,3	0,2
Botswana	170 000	110 000	15,3	5,1
Burkina Faso	61 000	59 000	0,9	0,5
Burundi	53 000	37 000	1,3	0,4
Cameroon	300 000	200 000	4,3	1,2
Centaral African Republic	91 000	49 000	5,5	1,1
Chad	110 000	70 000	2,8	2
Congo	43 000	30 000	2,3	0,8
Cote d'Ivoire	250 000	170 000	2,4	0,8
Democratic Republic of Congo	235 000	170 000	0,95	0,25
Eritrea	21 000	14 000	0,9	0,3
Etiopia	530 000	360 000	1,5	0,5
Gabon	27 000	19 000	3,9	1,3
Ghana	150 000	100 000	1,3	0,4
Guinea	48 000	33 000	1,2	0,4
Kenya	950 000	650 000	5,5	1,65
Lesotho	150 000	110 000	14,9	5,9
Madagascar	3 400	9 600	0,1	0,2
Malawi	490 000	350 000	8,4	2,4
Mali	56 000	37 000	1,1	0,4
Mauritius	3 800	9 200	1	1,8
Mozambique	810 000	590 000	8,5	2,9
Namibia	110 000	70 000	10,3	3,4
Nigeria	1 400 000	1 000 000	2,3	0,8
Rwanda	78 000	52 000	1,4	0,5
South Africa	3 200 000	2 200 000	12,7	4
Svaziland	100 000	70 000	22,6	5,8
Togo	69 000	51 000	2,4	0,8
Uganda	480 000	330 000	3,9	1,3
Tanzania	760 000	540 000	0,9	0,5
Zambia	560 000	420 000	11,3	3,6
Zimbabwe	680 000	520 000	7,7	2,9

Source: UNAIDS, 2008

In relative numbers: women represent 59 % of infected persons and men 41 % (calculated according to UNAIDS (2008) data). Remarkable is the relation between infected man and women according to their age. From the found data (Urassa et al, 2002; Zambia Central Statistical Office and Central Board of Health, 2002; Shisana, Simbayi, 2002) can be concluded that the percentage of infected women exceeds the percentage of infected men until the age of 40. The difference is the most noticeable around the age of 30. However, it is

obvious, that there are more infected women than men. Epstein (2004) induces that under economic pressure young women are forced to sell their body to provide for the family, to pay school fees for children etc. Next reason can be found in economic dependence of women on men, as UNAIDS (2008) claims. Nevertheless, we have to take into account that man to woman transmission is more likely than vice versa (Montagnier, 1993).

2.5 AIDS related crude death rates

As a consequence of HIV there is an increase in the number of deaths per 1000 persons, e.g. crude death rate. According to Epstein (2004), crude death rates are significantly higher in most Sub-Saharan countries because of the pandemic. He took into account the data from U.S. Census Bureau from 2004 (published and unpublished) and found in his model that i.e. for South Africa the crude death rate is 21 deaths per 1000 persons, whereas without AIDS scenario it would be 7. For Botswana it is 29 in reality compared to 3,5 without AIDS scenario. The outlook differs. In some countries the number of AIDS related deaths is going to increase, in some countries it should stabilize or decrease. However, the numbers remain high. Particularly, the increase is supposed to be observed in Mozambique, Botswana, Namibia, South Africa and Zambia. The decrease is expected in Kenya and Uganda. Some projections for 2015 are listed in Table 4.

Table 4: Adult crude death rates (deaths per 1000 adults); projected 2015

	Adult crude death rate	
	with AIDS	withou AIDS
Botswana	38,6	1,4
Cote d'Ivoire	11	5,3
Kenya	13,1	6
Mozambique	17,8	6,9
Nigeria	9,8	4,9
Rwanda	10,5	6,2
South Africa	22	2,8
Tanzania	13,8	5,3
Uganda	8,8	4,7
Zambia	19,2	5,2

Source: Epstein, 2004; U.S. Census Bureau; International Data Base, 2004

2.6 Adult mortality

Adult mortality is substantial for studying the pandemic impacts on economic situation. As Epstein (2004) says people between 15 and 49 years of age usually work, care for their families and nurture children. In other words, they are responsible for the preservation of society. According to U.S. Census Bureau there is the highest mortality at the age about 33 years. Table 4 shows the total number of AIDS related deaths in 2007.

Table 5: The number of AIDS related deaths of adults and children in 2007 in selected countries of Sub-Saharan Africa

	Number of AIDS related deaths of children and adults in 2007
Country	Median estimation
World	2000000
Sub-Saharan Africa	1500000
Angola	11000
Botswana	11000
Burundi	11000
Camerun	39000
Chad	14000
Comoros	100000
Cote d'Ivoire	38000
Democratic Republic of Congo	29000
Ethiopia	67000
Ghana	21000
Kenya*	107500
Malawi	68000
Mozambique	81000
Nigeria	170000
South Africa	350000
Uganda	77000
Tanzania	96000
Zambia	56000
Zimbabwe	140000

Source: UNAIDS, 2008; *own calculations of median estimation

The adult and children deaths are not distinguished. To emphasize that AIDS affects mainly adults, Epstein (2004) calculated that without AIDS scenario deaths of adults compose 21 % of all deaths in Botswana and with AIDS scenario (in reality) it was 68 % in 2005.

These numbers are 22 % respectively 44 % for Zambia, 21 % respectively 56 % for South Africa.

Considering the impact of the pandemic on crude death rate, we have to take into account that the number of deaths react with 11-12 years delay to a number of HIV infected persons. It means that in countries where falling number of newly infected occurs, the number of deaths will be high for 11-12 years, since it is a life expectancy for people infected one year ago. According to Epstein (2004) the pandemic should reach maximum around 2010. However, adult crude death rates will increase significantly in countries such as Mozambique, Namibia, Botswana, South Africa and Zambia. Resuming in the stabilization of HIV pandemic i.e. a decrease in the number of newly infected does not solve impacts of the pandemic. These will continue for years in the form of hundreds thousands or millions people dying for several following years.

2.7 Impact on children: infection, death rates, orphans

Table 6: Number of infected children in selected countries of Sub-Saharan Africa.

Country	Children (<15) 2007
World	2 200 000
Sub-Saharan Africa	1 700 000
Cote d'Ivoire	60 000
Etiopia	90 000
Kenya	150 000
Malawi	90 000
Mozambique	100 000
Nigeria	200 000
South Africa	300 000
Uganda	130 000
Tanzania	100 000
Zambia	120 000
Zimbabwe	100 000

Source: UNAIDS, 2008

As already mentioned in chapter 1.2.1, most children are infected in prenatal state, during birth or by breast-feeding. These three ways of transmission constitute almost 90 % of cases (Kengeya-Kayondo et al., 1995; Mulder et al., 1996; Hauri, Armstrong & Hutin 2004; Kiwanuka et al., 2004; Schmid et al., 2004). Table 5 shows the number of children (under 15 years of age) infected by HIV. It is evident that most infected children are in Sub-Saharan

Africa. In relative comparison there are 66 % infected adults in Sub-Saharan Africa, whereas 77 % of infected children worldwide live in Sub-Saharan Africa. The worst affected country is South Africa with 300 thousand infected children and Nigeria with 200 thousand infected children. The probability of mother to child transmission is 20 % - 80 % (Montagnier, 1993). As was already discussed, the mother to child transmission can be decreased to 8 % probability by antiretroviral drug use. However, by far not all women get antiretroviral drugs. It is considered that 13,5 % of infected in low and middle income countries take these drugs. However, 59 % of infected in Sub-Saharan Africa are women and it is obvious that not all women can get antiretroviral drugs. It implies that 30 % of children born to HIV positive mothers are born with HIV infection (Epstein, 2004). AIDS is considered to be the main cause of death for children until 1 year of age. Epstein (2004) claims that in Botswana 80 % of deaths of children 0-5 years of age are caused by AIDS, in South Africa it is 40 %.

Table 7: Children orphaned due to AIDS in 2007.

	AIDS related orphans (0-17) 2007
Country	median estimation
World	15 000 000
Sub-Saharan Africa	11 600 000
Burkina Faso	100 000
Camerun	300 000
Cote d'Ivoire	420 000
Ethiopia	650 000
Ghana	160 000
Malawi	550 000
Mozambique	400 000
Nigeria	1 200 000
Rwanda	220 000
South Africa	1 400 000
Uganda	1 200 000
Tanzania	970 000
Zambia	600 000
Zimbabwe	1 000 000

Source: UNAIDS, 2008;

Note: As an orphan is considered children at the age under 18, who lost one or both parents because of AIDS.

Table 7 shows numbers of AIDS related orphans in selected countries of Sub-Saharan Africa. The main problems of orphans are lack of care, love and insufficient human capital passing over. This will be discussed in the extra section.

An outlook to future is rather negative. Even though the stabilization of pandemic was reached in some countries, the impact will be notable for at least 11 - 12 years.

2.8 Life expectancy

Life expectancy is the proper indicator of HIV impact compared to mortality, since it eliminates various age structures of populations. Life expectancy says at which age newborn would die, if mortality would not change at least for the whole newborn's life. In developing countries and especially in Sub-Saharan Africa the life expectancy is lower mainly because of infant mortality. Nevertheless, HIV worsens the situation.

Table 7 and graph 6 describe the situation:

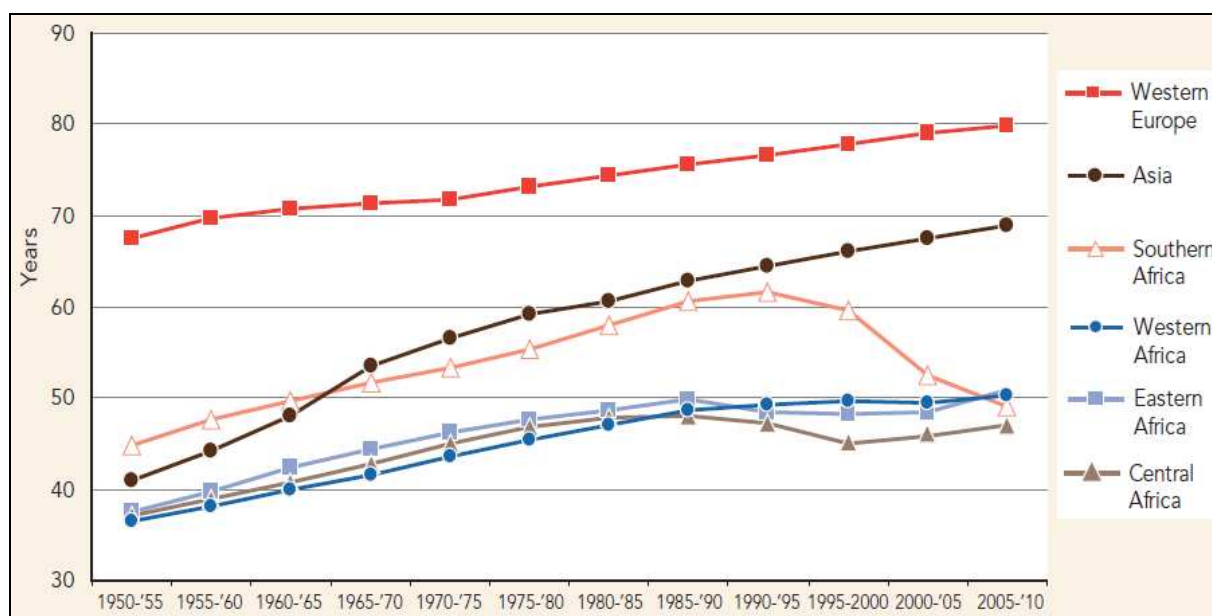
Table 8: Life expectancy at the age of 15, projected in 2015.

	Male		Female	
Country	with AIDS	without AIDS	with AIDS	without AIDS
Botswana	63,4	24,7	67,6	24,1
Cote d'Ivoire	49,3	42	55,4	44,4
Kenya	50,8	36,2	62,2	32,6
Mozambique	48,1	33,6	51,1	31,5
Nigeria	50,7	45,2	54	46,3
Rwanda	49,6	44,5	53	46,1
South Africa	54,9	36,3	61,5	33,6
Tanzania	50,1	41,3	53,9	42
Uganda	52,5	49,4	56,1	52,1
Zambia	51,2	35,8	55,2	34,6

Source: Epstein, 2004; U.S. Census Bureau

It is evident that AIDS has negative significant effect on the life expectancy. As will be discussed later, life expectancy has substantial impact on welfare calculation.

Graph 6: Life expectancy at birth in selected regions.



Source: UNAIDS, 2008; World Population Prospects, 2006

It is evident from Graph 6 that there was a decline in life expectancy in South and Central Africa since 1990, respectively since 1985.

2.9 Impacts of demographic changes

In the chapter 1.2, some demographic changes were described, which are related to HIV/AIDS pandemic. Demographic changes influence following social and economic indicators. The total dependency ratio change is one of them. It determines the number of people who have to support one person at productive age including him/her. In practise some specific rates are constructed. Epstein (2004) constructed a model according to U.S. Census Bureau data, which compares the number of dependent persons per 100 persons of working age with AIDS scenario and without AIDS scenario. Some results are shown in following table.

Table 9: Projected total dependency ratios for selected countries in Sub-Saharan Africa.

	2005		projected 2010	
	with AIDS	without AIDS	with AIDS	without AIDS
Botswana	74	66,7	62	54,6
Cote d'Ivoire	77,6	76,7	73,2	71,8
Kenya	81,2	79,8	78,5	77,2
Uganda	109,7	107,8	104,2	101,2
Zambia	95,8	92,7	87,7	83,1

Source: Epstein (2004)

3 Sources of HIV/AIDS pandemic in Sub-Saharan-Africa

'AIDS is a black plague; it is mainly killing black people ... And that is the cruel truth about why the world had failed to respond with dispatch.' Salih Booker, director of the Africa Fund/American Committee on Africa (2001).

In this chapter several reasons for extraordinary high HIV/AIDS expansion in Sub-Saharan Africa will be discussed. In the following sections will be discussed economic, cultural or social sources of the pandemic. However, this chapter will be focused on main possible sources. Since for instance according to Buve et al.(2002) even such factor as male circumcision is a significant factor in protecting HIV infection, and according to Christian Aid (2004) it is a possible factor which can explain low expansion rates in the Western Africa. Nevertheless, the extension of this thesis does not enable us to study all the factors.

3.1 Economic sources

'Finance people and trade people set the agenda. I've always been shocked by their questions. It's not bad-will, but they are naive. I have to make the case again and again that AIDS is not just about health, it's affecting economies.' Peter Piot, former director of UNAIDS (Guardian, 2002).

The HIV/AIDS pandemic has a certain impact on the economic situation in affected countries. Contra wise, economic situation in a country, changes in international trade conditions, fiscal policy or a privatization is supposed to influence the spread of HIV/AIDS or at least the vulnerability of inhabitants to the infection. This phenomenon is often called the downward spiral. Bad economic conditions increase the vulnerability of inhabitants to infection and high numbers of infected people induce significant economic costs (Christian Aid, 2004). The mechanism works as a vicious circle.

According to Christian Aid (2004), companies and governments plan their action with the certain horizon and they consider certain variables, but the problem is that they do not consider the long term impact of their decisions on the pandemic. If we think about the consequences of pandemic, they will exceed a century (Christian Aid, 2004). To sum up, it is necessary to consider the effects of structure adjusted policies or at the present time poverty reduction strategies on HIV/AIDS pandemic. Otherwise we are likely to adopt wrong policies, measures, investments or decisions in general.

3.1.1 Poverty, inequality and HIV/AIDS

According to Epstein (2004) and Christian Aid (2004), over 90 % of infected people live in developing countries. The World Bank (1998) stated that in the average developing country, a US\$2000 increase in per capita income is associated with a four % reduction in the HIV infection rate of urban adults. The research of 15 000 women done in 2001 in Cambodia found that the wealthiest women from the researched group had two times higher probability to know how to prevent HIV transmission, two times higher probability to practise safe sex and almost four times more likely to know where they could be tested for HIV, as the poorest women (Macro International, 2001). Pitanyon (1997) in Thailand found that in the poorest and less educated families is the highest probability of having a HIV positive member. UNAIDS (2004) found that people with higher life expectancy in the living area and higher literacy are more likely to use condoms.

On the other hand, South Africa, the richest African country, has high expansion rates. Moreover, there are poor communities with low HIV prevalence and the expansion is high in some wealthy social groups. One possible explanation was found by Bloom (2002) in his research in Brazil, where in 1980s three quarters of newly infected people had secondary education, although in 1990s this share declined to one third. It can be induced that wealthy communities are more vulnerable at the beginning of the HIV pandemic but in the latter stage

they become more resistant since they perform more effective prevention. Overall, there is no general consensus that poverty directly implies high HIV/AIDS prevalence. Nevertheless, the connection between poverty and vulnerability to HIV/AIDS infection can be found. Christian Aid (2004) shows these possible reasons, why poor people are more vulnerable to HIV/AIDS:

- Need for income – it implies sex work; higher work migration which weakens family relations.
- Life priorities – poor people act more risky to earn their living and do not care so much about their health.
- Women have less power – UNAIDS (2008) says one of the core factors in HIV/AIDS is the low social status of women. They are not economically independent, can not negotiate about safer sex; can be abused by older family members more easily.
- Level of knowledge – poor people have less information about HIV/AIDS, protection, health care.
- Physical disposition – HIV is more likely to develop in AIDS for poor people, since they do not get enough nutrition.

According to Christian Aid (2004), similar implication has income inequality.

3.1.2 HIV and migration - The Case study of Volta River

The impact of migration on HIV spread is often demonstrated on the case of the Volta River (Collins, Rau 2000; Decosas, 1996). In 1960s the construction of the Volta River Dam in Ghana started. The goal was to produce enough electricity for aluminium production from bauxite. The area of 8,500 square kilometres had to be given up for the dam reservoir. Thousands of farmers were displaced; they had to leave their land, their source of living. Many of the farmers were women. The alternative way how to feed themselves and their families was found in the infrastructure for dam workers – hotels, bars etc. Consequently the business of prostitution began. A generation later there was a generation of fatherless women, who did not have many opportunities better than to follow their mothers in the sex business. In the middle of 1990s the HIV prevalence rate at the side of the dam was 5 to 10 times higher in the comparison with the rest of Ghana (Christian Aid, 2004). Moreover, the migration of women into the urban centres Accra and Kumasi began (AIDS Analysis Africa, 1996; Tupozis, 1998).

3.1.3 HIV and the international trade policy – the case of Kenyan sugar belt (Christian Aid, 2004)

In January 2004 the research in two local districts, Nyando and Butere-Mumias in Kenya, was undertaken by the Catholic Correspondence Course Franciscan Missionary Charism (CCFMC) and the Anglican Church of Kenya (ACK). At that time Nyando had HIV prevalence around 29 % and Butere-Mumias around 14 % (according to Christian Aid it was far higher). The researchers interviewed over 60 people to find if they see any relation between the economic situation and the spread of HIV.

These two districts specialized on sugar production. Generally, sugar was the third largest agricultural commodity by value and it was a source of income for 100,000 small-scale farmers and it supported a living of 6 million people (Centre for Peace and Democracy, 2002; Sugar Campaign for Change, 2003).

From 1970s to 1980s there was a boom of a sugar industry. In 1990s the price control on the inputs for sugar industry was removed. Kenyan sugar industry was not internationally competitive. It lacked economies of scale, had poor investment and poor management. On the other hand the incomes were distributed more equally than in the case of plantation production. It implies that the tariffs removal in 2000 had hard impact on the sugar industry. Kenya is the member of Common Market for Eastern and Central Africa (COMESA). It benefited in many ways from more liberal international market, for example tea production increased significantly. Some benefited and some lost from trade liberalization. As Krugman and Obstfeld (2005) point out, the winners of free trade can compensate the ones who lost so that the benefits from liberalization are shared more equally. But that was not the case. People in Kenyan sugar area were harmed with no compensation. Their incomes decreased rapidly, unemployment increased. The sugar industry collapsed. In 2002 Kenyan government put a quota to sugar imports to alleviate these problems. The reaction of IMF (2003):

“Kenya continues the pursuit of a discriminatory policy on wheat and sugar imports from COMESA trading partners, which is designed to protect local producers from what are described as ‘unfair trading practices’. These are viewed as temporary measures, pending the resolution of these trade frictions through consultations or the COMESA dispute settlement mechanism... The mission urged the [Kenyan] authorities to review the recent protective measures [on sugar and others] in the context of their efforts to develop a medium-term trade strategy conducive to promoting strong economic growth.”

Christian Aid points out that there is no such a recommendation e.g. for UK when it comes to its tariffs.

The lift of tariffs lead to a delay of payments to sugar cane farmers, there was a decrease in the price of sugar cane. People tried to compensate the lack of income by home crop production, market trading etc., although the full compensation was not possible. In Nyando, HIV prevalence increased from 19 % in 1990 to 29 % in 1999 (Nyando District Development Plan 2002-2008, 2002). The inequality of incomes increased as well, since workers who lost their jobs and farmers incurred a decrease of income. The workers in sugar factories who kept their jobs were doing relatively well. They earned between £70 and £175 a month. These factors led to high HIV vulnerability. Some women of farmers started to be engaged in prostitution; mostly they offered their bodies to sugar factory workers who were supposed to have money. Also young women began sex work, since their parents could not afford to pay for their education. The practise of “sugar daddies” became common. In this case, old men offered money or material gifts to young girls who could not afford to continue their education without financial support. Informal sex is included in that practise. Nevertheless, the negotiation position for safer sex for these girls is limited.

Migration and alcohol consumption increased as well. Both imply higher promiscuity. There is also higher rate of early marriage, when young and uneducated woman is later economically dependent on her husband and again has worse negotiation position in sexual practises.

The respondents consider following possibilities as the core factors for high HIV prevalence (Christian Aid, 2004):

- Low condom for various reasons - social and religious reasons; women’s inability to negotiate their use; poor availability;
- Men do not save enough money and women do not generally control income, so women need to generate extra income, sometimes by sex work;
- Some traditional practices, such as female genital mutilation;
- Promiscuity unrelated to the need of money;
- A lack of awareness of HIV, or denial of HIV (HIV awareness appears to be high in the area, due to high prevalence);

- Sex workers close to the main highway running across the area;
- The high prevalence of HIV on sugar company estates;
- The flood - prone nature of the area (which leaves people regularly impoverished).

Some respondents were „interviewed to rank the different factors that lead to increased HIV prevalence in order of importance“, (Christian Aid, 2004). The most important factor was *loss of income from sugar/poverty*, second *sex work* and third *traditional practices (specifically wife inheritance, polygamy and funerals)*.

The international trade liberalization can lead to a rise of wealth for a country. Nevertheless, the impacts are not distributed equally. Some benefit and some lose. There can be compensation to distribute impacts more equally but it is usually not the case. So there are some harmed groups which become more vulnerable to HIV. If we consider the harms of HIV, the costs benefits analysis based on traditional variables is useless or at least inexact. In other words, we use apparatus which does not consider all relevant variables, thus our decisions are based on incomplete information. It means that not incorporating HIV/AIDS costs is likely to cause making wrong decisions.

3.2 The social sources of pandemic

In the general meaning “culture” is often mentioned as the main source of high HIV prevalence in Sub-Saharan-Africa.

Caldwell et al. (1989) is frequently quoted work about social aspect of AIDS in Africa. It claims that sexual relations do not play a serious role in Sub-Saharan society. Pre-marital and extra-marital sexual relations are not considered to be prohibited. In moral and religious point of view sexual relations are not in the centre of interest. In Ondřej Fisher’s words, it is not obvious to connect personal belief and morality. According to his experience it is possible for some people to accept Christianity and at the same time to perform pagan practises or practise actions counter Christian religion and all is done with a clear conscience.

Caldwell et al. (1989) claim that woman has more freedom in African society, although this freedom is connected with great responsibility and hard work. It is quite common for a woman to be responsible for supporting the whole family. The role of women in families is

considered to be one of the possible explanations for the discrepancies in HIV prevalence among African countries. In other words, women's sexual life is less restricted than in traditional Eurasian society. Next explanation can be found in the male to female ratio, which is in a traditional mining region significantly high. Consequently there are foci of infections in the society of prostitutes. The unequal sexual structure can be comprehended as an implication of colonial policy that restricted the entry of women to mining areas, Caldwell et al. (1989) claim. Nevertheless, the existence of this model for such a lengthy time period is quite incomprehensible. Some role can be credited to a long postpartum sexual abstinence which is quite frequent in West Africa, where HIV is less frequent.

According to Caldwell et al. (1989) and Caldwell & Caldwell (1987), society in Sub-Saharan Africa is focused on the preservation of parentage. The main goal of a relationship between male and female is reproduction. That is also the reason why extra-marital sex is not considered to be fundamentally wrong. In other words men give priority to their parents, descendents of their parents compared to their conjugal family and they do not bear the full costs of their children, since wife and children do not have monopolistic claim to their earnings. This claim belongs to parents. Children are economic surplus for woman that means she has no reason to care much about the number of her children.

Dr. Shiokawa (2000) pointed out that "The AIDS crisis in Africa could be brought under control only if Africans restrained their sexual cravings ... it follows that Africans should change their sexual behaviour." This can be considered a common view of western scientists and politicians on the methods of fighting HIV.

Even Caldwell et al. (1989), focused on social context of HIV pandemic, admit the possibility of pandemic determination by medical, biological and health condition. They point out that HIV pandemic does not have to be only a product of "networks of sexual relations", but is determined also by the persistence of untreated genital lesions and ulcers, venereal diseases and unhygienic living conditions.

3.3 Biomedical effect of economic conditions

"The microbe is nothing, the terrain everything." Louis Pasteur

According to Stillwaggon (2002), it is proven in established literature that people with deficiency of nutrition, with parasitic diseases or generally poor health, people who have bad

access to health services or are economically disadvantaged in some other way, have greater susceptibility to infectious diseases. No matter if they are transmitted by water, food, air or sex. In other words, according to epidemiological, clinical and laboratory evidences HIV infection is influenced by the same factors that promote transmission of other infectious diseases (Stillwaggon, 2003). Focusing on some epidemiological factors, calorie intake per person in Sub-Saharan Africa is about 70 % of the consumption level in industrialized countries (UNDP, 1998). The expenses on health services are substantially lower as well (UNDP, 1998). In general, the relevance of the influence of the economic conditions (expressed in the amount of calories and micronutrients received), hygienic conditions and other variables for the spread of infectious diseases should be studied and their relevance to the spread of HIV should be determined.

The HIV prevalence in Europe and USA compared to prevalence in Sub-Saharan Africa is insignificant. Moreover, the character of the infection is different. In Euro-American society mostly homosexuals, drug users who share needles, female partners of bisexuals or haemophiliacs are infected. On the contrary, the dominant transmission in Africa is by heterosexual sexual encounter. Moreover, the relation of infected male to female is about 4:1 in Europe, 6:1 in USA and 1:1,2 in Sub-Saharan Africa. Therefore different patterns of pandemic can be observed in wealthy countries and in Sub-Saharan Africa. It would be appropriate to ask why this inequality occurs.

The analysis conducted by HIV pandemic researchers was firstly focused on characteristics of virus, stages of infection etc. Nowadays the attention is focused on the host rather than virus itself (Stillwaggon, 2002). In other words, considering emergence of new infections (including HIV), host susceptibility is considered to be a core factor (Morris, Potter, 1997).

As was already mentioned, host susceptibility is shown in the way that transmission occurs. Heterosexual sexual encounter is the main way of transmission in Sub-Saharan Africa, on the contrary to Europe and USA, where heterosexual sex is the inefficient way of transmission. In addition, rates of vertical transmission (mother to child) vary substantially between wealth and poor countries. Without intervention, 14 % of infants born to HIV-positive mother are infected in Europe, for the United States it is 17 to 25 % without intervention. In Africa, vertical transmission occurs in 25 to 40 % of births to mother with HIV or AIDS (Fowler and Rogers, 1996). One possible explanation for such a great

difference provide Morrice and Potter (1997). They claim that globally “the leading cause of increased host susceptibility to infection” is probably malnutrition. It affects epithelial integrity and cell-mediated immunity. Next possible explanation is parasite infection, which produces chronic immune response to the parasite thus leads to exhaustion of body immune system (Bentwich et al. 1995).

3.3.1 The Economic conditions and health in Sub-Saharan Africa (Stillwaggon, 2002)

This chapter is focused on the economic background of African health situation.

Countries of Sub-Saharan Africa belong to the group of the poorest countries in the world. Moreover, there is very unequal distribution of income in countries with relatively higher GNP per capita (Stillwaggon, 2002), e.g. Botswana and Zimbabwe, which are the countries with highest HIV prevalence and the higher Gini coefficient (World Bank, 1997, 1999). Even the GDP growth does not mean that all inhabitants are in a better position. There was 8,5 % GNP growth in 1975 - 1990, although the daily per capita supply of protein and cereals from 1970 to 1995 fell by 9 % each in Botswana (UNDP, 1998, 2000; Stillwaggon, 2002).

Stillwaggon (2002) presents the situation of Sub-Saharan economies and health situation in 1980s and 1990s, when HIV pandemic has its origin. According to her quotation of World Bank data, the number between a quarter and a half of the population in the region suffered serious malnutrition. According to Kamarck (1988), 150 million inhabitants of Sub-Saharan Africa consume less than 90 of the FAO/WHO required calories, this is considered to be the necessary calories intake required for active work. According to Pio (1994), between 1980 and 1989 the average daily caloric intake in Sub-Saharan African fell in 25 of 44 countries. The region was the only one in the world where the protein supply fell between 1970 and 1997 (UNDP, 2000).

The economic situation was getting worse at the end of 1980s in many African countries and the consumption was declining there. The problem was that in those countries where the incidence of poverty fell and there were some moderate economic reforms. The poorest of the poor were considerably worse off in 1991 than they were in 1983 (Demery and Squire, 1996). The situation of poor can be demonstrated on the example of people in Zimbabwe, where the substantial income distribution inequality occurs. In 1980, per capita income ratio of whites, urban blacks, and rural black were 39:5:1 (Barry et al. 1990). Zimbabwe is one of the worst affected countries by HIV pandemic. However, President Mugabe’s destruction of the

Zimbabwean economy has to be considered. Besides the absolute shortage of food, another serious problem is micro-nutrient deficiency. Deficiency of vitamin A leads to measles and diarrhoea, lack of vitamin C leads to scurvy, niacin deficiency leads to pellagra. Anaemia is not rare in camps in Ethiopia, Malawi, and Somalia (Stillwaggon, 2002; CDC 1992).

One of the groups most affected by insufficient intake of nutrition and micro-nutrient are refugees. Frequent disease is cholera. Approximately 800 thousand Rwandan refugees living in Goma (Democratic Republic of Congo) were affected by it (Cookson et al. 1998). To conclude: malnutrition, infectious diseases and parasites make the immune system and the whole organism weaker. E.g. the children who survived 1980s famines have nowadays problems with malnutrition and parasites and a lot of them “are dying of AIDS” (Stillwaggon, 2002).

Additional problem is parasitic diseases. Malaria occurs in 300 to 500 million cases worldwide, out of that number 90 % is in Africa. At about 200 million people live with Schistosomiasis, out of which 80 % in Sub-Saharan Africa (Stillwaggon, 2002). Schistosomiasis damages some organs, leads to anaemia and protein-energy deficiency (Stephenson, 1993; Scrimshaw and SanGiovanni, 1997). The most prevalent are intestinal parasites which lead to blood loss, chronic diarrhoea resulting in aggravated malnutrition and retarded development (Stillwaggon, 2002; WHO 1998; Hlaing, 1993; Oberhelman et al., 1998). Sexually transmitted diseases are also often prevalent and it was found that HIV is more prevalent among women at least on other sexually transmitted disease (Sturm et al. 1998). Under nutrition and micro-nutrient deficiencies weaken the immune system (Stillwaggon, 2002).

3.3.2 The Economic/biomedical hypothesis (Stillwaggon, 2002)

Based on previous facts and data Stillwaggon (2002) proposed a hypothesis which says that “characteristics of poor populations conventionally associated with higher prevalence of other infectious diseases help to explain the high prevalence of HIV in Sub-Saharan Africa.”

Dependent variable was HIV prevalence stated according to UNAIDS estimations and serious data from HIV/AIDS Surveillance Data Base of the US Bureau of the Census, data from clinics etc. Independent variables were: caloric intake change between 1970 and 1995, change in the protein consumption between 1970 and 1995, change in the urban population

between 1970 and 1995, inequality in the distribution of income measured by Gini coefficient, GDP per capita in real terms (on PPP basis) and real GDP change between 1960 and 1995.

Expectations:

- Calories and protein consumption change is inversely correlated with the prevalence of HIV.
- Gini coefficient and the urban population change are positively correlated.
- Gini is more significant compared to GDP, since it expresses the living conditions of poor and very poor.
- Urbanization support diffusion of virus and its mutations.
- The effect of GDP is not obvious: high and rising per capita income is associated with higher migration, social disruption, and increasing inequality; on the other hand data presented in previous chapters show the connection between bad living conditions caused by poverty and high HIV prevalence.

Results: The increase in consumption of calories and protein is significantly (99,9 % confidence level) and negatively correlated with HIV prevalence. Nevertheless, these two variables are collinear. Therefore the protein consumption was excluded in the ongoing regression. Strong positive correlation between income distribution inequality and HIV prevalence was found. Also urbanization and HIV prevalence are strongly correlated. The relation between GDP and HIV prevalence was inconsistent. The connection between low GDP and low HIV prevalence was not proven. Even the changes in GDP are not significant variable, which can be explained through two factors: a) higher migration, worsening the situation of the poorest people in some countries; b) on the other hand more wealth for health services.

To strongest correlation in medium and low developed countries (range based on the Human Development Index) was between HIV prevalence and change in calorie consumption and Gini coefficient (Stillwaggon, 2002). There is also significant correlation between HIV prevalence and protein consumption and urbanization.

3.4 Structural adjustment policies and HIV

Developing countries are under the pressure of the World Bank and International Monetary Fund to perform structural adjustment policies to enhance growth. Under these conditions some of them capitulated in formulation of health a social policy (Poku, 2002b) and moved emphasis from social justice and equity towards market and efficiency (Shoef, et al., 2000). Because of the large expenditures for health service and health care these are considered to be the main factor threatening public finances and wealth of African countries (Poku, 2002a). Cutting off costs for health services is performed in the time when there is real decline of standard of living, access to health services is poor, drugs are not available (Namposya-Serpell, 2000) Africans are five times more likely to die before they reach five years of age than any other people in the world (Poku, 2002a). It is often said that all the progress of forthcoming forty years is being destroyed.

Poku (2002a) shows, that African economic performance was declining at the beginning of the millennium. Economic growth was not able to keep with population growth, the production of food was declining, and export of food was rising. There were collapses of currencies, official economies decreased and extralegal economies rose (World Bank, 2000, Poku 2002a). It is obvious that poverty has risen and it happened more quickly than in any other region in the world. Poku (2002a) points out that HIV is sexually transmitted disease which causes AIDS, although it must be considered as any other disease in the context of African underdevelopment. Thus considering HIV, structural adjustment of policies which influence poverty should be taken into account, which is often forgotten.

An example is given on the medium term planes (MTPs), which are a leading guide for the leading multilateral donors such as IMF and the World Bank. MTPs are the core for implementation of domestic response to HIV. At the beginning of HIV pandemic MTPs were mainly focused on the response of public health to the pandemic. This means, that they were designed to state the reaction of the domestic health system to coping with impacts of the pandemic. In other words, the main way how multilateral donors fought against the pandemic was not fighting against its sources or conditions which make people susceptible to infection. It was focused on adjustment in health system which cares about infected persons, which is not considered to be an inappropriate measure. The problem is that the MTPs are almost the same these days (Poku, 2002a). Poverty leads to risky social behaviour which makes

organism weaker and more susceptible to infection. Nevertheless, multilateral development assistance is not focused on these aspects. It means that multilateral donors care about impact but not about reasons and sources. HIV/AIDS is treated as a health crisis caused by a hyper sexualized culture, therefore IMF and World Bank can continue with structural adjustment policies, uninterrupted (Poku, 2002a).

It is generally accepted that these programs had no intended effect on economic growth. Moreover, these policies and program worsen the situation of the poorest members of society, e.g. they affected food prices, costs of education and payments for medical services (Schoepf, 2000). Former director of UNAIDS Peter Piot said (2001): “Structural adjustment raises particular problems for governments because most of the factors which fuel the AIDS pandemic are also those factors that seem to come into play in structural adjustment programmes”. At the time of such a statement there is a pressure to cut expenditures on health services in Africa. It can be concluded that in the time of costs cutting it is impossible to take care about patients infected by HIV and perform appropriate preventive measures such as provide proteins, micronutrients etc. The question is if the subsequent costs implied by pandemic will not be subsequently higher than the costs of its prevention.

One of the reasons why African countries are forced to structural adjustment is unpaid debts. For example Tanzanian government, whose expenditures on health provision are about 3,2 USD per person per year, which is a quarter of World Bank recommendation. At the same time it pays three times more on debt service than on health care (Colgan, 2001).

The total African debt was 315 billion USD in 2000 (UNAIDS, 2001), which can be considered low in comparison with 120 billion USD debt of Brazil. But the problem is the ability of debts repayments. African countries can pay off the debt with the use of earnings from export, aid, investments or new loans, since the debt has to be paid off in foreign currency. This problematic can be show on the example of Ethiopia. Its debt was 10 billion USD in 1996 which means 176 USD per person, for comparison European expenditures for ice-cream in 1997 were 11 billion USD (Poku, 2002a). It states that in the absolute terms the debt is not enormous. The problem is the ability to pay off the debt. Ethiopian earnings from import were almost thirteen times lower than the amount of debt. Ethiopia uses 45 % from these earnings for debt payments, although its debt is still unsustainable (Poku, 2002a). In general, Sub-Saharan Africa is the region with the highest HIV prevalence and AIDS

mortality in the world. Nevertheless, out of Sub-Saharan countries only South Africa spends more for health care than on debt service (Poku, 2002a).

In 1996, the Heavily Indebted Poor Countries initiative was proposed by IMF and World Bank. Creditors (both multilateral and bilateral) agreed to cancel about 80 % of external debt of poor countries. Nobody answered question who will pay the debts. The conditions for debt cancellation were structural adjustment policies proposed by IMF or World Bank (Poku, 2002a). The strict conditions were fulfilled only by eight countries in 1998; the actual condition for debt cancellation was not fulfilled. In June 1999, the Heavily Indebted Poor Countries initiative II (HIPC) occurred and it included larger debt relief, but the condition was a good performance in implementation of adjustment policies in the period of three years (Poku, 2002a). If country qualifies, its debt is decreased to “sustainable” level. The question is when will the new funds be provided and how will the debt relief be performed during the time of economic crisis. According to Poku (2002a), debt relief is not sufficient for improving the situation of poor countries.

3.4.1 Case Study – Debt relief in Zambia (Poku, 2002a)

Zambia is one of the countries most affected by HIV pandemic. HIV prevalence in adult population is 15,2 % (UNAIDS, 2008). Life expectancy is about 37 years compared to 54 years a few years ago, and it is expected to get even worse. Qualified persons such as teachers, accountants and civil servants are dying in large numbers that hurt economy heavily (UNESCO, 1996). Barclays Bank of Zambia lost more than a quarter of its senior managers due to AIDS. It implicates additional costs for training and losses in a human capital. Zambia tried to qualify for HIPC initiative. Its external debt was regularly serviced at the expense of social expenditures. Debt service in 1998 was 123 million USD which was 69 % of social sector budget. Some of Zambia’s debts could not qualify for debt relief since they were multilateral and these debts are preferred and exempt, which means they have priority and they can not be cancelled. Zambia continues with HIPC initiative, although the conditions for debt cancellation are structural adjustment policies, which creates a threat that resources needed to tackle the HIV pandemic will be hold for government structural reforms. The question is how a country can evolve without qualified working force and during the pandemic.

3.4.2 Conclusion about Structural Adjustment Policies

Poku (2002a) states that it is quite strange that World Bank (the sponsor of UNAIDS) is supposed to alleviate poverty and HIV infectivity through its funding strategies: “if the only effect of the AIDS pandemic was to reduce the population growth rate [in developing countries], it would increase the growth rate of per capita income in any plausible economic model” (Washington Post, 2000). Which puts up a question: what is worth more, number called GDP or human lives?

According to Poku (2002a), without poverty reduction there is a little progress with virus transmission reducing or creating an enhanced capacity to cope with its social-economic consequences. It is difficult to find the way to accomplish this, but according to her the debt relief is the first step, since in the case when poor countries allocate such an enormous amount of resources to debt service there is no space for investment in health and social services that can stop pandemic.

There is often argument that debt relief is a moral hazard and that it will lead to more risky behaviour of governments. Because of that there are some conditions for governments to qualify for a debt relief. Nevertheless, it is possible to change conditions so that they do not create suitable surroundings for infectious diseases such as AIDS. Otherwise, we prefer short and very limited goals such as a sustainable debt service without taking into account long term impacts on lives of people, thus long run economic performance of the country. It seems that our considerations and evaluation of what is and what is not important is blind and helpless. We prefer some goals just because we can measure them. We forget that all policies, programs, GDPs, investments etc. are worth because of life and not vice versa.

HIV is not just medical problem but also political problem and challenge thus the solution has to be found also within political arena (Poku, 2002a).

3.5 Summary

Africa is the continent with extreme poverty which leads to malnutrition, micro-nutrient deficiency. These two factors along with the climate conditions are fertile terrain for many parasites diseases (e.g. chronicle diarrhoea kills about one million children a year through dehydration and subsequent malnutrition). Parasite diseases and insufficient nourishment weaken the organism, especially its immune system. Weaken organism is more susceptible to

infectious diseases, one of which is HIV. We can conclude that the HIV pandemic in Sub-Saharan Africa can not be explained without the emphasis on the nutrition, hygienic and other living conditions. The sexuality, promiscuity, traditional practices and other social factors can partially explain the pandemic in Sub-Saharan Africa. It is not rare to claim that the pandemic is the blame on Africans for their “primitive practices”, emphasise on ancestry etc. However, these claims are often based on analysis of individual practices without proper statistical data. Poku (2002a) criticised Dr. Shiokawa (2000), who focused the solution of AIDS crises just on changing of sexual behaviour, claims: “Although this view merely reiterates the central thrust of prevention programmes and strategies over the past two decades-which have been dominated by the advocacy of behavioural modification and the encouragement of condom use-there is no empirical evidence to support it.” Therefore we do not have proper evidence that sexual behaviour (especially promiscuity) in Africa is substantially different compared to Europe or the USA. E.g. Nevid (1999) shows that in the Western World there is significant number of unprotected sex which can result in STD, such as herpes-2 and Chlamydia.

AIDS policy is often based on the behavioural change. It has some effect in Europe and the USA but its success in Africa is limited (Stillwaggon, 2002). Stillwaggon (2002) concludes that behavioural prevention is a substantial measure in the fight against HIV, although it is insufficient on its own. Especially the use of condom is less effective in countries where pandemic is the case. It cuts “the cumulative risk of infection” by 36 % (Turshen, 1997). Moreover, condoms are sometimes used less because of weak position of woman in relation.

To compare the costs of improving the nutrition and the cost of condom use (Stillwaggon, 2002):

- Sufficient portion of vitamin A to prevent blindness and other deficiency diseases for one year cost less than one condom.
- Year’s supplementation of vitamin A, iron, and iodine costs less than ten condoms.
- To prevent anaemia and increase disease resistance through iron intake costs about 20 US cents per person per year.

To repeat again: “Prevalence of HIV in Africa is not a special case, but a brutal indicator of the nutrition, infectious, and parasitic diseases that have afflicted African people all along and a precursor of higher rates among similarly marginalised population in the rest of the world”(Stillwaggon, 2002).

3.6 Poverty or sexuality

It is obvious that to fight effectively against HIV it is essential to find the reasons for the pandemic breakout. The two main possible factors that can determine pandemic were discussed. The question is, which one to choose? Social background of pandemic is attractive for many reasons. It shifts responsibility for pandemics totally to African people, culture, traditional habits, society. It says: Africans are guilty for pandemics and Euro-American society is so generous that helps with its enlightened wisdom and mercifully provides condoms, advices, lectures about sexual abstinence etc. The theory is attractive, but not without deficits. As mentioned above, the core researches Caldwell et al. (1989) and Caldwell &Caldwell (1987), who are often quoted by academics or in official materials, are not supported by proper analysis and are often racially biased (Stillwaggon, 2003). In other words different behaviour of Africans became a paradigm which is taken as given for many researches. Stillwaggon (2003) claims that it seems to be unnecessary to perform proper analysis to support the statements if it goes about people living in Africa. Moreover, these works are criticised as racial. They explain normal patterns of behaviour as something barbarian. E.g. Caldwell &Caldwell (1987) say that children are considered as a blessing from God in African society to explain why Africa stays apart from standard societies. Regardless of the fact that the children are considered to be a blessing from God in many non African societies. Actually, fact interpretation is biased according to what we need to prove. According to found facts I find sexuality in the context of social patterns overrated. We can not underestimate the social factors and their importance, although they are not a “golden calf”.

As the evidence of the risky sexual behaviour in Africa, can be used so called “The Actuarial Society of South Africa (ASSA 600, Dorrington, 1998) model”. It was created to forecast the development of South African population and the impact of AIDS on its various segments (Quattek, 2000). The ASSA model which is used here is currently built to reflect the entire population of South Africa. Population is sorted into three distinct age groups:

- young (0-13 years old);
- adult (14-59);
- old (60 years and older);

When persons reach their 14th birthday, they are allocated into the various risk groups, in accordance with the assumed proportions of the population as a whole (Quattek, 2000). The assumption is that none of the prenatal infections will survive until the age of 14. The adult group is divided into four subgroups, differentiated by their level of exposure to the risk of a heterosexual pandemic (Quattek, 2000):

- PRO – Individuals whose level of sexual activity is such that their HIV prevalence is similar to that of sex workers and their clients;
- STD – Individuals whose level of sexual activity is such that their HIV prevalence is similar to that of people being treated for sexually transmitted diseases at STD clinics;
- RSK – Individuals with a lower level of sexual activity but who are still at risk from HIV;
- NOT – Individuals who are not at risk of HIV infections;

There is an assumption of contact both within and between risk groups. *“Instead of modelling the various factors involved during a single sexual encounter, the model uses an average “force of infection” to determine the spread of HIV. The force of infection is a combination of “number of sexual partners”, “number of new contacts” and “ease of infection”. The age and sex of the specific force of infection is then derived by incorporating the relevant sexual activity index for age and sex. Although the sexual activity curve is arbitrarily chosen, it is chosen such that the shape of new HIV infections matches known data”* Quattek (2000). Table 10 shows a structure of population according to the level of risk in their sexual behaviour in terms which were described above.

Table 10: Population structure according to the level of sexual risk behaviour, 2000.

Risk group	Description of risk group	% population	Relative fertility (%)	Probability of HIV + infection per year
PRO	sex workers and clients	1	40	0,85
STD	Treated for sexually transmitted diseases	20	0	0,47
RSK	Normal HIV risk	40	100	0,09
NOT	No HIV risk	39	117	0

Source: Dorrington (1998), ASSA 600 and its A User's Guide; Quattek (2000)

It is evident that the most of the population is at normal or at no HIV risk. 20 % of the adult population is treated for sexually transmitted diseases, which can be evaluated as a result of poor health conditions. Only 1 % of the adult population has very risky sexual behaviour.

The second possible explanation is based on the general poverty in Sub-Saharan Africa, which leads to a virus susceptibility as was described above. This attitude states that actions focused on behaviour are useless without proper emphasise to nutrition, hygiene etc. This attitude is problematic since the fight against poverty in Africa takes place for decades and there are no expressive results. The access is more complex, thus probably more effective, although its performance is for the long run. According to some literature (Stillwaggon, 2003) it is possible and cheap to provide additional micro-nutrient to strengthen immunity. These measures should be a part of prevention measures, but defeat of poverty is more complex question.

4 The economic impact of HIV pandemic

4.1 Theoretical approach

4.1.1 Alternative approach to Solow's model

According to Barnett and Clement (2005), a quantitative economic analysis of the HIV/AIDS impact at the macro level of affected poor countries suggested that the disease has an insignificant effect on growth of per capita income and on other key macroeconomic indicators. According to them, this is the consequence of almost exclusive focus on standard economic indicators on which depends the economic growth of the population and the rate of

investments. Nowadays the traditional approach based on standard Solow's model is viewed as insufficient and inappropriate. Significant theoretical attempt to formally analyse the impact of HIV/AIDS is Bell's et al. paper (2004) "Thinking about the long-run economic costs of AIDS".

The basis of Bell's et al. (2004) is to evaluate the impacts of pandemic in the long run. They claim that HIV differs from various diseases in the fact, that it affects mainly young adults in the productive age. Most of such youths are parents with children. It means that children's ability to grow into capable and productive citizens is worse. This is caused by family's need to allocate finance to health care, not for education, and when the parents die, children have very limited source of finances for schooling (there are limited tax sources or nobody to pay school fees). Moreover and probably more significantly, there is often nobody to provide love, knowledge, and guidance that complements formal education, thus HIV does not destroy just existing capacities and abilities (human capital), but also the mechanism through which human capital is formed in the next generations (Bell et al. 2004). An impact of such damage of human capital will be visible in decades. HIV/AIDS could be also considered as a potential generator of poverty and inequality (Bell et al. 2004). It is caused by adult mortality, which leaves some children without support (psychical and financial) of their parents and other with such a family background. According to them, for proper analysis of these facts Solow's model is unsuitable. It is more suitable to use the overlapping generation model (OLG).

4.1.2 The basic idea of Bell's et al. (2004) Model

Family is considered as the main economic unit where parents decide if they allocate their resources for family's consumption or children education. The amount of these resources is substantially determined by parent's level of human capital, their survival rate during childhood, school years. Children can also contribute to these resources through substitution of school attendance for labour. The investment into children's human capital (through school attendance) depends besides family's resources also on:

- The strength of the parent's altruism. It means the willingness of parents to forgo some current consumption in favour of investment into their children's schooling, in other words the willingness to invest into children's human capital.

- Efficiency of transformation of schooling into the human capital. This efficiency is determined by the quality of school system and child's upbringing within the family (it is supposed to be influenced by parent's human capital).
- The returns of the investment into any child's human capital are destroyed if the child dies prematurely in adulthood. It implies the expected returns to education of child to be dependent on parent's subjective assessment of the probability that their children will meet an untimely death.

At the end of each generation the surviving adults die in an "old" age and children become adult thus the circle continues.

Dynamic elements of the model:

The present generation's levels of human capital, premature adult mortality in the present generation and present expectations concerning premature adult mortality in the future play a key role in determining the level of human capital which the next generation obtains. This dynamic system can attain several equilibriums and exhibit multiple levels of behaviour. In the case when parents are too poor, they are not prepared to invest into their child's human capital. It means that poverty can perpetuate itself. Considerably higher level of human capital affluences will yield a fine upbringing and education. Poverty trap and dampened accumulation of human capital can be caused by high level of premature adult mortality. "The outbreak of a pandemic may even pitch what was a growing system into the widening jaws of a poverty trap" (Bell et al. 2004).

Authors also incorporated a social response to premature adult mortality into their model. Common African response to such a challenge is fostering and adoption within the circle of kinship. It is considered as a pooling arrangement to deal with the individual risks of premature adult mortality as a factor which determines the rearing of children and hence a well-being of society (Bell et al. 2004).

4.1.3 The implication of Bell's et al. (2004) Model

The model describes what happens when a hitherto unknown disease brings a dramatic increase in the premature adult mortality. Firstly, very little happens since infected show no symptoms. After some time they start to sicken and die. Survivors start to revise their assessments about their children's life expectancy. There is enormous number of orphans left after the first wave of deaths. Because of the character of AIDS, infection of one partner

implies almost certainly the infection of the second partner. It means that the number of full orphans will rise dramatically. The proportion of adults surviving into old age will fall with adverse effect on current sources and with damaging effect on accumulation of human capital. Moreover, there will be a decrease in expected returns from investment into education. The authors claim that this fact can lead societies enjoying so to sustainable growth into poverty. In other words AIDS pandemic is capable to lead economy into a downward spiral in three or four generations. Study than argues that the way to stop harmful effects of AIDS on human capital accumulation are government and municipal policies targeted on education and support of families or orphans, so that they can afford to attend schools.

4.2 Microeconomic impact of HIV

4.2.1 Households

Family is considered as the basic economic structure of society. That is the reason why I consider the impact of HIV on the welfare of household (family) to be the basis for any evaluation of HIV economic incidence. The problem is that the research in this subject is still insufficient according to Yamano and Jayne (2004).

Haacker (2004) sees these impacts of HIV on family wellbeing:

- Decline of income through illness or death of breadwinner
- Reallocation of income to healthcare for ill member of family
- Reallocation of time from income generating activities to health care activities
- Higher vulnerability of households to income changes

In Table 7 Epstein (2004) shows the increase of dependency ratio because of HIV. It shows that adults in productive age have to allocate bigger share of their income to care for orphans and old people who are without support of their relatives, because these have died from HIV. Morris and Cheevers (2000) show that HIV leads to increased absenteeism in work and Rosen et al. (2004) claim the decrease of income of the workers infected by HIV.

Yamano and Jayne (2004) performed research in 22 Kenyan districts, where they researched situation of 1422 households between 1997 and 2000. Their goal was to explore the impact of adult mortality on composition, farm production, asset holdings, and off-farm income of households. They found these main findings:

- Comparing HIV related deaths there is a difference in a level of income deceased persons' based on gender. In the survey from 1997 they claim that half deceased man in the working age were from the highest income quartile. Although women deceased in the working age were divided more equally through income classes. It shows that man's sexual risky behaviour is not negatively correlated with the level of income as it is often claimed about woman.

- Adult mortality is region related. It means that in some regions households are affected relatively more by pandemic compared to the rest of Kenya. We can conclude that HIV prevention measures should be focused regionally.

- The number of deceased family members depends on a gender of the first member who was infected. Concretely woman as the first infected member means more deceased persons in the family. One of the possible explanations can be seen in the mother to child transmission.

- Exploring the impact of mortality on crop production (as one of the core product of rural regions which were the place of research), the effects are sensitive to gender. The death of a man between 16 to 59 years of age means in average 68 % decline in the net value of the household's production of crop. This is surprising if we consider the higher amount of labour allocated by woman to crop production. Authors explain this apparent paradox by higher human capital of males who are able to produce more demanding kinds of crop, are more experienced in marketing etc.

- Households compensate the lack of income caused by a death of its member by selling its assets, mainly small animals.

- It is reasonable to claim that households are not capable to compensate the decrease of income due to a death of its member, at least during the three years of research.

- The significant negative correlation between the decrease of household's labour force and the level of crop output can be observed in the lower 50 % of households ranked on the base of productive assets. It means that relatively wealthy households are more capable to face up to a death of its family member.

In conclusion, authors state that they have analysed the short run effects of HIV on households. These affects are considered as eroding the livelihood of many households,

although the poor households are affected the most seriously. However, the study is focused on short run effects according to researchers, long terms impacts need longer observation of households' situation.

4.2.2 Labour productivity

The key study focused on HIV/AIDS impact on labour productivity is “The impact of HIV/AIDS on labour productivity in Kenya” performed by Rosen et al. (2004). They performed the research between 1997 and 2002 in western Kenya. The research was focused on tea production with output measured in kilograms of tea plucked. The studied group were 54 workers who died or were retired because of AIDS compared with their co-workers on the same field and at the same time period. Rosen et al. (2004) found that HIV positive workers plucked less in 18 mounts preceding their termination from work (adjusted from age differences and environmental factors). Moreover, infected workers used between 9,2 and 11,0 more sick day leaves, 19,9 and 11,8 more casual leave days, 6,4 and 8,3 more annual leave days, and spend 19,2 to 21,8 more days performing less physically demanding work in the 2 years preceding their termination. The decrease in productivity was exposed in earnings. If we take a look on marginal data, the average tea pucker is the last year on the job about 87 % more often absent from work, spend about 67 % more days doing less demanding work, and plucks about 17 % less tea compared to other tea pluckers. Rosen at al. (2004) found that infected workers have earned 16 % in the second year and 17,7 % in the last year preceding their termination.

4.2.3 HIV/AIDS and private enterprises

“AIDS is destroying the twin rationales of globalization strategy: cheap labour and fast-growing markets”. Rosen et al. (2003)

Rosen et al. (2003) focused in their research on the cost of HIV/AIDS for international enterprises. They have constructed the list of the cost for countries operating in countries affected by AIDS.

Rosen et al. (2003) carried out the research between 1999 and 2001 in six companies in South Africa. Each company was from different branch of economy: mining, metals processing, utilities, agribusiness, retail and media. The companies' size was from 500 to 35000 employees and 35 million and 3,4 billion USD of sales. They have performed voluntary testing and found HIV prevalence in researched companies was from 7,9 % to 29

% . The mining, metal processing and agriculture were affected the worst, followed by retail, media and utility. There was a difference between workers (both unskilled and skilled) and superiors (including managers). Workers were two to three times more likely to be infected (Rosen et al. 2003).

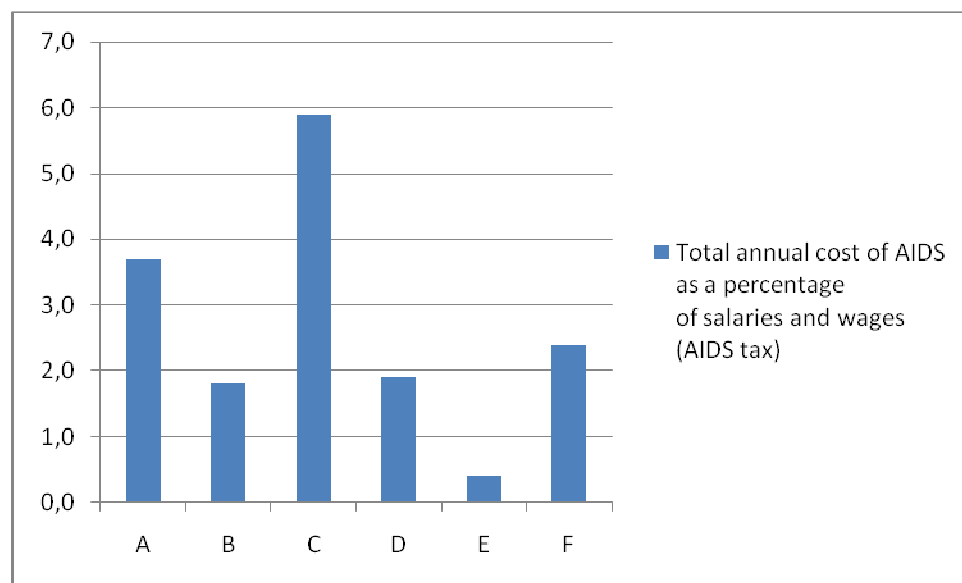
Researchers calculated AIDS related costs for studied companies. Their findings are shown in following table.

Table 11: List of business HIV/AIDS related costs.

	Direct costs	Indirect costs
From one employee with HIV/AIDS (individual costs)	<ul style="list-style-type: none"> • Medical care • Benefits payments • Recruitment and training or replacement worker 	<ul style="list-style-type: none"> • Reduced on-the-job productivity • Reduced productivity due to employee's absences • Supervisor's time in dealing with productivity losses • Vacancy rate until replacement is hired • Reduced productivity while replacement worker learns the job
From many employees with HIV/AIDS (organizational costs)	<ul style="list-style-type: none"> • Insurance premiums • Accidents due to ill workers and inexperienced replacement workers • Costs of litigation over benefits and other issues 	<ul style="list-style-type: none"> • Senior management time • Production disruptions • Depressed moral • Loss of experienced workers • Deterioration of labour relations

Source: Rosen et al. (2003)

Graph 7: Total annual costs of AIDS as a percentage of salaries and wages (AIDS tax).



Source: Used data from Rosen et al. (2003)

The highest costs prevail for a mining company (the highest HIV/AIDS). However, the second highest costs are for company acting in utilities, where was the lowest HIV prevalence in working force. It clearly shows that HIV related costs are not affected just by the HIV prevalence but also by the qualification of infected labour force. We can reasonably expect that in utilities there will be more qualified labour force compared to mining, thus qualification of labour force is substantial factor in HIV related costs. We get the same result if we analyse the costs and HIV prevalence in agribusiness and metal processing.

Rosen et al. (2003) then focused on the prevention and treatment activities. Costs that were discussed above and benefits listed below are cuts of costs. In other words, company benefits if the reduction of costs is bigger than the expenditure needed for such cost reduction. They found that if company provides education, counseling and treatment of other sexual transmitted diseases, prevention strategies can help. There are differences in various branches of economy. As was mentioned in previous sections, workers who perform their job far from their homes are more vulnerable to HIV. Rose et al. (2003) quoted a case of one South African mining company where prevention strategies cut HIV infection by 50 %. They conclude that in studied sample of six companies it is worth to invest into prevention strategies and even in the case of low wage companies the prevention strategies were positive. Last part of research was focused on treatment measures. The results are shown in the following table.

Table 12: Possible AIDS related costs reduction in researched companies sorted by economic branch.

	utility	agribusiness	mining	metal processing	retail	media
Potential reduction of AIDS related costs due to treatment program (percentage)	32,5	5,5	15,7	8,9	0,8	40,4

Source of data: Rosen et al. (2003)

For all six companies the investment in treatment of HIV infected workers was a beneficiary step. Authors claim that taking HIV into account matters not just for companies doing business in Africa, but Africa can be a warning for the rest of the world. They conclude with statement that HIV: *“prevention and treatment will pay off in financial terms for most companies, making workforces more productive and less expensive. Investing in such programs will also provide the intangible benefits of generating goodwill and raising the*

corporation's prestige. Not only is AIDS your business; fighting it also makes good business sense."

4.3 Macroeconomic effect of HIV/AIDS pandemic

4.3.1 Effect on economic performance

Quattek (2000) tries to evaluate the impact of HIV pandemic on GDP of South Africa. Her attitude is based on the pandemic impact on labour force. The research firstly shows the model if the demographic changes based on HIV with emphasis on various levels of qualification of labour force. Secondly, it uses the demographic projection to evaluate the impact of demographic changes on long term economic forecast. In the research demographic model Actuarial Society of South Africa (ASSA 600, Dorrington, 1998) was used and in compliance with the model author forecasted the impact on labour force and distinguish No-AIDS and AIDS-inclusive scenario. According to Quattek (2000), the HIV prevalence in labour force varies among highly skilled, skilled and semi- and unskilled workers. E.g. in 1999 HIV prevalence of highly skilled workers was 10,2; skilled 15,5; and semi- and unskilled 19,9. The relation of infected skilled to highly skilled was 1,5 and ratio of semi-and unskilled to highly skilled was 2. The model predicts that in 2015 the HIV prevalence will be 9,3 for highly skilled; 20,2 for skilled and 32,6 for semi-and unskilled. The relations of skilled to highly skilled and semi-and unskilled to highly skilled will be 2,2 respectively 3,5. As we will see these relations have significant effect for HIV/AIDS impact on GDP.

Based on the demographic forecast author constructed a macroeconomic forecast. The forecast is based on these assumptions (i.e. canals through which HIV/AIDS will affect economy):

- Labour supply and productivity: in heavily affected population, such as South Africa, the AIDS - related deaths will decrease the labour force. As Quattek (2000) points out, there is 30 % unemployment in South African. It means there is a surplus in the labour marker. It can be concluded that the workers who are unable to work or die due to AIDS can be easily replaced. However, the cost of this replacement has to be taken into account. In the case of unskilled workers the cost is not high. Quattek (2000) claims, that there is a shortage of skilled and highly skilled labour force and as we have seen in the demographic model, skilled and highly skilled workers will be

affected as well. The productivity of workers was incorporated into the model through the relation of highly skilled, skilled, and semi - and unskilled workers, which is 1,91:1:0,65 and the percentage of these groups in the total labour force. Autor than incorporated lower productivity based on absenteeism as was discussed in section 3.2.2.

- Next channel is the increase of remuneration costs. Quattek (2000) expects that employees will demand higher remuneration because of AIDS. The reason is the need for earlier retirement payments, health care for family members etc. Consequently this model expectations will transfer some remuneration costs to consumers via producer price index, some extra cost will be financed by operating surplus.

- Third channel is the household demand decrease because of: lower wage income; the decrease in overall population which affects aggregate demand; a transfer of income to health care.

- Fourthly to government expenditures, since government will have to (or should have to) pay the medical bills for the poor.

For long-term macroeconomic prediction Quattek (2000) used WEFA's long-term macromodel which is trend scenario. It is a mixture of two attitudes. In the first approximately three years of projection the results are based on demand projections. Technology and resources are considered as constant. In the second part, from 2002 to 2015, forecast is based on supply factors such as labour force participation, productivity growth, population growth fiscal and monetary policy, regional and international trade (Quattek, 2000).

Here are the results of macromodel. Constant price GDP is expected to be an annual average 3,1 % lower in 2006 - 2010 if we compare AIDS and no-AIDS scenario; in 2011 – 2015 it is going to be 4,7 % lower on annual average basis (Quattek, 2000).

Table 13: The impact of HIV/AIDS on GDP and components of consumption expenditures

	Real GPD* %	Growth (% point diff)**	Real household disposable inc* (%)	Growth (% point diff)**	Real % consumption expenditure (%)	Growth (% point diff)**
2000	0,7		-1		-0,6	
2001	-1	-0,3	-1,3	-0,4	-0,8	-0,3
2002	-1,2	-0,2	-1,7	-0,5	-1,2	-0,4
2003	-1,4	-0,2	-2,1	-0,4	-1,5	-0,3
2004	-1,6	-0,2	-2,4	-0,4	-1,9	-0,4
2005	-1,9	-0,3	-2,8	-0,4	-2,4	-0,5
2006-2010	-3,1	-0,4	-4,4	-0,6	-4,7	-0,8
2010-2015	-4,7	-0,3	-5,8	-0,2	-8,4	-0,8

*Real % difference between AIDS and no-AIDS scenarios, not YoY growth rate differences

**Difference between the YoY rates in the AIDS and no-AIDS scenario

Source: WEFA; (Quattek, 2000).

BER (2001) claims that GDP per capita can increase in some cases. In its focus on South Africa the research found that in 2010 the GDP per capita is about 8 % lower in comparison with no-AIDS scenario and also non-health and non-food expenditures are declined by over 10 %. It means that less people are left with less resources and more resources are allocated on health and food (BER, 2001). In other words, the space for economic development is narrow.

With reference to Quattek (2000), there will be also impact on investment. E.g. gross domestic fixed investment should be about -1,1 % lower with AIDS compare to without AIDS scenario. In the model capacity utilization should not change between 2011-2015 and in this period there is estimated decrease in inventories; government revenue should decline about 4,1 %; government expenditures decline about 2 % between 2011 - 2015. Model also predicts the impact on savings which is evaluated to be -23,6 % for private, -22,7 % for public, and -7,1 % for corporate savings between 2011 - 2015. Pandemic also affects international trade through decline of imports and slight increase of exports.

BER (2001) claims that from 1970s to 2000 there was a very poor job creation for unskilled and semiskilled workers, combined with increased number of labour force in these categories. One of the possible explanation is seen in the rapid growth in remuneration of these labour categories. BER (2001) argues, that AIDS is going to drive growth rates of labour supply of unskilled and semi-skilled labour to almost zero. At the same time, AIDS

declines economic growth in sectors which are demanding unskilled and semi-skilled labour, especially construction and equipment sectors. Because of these factors unemployment is supposed to persist in high numbers. The only way from unemployment is reportedly rapid economic growth in sectors which demand the kind of labour mentioned above and this growth can be supported by remuneration reduction.

To sum up, we have to consider the relationship between unemployment and GDP. As mentioned above, there is a surplus of labour in South Africa (Ber, 2001; Quatteck, 2000). An employee dying of AIDS can be replaced by formerly unemployed person. In such a situation there are cost of the replacement, mainly the training of the new employee. However, there are no significant costs related to the production, since if the training of the new employee is helped at the right time, this employee can replace the dropped out employee immediately. In other words the production process is almost intact by dying of employee under the condition of high unemployment. If we use standard features to evaluate the economic hardly affect the variable which measures the economic performance of the country.

The costs depicted in standard economic quantities are: In the previous section the costs related to a death of HIV positive employee were discussed. Mainly these are connected with the human capital, it means with money invested into an infected employee, the money needed for a new employee training and moreover, there are costs related to health care, lower productivity, lower savings etc. A number of human capital costs depends on the level of human capital of infected person (Quatteck, 2000).

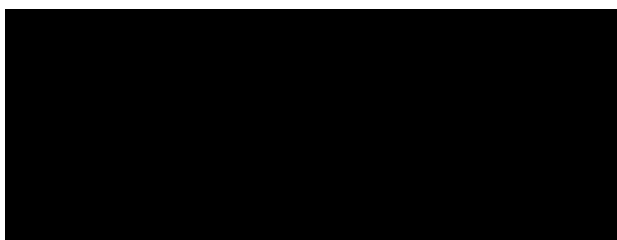
GDP is used as a standard measure of economic performance of the country. We can derive that GDP is the inappropriate way to measure an impact of HIV/AIDS on peoples' being.

4.3.2 Impacts on welfare

Crafts and Haacker (2004) claim that aggregate indicators such as GDP are not able to incorporate changes in income distribution. Poor households with small fraction of GDP creation are affected the most by the decrease of income etc. The attempt to eliminate insufficiency of GDP measure of welfare, is the creation of Human Development Index, which incorporates income per capita, attained education and life expectancy with equal weight. Craft and Haacker (2004) say the most direct welfare effect associated to HIV is because of high mortality. They use the concept of value of statistical life (VSL) which is

based on differences in wages between employment categories and differences in mortality risk. It says that the wage differences show the willingness to pay for decreased mortality risk. Their attitude is unique since no significant study calculates VSL for Sub-Saharan Africa. Crafts and Haacker (2004) developed a model evaluating welfare on the basis of income and life expectancy. They use data from International Programs Centre (IPC) of the U.S. Census Bureau. As an example, the impact of HIV/AIDS on life expectancy at birth in 2004 is shown.

Table 14: Life expectancy at birth, 2004.



Source: UNAIDS (2004), U.S. Census Bureau, International Data Base; Craft and Haacker (2004)

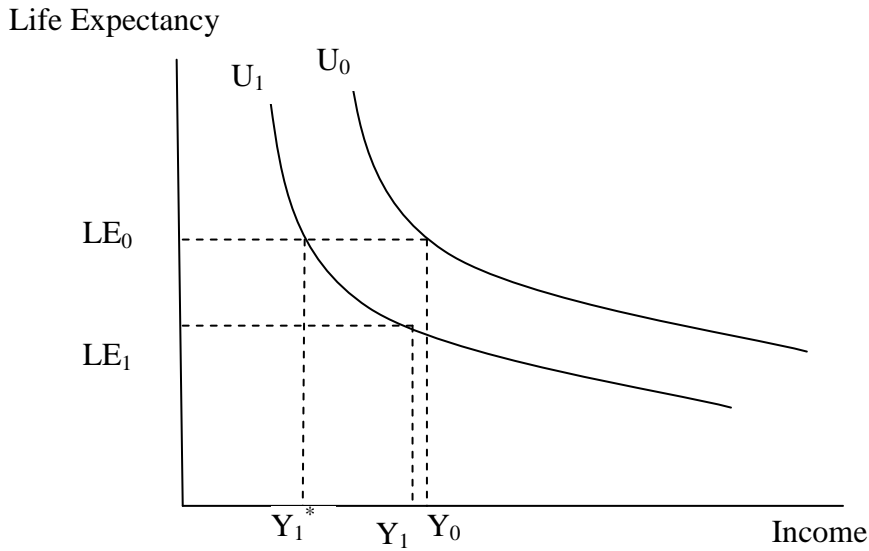
Moreover there is an impact to mortality rates. Crafts and Haacker (2004) adopted the VSL based on GDP per capita (not on wages). Their estimations are build on “the link between life expectancy and equivalent change in income”, using the VSL from equation

The proposed outlook of life as a utility function:

$$U = F(Y, LE) \quad (1)$$

It means the Utility from life is a function of annual income Y , and life expectancy LE . Because of HIV/AIDS pandemic, there is decline in income and also decline in life expectancy. They argue that economists mainly focus on the decline in incomes (which might be insignificant) but they do not take into account the “possibility that most of the welfare loss comes from the decline in life expectancy, not the decline in income”. That is why Crafts and Haacker (2004) measure the welfare loss caused by HIV/AIDS as the decline in income ($Y_I^* - Y_0$), that for a given life expectancy would yield the same level of welfare as the actual changes in income and life expectancy because of HIV/AIDS. The situation is demonstrated in the Graph 8.

Graph 8: Impact of HIV/AIDS on Welfare Accounting for Changes in Life Expectancy



Source: Constructed according to Crafts and Haacker (2004)

Where Y_1^* can be calculated as:

$$F(Y_1^*, LE_0) = F(Y_1, LE_1) \quad (2)$$

For explicit function expression, see Crafts and Haacker (2004).

Taking into account life expectancies in Table 14 (associated with mortality rates) and equivalent change in income, they used the concept of VSL as a percentage of GDP per capita to calculate the impact of HIV/AIDS on welfare.

The selection of their findings is listed in the Table 15.

Table 15: Estimated Welfare Effect of Increased Mortality in Selected Countries as a percentage of GDP per capita.

Country	Based on decline in life expectancy	Based on decline in discounted life expectancy
2004, aggregate		
Bostwana	-88,9	-92,9
Cote d'Ivoire	-37,3	-43,5
Ethiopia	-25,3	-30
South Africa	-69,6	-76,9
Zambia	-68,8	-75,1
projected 2010, aggregate		
Bostwana	-89,5	-93,4
Cote d'Ivoire	-40,2	-46,9
Ethiopia	-29,7	-35,1
South Africa	-75,5	-82
Zambia	-67,3	-74,1

Aggregate = average of welfare losses by age group, with age groups weighted by survival rates.

Source: Calculations of Crafts and Haacker (2004).

Table 15 clearly shows the serious effect of HIV/AIDS on welfare of the affected countries. In comparison with the impact on GDP, it is much more noticeable. It can be concluded that GDP does not constitute appropriated measure for welfare. I claim it is misleading to use the indicator which takes just the amount of annual production for measuring the welfare of nations into account. As was shown in the previous section, it is possible the GDP per capita is rising at the same time that hundreds of thousands people within the country are dying. GDP measures just the level of production; the question is why we use it as the main goal and the idol nations' and individuals' lives. The possible explanation is so called "fascination by gauge" (Vácha, 2009), when we have tendency to care about measureable indicator and do not take into account the core and the purpose of our (human) activity.

5 Solution of the pandemic

The massive HIV pandemic occurs in Africa for decades. There was a lot written about the possible solutions and some attempts to solve widespread AIDS related death were done. The debate about solutions is very heated, with a great deal of prejudice. A common opinion

in western world comprises the concern about “African culture”. This attitude represents e.g. Dr. Shiokawa (2000): Africans should “restrain their sexual cravings” or should change their sexual behaviour. “When I was finding the data and discussed with some economist or people from medicine branch there was often mentioned the word “culture.” The question “Why Africa?” was answered by “You know, probably culture,” usually without deeper knowledge. Besides prejudice there is an involvement of condom producers, antiretroviral drug business, churches, humanists etc. Stake is money, ideas, doctrines, racism. The problem is, it is very difficult to find the truth and to fight for it”.

Based on the studied sources I claim that there is no reason to consider Africans to practise sexually risky behaviour on the level explaining the high HIV prevalence, this statement can be supported e.g. by Stillwaggon (2002) or Dorrington (1998), ASSA 600 and its A User’s Guide; Quattek (2000). Heterosexual intercourse is the dominant way of transmission in Africa. However, there is no evidence that Africans behave sexually so risky that this behaviour can explain high HIV prevalence itself. We have to consider protein, calories, micro-nutrient intake, hygiene and other epidemiological factors. Nevertheless, it does not say much about the optimal solution of the pandemic. As was mentioned above, the way from poverty is a long run process. Stillwaggon (2002) argues the intake of some vitamins with micro-nutrient value is not expensive comparing to condoms distribution. However, wider solution of poverty seems to be more complex, complicated and at current attitude long run task. Under these conditions I consider strategies for sexual prevention to be significant and relevant. Here I add that Africans should become more responsible than Europeans or North Americans in many ways, if pandemic will be stopped.

To simplify, there are two main possible courses in prevention strategies. One is responsible sexual behaviour based on faithfulness, avoidance of premarital and extramarital sexual practices. It can be called the way of responsible choices. The second course is based on following the western pattern of sexual life. Where there is not high emphasise on faithfulness, promiscuity is not considered as something abnormal. In the second course the main prevention strategy of HIV prevention is a condom distribution.

5.1 Condom distribution

This attitude is based on changing the sexual behaviour of Africans. They should behave responsibly in the way that they use condoms. The social change in behaviour is seen in

strengthening the position of women in African society. In other words women should be able to negotiate about sexual behaviour, be able to persuade their partner to use preservative. There are guides for teachers how to educate girls in negotiation, women are advised to ask partner about his former sexual life. There is a distribution of preservatives for free or at subsidised prices. There are information campaigns about sexuality, condoms etc. Some concrete measures can be found in UNAIDS (2008).

The question is how this attitude works. There is still increase in absolute number of HIV prevalence in Sub-Saharan Africa. The percentage of infected adult population is decreasing but this can be considered as a statistical illusion as was discussed in the first chapter of this thesis. From medical and epidemiological point of view there is a significant work of Green et al (2006). They were exploring the development of HIV prevention in Uganda. At the beginning of 1990s the HIV prevalence in adult population was about 15 %, fell to 4 % in 2003 and in 2007 prevalence was 7 % and it is supposed that incidence was the highest at the end of 1980s (Measure DHS 2005; Mikolášik, 2009). Green calls it “miracle” of HIV prevention in Uganda. In GPA survey in the population of single men of the age from 15 – 24, the premarital sex declined 60 % in 1989 and 23 % in 1995 (Kaleeba et al., 2000; Marum, 2002; Wilson, 2004). Now what were the prevention measures in Uganda? According to Mikolášik (2009) the prevention was based on national pride. The prevention campaign included access to information, education and mainly attitude which led people to change their behaviour, including motivation for such change. The campaign was lead mainly by face to face communication in communities, not through billboards (Allen and Heald, 2004; Stoneburner and Low-Beer, 2004; Wilson 2004). In 1989 there were 15 % of men who mentioned 3 or more irregular partners in previous year; in 1995 the number was 3 % (Bessinger et al., 2003). According to Epstein (2004), the condom advertisement did not play a key role and its role was definitely lower compared to other countries in Southern and Eastern Africa.

At the beginning the reason for condom rejection was the indifference of president Meseveni and other leaders, later condoms were incorporated into the strategy but as a last change, when the strategy of abstinence and strategy of faithfulness to a regular partner (husband and wife) fails (Kaleeba et al. 2000; Mikolášik, 2009). It is possible to be infected by HIV even by condom use, which is a significant fact of the campaign. According to Green et al (2006), indifference to condoms helped to change sexual behaviour of people. Allen and

Heald, (2004, p. 1151) say “In Uganda, the fact that condoms were not initially introduced and also the president’s negative attitude towards them, played a part in the social acceptance of sexual behavioural change messages.”

Based on the case of Uganda, we can conclude that fundamental change in sexual behaviour is possible (Mikolášik, 2009). Model and epidemiological studies show that significant reduction in the number of partners had a significant impact on HIV prevention in Uganda and reduction of HIV infection in the whole population of Uganda (Auvert and Ferry, 2002; Bernstein *et al.*, 1998; Robinson *et al.*, 1995; Auvert *et al.*, 2000, Mikolášik, 2009).

(Wilson, 2004:894) quotes the researcher in Zimbabwe David Wilson: “Partner reduction is good epidemiology, not good ideology.”

5.1.1 Condom successfulness

Next question is how successful are condoms in HIV prevention. The answer on this question is not obvious. Cardinal Lopez Trujill (2003) finds in his study that latex, which condoms are made of, has pores, thus the 15 – 30 % ineffectiveness. As a response to this statement, there was a research performed by BBC in San Francisco called “BBC Panorama program” and they found that if 100 healthy people have sex with infected persons, just one of them is infected by HIV. Here we should consider Stillwaggon (2009) and take into account that probability of HIV infection through heterosexual intercourse is significantly higher for persons with insufficient nutrient, micro-nutrient, hygiene etc. In other words it is not possible to apply the “BBC Panorama program” on the situation of Africa. According to Mikolášik (2009), efficiency of condoms in preventing other sexually transmitted diseases is between 60 and 95 %, studies from 2006 find 80 % efficiency. We can conclude that condoms are not 100 % safe prevention measure against HIV transmission and definitely not in Africa. Moreover, as Dr. John Riches said for The Lancet, the prophylaxis of condoms against HIV is unique. However its efficiency is weakened by stimulating “risky behaviour” or as the economists say, condoms can enforce moral hazard. If it is said that condoms protect infection safely, we encourage people to behave irresponsibly and in case of condom failure or in case of high partner change there is a higher probability for people not to use condoms.

5.2 Holistic approach

The second possible approach to prevention can be called a holistic approach. In other words it says that HIV pandemic can be solved only if we adopt strategies targeted on the whole human being. It is based on formation and education, solving the background of pandemic such as poverty, unequal distribution of income, discrimination etc. I will introduce this attitude on several levels. Firstly I will show general attitude to human progress with the use of the Pope's Benedict XVI statements. Secondly I will introduce measures proposed by Association of Member Episcopal Conferences in Eastern Africa. Thirdly approach of Salesians of Don Bosco as a congregation focused on youths. Finally we will discuss one concrete project in South Africa.

5.2.1 Human development

Here I will quote the Pope Benedict XVI since he resumed some aspects of the teaching of the Catholic Church in one interview (2006) quite briefly. Question: *"Holy Father, my question is linked to that of Fr von Gemmingen. Believers throughout the world are waiting for the Catholic Church to answer the most urgent global problems such as AIDS and overpopulation. Why does the Catholic Church pay so much attention to moral issues rather than suggesting concrete solutions to these problems that are so crucial to humanity, in Africa, for example?"*

Answer of the Pope Benedict XVI: *"So that is the problem: do we really pay so much attention to moral issues? I think - I am more and more convinced after my conversations with the African Bishops - that the basic question, if we want to move ahead in this field, is about education, formation. Progress becomes true progress only if it serves the human person and if the human person grows: not only in terms of his or her technical power, but also in his or her moral awareness. I believe that the real problem of our historical moment lies in the imbalance between the incredibly fast growth of our technical power and that of our moral capacity, which has not grown in proportion. That is why the formation of the human person is the true recipe, the key to it all, I would say, and this is what the Church proposes. Briefly speaking, this formation has a dual dimension: of course, we have to learn, to acquire knowledge, ability, know-how, as they say. In this sense Europe and in the last decades America have done a lot, and that is important. But if we only teach know-how, if we only teach how to build and to use machines and how to use contraceptives, then we should*

not be surprised when we find ourselves facing wars and AIDS epidemics; because we need two dimensions: simultaneously, we need the formation of the heart, if I can express myself in this way, with which the human person acquires points of reference and learns how to use the techniques correctly. And that is what we try to do. Throughout Africa and in many countries in Asia, we have a vast network of every level of school where people can first of all learn, form a true conscience and acquire professional ability which gives them autonomy and freedom. But in these schools we try to communicate more than know-how; rather, we try to form human beings capable of reconciliation, who know that we must build and not destroy, and who have the necessary references to be able to live together. In much of Africa, relations between Christians and Muslims are exemplary. The Bishops have formed common commissions together with the Muslims to try and create peace in situations of conflict. This schools network, dedicated to human learning and formation, is very important. It is completed by a network of hospitals and assistance centres that reach even the most remote villages. In many areas, following the destruction of war, the Church is the only authority - not authority but structure - that remains intact. This is a fact! We offer treatment, treatment to AIDS victims too, and we offer education, helping to establish good relationships with others. So I think we should correct that image that sees the Church as spreading severe “no’s”. We work a lot in Africa so that the various dimensions of formation can be integrated and so that it will become possible to overcome violence and epidemics that include malaria and tuberculosis as well.”

5.2.2 Proposed measure for Africa

Here I would like to introduce some measures proposed by Association of Member Episcopal Conferences in Eastern Africa, published in a declaration in 2005 in Uganda. Among other things it suggests so called holistic care. Particularly it says that pandemic should be solved through spiritual, physical, psychological, social and material measures focused on human being and also to communities. Next features are (AMECEA, 2005):

- Solidarity with people living with HIV, protecting the human dignity.
- The role of media: Media should play vital role in prevention. They should educate people, promote counselling about HIV, and good family values, enhance the positive appreciation of human sexuality and chastity.

- Nutrient: Governments are called upon promoting sustainable agriculture to develop, protect, and preserve indigenous seeds, the soil and the environment. To goal is to secure healthy natural food and fruit.

- Stand by affected people: not all the problems and question can be answered and solved.

- Integral Sexuality: The declaration says that “sexuality is a precious gift from God our Creator to every man and woman”. Thus it calls for using sexuality as a gift not as a pure “flash” or commodity. That is why parents, teachers and pedagogues are called to speak about the value of sexuality, chastity, and fidelity.

- Church leaders are encouraged to perform advocacy in the favour of affected persons to secure financial and all the other care.

- It is necessary to secure sustainability of HIV prevention measures.

- Approach should be based ecumenically and cooperation between churches should be established: To success in prevention it is necessary to create networks. It can lead to mobilization of resources and avoid duplication.

- The Church should create new policy in stronger emphasise on education, formation and information.

- Besides positives effects of globalization, declaration sees also negative features. It criticises that globalization took away and stifled local ownership and economic initiatives. It should lead to creating a gap between the low number of rich people and the poor majority. Moreover, there is promotion of pornography in all types of media, which corrupts youths and children and leads them to higher HIV vulnerability. As a threat is also considered commercialization of sex.

- Debt cancelation and real development assistance: There should be debt cancelation for poorest countries so that resources needed to combat HIV/AIDS are available.

The declaration ends with rejection and condemnation of negative prediction about future marginalization and “black” future of Africa. As an example Uganda is given.

5.2.3 The challenge for education

Bishop of Port-Louis (Mauritius) spoke about the role of education during his Christmas message in 2005.

“Today, many parents and teachers are afraid that the lifestyle young people are living will lead them to be infected with AIDS. So they tell them: ‘Take precautions, use a condom. They are given free, they are given out in schools, in night clubs, at feasts, etc.’. This recommendation is made by adults who are aware of the problem. Nevertheless we have to reflect on the consequences that in fact this recommendation, given with the best of intentions, provokes. Some research has been done in Southern Africa by organisations that have been surprised to see the disease spread very rapidly despite the tons of condoms given out in high schools, colleges, universities, etc. This is what these researches have uncovered: when well-intentioned people come into the colleges to run AIDS information and prevention campaigns and propound the condom as the only preventive means, it often happens that the young people who up till then abstained from sexual relations for fear of AIDS, think that they can have all the sexual relations they like, without danger, as long as they use a condom. Then they start having an active sexual life, often with different partners, using a condom for protection. After some time, either they or their partner become fed up with the “fastidious” condom, they neglect having one handy and, more and more, run risks and have unprotected sexual relations. And in this way they contract the virus and become transmitters of the disease. What is serious is the not using a condom if they cannot keep from having risky sexual relations and want to protect themselves or protect their partner. But what is even more serious is letting young people believe that they can have the most disorderly sexual life possible before marriage and they will always be secure, on condition that they use a condom. Everyday experience shows that what happens is often the very opposite. To be responsible, we have to learn the lesson facts teach us: condoms alone, without a serious education of young people to abstinence before marriage and fidelity in marriage, cannot stop the spread of the epidemic” (Message of Mons. Maurice Piat, Bishop of Port-Louis, Mauritius, Christmas 2005).

Gavioli (2008) continues that the absolute priority in prevention measures should be give to education campaigns and awareness raising campaigns. World Health Organization promotes so called ABC against AIDS. According to Monsignor Piat (2005) it means:

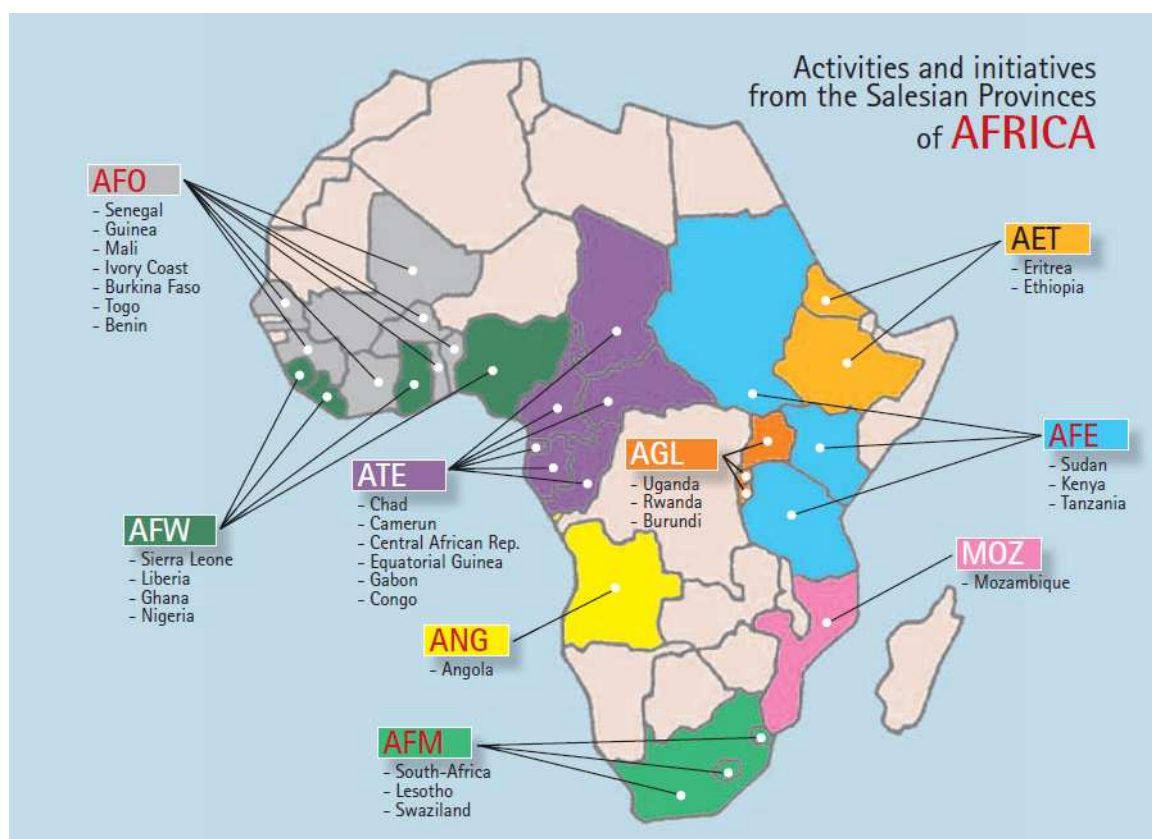
- A** – for sexual abstinence before marriage
- B** – for to “be faithful”, or fidelity in marriage
- C** – for “condom” or contraceptive

Monsignor Piat (2005) says it is vital that the condom is at the last place. In other words the WHO considers condom to be the last solution “if we can no do otherwise”. Sometimes C refers to “Character building.” “Investing in education is much more efficacious than investing in latex.” (Piat, 2005)

5.2.4 Salesians related programs (Domisal, 2008)

Concrete measures and programs to prevent HIV infection through responsible choices are plenty of in Africa. Here I will focus on programs designated to youths. As was mentioned above Salesians of Don Bosco are a congregation in Catholic Church focused on the care for the young. Its roots come to 19th century. Firstly I will show a selection of projects performed in various Salesian provinces in Africa. For illustration I enclose the map of countries in Africa where Salesians perform program concerned with AIDS. The Salesians also work in other countries of Africa.

Graph 9: Map of countries where Salesians run project concern with Africa.



Source: Domisal, 2008

The list of selected activities in particular areas follows (Domisal, 2008):

- **Activities on AIDS in Angola - ANG.** Goals:

- Educate to values about sexuality and family;
- Put a brake on the spread of AIDS;
- Overcome prejudice against HIV-AIDS;

Realized projects:

- EDUCATION OF VALUES;
- PUT A STOP TO AIDS;
- LOVE MATTERS;

- **South Africa - AFM;** Program: Love matters; will be described in the next subchapter.

- **Mozambique - MOZ:** Project: CNCS: An education Manual on values and HIV/AIDS; activities: technical books distribution for lectors, manual distribution for pupils, training of teachers and formation personnel.

- **East Africa - AFE:** Life Choices Programme; Some objectives:

- Develop a curriculum on preventing HIV and providing technically appropriate and significant encouragement on fidelity/abstinence;
- Offer messages on behavioural change and on abstinence to about 30,000 individuals per year in each country where the project is run.
- Train about 400 peer educators who should reach about 9 000 youths per year in each of the two countries;
- Train 600 parents per year in each country;
- Reach about 10 000 young people with the message on behavioural change;
- At the end of the programme, reach about 300 000 people in the two countries.

- **Africa Great Lakes - AGL:** Anti-AIDS Club of the Youth Centre of Gatenga – Kigali; Contents: club for youths where there is dialogue especially about HIV/AIDS; club attend youths from various religions; Activities: dialogue groups, testing for the virus; Awareness campaign preparation.

- **West French-speaking Africa – AFO:**

- **Mali:** 1. training sessions on the World AIDS day at schools; moral education program during the last year of school;

- 2. Activities in civil prison: medical care, information about HIV/AIDS (especially for youths), problem is that many people with HIV die since the infection was not diagnosed;
- **Ethiopia Eritrea - AET:**
 - Annual program developed in the college: 3 meetings at different times run by medical personnel to be aware of HIV; 2 one-day seminars, lessons from ethics; exhibition of HIV statistics.
 - **ASCO Children Centre:** Cares about and looks after children infected with HIV. It looks after about 400 children at the age of 0-18 years. For more information see appendix.
- **Africa Tropical Equatorial - ATE:** School training program focused on teachers and pupils focused on HIV, sexuality, education to values regarding AIDS. Training of teachers and leaders of various groups.
- **Africa West English-speaking - AFW:**
 - Educational activities focused on teachers who than train pupils at Salesians schools and centres; public schools.
 - Care about HIV related orphans: 1. Scholarships for non HIV-positive orphan students whose parents died of HIV/AIDS; 2. A hostel will be built for orphans in those areas of Nigeria.

Besides activities of bishoprics and Salesians there are many more programs performed by various groups connected with the Church, e.g.: Caritas Internationalis, Community of St. Egidio, Doctors with Africa etc. It is estimated that 26,7 % of the centres providing services to people living with the virus are administered by Catholic Church-related structures (Cardinal Barragan, 2006).

5.2.5 Love matters program

In this section we will focus on the program “Love matters” which is run by Salesians particularly in South Africa, but with some adjustment it is also used in other countries. I will describe the practise in Bosco Youth Centre 40 kilometres South of Johannesburg City Centre. Sources of data: interview with father John Coleman SDB, who is involved in the program for 9 years, performed by the SADBA expedition (2009), text for participants of the program, propagation materials of the program, time schedule of the program.

The origin of the program: It was started because of HIV/AIDS, but the focus of the program is wider; father John says: “it is all about making choices in your life”. It is focused on sexuality, but the gained knowledge is transferred to other spheres youths’ lives. The program is inspired by the program of sister and also a doctor Mary Dugness who performed the program in Uganda.

For Whom: For teenagers, the best age is at 11 years or at 12 but according to father John it is difficult to involve youths at the age of 12 since they are usually in the final year of school. Catholic schools, government schools; 9 years it is possible – it can be late, parishes, come from very big distances. Younger they have to modify it.

Duration: It is necessary to have five full days to have impression from it.

Program: In the program personal atmosphere is essential. Firstly people come to know each other and the program is run in a great surroundings. They are divided into groups and all the time they are accompanied by young volunteers. Participants get information from doctor, well experienced nurse about sexuality. They get information about conception and birth of a human, here is used BBC document “The Miracle of Birth”. All things can be discussed in groups. They are thought to recognize the difference between male and female. Pupils are asked how they would solve some difficult family tasks if they were advisers. There is a testimony of former drug users or criminals, people who broke some addiction. There is a movie about sexuality and voluntarily movie about abortions. What is very important and emphasized by a lot of people involved is motivation. Father John says: “*The problem is low motivation and low images of them selves.*” That is why there is a lecture of one African about motivation and a movie about one seriously ill young guy who had strong optimism and lived full and wonderful life. To show pupils, that they can live their lives fully and not desperately. Moreover there is a clip with Palm Stenzel (2000) lecturing about sexuality. She was a counsellor in Saint Paul high school in the USA, now she gives lectures about sexuality. So that students can not say anymore “nobody told me”, “I did not know.” The problem is that young people do not have information about the high value of sex, about the way how to use this gift. Moreover as Palm Stenzel (2000) and Mr van Rensburg (Love Matters, 2002) program at Don Bosco Youth Centre, Johannesburg, South Africa) say, youth do not have information about sexual intercourse. They are give information just how cool sex is and how not to become pregnant and not to get HIV infection and that is insufficient. At the end of the week there is a group reconciliation service, something like a chance to start again.

Those, who want and feel ready, can take a pledge to promise before him/herself, God, witnesses to remain pure until marriage. Father Francois Dufour SDB (Love Matters, 2002) who was putting the program in says the program is for youths who are looking for alternative life style, who want to learn how to say no to pressures of their surroundings. The program is to explode the myths about life and sex, give youth real facts about life from doctors. It should say that relationship is more than just sex and “that they can not protect their minds and hearts with condoms” as father Francois says. It is not about drilling the Church doctrine or brain washing, everything is focused on traditional values as fidelity in marriage. Father Francois adds that Gospel correlates with knowledge from medicine, psychology and there is still trauma from failed relationship, even if person is not infected.

Evaluation of Love matters program: The impact is monitored by question marks and forms filled by participants some time after Love matters program, additionally there are responses from parents and teachers. According to these indicators it is visible that the program has a positive impact. Participants have “new vision of life” and instead of living without future they start to set goals for their future.

Conclusion

„Man is the source, the focus and the aim of all economic and social life. “Gaudium et Spes.

HIV/AIDS becomes a real threat for countries in Sub-Saharan Africa. There were 22 million infected by HIV in 2007, which is almost 67 % of infected people worldwide. The life expectancy has declined substantially; the gross death rates have risen. Women are harmed more frequently. Mainly adults die because of AIDS, what leads to a great number of orphans, worsens passing of the human capital to decedents and decreases human capital investment. Some indicators show that there is an improvement in the trend of pandemic; nevertheless the decline in the number of deaths will be noticeable in 10 years at the earliest. It seems to be proven that poverty and inequality leads to higher HIV vulnerability, which implies that measures taken by international trade policy or migration policy have impact on the HIV vulnerability. Social and cultural behavioural practices play role in the spread of HIV pandemic; however these are not factors explaining everything. Malnutrition, insufficient ingestion of micronutrients and weak immune system are supposed to facilitate the spread of

HIV/AIDS in Sub-Saharan Africa. The impact of evaluated measures on poverty, inequality and consequently on HIV/AIDS is often not taken into account. That is why some inappropriate measures in structural adjustment policies, debt reliefs, etc., are accepted. The economic impact of HIV/AIDS is noticeable especially in human capital. Adults, as a social group with the highest productivity, die most frequently. Moreover there is a lack of willingness to invest into children's human capital, transmission of human capital from parents to children is weakened. Households have to allocate more income into health services; there is a decline in income, investment decrease. Private enterprises suffer from a decrease in the labour productivity and human capital losses, therefore there is an uncertainty in enterprises planning.

The impact of HIV/AIDS pandemic on GDP is not massive. One of the explanations is the large unemployment in Sub-Saharan countries; moreover not all economic activity is recorded in statistics. Nevertheless, the impact of the pandemic on income and life expectancy is broad. It represents about 75% of GDP per capita decline.

Mere condom distribution is not able to stop HIV/AIDS pandemic. The case of Uganda shows that behavioural change based on fidelity and abstinence is an efficient way of prevention. Moreover, the additional measures in nourishment and micronutrient providing are covetable. In general so called "holistic approach" based on education, nutrient provision, and international cooperation with condoms as a last chance, can be an efficient way to cope with HIV/AIDS pandemic in Sub-Saharan Africa.

Appendix:

"My name is Fulvia; I am a doctor and a Salesian volunteer. At a certain point in my life, I decided to go to Ethiopia to work with the Salesians. After various experiences and after having come to know different places, missions, people, I arrived in the country's capital: Addis Abeba. Here things are different to the rural areas where I had worked for years: it is a big city, millions of people walk the streets, the very poorest beside the richest, beautiful apartments beside slum, both part of the same city. Here in this great Ethiopian city, I realised that if you really want to work for young people and the poor, you have to tackle a great problem: AIDS.

You cannot avoid it. It is at your door, it is among the boys and girls at the Oratory, school, the youth centre. It is in the surroundings where people come from outside in search of better opportunities, dreaming of becoming rich like the world's north, but obliged instead to survive as best they can because the disease is spreading. So, having understood this, I began working as a doctor in the only centre in Addis Abeba that concerns itself with children and adolescents at risk from or suffering from HIV/AIDS.

It is called the "ASCO CHILDREN CENTRE", a centre that supports and looks after children affected by HIV/AIDS. The Missionaries of Charity run it and at present, it looks after about 400 children between the ages of 0 and 18. The majority of these need special treatment to be able to live a "normal" life. Many live in the centre, because being HIV-positive, they are rejected by their families and community. What these children suffer from most is not being sick of being HIV-positive, but being alone, being considered "dangerous", of no use to their families and community, "dead people walking".

If Don Bosco were here, what would he do for them? I like to think he would not have accepted all this. In sub-Saharan Africa, the number of children struck by HIV is beyond calculation. In Ethiopia, the Minister for Health talks of 135,000 children (under 10s) with the virus. This generation is being robbed, its future destroyed. It is a terrible loss for society because we all believe that young people are the world's future. So what ASCO is trying to do is look after these young people, support them, show that their life is precious, just like that of anyone else, and that they have the right to go back to their families and communities, not a burden to be carried, but as a gift. Even if in all probability, they will have a shorter life, that does not mean it is not precious. They can teach us how important it is not to waste life and how it is full of meaning.

I would also like to add an experience I had in the Oratory in Mekanissa last year: The Sisters of Charity in ASCO asked the community in Mekanissa about the possibility of giving a group of HIV-positive adolescents a short course on computers. The Salesian community was already preparing such a course for its own students and the young people in the Oratory. So it was decided to include these adolescents in the same group. In the beginning relations between the two groups of young people was very strained. They were afraid to mix with each other; the HIV-positive ones were viewed with suspicion. The boys and girls from the Missionaries of Charity did not come only for the computer course; they also stayed for dinner and the recreations. Bit by bit integration improved, and by the end of the course, and

as this experience was ending, they were not content to head off and they asked to continue for the next year;" (Domisal, 2008).

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