Research Paper Statistics

Global- HIV/AIDS Statistics

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ABSTRACT

The HIV and AIDS epidemic is one of the most destructive health crises of modern times, ravaging families and communities throughout the world. The number of people living with HIV rose from around 8 million in 1990 to 35.3 million by the end of 2012. The overall growth of the epidemic has stabilised in recent years. The annual number of new HIV infections has steadily declined and due to the significant increase in people receiving antiretroviral therapy, the number of AIDS-related deaths has also declined.

This article describes an overview of the effect of HIV and AIDS on population size, characteristics, Growth Rate, Trend line and well-being. It also highlights the major efforts needed to control the epidemic. The epidemic continues to spread globally despite prevention efforts and successes in a few Regions.

KEYWORDS | Trend Lines, Forecast, Growth Rate

Introduction

GLOBAL : Estimated Global no. of PLHIV

Expanding HIV prevention in 9 years:The study shows that global number of people living with HIV is 33.2 million in 2007 and it has increased by 35.3 million in 2012. The figure show that expanding HIV and its prevention over a 6-year timeframe would increase by Growth Rate 1.23 percent (From year 2007 to 2012), and it will be reaching at 36.6 million by the end of year 2015. Rapidly expanding HIV and its prevention would not be easy, but it's achievable. As the year 2015 deadline approaches, and the countries still urgently need to strengthen and safeguard their efforts to scale up treatment. In the followingTable 1, Actual Year Estimated figure and Projected/Forecast Figure shown with different trend line fitted and among them Linear and Exponential Trend line are the best. However Residual Square (R2)hasalso shown.

Objective of the Study:

The main purpose of this study is to search what exact scenario of the Global number of people living with HIV for the year ended 2015 and what the Global Fact Sheet would be for the year ended 2015.

Methodology

The Collection of the latest estimated data for the year 2012 of Global HIV/AIDS taken from the UNAIDS which works for HIV/AIDS epidemic. And the collected data are analysed with trend line.Obtain the Different Trend line equations for forecast the years and also calculate the Residual Square (R^2).

For that Different trend line like Linear, Exponential, Logarithmatic, Polynomial & Power fitted for given data.

And also, we have calculated the growth rate for better understanding the situation.

Growth Rate Formula is :

$$\text{Growth Rate} = \left[\left(\frac{Ending\ Year}{Beginning\ Year} \right)^{\frac{1}{n-1}} - 1 \right] * 100$$

$$where\ n = \text{no. of years}$$

Analysis

In the below Table 1 we have taken the Global number of people living with HIV from year 2007 to 2012.

We have applied different trend line and calculate the Forecast year 2013 to 2015.

In trend line equation x is the year. For the different value of x we can get the different value of forecast year.

TABLE 1 :Estimated Global number of people living with HIV, by year

		ACTUAL YEAR						FORECAST		
X	**Year**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
TREND										
Y	NUMBER OF PEOPLE(MILLIONS)	33.2	33.5	34.0	34.4	34.9	35.3	35.73	36.16	36.59
LINEAR		y = 0.4314x + 32.707 R² = 0.9966								
Y	NUMBER OF PEOPLE(MILLIONS)	33.2	33.5	34.0	34.4	34.9	35.3	35.73	36.16	36.59
EXPONENTIAL		y = 32.732e0.0126x R² = 0.997								

Y	NUMBER OF PEOPLE(MILLIONS)	33.2	33.5	34.0	34.4	34.9	35.3	35.75	36.20	36.66
LOGARITHMATIC				y = 1.1661ln(x) + 32.938			R² = 0.9135			
Y	NUMBER OF PEOPLE(MILLIONS)	33.2	33.5	34.0	34.4	34.9	35.3	40.68	40.83	40.97
POLYNOMIAL				y = 0.0089x2 + 0.3689x + 32.79			R² = 0.9975			
Y	NUMBER OF PEOPLE(MILLIONS)	33.2	33.5	34.0	34.4	34.9	35.3	35.81	36.31	36.83
POWER				y = 32.952x0.0341		R² = 0.9177				
Y	NUMBER OF PEOPLE(MILLIONS)	33.2	33.5	34.0	34.4	34.9	35.3	35.2	35.37	35.5

In Figure 1:Estimated Global number of people living with HIV from Year 2007 to 2012 and Expected global number of people living with HIV fromYear 2013 to 2015 has been shown. Different Trend line equations and residual square (R2) are show in Figure 1.

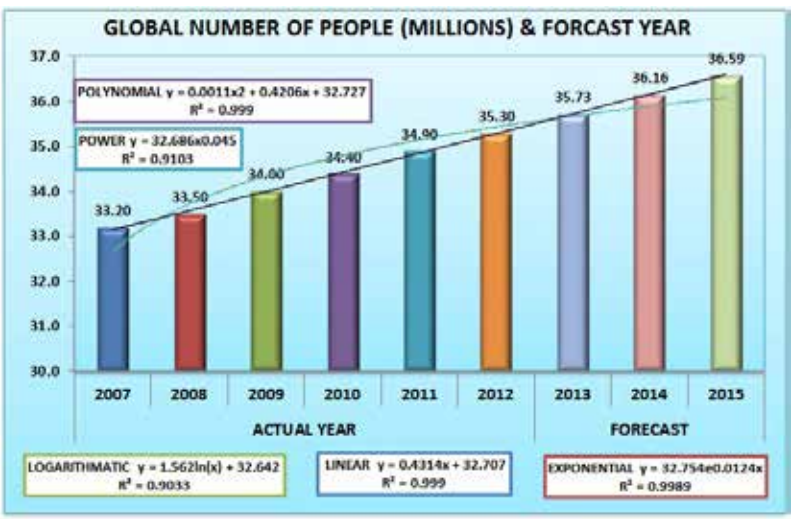


Figure 1: Estimated Global number of people living with HIV with Trend line.

We use the Table 2 Global fact sheet and get the different Trend line equations like Linear, Exponential, Logarithmatic & Polynomial in Table 3. Similarly the Residual Square (R2) is calculated. Best residual square value is nearest by 0.

Linear trend line is the most reliable, trustworthy & authentic for fit the trend line equation.
In trend equations, where x is the year. Different value of x, we can get the different value of forecast/projected year.

Table No2:Global Fact Sheet

Particulars	ESTIMATED YEAR						GROWTH RATE(%) Range (min – max)		PROJECTED YEAR		
	2007	2008	2009	2010	2011	2012			2013	2014	2015
People living with HIV	33.2 million	33.5 million	34.0 million	34.4 million	34.9 million	35.3 million	**1.23**		35.7 million	36.2 million	36.6 million
	(30.4-36.3 million)	(30.7-36.7 million)	(31.1-37.1 million)	(31.5-37.7 million)	(31.9-38.3 million)	(32.2-38.8 million)	**1.16**	**1.34**	(32.6-39.3 million)	(32.9-39.8 million)	(33.3-40.4 million)
New HIV Infections (Total)	2.7 million	2.6 million	2.6 million	2.5 million	2.5 million	2.3 million	**-3.16**		2.2 million	2.2 million	2.1 million
	(2.4-3.1 million)	(2.3-3.0 million)	(2.3-3.0 million)	(2.2-2.9 million)	(2.2-2.9 million)	(1.9-2.7 million)	**-4.56**	**-2.73**	(1.8-2.6 million)	(1.7-2.6 million)	(1.7-2.5 million)
New HIV Infections (adults)	2.2 million	2.2 million	2.2 million	2.2 million	2.2 million	2.0 million	**-1.89**		2.0 million	1.9 million	1.9 million
	(2.0-2.5 million)	(1.9-2.5 million)	(1.9-2.5 million)	(1.9-2.5 million)	(1.8-2.5 million)	(1.7-2.4 million)	**-3.20**	**-0.81**	(1.6-2.4 million)	(1.6-2.4 million)	(1.5-2.3 million)
New HIV Infections (Children)	480 000	450 000	400 000	360 000	310 000	260 000	**-11.54**		229996	203454	179975
	(440 000-550 000)	(410 000-520 000)	(360 000-470 000)	(330 000-420 000)	(280 000-370 000)	(230 000-320 000)	**-12.17**	**-10.27**	(202015-287149)	(177434-257671)	(155845-231218)

AIDS- related deaths	2.2 million	2.1 million	2.0 million	1.9 million	1.8 million	1.6 million	**-6.17**		1.5 million	1.4 million	1.3 million
	(1.9-2.5 million)	(1.8-2.4 million)	(1.7-2.3 million)	(1.7-2.2 million)	(1.6-2.1 million)	(1.4-1.9 million)	**-5.92**	**-5.34**	(1.3-1.8 million)	(1.2-1.7 million)	(1.2-1.6 million)
People accessing treatment	2.9 million	4.1 million	5.3 million	6.6 million	8.1 million	9.7 million	**27.31**		12.3 million	15.7 million	20.0 million

Table 3 : Global Fact Sheet with Different Types of Trend line/Regression Equations

PARTICULARS	LINEAR					EXPONENTIAL				
	Y	R2	PROJECTED YEARS			Y	R2	PROJECTED YEARS		
			2013	2014	2015			2013	2014	2015
People living with HIV (Millions)	y = 0.4314x + 32.707	R^2 = 0.9966	35.73	36.16	36.59	y = 32.732e0.0126x	R^2 = 0.997	35.75	36.20	36.66
New HIV Infections (Total) (Millions)	y = -0.0686x + 2.7733	R^2 = 0.8816	2.29	2.22	2.16	y = 2.7847e-0.027x	R^2 = 0.8701	2.31	2.24	2.18
New HIV Infections (adults) (Millions)	y = -0.0286x + 2.2667	R^2 = 0.4286	2.07	2.04	2.01	y = 2.271e-0.014x	R^2 = 0.4286	2.06	2.03	2.00
New HIV Infections (Children)	y = -44571x + 532667	R^2 = 0.9952	220670	176099	131528	y = 565966e-0.123x	R^2 = 0.9784	239256	211565	187080
AIDS- related deaths (Millions)	y = -0.1143x + 2.3333	R^2 = 0.9796	1.53	1.42	1.30	y = 2.3737e-0.06x	R^2 = 0.964	1.56	1.47	1.38
People accessing treatment (Millions)	y = 1.3514x + 1.3867	R^2 = 0.996	10.85	12.20	13.55	y = 2.4658e0.2371x	R^2 = 0.9861	12.96	16.43	20.83
Resources (US$ BILLION)	y = 1.4171x + 10.407	R^2 = 0.8823	20.33	21.74	23.16	y = 10.746e0.0977x	R^2 = 0.8322	21.29	23.48	25.89

PARTICULARS	LOGARITHMATIC					POLYNOMIAL				
	Y	R2	PROJECTED YEARS			Y	R2	PROJECTED YEARS		
			2013	2014	2015			2013	2014	2015
People living with HIV (Millions)	y = 1.1661ln(x) + 32.938	R^2 = 0.9135	40.68	40.83	40.97	y = 0.0089x2 + 0.3689x + 32.79	R^2 = 0.9975	35.50	35.88	36.27
New HIV Infections (Total) (Millions)	y = -0.182ln(x) + 2.7324	R^2 = 0.7749	-0.85	-0.88	-0.90	y = -0.0089x2 - 0.0061x + 2.69	R^2 = 0.9135	2.52	2.50	2.47
New HIV Infections (adults) (Millions)	y = -0.063ln(x) + 2.2361	R^2 = 0.2642	-0.26	-0.27	-0.28	y = -0.0179x2 + 0.0964x + 2.1	R^2 = 0.7857	2.52	2.58	2.65
New HIV Infections (Children)	y = -1E+05ln(x) + 508010	R^2 = 0.9017	2540060	2540060	2540061	y = -1785.7x2 - 32071x + 516000	R^2 = 0.9986	266503	230861	195218
AIDS- related deaths (Millions)	y = -0.305ln(x) + 2.2676	R^2 = 0.8744	-1.29	-1.33	-1.36	y = -0.0089x2 - 0.0518x + 2.25	R^2 = 0.9923	1.76	1.69	1.62
People accessing treatment (Millions)	y = 3.6382ln(x) + 2.1273	R^2 = 0.9056	14.82	15.30	15.73	y = 0.0571x2 + 0.9514x + 1.92	R^2 = 0.9998	9.38	10.44	11.51
Resources (US$ BILLION)	y = 4.1263ln(x) + 10.842	R^2 = 0.9384	52.77	53.32	53.80	y = -0.1625x2 + 2.5546x + 8.89	R^2 = 0.9071	24.50	26.73	28.96

DISCUSSION:
LOOK AHEAD GLOBAL FACT SHEET - YEAR 2015

a) People living with HIV

- In year 2015, there will be36.6 million [33.3 million-40.4 million] people living with HIV.
- Growth Rate of People living with HIV from Year 2007 to 2012 is 1.23%
- The Trend line showing the people living with HIV is in control.

b) New HIV infections

- New HIV infections have fallen by 33% since 2001.
- Decreasing Growth Rate of newly infected with HIV from Year 2007-2012 is-3.16%
- Worldwide, 2.1 million [1.7 million-2.5 million] people will become newly infected with HIV in 2015, down from 3.4 million [3.1 million-3.7 million] in 2001.
- New HIV infections among adult have declined by 50% since 2001.
- Decreasing Growth Rate of Newly infected with HIV in

adult from Year 2007 to 2012 is – 1.89%
- Worldwide, 1.9 million [1.5 million-2.3 million] adult will become newly infected with HIV in projected year 2015.
- New HIV infections among adults and adolescents decreased by 50% or more in 26 countries between 2001 and 2015

➢ New HIV infections among children have declined by 52% since 2001.
- Decreasing Growth Rate of Newly infected with HIV in children during the period year 2007 to 2012 is – 11.54%
- Worldwide, 179975 [155845-231218] children will become newly infected with HIV in projected year 2015, down from 550 000 [500 000-620 000] in 2001.

c) AIDS-related deaths

➢ AIDS-related deaths have fallen by 30% since the peak in 2005.
- Decreasing Growth Rate of Newly infected with HIV in children during the year 2007 to 2012 is – 6.17%
- In year 2015, 1.3 million [1.2 million-1.6 million] people died of AIDS-related causes worldwide compared to 1.6 million [1.4 million-1.9 million] in 2012.
- Since the start of the epidemic an estimated 36 million [30 million - 42 million] people have died of AIDS-related illnesses.

d) Antiretroviral therapy

➢ In 2015, around 20.0 million people will be access to antiretroviral therapy in low- and middle-income countries.
- Growth Rate of People Accessing treatment from Year 2007 to 2012 is 27.31%

Conclusion:

The Trend line showing the People living with HIV will slightly be increasing but it would be under control in year 2015. The Growth rate of New HIV infection in (Adult and Children) is going to decreasing. People are highly increasing for accessing the antiretroviral therapy. There for the AIDS related deaths will also be decreasing in year 2015.The massive scale up of antiretroviral therapy is saving more lives. The number of people dying from AIDS related causes each year has declined from high of 2.3 million in 2005 to 1.6 million in 2012. It would reach 1.3 million in year 2015.

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