

## I. PREAMBLE

A request has been received by the President of the Institute of Actuaries of India (IAI) from NACO (National AIDS Control Organisation) under Department of AIDS Control (DAS) expressing an immediate requirement of conducting a mortality investigation into the PLHIV (People Living with HIV) late in the month of June 2013 and the Institute has responded favourably keeping in view of the need and importance of such an investigation in extending life insurance coverage to the PLHIV group in future. The responsibility to conduct an investigation and to prepare a report on the mortality features of PLHIV lives on the basis of sample data collected and provided by NACO from its selected ART (Antiretroviral Therapy) centres spread across 20 districts representing all regions of the country has been entrusted to the Research department of IAI. The paper attempts to match the mortality indicators derived from the sample data with IALM (Indian Assured Lives Mortality) (2006-'08) on a broad age grouping basis. An attempt has also been made to derive some valuable insights into the demographic profile of deaths reported from PLHIV group during the year 2012-'13. We sincerely believe that the report, first one of this kind in India, would definitely be useful to all stakeholders to begin to work towards offering insurance services to PLHIV population.

It is learned from NACO that, there are no mechanism in ART centres for tracking termination of an infected life. The question as to how complete and credible the sample death data can only be answered at a time when DAC implement efficient data systems tracking all members of PLHIV group on a real time basis. Credibility and completeness of data can only be assumed at this stage. Under these circumstances, a reader should keep the following points in mind:

- I. The credibility of results emerged out of data and validity of suggestions are subject to validation of assumptions used in the report.
- II. The report has undergone a limited review process due to constraints of time.
- III. The Institute of Actuaries of India is not in favour of using any data indicators of this report by any one for any commercial purpose, however, individuals/ institutions are free to judge on merit of data indicators in the report on the basis of their understanding of deaths in PLHIV group, validation of assumptions used in the report and action taken on "next steps".
- IV. The investigation and report is an attempt to derive some valuable insights into the demographic profile of death cases out of PLHIV group and to validate some extra mortality ratings proposed by a committee of underwriters in relation to offering life insurance products to PLHIV group.
- V. The purpose of this investigation and generation of report is limited to the extent of providing a basic level information regarding the demographic profile of deaths in PLHIV group and also to compare PLHIV mortality with Indian Assured Lives Mortality (2006-'08). The report is not meant to recommend anything to the concerned parties.

## II. BACKGROUND

A committee constituted by the Life Council to put in place an underwriting policy for products applicable for PLHIV group has recommended extra mortality charges on the basis of a sample study and

subsequent deliberations on the subject in response to an exposure draft prepared by the Insurance regulator, IRDA Ref: 70/IRDA/HLT/Coverage of HIV/2011-12 dated 02-02-2012.

A joint meeting of a sub-group constituted for mortality investigation by NACO in compliance to directives from Hon. High court of Delhi and the above referred group constituted by Life Council met on 3<sup>rd</sup> May'13 and have deliberated on the issue of mortality of PLHIV lives and taken a view that, a validation of the extra mortality rates may be appropriate at this stage by keeping in view of limited scope for collecting required data from ART centres through NACO. A committee constituted under NACO to meet certain objectives with regard to PLHIV group as directed by the Hon. High Court of Delhi has discussed this proposal and agreed to take it forward.

### III. DATA , METHODOLOGY AND LIMITATIONS

Data management systems in ART centres under NACO are tuned only to the extent of providing monthly consolidated statements which takes a macro level view of movements of PLHIV group. Systems are yet to be streamlined for supporting extensive investigations required for creating mortality rates to be used as basis for pricing of individual and/or group life insurance products in actuarial models. Keeping in view of limitations of existing data management systems for generating data required for a basic level of mortality investigation, the committee has suggested the following methodology:

- ✓ A maximum sample size of 2000 death data to be collected from five regions viz., North, South, East, West and North East.
- ✓ Selection of ART centres to keep good rural and urban mix.

- ✓ Death cases reported to ART centres during Apr'12 to Mar'13
- ✓ Monthly on-off movements of data on a month to month basis for the period Apr'12 to Mar'13 for the same ART centres from which above death cases are reported
- ✓ In order to understand and to manage age-wise/ age group wise exposure trends of the PLHIV group, new registrations pertaining to months Dec'10 and Dec'12 out of ART centres belonging to all above referred regions will be collected.

NACO has collected details of death cases reported during Apr'12 to Mar'13 from its 20 ART centres spread across 20 districts falling under 5 states. The data format carries data fields with details of state, district, date of HIV infection, date of ART registration, Date of death and age last birthday at time of ART registration and death. Other demographic references related to the lives are also included. A total of 2008 death cases were available in the data out of which 313 cases were out of the observation period, i.e., year 2012-'13. Sample death data available for investigation after removing these cases counts to 1695 only which has undergone an extensive cleaning up process in order to remove errors, inconsistencies and gaps and are recorded in the audit trail.

It is learned that, there are no regular and established tracking mechanisms of lives registered in ART centres in order to update their exit status. The question of completeness of death registrations in the selected centres and hence completeness of death data provided are to be verified and all assumptions related to this aspect to be validated on a real time basis.

We have recently completed an investigation in order to understand the demographic profile and medical needs of PLHIV group by using a sample

## HOW DIFFERENT THE MORTALITY OF PLHIV GROUP?

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data collected from 132 ART centres spread across the country. The report has been named as “**Understanding demographic profile and medical needs of PLHIV group**” and carries following indicators for the underlying PLHIV group.

- PLHIV infection ratio for Male: Female is 56: 44 (approximate)
- Age group 25-49 constitute 83% of HIV infected
- Around 50% visit ART centres once in every month
- Proportions of infected lives falling in different age groups in the following summary:

Age bands	Female	Male	Overall
0-10	1.00%	0.60%	0.80%
11-19	0.80%	0.80%	0.80%
20-24	5.90%	2.40%	3.90%
25-34	38.70%	21.90%	29.30%
35-44	37.50%	45.90%	42.20%
45-49	8.70%	14.70%	12.00%
50-59	6.20%	11.00%	8.90%
60 & above	1.20%	2.70%	2.00%

- Average CD4 count in different age groups at the time of identifying infection of HIV summary:

Age groups	Average CD4 count at registration
0-10	357
11-19	254
20-24	279
25-34	264

35-44	228
45-49	222
50-59	219
60 & above	245
Overall	241

- Split of educational qualification of PLHIV group

College	Illiterate	Primary	Secondary
9.2%	28.6%	30.6%	31.6%

There are different instances in the report where above indicators are used with reference to the underlying PLHIV group. For a wider understanding of these indicators, reading of the above referred report is suggested. Readers intercepting such instances need to keep the above report and background in mind.

### IV. ASSUMPTIONS

Following assumptions are used for data cleaning, generation of results and interpretation.

- Data records in NACO are updated, accurate and credible.
- Deaths out of PLHIV lives registered in the ART centres are updated in the books within a reasonable time period of 3-4 months time and IBNR (Incurred but not reported) are not significant.
- Errors observed in the death data format are due to issues related to manual intervention, system errors, compilation issues and other technical and soft skill issues prevailing within the system.



- d) Deaths happening out of PLHIV group registered in respective ART centres are updated in time to time and date of death are correct.
- e) Selection of states/ districts/ ART centres represent a cross section of each of the regions and both death data and on-off movements from such centres are cross section of such data across all parts of India.
- f) Age/ age groups registered during Dec'10 and Dec'12 broadly represent the PLHIV group as a whole at any time
- g) Date of death > Date of registration of ART > Date of infection of HIV
- h) Where date of infection of HIV are not available, date of registration is an appropriate substitution
- i) Where date of registration in ART centre are not available, date of registration is set as month and year falling 20 months prior to date of death.

## V. FINDINGS AND ESTIMATIONS

Results are represented as proportions based on the above assumptions. Tables generated by summarising different combinations of characteristics of data are converted to proportions to the overall data sample in order to understand the underlying trends of the death cases and other statistics. Summary tables are placed in **Appendix-I**

### A. DEMOGRAPHIC PROFILE OF PLHIV DEATHS:

#### 1. GENDER AND MARRIAGE STATUS:

Male representation is 66.96% where as females are 32.86%. Presence of 0.18% transgender also shown and is considered as negligible for any

further splits. For all proportions where gender is a character, transgender is not taken as a factor.

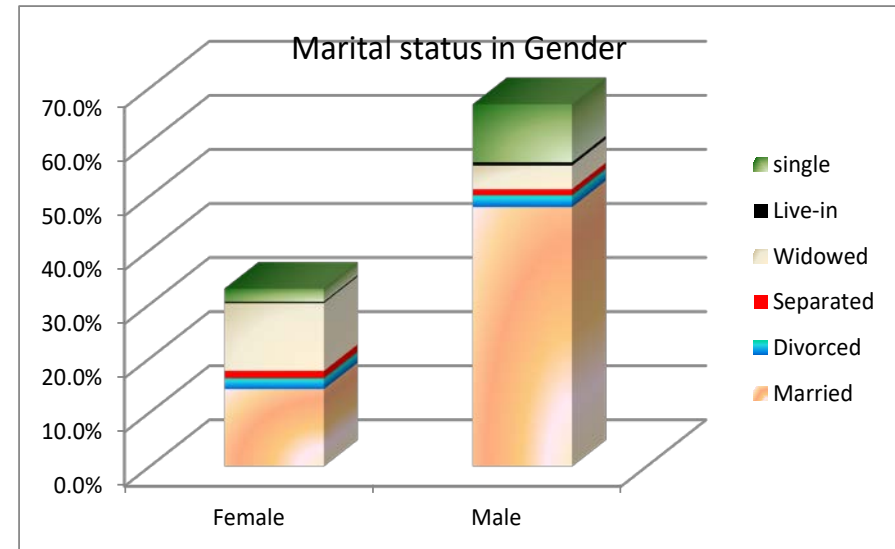


Figure 1

The male: female split under PLHIV group is likely to be 55.80%: 43.87%, if we borrow some insights from a recent investigation conducted by IAI on PLHIV group [refer section III (a) above]. If these proportions are taken as appropriate for the underlying PLHIV population, it may be observed that men are contributing more deaths than women which resembling a characteristic of general population.

#### 2. DEATH SPLITS IN AGE GROUPS

A detailed split of age groups of registered death cases revealed that the age group 35-44 is the major contributor with 39.4% followed by the group 25-34 sharing 28.1%. 78.3% of the total deaths are out of age

group 25-49. A recent investigation on PLHIV group broadly estimated [ refer section III(d) above] that 83.5% of the infected lives are out of the age group 25-49 which means, the death share is reasonable and it may be appropriate to rule out any extra mortality to this group in comparison with other age groups.

On a broad basis, age groups in PLHIV group represent more or less the same proportion in death data as well. It is too early to conclude anything related to levels of mortality among these age groups, however, there is no evidence to state that any age group bearing higher mortality in relation to other.

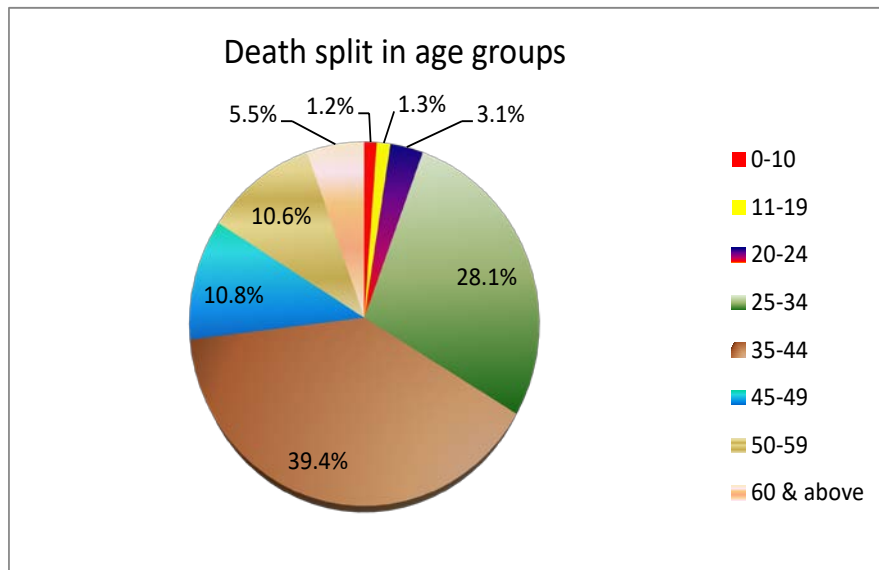


Figure 2

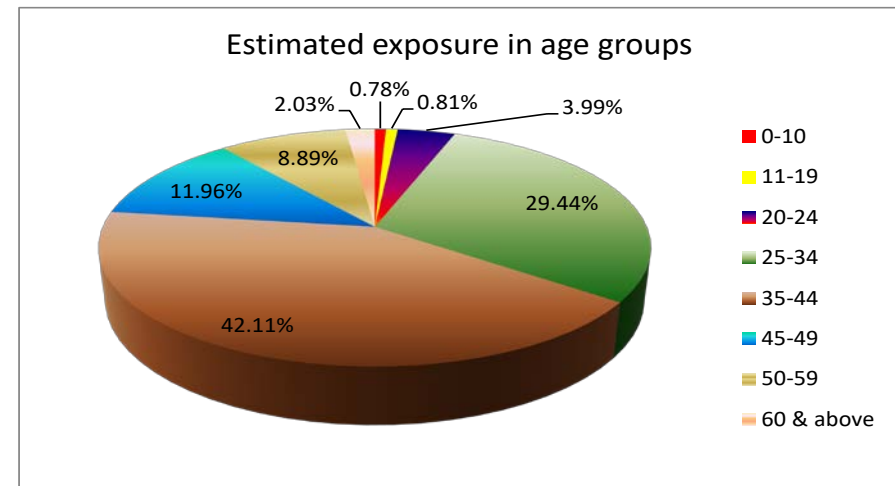


Figure 3

### 3. EDUCATION LEVEL

Proportion of infected lives dying under illiterate category is obviously higher than other groups. Does this mean that education level is an influencing factor in death cases?

It appears that a larger proportion of illiterates are dying in comparison to their proportion in the underlying PLHIV group. Indicators from a recent investigation revealed that [refer item III (f) above] illiterates share only 28.6% of the PLHIV group, where as 43.9% out of death cases are reported from the illiterates. There is an inverse trend on education levels and death proportions in relation to their respective constituents in PLHIV group as shown in figure 4 and figure 5.

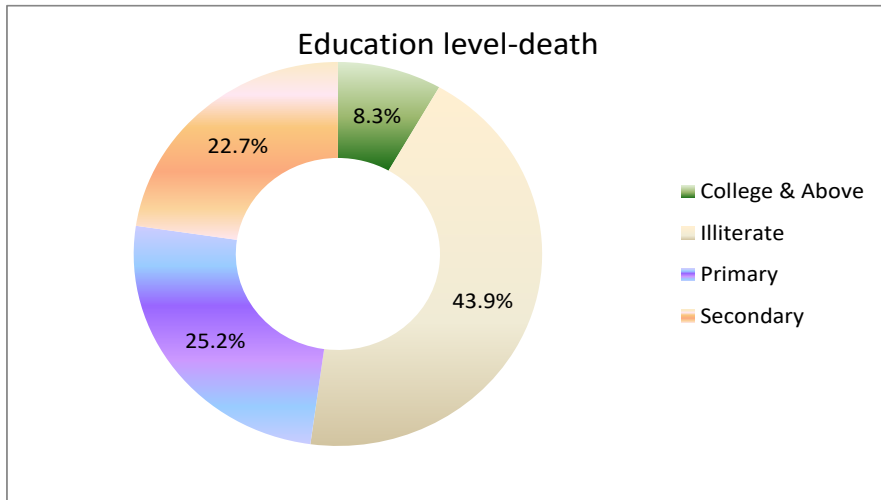


Figure 4

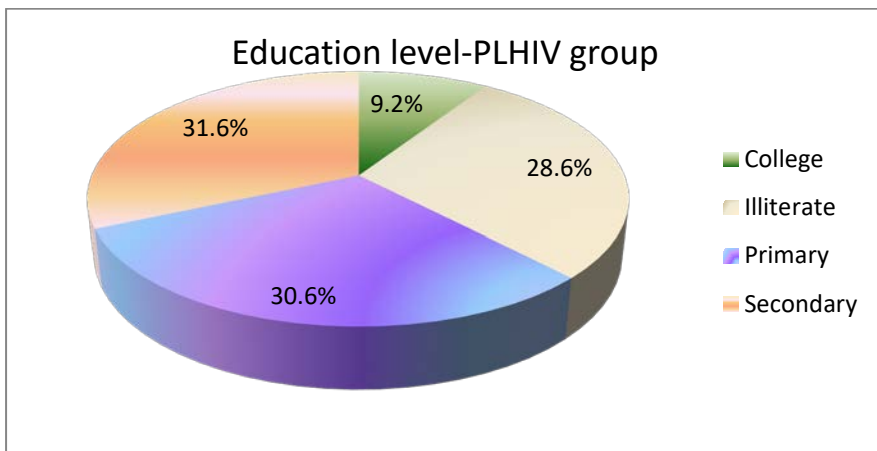


Figure 5

#### 4. MARITAL STATUS

The single/unmarried group constitutes only 13.22% of the lives died. Rest of 86.78% is dominated by the married category sharing 62.30% of the total.

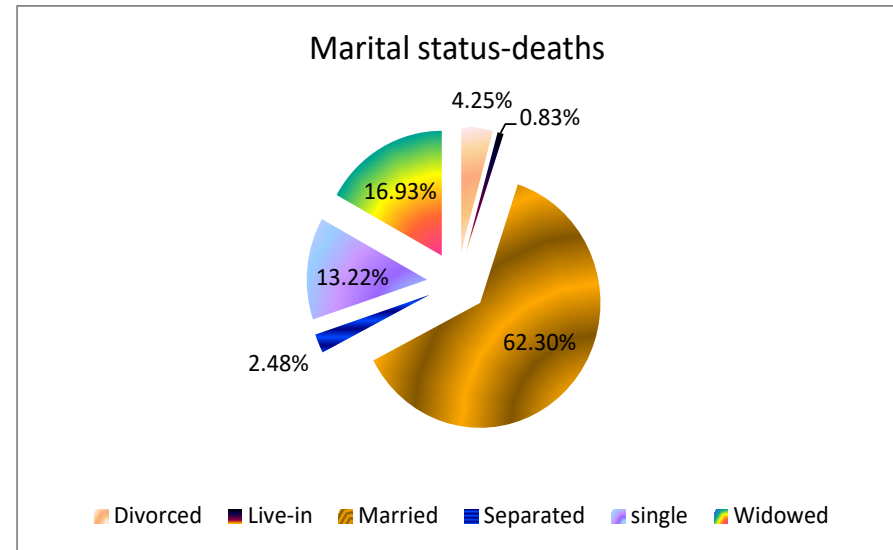


Figure 6

16.93% fall in the widowed category. This also needs to be read in conjunction with the HIV infection sources. 89.97% of infection is due to unprotected sex.

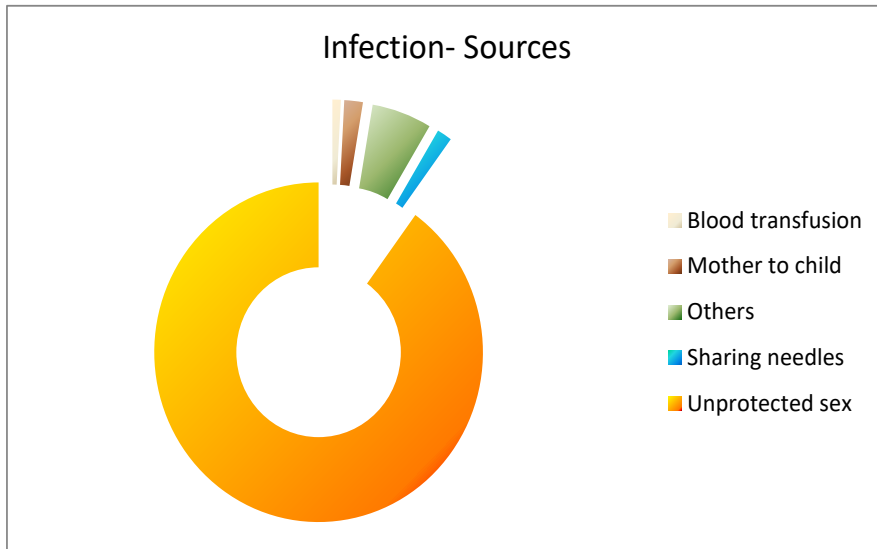


Figure 7

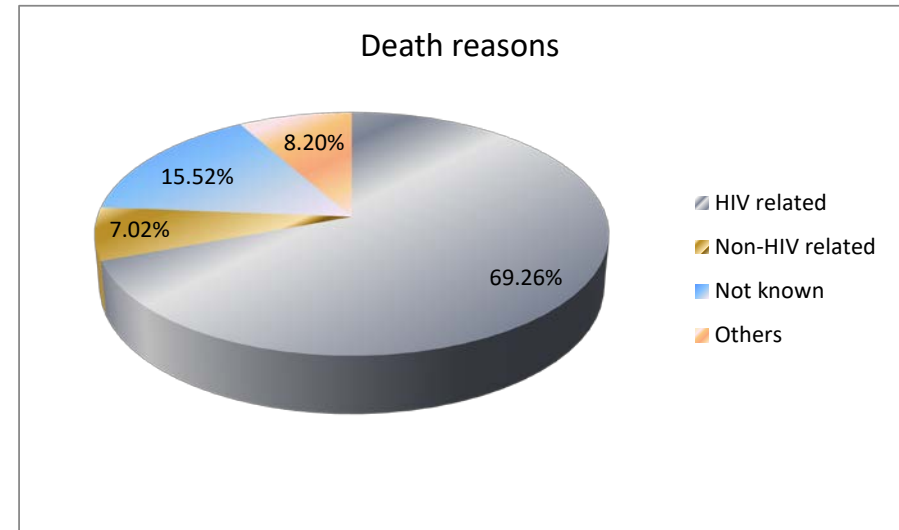


Figure 8

## 5. REASONS OF DEATH

All deaths are not assigned to HIV related as per the data. A small proportion of 7.02% is recorded as non-HIV related. There were no specific reasons in “others” category and a significant proportion under reason “not known”. Without any prejudice, both these reasons can be included in HIV related category. This means, a 92.98% of deaths reported out of PLHIV group are HIV related.

## 6. ART CENTRE ASSOCIATION

Average CD4 count at the time of first registration at ART centres for the death cases is 164 only whereas the PLHIV group as a whole showing this value as 241. A comparison of average CD4 counts of infected lives at the point of registration at ART centres as in figure 9 and figure 10 indicate that the survivors have a higher CD4 count in all age groups except 0-10 group to the death group. This group is not significant as it constitutes only 0.78% of the deaths.

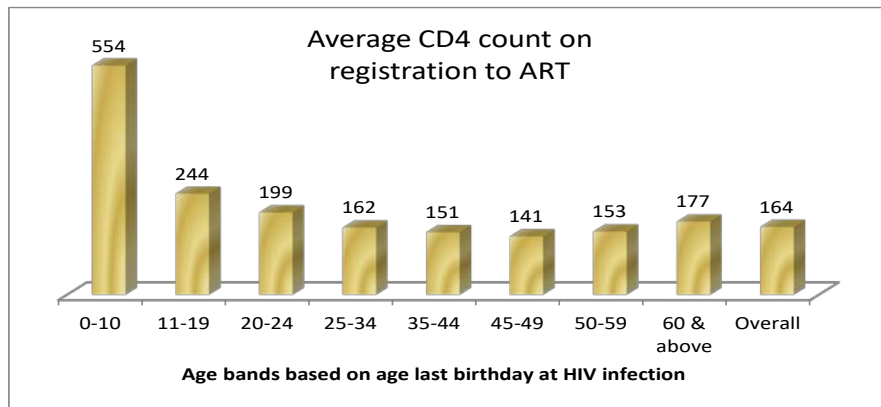


Figure 9

One of the factors leading to death is obviously the delay in reaching out to the ART. Within the death group, average time taken to register with ART centre is 7.4 months which may lead to deterioration of health beyond recovery.

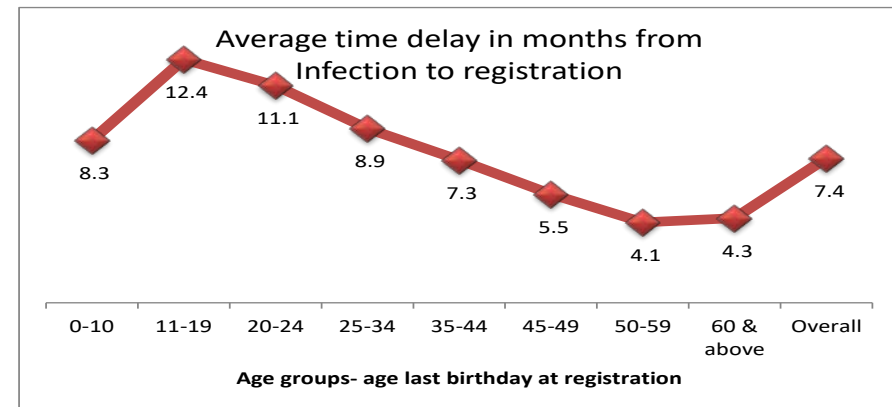


Figure 11

Infected lives who died have taken average time in the range of 4.1 to 12.4 months to undergo their first ART and after reaching a stage of low levels of CD4 counts. This could be one of the main reasons leading to early death.

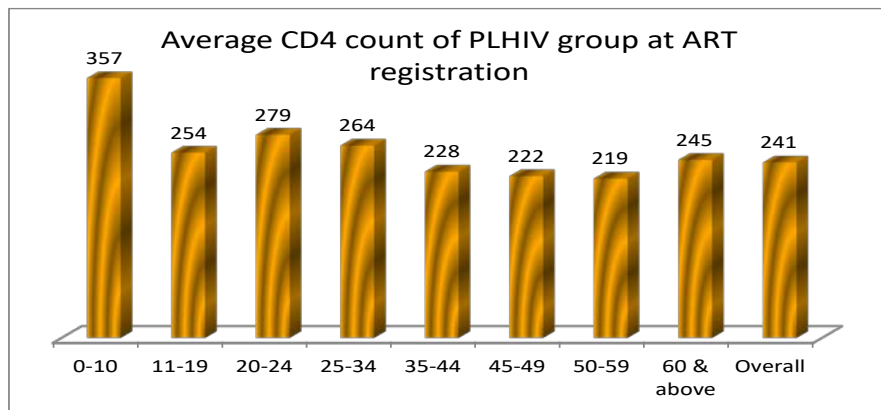


Figure 10

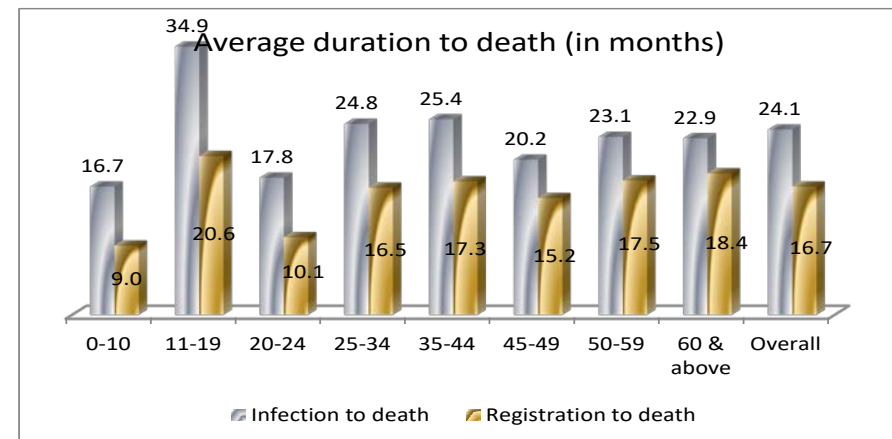


Figure12



On average, infected lives survived about 24 months after infection and 17 months after registering with ART. The CD4 count at the time of infection and time to reach out to ART centres are two major factors deciding the stability and longevity of infected life.

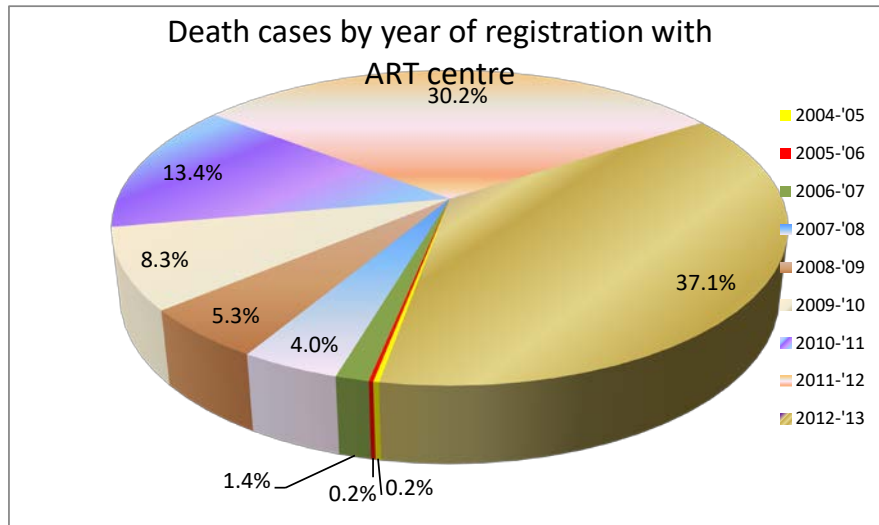


Figure 23

Death cases do not carry a very long history of registration as evident from the average time period from date of registration to date of death. 80.6% of deaths carry history of ART registration within 3 years with a significant contribution of 37.1% from the year 2012-'13 itself. It is important to analyse as to why the number of deaths in absolute volumes increase year by year.

One of the possibilities is that the PLHIV group might be adding more vulnerable sections of the society every year than a population who learned lessons of HIV infection and survival. However, a judgement regarding year to year severity can only be made on the basis of understanding of PLHIV group who are contributing to deaths.

Smaller proportions in deaths from distant past may be due to two main reasons;

- ✓ An infected population having long term association with ART centres is more stabilised for survival than those who have lesser tenure with ART or
- ✓ the infected population in the distant past are at the point of extinction altogether

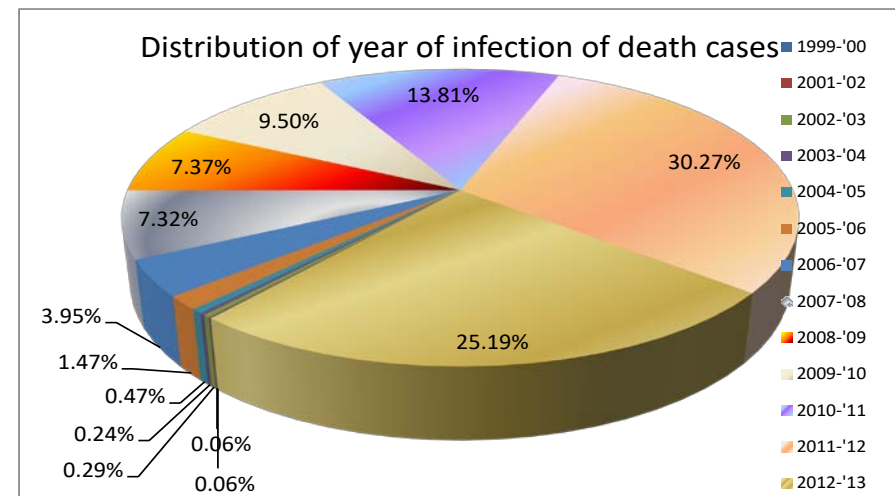


Figure 34

Deaths during the year 2012-'13 in all ART centres together appears nearly uniformly distributed on a monthly basis. Variations appearing in different months could be due to issues related to recording the correct date of death.

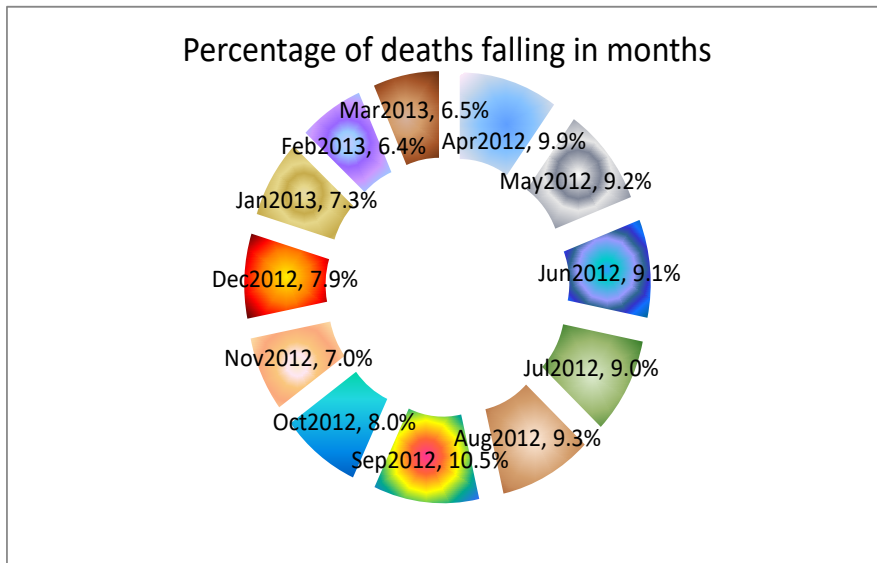


Figure 45

### EXPOSURE PATTERNS

Transmission of monthly data from ART centres to DAC has been on a month to month basis which does have a gender split and do not carry any age / age related groupings. While all mortality related investigations take age as the most significant factor, a situation has never arisen with DAC in the past to serve a mortality purpose. However, the situation now warranted a broad understanding of age/ age group of PLHIV group

contributing to death. Due to urgency of the situation, a random sampling process has been adopted by collecting age grouping of newly registered members during Dec'10 and Dec'12 from all ART centres from which deaths data are collected. Age groupings of newly registered members during the sample months resemble a similar pattern as in figure 16.

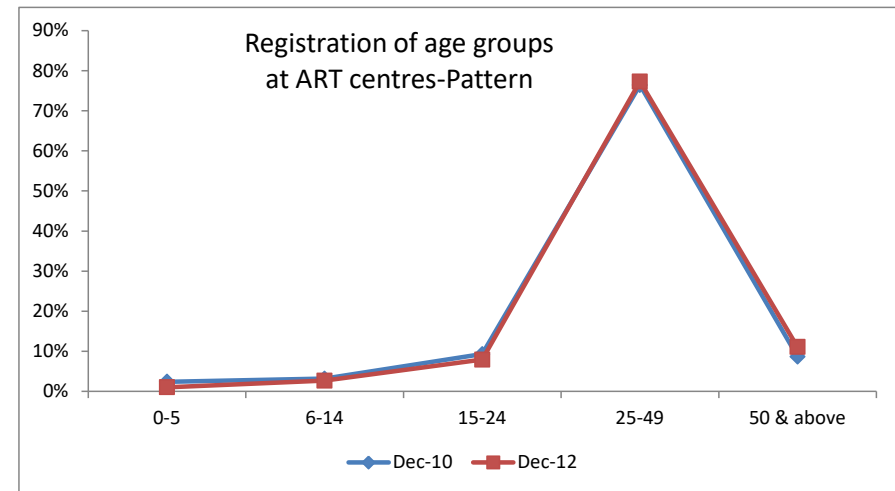


Figure 56

While 25-49 group strikes around 77%, a recent investigation conducted by the Research department on a widespread PLHIV data and with more extensive age groups show a close match with the above indicators [refer item III (d) above].

The major age group 25-49 contributes 83.5% of the total exposed PLHIV group. Keeping in view of the originated times of death data in a slightly distant time than the trend setting months, the age band categorisation has been adopted from the earlier investigation as shown in figure 17.

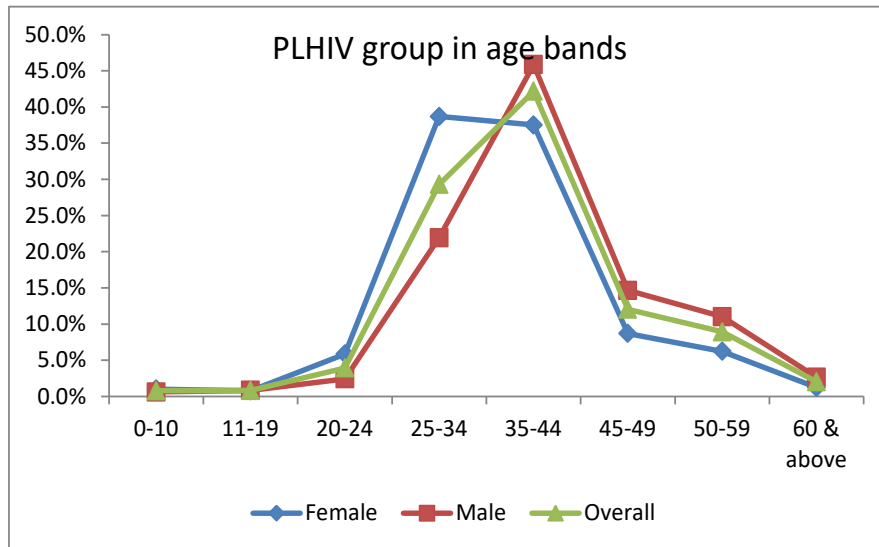


Figure 67

### B. EXPOSURE CALCULATIONS

Data available in respect of:

- Total number of registered lives as on 1<sup>st</sup> Apr'12 split by gender from all ART centres from where death data recorded.
- Month wise new registrations and exits split by gender for 12 months starting from Apr'12 to Mar'13
- Estimated percentages of PLHIV lives falling in different age groups

Total size of exposed data at the beginning of the year 2012-'13 from all centres is 212532, inclusive of transgender. During the period, total new registrations and terminations count to 19507 and 1743 respectively. Total exits available in the monthly on-off movement statement as in (b) above differ by 48 counts in comparison with the death data finalised for the investigation. This small variation is neglected and for estimation of exposed data, figures in (b) are used.

#### Methodology:

- Exposure for full month for all lives available at the beginning of the month
- Assuming new registrations happening half the way, i.e., 15<sup>th</sup> of every month, all new entries will have 15 days exposure for every month and will reflect as additions to (1) above.
- Assuming exits happening half the way, i.e., 15<sup>th</sup> of every month, all exit will have 15 days exposure and will reflect as deletions from (1) above
- Assumed that no entry and exit of the same life happening during a month.
- Total exposure for the year estimated as (1) + (2)- (3) and split by gender
- Transgender data for both exposure and death counts are small in counts and excluded from both calculations
- All 8 age groupings as per figure17 above are applied to total exposed data to arrive exposure in different age bands and gender as per the table below:

Age bands	Female	Male	Overall
0-10	1.0%	0.6%	0.8%
11-19	0.8%	0.8%	0.8%
20-24	5.9%	2.4%	3.9%
25-34	38.7%	21.9%	29.3%
35-44	37.5%	45.9%	42.2%
45-49	8.7%	14.7%	12.0%
50-59	6.2%	11.0%	8.9%
60 & above	1.2%	2.7%	2.0%

Table 7

### C. ESTIMATION OF MORTALITY OF PLHIV GROUP

Below table summarises estimated age band wise data of exposed lives and death data as provided.

Age bands	Exposure		Deaths	
	Female	Male	Female	Male
0-10	967	745	8	12
11-19	774	994	10	12
20-24	5,706	2,981	28	25
25-34	37,431	27,201	194	280
35-44	36,270	57,011	197	471
45-49	8,415	18,259	43	140
50-59	5,997	13,663	48	132
60 & above	1,161	3,354	29	63
Overall	96,720	1,24,208	557	1135

Table 2

Estimated age group wise mortality rates estimated from the above table showing females experiencing better mortality than males almost everywhere which resembles the mortality trends in general population.

Age groups 0-19 and “60 & above” mainly represent minors and non-insurable groups ; other age groups establishes a clear trend of gender wise mortality. Under the insurable age groups, males experience an average 33% extra mortality than females.

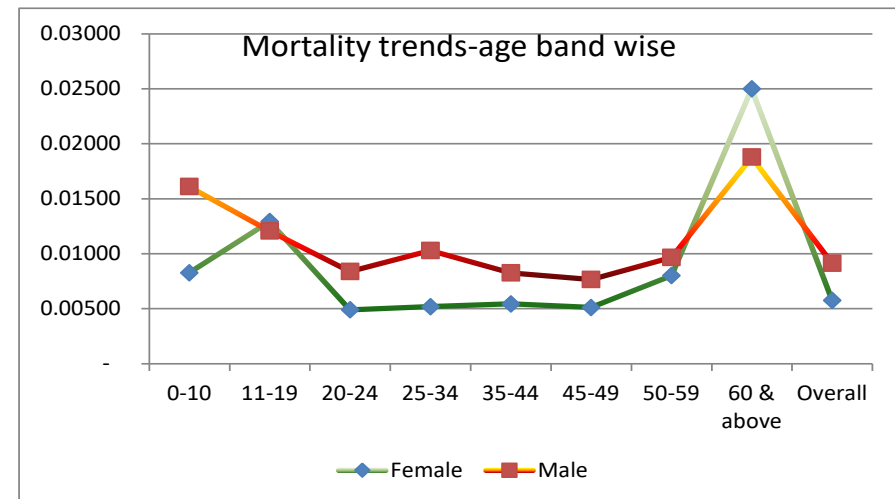


Figure 88

### D. IALM (2006-'08) VIS-A-VIS PLHIV MORTALITY

The Indian Assured Lives Mortality (IALM) (2006-'08) hereinafter referred as standard mortality table is the recent investigation completed on



Indian assured lives and effective from 1<sup>st</sup> Apr'13 for all purposes of life insurance. A comparison of rates estimated for all above groups may be appropriate at this stage. As males and females experiencing different mortality among PLHIV as well, the comparison also been done on the gender basis separately.

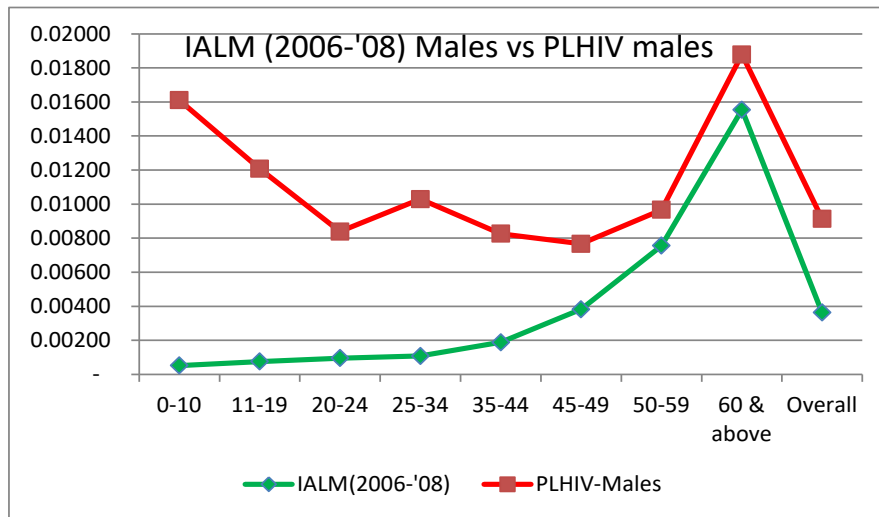


Figure 99

Estimated mortality rates are above IALM (2006-'08) in all age groups for male lives. Severity levels in each of the age groups may be better reflected as multipliers of the standard rates and summarised in the below table:

Age bands	IALM(2006-'08)	PLHIV-Males	Multiplier
0-10	0.00052	0.01610	30.8
11-19	0.00076	0.01208	16.0
20-24	0.00096	0.00839	8.8
25-34	0.00108	0.01029	9.5
35-44	0.00189	0.00826	4.4
45-49	0.00382	0.00767	2.0
50-59	0.00756	0.00966	1.3
60 & above	0.01554	0.01879	1.2
Overall	0.00363	0.00914	2.5

Table 3

The multiplier show the ratio of estimated mortality factor of PLHIV (males) to estimated mortality factor of standard table in different age groups and overall. Severity levels are showing a decreasing trend in terms of multiplier except at the age group 25-34 which could be a data issue either in exposure split or registering age at death and requires more study to conclude.

Mortality of PLHIV (males) to PLHIV (females) bears a ratio 1.44 on average for all ages combined. Male to female mortality ratio with reference to the standard mortality table across all age range bearing an average value 1.48 which is close to the above value is validating the estimated rates of mortality of PLHIV to some extent.

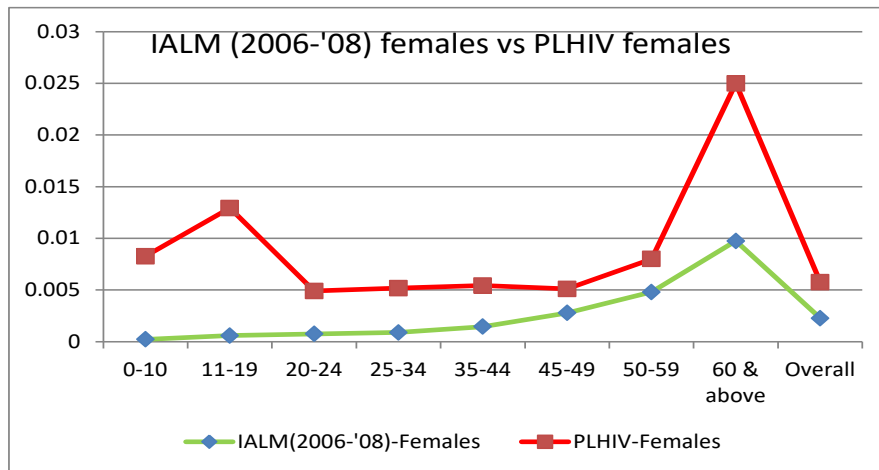


Figure 20

Multiplier and extra mortality charges estimated for female lives under PLHIV group shows lesser severity levels than infected males group in relation to its respective standard rates.

Age bands	IALM(2006-'08)-Females	PLHIV-Females	Multiplier
0-10	0.0002	0.00827	35.44
11-19	0.0006	0.01292	21.83
20-24	0.0008	0.00491	6.47
25-34	0.0009	0.00518	5.79
35-44	0.0015	0.00543	3.73
45-49	0.0028	0.00511	1.83
50-59	0.0048	0.00800	1.66
60 & above	0.0097	0.02499	2.57
Overall	0.0023	0.00576	2.53

Table 4

The estimated extra mortality charges applicable per mile (1000 sum assured) for the both male and female category under each of the above age groups are arrived as the difference of mortality rates multiplied by 1000 and comes out as:

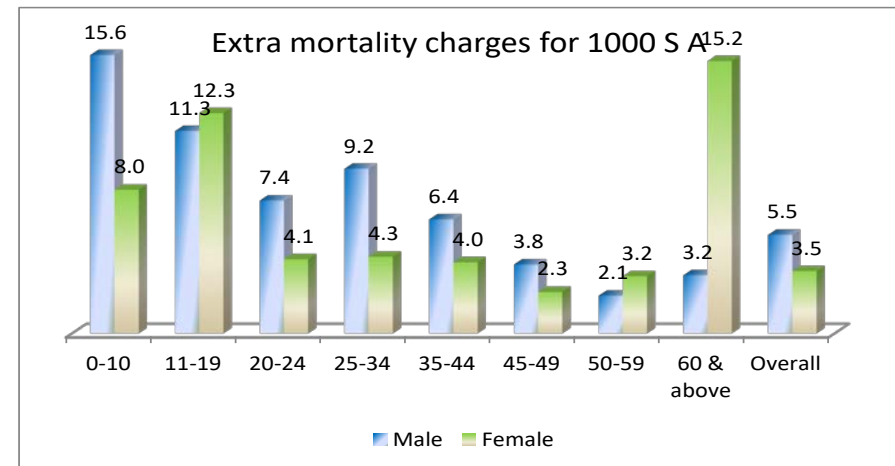


Figure 21

Above charges show a declining trend except for the age group 25-34. This might be due to issues in recording death data in relation to age at death. An interpolation of charges from upper and lower age groups may be appropriate for both gender categories which can be reasonably set at values 7 and 4 for males and females respectively. Age groups 0-19 and "60 & above" are influenced by small volumes of data and to be viewed as random fluctuations. Extra mortality for the insurable group lies approximately in the range of (3.5- 7.5) and (2-4) for males and females respectively.

## E. VALIDATION OF EXTRA MORTALITY FACTORS PROPOSED BY UNDERWRITERS GROUP AND SUGGESTIONS

A committee constituted for the purpose of preparing underwriting guidelines for life insurance products meant for the PLHIV group has proposed extra mortality factors applicable for different age groups based on two major factors; period of association of the life with ART centre and CD4 count at the time of registration. While the investigation identified 2 years as a reasonable period of waiting for a member of the PLHIV group having low CD4 count to become eligible for an insurance coverage irrespective of the gender, there were no indicators for establishing correlation between period of association with ART centre and longevity of life for a life with higher levels of CD4 counts. The extra mortality factors are proposed in the underwriters draft report without reference to the gender, however, the investigation has evidence to suggest different extra mortality rates for male and female. A summary of extra mortality rates proposed by the underwriters group and finding of the investigation below:

Age groups	HAART 3-5 years			HAART 6-8 years		HAART 9-10 years	Male	Female
	Term							
	5	10	15	5	10	5		
25-29	4	4	4	5	5	6	7.0	4.0
30-34	6	6	6	5	5	6	7.0	4.0
35-39	6	6	6	6	7	8	6.4	4.0
40-44	6	6	6	7	8	8	6.4	4.0
45	6	6	6	7	9	10	3.8	2.3

Table 5

The condition in the report of underwriters group that the CD4 count to be above the bench mark level of 350 to become eligible for an insurance cover appears reasonable in view of the lower average CD4 count (164) of died members. However, there is no valid reason for a member waiting for 2 years after achieving the above benchmark level of CD4 counts. A medical history of the member consistently maintaining CD4 counts above the bench mark level over a reasonable period should be the basis for considering an HIV infected person for insurance coverage. The waiting time to be decided on a case to case basis based on the expert opinion from an attending doctor.

While extra mortality ratings for members of the PLHIV group by their association with ART centres up to 5 years can be readily validated with the respective values estimated by the investigation except for age 45 and or above, a cross subsidisation of extra mortality of males to females appear unnecessary. Males and females need to be rated separately. The issue of offering different rates for different durations may alternatively resolved by judging eligibility of renewal of the policy after expiry of a specific time period by evaluating the immediate past history of treatment and status of health of the insured.

## F. TAKEAWAYS

- a) Women tend to survive longer than men
- b) Age group 25-49 contribute 78.3% of total deaths in absolute volume
- c) Age group of infected lives falling in age group 25-29 is estimated to be 83.5%



- d) Illiterates more prone to death; 28.6% of infected illiterates contributing 43.9% of deaths
- e) About 90% of the infection is from unprotected sex among death cases
- f) Married lives constitute 86.78% of the death group
- g) A small proportion of 8.2% reported deaths are non-HIV related.
- h) Average time from infection to ART registration is 7.4 months; average CD4 count at the time of registration is 164
- i) Older the infected life, more faster reaching to ART
- j) Average number of months survived after infection is 24.1 and after registration to ART is 16.7
- k) 80.6% of the death cases carry only less than 3 years' association with ART centre.
- l) Death cases are nearly uniformly distributed during a year.
- m) New registrations in ART centres shows a common trend in respect of different age groups and recent years
- n) PLHIV group dominated by lives in 35-44 age group
- o) Male mortality worse than female mortality in PLHIV group which broadly bears the ratio 1.44; same ratio under standard table is 1.48.
- p) Variation of mortality of male in PLHIV group varies more significantly than female in PLHIV group in relation to the standard mortality table applicable for insured population
- q) Gap between IALM(2006-'08) and PLHIV group decreases gradually as age increases
- r) Extra charges for covering mortality under insurance for males and females are in the range (3.5- 7.5) and (2-4) respectively and varies by age groups.

### G. OBSERVATIONS AND SUGGESTIONS

- I. Lives reaching to ART centre after a reasonably long waiting period after infection appears more vulnerable to death
- II. The CD4 count at the time of registering to ART and access to regular treatments are major deciding factors of longevity of life
- III. Educational, economical and social backwardness among major factors leading to early death.
- IV. Males appear more vulnerable to the disease than females.
- V. There are no regular tracking mechanisms of terminated cases currently in place with ART centres, hence , it is likely that the mortality indicators applicable to PLHIV groups could be an under estimation. Identifying the IBNR (incurred but not reported) part of the data is a matter of further development of systems to be in place with ART centres and can only resolved over a period of time.
- VI. A life insurance product offered to a non-HIV life may be offered to an HIV infected life subject to strict medical, financial and life style underwriting.
- VII. Underwriting of lives may be based on gender.
- VIII. There are no studies to understand longevity of life of an HIV infected person. The duration of insurance coverage is a subject matter to be decided on the basis of calculation of life expectancy of HIV group and requires further study.
- IX. A life maintaining a stable and secure CD4 count by regular ART may be considered for a life coverage under an insurance product for a desired term, subject to submission of medical report/ history in every pre-fixed term, say quarterly or half yearly basis.



- X. There is no reason for a waiting period for an infected person if the medical history and current medical status indicate stable and health living.
  - XI. Mortality charges estimated in the report is only an indicator from the data provided by DAC and not recommended for any commercial purpose by any stake holders across the insurance market.
  - XII. Development and maintenance of systems to manage HIV data is an urgent need of the hour. The credibility and effectiveness of any program targeted to improve the quality and standards of PLHIV group can only be established by micro indicators derived from a data system where data is collected, maintained and updated on a real time basis. The data should talk, data can only talk; anything else cannot survive times.
- e) Conduct an extensive investigation by using records from all ART centres to understand and validate the demographic features of the sample death data used.
  - f) Use results of any investigation conducted by any agency on PLHIV to validate demographic profile of death in PLHIV group revealed in the investigation.

### H. NEXT STEPS

- a) To create an efficient and dynamic data management system at all ART centres to create a central repository at NACO in order to generate continuous and regular indicators on PLHIV. This includes mechanisms to capture all terminations with all details of exit.
- b) Capturing data on a real time basis for a stipulated period in order to validate all assumptions made in the report.
- c) To create a central repository of PLHIV data at NACO to enable validation of any assumptions made time to time by any stakeholder.
- d) To employ technical experts in NACO and at all major ART centres for efficient management of data and related systems.

## ANNEXURE-I

**Table 1** Gender /region split

Gender	Rural	Urban	Grand Total
Female	305	252	557
Male	598	537	1135
Transgender	2	1	3
Grand Total	905	790	1695

**Table-2** Education level in Gender

Education level	Female	Male	Transgender
College & Above	26	114	
Illiterate	307	436	1
Primary	128	297	2
Secondary	96	288	
Grand Total	557	1135	3

**Table 3** Gender/ smoking habit

Education level	Non-smoker	Smoker	Grand Total
Female	520	37	557
Male	672	463	1135
Transgender	2	1	3
Grand Total	557	1135	1695

**Table 4** Gender/ Marital status split

Marital status	Female	Male	Transgender
Divorced	34	37	1
Live-in	4	10	
Married	242	813	1
Separated	23	19	
single	41	182	1
Widowed	213	74	
Grand Total	557	1135	3

**Table 5**

Row Labels	Employed	Unemployed
Female	183	374
Male	708	427
Transgender		3
Grand Total	891	804

**Table 6**

Row Labels	Employed	Unemployed
College & Above	87	53
Illiterate	349	395
Primary	234	193
Secondary	221	163
Grand Total	891	804

**Table 7**

Age groups	Female	Male	Transgender
0-10	8	12	
11-19	10	12	
20-24	28	25	
25-34	194	280	2
35-44	197	471	
45-49	43	140	
50-59	48	132	
60 & above	29	63	1
Grand Total	557	1135	3

## HOW DIFFERENT THE MORTALITY OF PLHIV GROUP?

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**Table 8** Age groups in months

Month & Year	0-10	11-19	20-24	25-34	35-44	45-49	50-59	60 & above	Grand Total
Apr2012	4	1	5	55	55	20	18	9	167
May2012	0	3	3	52	52	20	16	10	156
Jun2012	1	1	3	46	66	15	15	8	155
Jul2012	2	3	3	50	56	15	18	5	152
Aug2012	0	1	5	40	56	29	15	11	157
Sep2012	3	2	9	45	76	18	18	7	178
Oct2012	2	2	4	27	62	17	16	5	135
Nov2012	3	3	7	32	49	9	9	6	118
Dec2012	0	1	3	35	54	12	20	9	134
Jan2013	3	2	2	37	48	13	11	7	123
Feb2013	1	2	3	33	40	6	15	9	109
Mar2013	1	1	6	24	54	9	9	7	111
Total	20	22	53	476	668	183	180	93	1695

**Table 9**

Average no. of months survived till death after registration

Age bands (at death)	Duration in months
0-10	9.00
11-19	20.64
20-24	10.09
25-34	16.53
35-44	17.33
45-49	15.19
50-59	17.46
60 & above	18.39
Grand Total	16.66

**Table 10**

Average no. of months survived till death after infection

Age bands (at death)	Duration in months
0-10	16.65
11-19	34.86
20-24	17.81
25-34	24.82
35-44	25.41
45-49	20.15
50-59	23.12
60 & above	22.95
Grand Total	24.08

**Table 11**

Average CD 4 count at the time of first visit after infection

Age bands (at infection)	CD4 count
0-10	554
11-19	244
20-24	199
25-34	162
35-44	151
45-49	141
50-59	153
60 & above	177
Grand Total	164



# HOW DIFFERENT THE MORTALITY OF PLHIV GROUP?

**Table 12** Average delay in reaching to ART centres after infection

Age bands (at infection)	Duration in months
0-10	8.3
11-19	12.4
20-24	11.1
25-34	8.9
35-44	7.3
45-49	5.5
50-59	4.1
60 & above	4.3
Grand Total	7.4

**Table 13** Possible reason/ source of infection

Age bands (at death)	Blood transfusion	Mother to child	Others	Sharing needles	Unprotected sex	Grand Total
0-10		19	3		2	24
11-19		9	3	1	9	22
20-24		1	4	1	70	76
25-34	4		20	9	475	508
35-44	2	1	34	7	597	641
45-49	5	1	13	3	158	180
50-59	3		10	3	141	157
60 & above			13	1	73	87
Grand Total	14	31	100	25	1525	1695

Age categories/ marriage status

**Table 14**

Age bands (at infection)	Divorced	Live-in	Married	Separated	single	Widowed	Grand Total
0-10					24		24
11-19			1		21		22
20-24	4		37	2	22	11	76
25-34	30	3	308	12	80	75	508
35-44	25	1	434	16	56	109	641
45-49	9		117	5	19	30	180
50-59	3	2	112	2	5	33	157
60 & above	1		47	5	6	28	87
Grand Total	72	6	1056	42	233	286	1695

**Table 15** Age bands and death reasons

Age bands (at death)	HIV related	Non-HIV related	Not known	Others	Grand Total
0-10	12		6	2	20
11-19	13		7	2	22
20-24	37	6	8	2	53
25-34	341	32	65	38	476
35-44	461	40	116	51	668
45-49	125	16	22	20	183
50-59	126	17	23	14	180
60 & above	59	8	16	10	93
Grand Total	1174	119	263	139	1695



## HOW DIFFERENT THE MORTALITY OF PLHIV GROUP?

**Table 16** Distribution of death cases by year of Infection

Year	0-10	11-19	20-24	25-34	35-44	45-49	50-59	60 & above	Grand Total
1999-'00				1					1
2001-'02					1				1
2002-'03				1	4				5
2003-'04				2	2				4
2004-'05				1	5	2			8
2005-'06			2	11	9	1	1	1	25
2006-'07	1	3	6	22	25	4	5	1	67
2007-'08	1	1	4	41	45	15	11	6	124
2008-'09		4	6	38	50	13	7	7	125
2009-'10	4	2	14	63	51	5	13	9	161
2010-'11	4	2	10	77	94	22	17	8	234
2011-'12	12	4	16	151	179	72	50	29	513
2012-'13	2	6	18	100	176	46	53	26	427
Grand Total	24	22	76	508	641	180	157	87	1695

**Table 17** Distribution of death cases by year of registration with ART

Year	0-10	11-19	20-24	25-34	35-44	45-49	50-59	60 & above	Grand Total
2004-'05				1	3				4
2005-'06			1		2				3
2006-'07			1	7	7	3	5		23
2007-'08		1	2	22	30	8	2	3	68
2008-'09	1		4	30	33	9	7	5	89
2009-'10	1	2	8	50	53	7	10	10	141
2010-'11	4	7	12	70	82	22	22	8	227
2011-'12	10	3	14	162	182	65	47	29	512
2012-'13	8	9	34	166	249	66	64	32	628
Grand Total	24	22	76	508	641	180	157	87	1695

## HOW DIFFERENT THE MORTALITY OF PLHIV GROUP?

**Table 18** PLHIV mortality rates

Age bands	Exposure		Deaths		Mortality rates	
	Female	Male	Female	Male	Female	Male
0-10	967	745	8	12	0.00827	0.01610
11-19	774	994	10	12	0.01292	0.01208
20-24	5,706	2,981	28	25	0.00491	0.00839
25-34	37,431	27,201	194	280	0.00518	0.01029
35-44	36,270	57,011	197	471	0.00543	0.00826
45-49	8,415	18,259	43	140	0.00511	0.00767
50-59	5,997	13,663	48	132	0.00800	0.00966
60 & above	1,161	3,354	29	63	0.02499	0.01879
Overall	96,720	1,24,208	557	1135	0.00576	0.00914

**Table 19** IALM(2006-'08)-Males vis-à-vis PLHIV Males

Age bands	IALM(2006-'08)	PLHIV-Males	Multiplier	Extra
0-10	0.00052	0.01610	30.8	15.6
11-19	0.00076	0.01208	16.0	11.3
20-24	0.00096	0.00839	8.8	7.4
25-34	0.00108	0.01029	9.5	9.2
35-44	0.00189	0.00826	4.4	6.4
45-49	0.00382	0.00767	2.0	3.8
50-59	0.00756	0.00966	1.3	2.1
60 & above	0.01554	0.01879	1.2	3.2
Overall	0.00363	0.00914	2.5	5.5

**Table 20** IALM (2006-'08)-Females vis-à-vis PLHIV Females

Age bands	IALM(2006-'08)-Females	PLHIV-Females	Multiplier	Extra
0-10	0.00023	0.00827	35.4	8.0
11-19	0.00059	0.01292	21.8	12.3
20-24	0.00076	0.00491	6.5	4.1
25-34	0.00090	0.00518	5.8	4.3
35-44	0.00146	0.00543	3.7	4.0
45-49	0.00279	0.00511	1.8	2.3
50-59	0.00481	0.00800	1.7	3.2
60 & above	0.00974	0.02499	2.6	15.2
Overall	0.00228	0.00576	2.5	3.5

**Table 21** Proposal from underwriters group vis-à-vis findings from investigation

Age groups	HAART 3-5 years			HAART 6-8 years		HAART 9-10	Male	Female
	Term							
	5	10	15	5	10	5		
25-29	4	4	4	5	5	6	7.0	4.0
30-34	6	6	6	5	5	6	7.0	4.0
35-39	6	6	6	6	7	8	6.4	4.0
40-44	6	6	6	7	8	8	6.4	4.0
45	6	6	6	7	9	10	3.8	2.3



### Reference:

1. “Understanding demographic profile and medical needs of PLHIV group”, an investigation report prepared by Research department, Institute of Actuaries of India-Aug’13