Causes of Death and Early Mortality in People with HIV in Mexico (2004-2015)

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Background:

- HIV/AIDS associated mortality has decreased worldwide in high-, middle-, and low-income countries [1-4] , and the causes of death have shifted to non-AIDS defining diseases.
- HIV/AIDS mortality has remained constant in México even after expansion of Antiretroviral treatment (ART) access in 2000 [5].
- Information regarding time from HIV diagnosis to death and causes of death provide important information that may help to identify gaps in the continuum of care.
- Mortality during the first months after HIV diagnosis usually indicates: a) delayed or no entry into care and treatment and b) the occurrence of AIDS related complications.
- **We aimed to describe trends in the causes of death over time and estimate the frequency of HIV/AIDS associated mortality early after diagnosis.**

Methods:

- Using national death registry data, we identified all registered deaths among HIV-infected people between 2004-2015.

  Early mortality (EM): deaths occurring within the first year after HIV-diagnosis and
  Very early mortality (VEM): deaths in the first month after HIV–diagnosis.
  - Time since HIV diagnosis was defined as the time reported since the first cause related to HIV in the death registry.
- We describe changes in the proportion of EM by calendar year and stratified by gender using logistic models.
- We classified the **main cause** of death according to ICD-10, and described the most frequent causes of death by gender, calendar year and EM condition.
- Causes of death were classified as AIDS and non-AIDS**.**
- Logistic adjusted models for AIDS and for EM were fitted to evaluate trends of death due to AIDS and factors associated to EM respectively.

Results:

There were 10,853 deaths in women and 48,797 in men. **AIDS-related deaths** occurred in **74% of all subjects**.

Most frequent AIDS-related causes (Figure 1)

1. Pneumonia (n=12410, 20%)
2. AIDS unspecified (n=5668, 15%)
3. Opportunistic infections (n=5407, 9%)
4. Tuberculosis (n=3538, 5%)

Most frequent non-AIDS-related causes

1. Infectious Diseases (n=9002, 13%)
2. Unclassifiable/Unknown (n=8955, 14%)
3. Central and peripheral vascular disorders (n=4588, 3%)

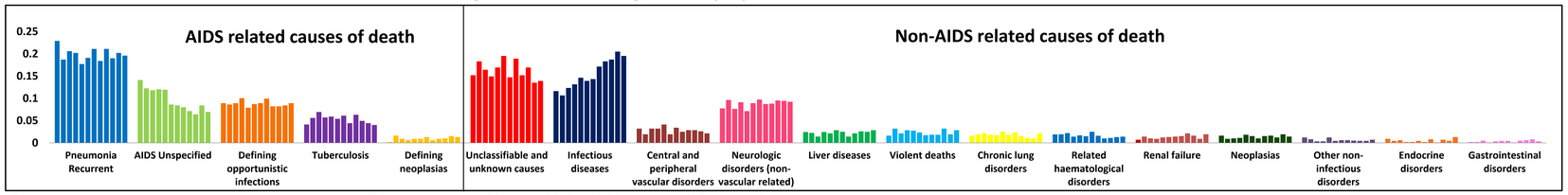
Non-significant differences were observed by sex over time.

EM: 53% (n=3,677) among women and 57% (n=17,824) among men.

VEM increased from 15% to 22% (p<0.001), with no differences by sex **(Figure 2).**

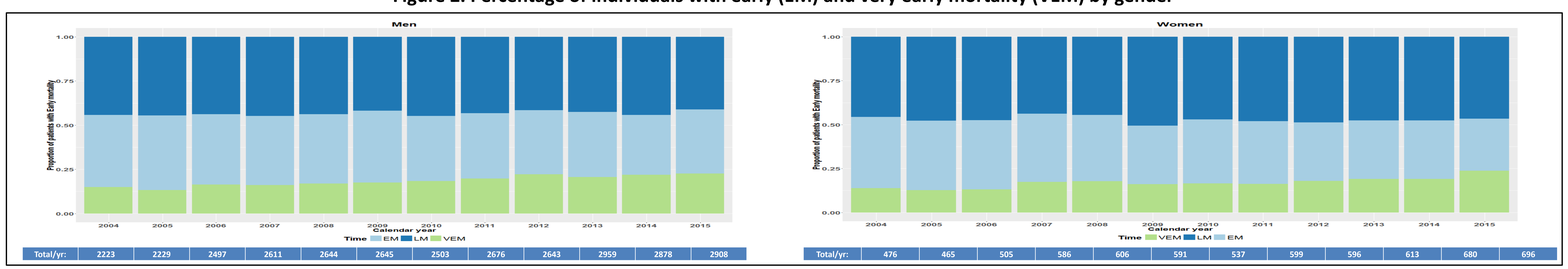
AIDS explained 75% of EM. Overall, men had a higher risk of EM (OR: 1.24 [95%CI: 1.17- 1.31], p<0.01) **(Table 1).** The percentage of deaths due to AIDS decreased during the first years (2004-2010) in both sexes, but particularly among men. This trend was observed in both , early and late deaths **(Figure3).**

Figure 1. Annual changes in the proportion of causes of death between 2004-2015



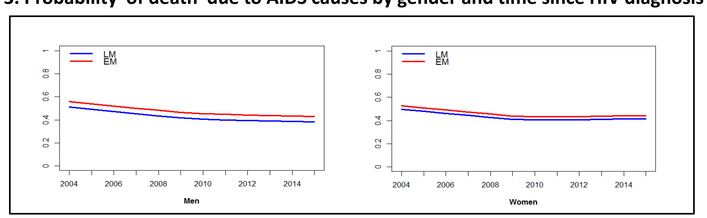
The panel shows the most common causes of death among HIV people between 2004 and 2015 by AIDS and non-AIDS causes. Each bar represents a year.

Figure 2. Percentage of individuals with early (EM) and very early mortality (VEM) by gender



Percentages of early mortality were estimated relative to the numbers of records with time to death available, which ranked from 56 to 74% of total deaths among males and 58 to 75% among females, between 2004 and 2015. The total of individuals included by year are shown in the total/yr table below the figure. **LM** Late mortality. **EM: ≤1y, VEM: <1mo, LM: >1y**

Figure 3. Probability of death due to AIDS causes by gender and time since HIV diagnosis



Adjusted model by age, calendar year, scholar level, Social security, receiving medical assistance for the death event stratified by gender and Mexican state (**LM**) Late mortality , (**EM**) early mortality

Conclusions :

- The frequency of **EM, VEM** and deaths related to AIDS (all markers of late HIV diagnosis) have persisted or increased along time in Mexico.
- These results provide further evidence of the high impact of late diagnosis over mortality in this population in Mexico.
- The reduction of deaths due to AIDS over time was lower among women, which may reflect gender inequalities and increased vulnerabilities previously reported among Mexican women living with HIV.
- Our results support the need to strengthen policy efforts to expand HIV diagnosis and early linkage to care, particularly among women.

Table 1. Factors associated to early mortality

		OR	95%CI	p-value
Male		1.24	1.17 - 1.31	<0.001
Age at death	45 vs 30	0.74	0.71 - 0.77	<0.001
	50 vs 30	0.72	0.69 - 0.75	
	60 vs 30	0.71	0.67 - 0.75	
Calendar year at death	2007 vs 2004	1.06	1.00 - 1.12	0.03
	2010 vs 2004	1.12	1.03 - 1.21	
	2014 vs 2004	1.17	1.07 - 1.29	
Education	Primary vs Unknown	1.13	1.04 - 1.24	0.09
	Secondary vs Unknown	0.89	0.79 - 0.95	
	High vs Unknown	0.92	0.83 - 1.01	
Social seccurity	None vs IMSS	1.15	1.09 - 1.22	0.04
	Other vs IMSS	0.91	0.83 - 0.99	
	Seguro Popular vs IMSS	0.98	0.92 - 1.04	
	Unkwon vs IMSS	0.89	0.81 - 0.99	
Received medical assistance for the death event		1.29	1.19 - 1.41	<0.001
Mexican State	Mexico City vs Other	0.88	0.82 - 0.95	0.05
	Veracruz vs Other	0.99	0.93 - 1.05	
	Mexico State vs Other	1.14	1.06 - 1.22	
	Chiapas vs Other	1.29	1.17 - 1.42	

Adjusted model by age, calendar year, education, Social security, medical care at death time stratified by Mexican state . **IMSS: Institute of Mexican Social Security**

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