Chronic Disease-Free Life Expectancy in Algeria: Recent Evolution and Future Prospects

Farid FLICI*

*Research Center in Applied Economics for Development, CREAD, Algiers, ALGERIA. e-mail:
farid.flici@cread.dz
webpage:
https://farid-flici.github.io

2nd Arab Actuarial Conference, Tunis (Tunisia) April 25, 2024.

- From the previous Edition: Population aging and Pension sustainability

World Aging Map, From my talk at the Arab Actuarial Conference, Cairo 10/05/2023

https://www.youtube.com/watch?v=G8S3JffJCww

- Health Expectancy-related publications

Flici, F., & Chinoune, M. (2022). Analysis of Recent Changes in Chronic Disease-Free Life Expectancy in Algerias, *Eastern Mediteranean Health Journal, 28(12)*,872-878: https://doi.org/10.26719/emhj.22.091

Chinoune M., & Flici, F. (2024, forthcoming). Which Chronic Diseases Contribute the Most to Healthy Years Lost in Algeria, *Chronic Illness, x(x)*, xx-xx.

Flici, F., & Chinoune, M. (2024, Under Review). The Algerian Elderly Are Living Longer But Less Healthier, *Manuscript under review, x(x)*, xx-xx.

Flici, F., et al. (2024). On Health Expectancies Forecasting Methodology: The Morbidity-Mortality Relational Model, *Working Paper.*

Life Expectancy Vs. Healthy Life Expectancy

Longevity - Life Expectancy Improvement
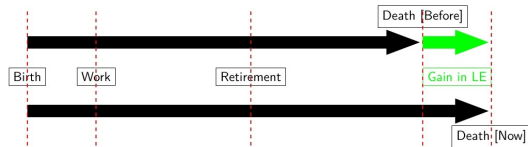
- What is the quality of the gained years (of good or bad health);

- Population Health Indicators
  - Chronic Disease-Free Life Expectancy (Wider Definition of Morbidity)
  - Disability-Free Life Expectancy (Excludes non Disabling Chronic Diseases, Considers Injuries)
  - Disability Adjusted Life Expectancy (Considers Severity: limitation to carry-out daily tasks to total dependency)

Healthy Life Expectancy Vs. Life Expectancy

- Morbidity Compression
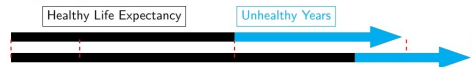
- Morbidity Expansion


- Mortality Morbidity Balance: Constant Ratio of HLE/HL

- The Evolution of Healthy Life Expectancy Compared to Life Expectancy
  - Morbidity Compression (Reduction of Morbidity faster than Reduction in Mortality, Concentration of Illness to the End-of-Life)
  - Morbidity Expansion (Reduction of Morbidity Slower than Reduction in Mortality, Expansion of morbidity, Reduction of Disease Severity without Postponing the Onset Age)
  - Mortality-Morbidity Balance (Healthy Expectancy and Life Expectancy are expanding at the same pace)

Evolution of Life Expectancy in Algeria: Future Perspectives

➤ A Gain of More Than 30 years in LE in a Time Laps of 56 years
  ➤ In 2050, life expectancy is expected to increase to 81.21 and 82.70 for men and women resp.
  ➤ In 2070, life expectancy is expected to increase to 82.08 and 83.46 for men and women resp.
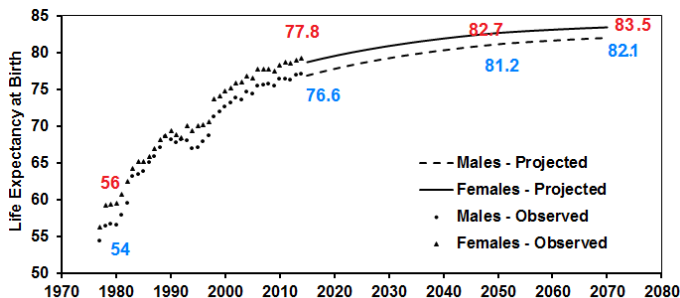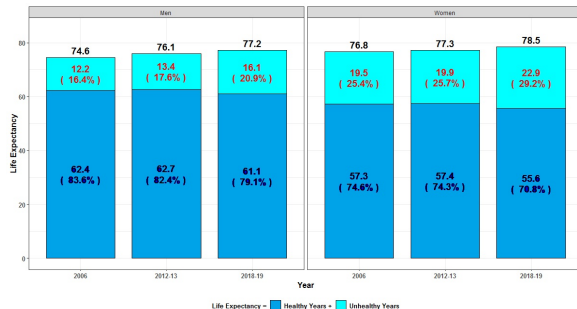

Flici, F. (2020). Analyzing the Trend of Life Expectancy Evolution in Algeria from 1962 to 2018: The S-logistic Segmentation with Jumps. *Population Review 59(1)*, 56-72, doi: 10.1353/prv.2020.0002
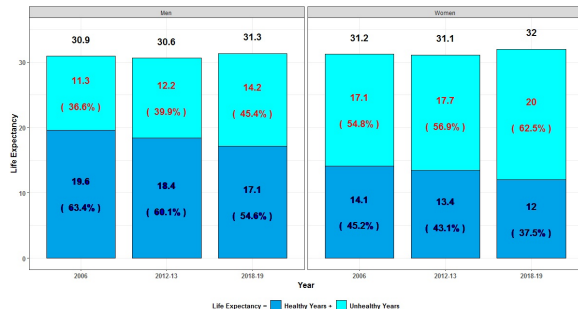
Flici, F. (2021). Coherent Mortality Forecasting for the Algerian Population. *Insurance and Risk Management Journal 87(3-4)*, 209-31, doi: https://doi.org/10.7202/1076125ar

Recent Evolution of Chronic Disease-Free Life Expectancy in Algeria
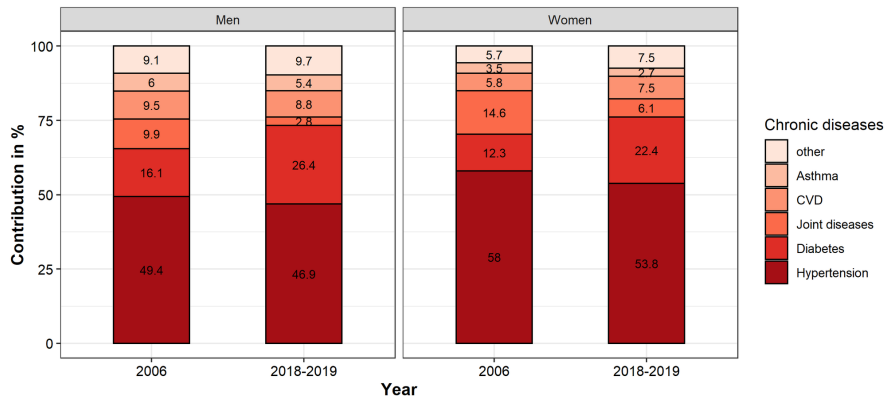
Healthy and Unhealthy Expectancy at age 0   Healthy and Unhealthy Expectancy at age 50

- Data Source: the Mutltiple Indicators Cluster Survey (MICS: 3 (2006), 4 (2012), and 6(2018)), by UNICEF and Algerian Health Ministry.

Contribution of the # chronic diseases to the lost healthy years (at age 60)

Chinoune M., & Flici, F. (2024, forthcoming). Which Chronic Diseases Contribute the Most to Healthy Years Lost in Algeria, *Chronic Illness, x(x)*, xx-xx.

Relational models - Mortality forecasting using limited data

- Main idea: find a relationship between the mortality of a population (A) with limited data and a reference population (B) with a large data history.

- the defined regression will allow for deducing the projected mortality rates of (A) based on (B).

- Often used to forecast age-specific mortality rates of life insurance portfolios;

- Flici and Planchet (2019) evaluated the logit-linear model and proposed a logit-quadratic model to forecast retirees' mortality using the global population mortality as a reference.
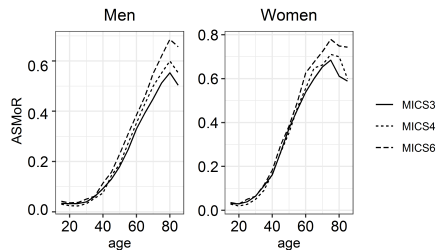
- logit-linear model:

$$Logit(\widehat{\mu}_{x,t}^{exp}) = \gamma + \delta Logit(\widehat{\mu}_{x,t}^{ref}) + \zeta_{x,t}$$

- A proposed logit-quadratic model

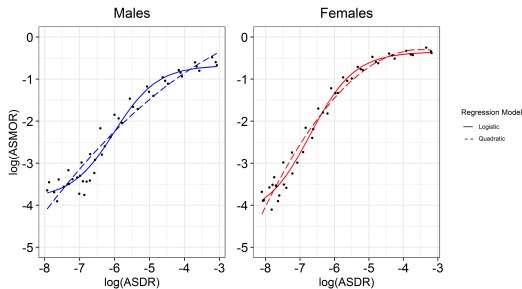$$Logit(\widehat{\mu}_{x,t}^{exp}) = \gamma + \delta Logit(\widehat{\mu}_{x,t}^{ref}) + \varphi Logit(\widehat{\mu}_{x,t}^{ref})^2 + \zeta_{x,t}$$

Predicting Future Trends: the Mortality-Morbidity Relational Model

Figure: Crude CD prevalence rates ($prv_{x,t}$), Data source: 2006(MICS3), 2012(MICS4), 2018(MICS6)

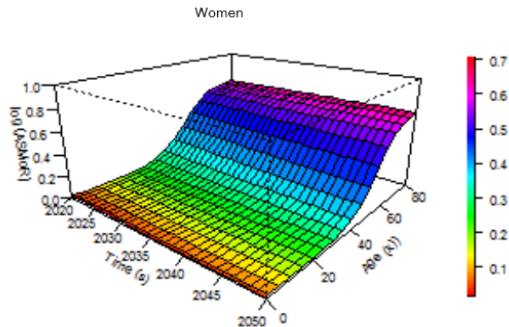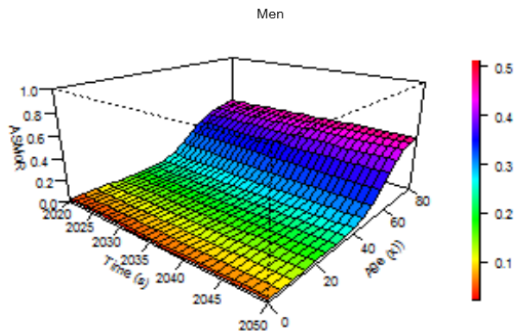Figure: Fitting $\log(prv_{x,t})$ in fct of $\log(m_{x,t})$

$$\log(prv_{x,t,m}) = -3.838 + \frac{3.165}{1+\exp^{-(1.626*\log(m_{x,t,m})+9.765)}}$$

$$\log(prv_{x,t,f}) = -4.277 + \frac{3.928}{1+\exp^{-(1.556*\log(m_{x,t,f})+10.432)}}$$

Projected Age-Specific Morbidity Rates

Projected morbidity surface for men (left) and women (right) obtained with the S−logistic morbidity−mortality relational model

- The share CDFLE/ LE will decrease from 78% and 69% in 2020 to 69% and 62% in 2050 for males and females respectively

Wrap-up

- Algerians are living longer but not healthier
- Between 2006 and 2018-19, Life expectancy of the Algerian population knew an increase by 2.1 years while CDFLE decreased by 1.4 years.
- the survival-health gender paradox was observed in Algeria
  - Algerian women live 1-2 years longer than men on average but with five years less healthier
- Future Evolution
  - Algerian population are expected to live an average of 56.1 and 50.9 years without chronic diseases by 2050
  - The forecasts indicate that the share CDFLE/ LE will decrease from 78% and 69% in 2020 to 69% and 62% in 2050 for males and females respectively
- Perspectives
  - Use additional data sources (social security, health administrative data)
  - The model needs to be tested on other health indicators and other countries
  - Other model can be considered with the same approach (relational models)

To conclude

- Morbidity Expansion will increase social security expenditures in Algeria,
- The presented studies can inspire similar studies in the Aarb region;
- Also, it should help actuaries in the industries to have a better idea on future trends in terms of morbidity;
- Actuaries from different institutions (actuarial association, insurance regulators, social security, insurance industries) should collaborate.

Thanks For Your Attention

www.linkedin.com

https://farid-flici.github.io/