Día R sobre demografía y población: Modelización de los patrones de edad de la mortalidad de menores de 5 años con package logquad5q0

Andrea Verhulst

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UNFPA-Colombia

Modelización de la mortalidad de 0 a 5 años

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Modeling Age Patterns of Under-5 Mortality: Results From a Log-Quadratic Model Applied to High-Quality Vital Registration Data

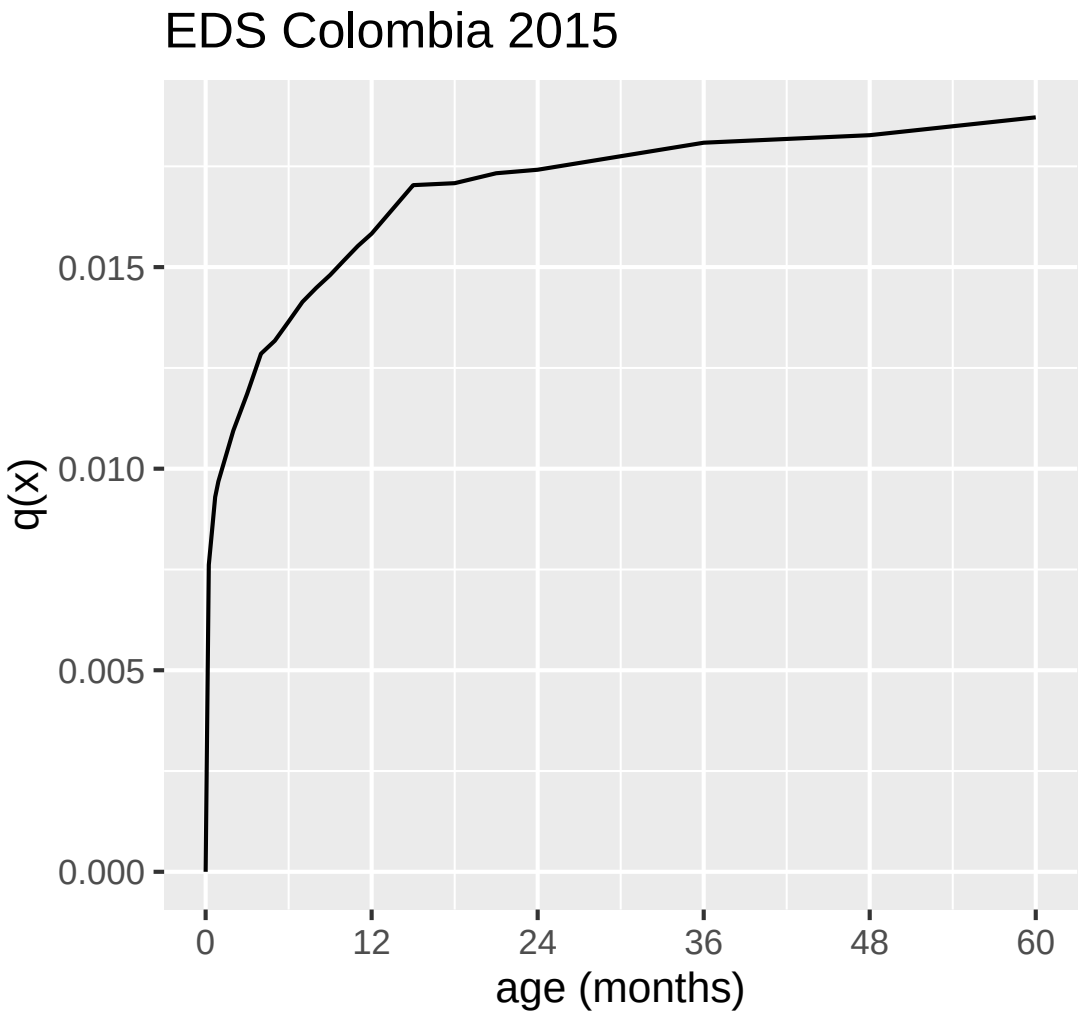
Michel Guillot
University of Pennsylvania, miguillo@upenn.edu

Julio Romero Prieto
London School of Hygiene and Tropical Medicine, julio.romero-prieto@lshtm.ac.uk

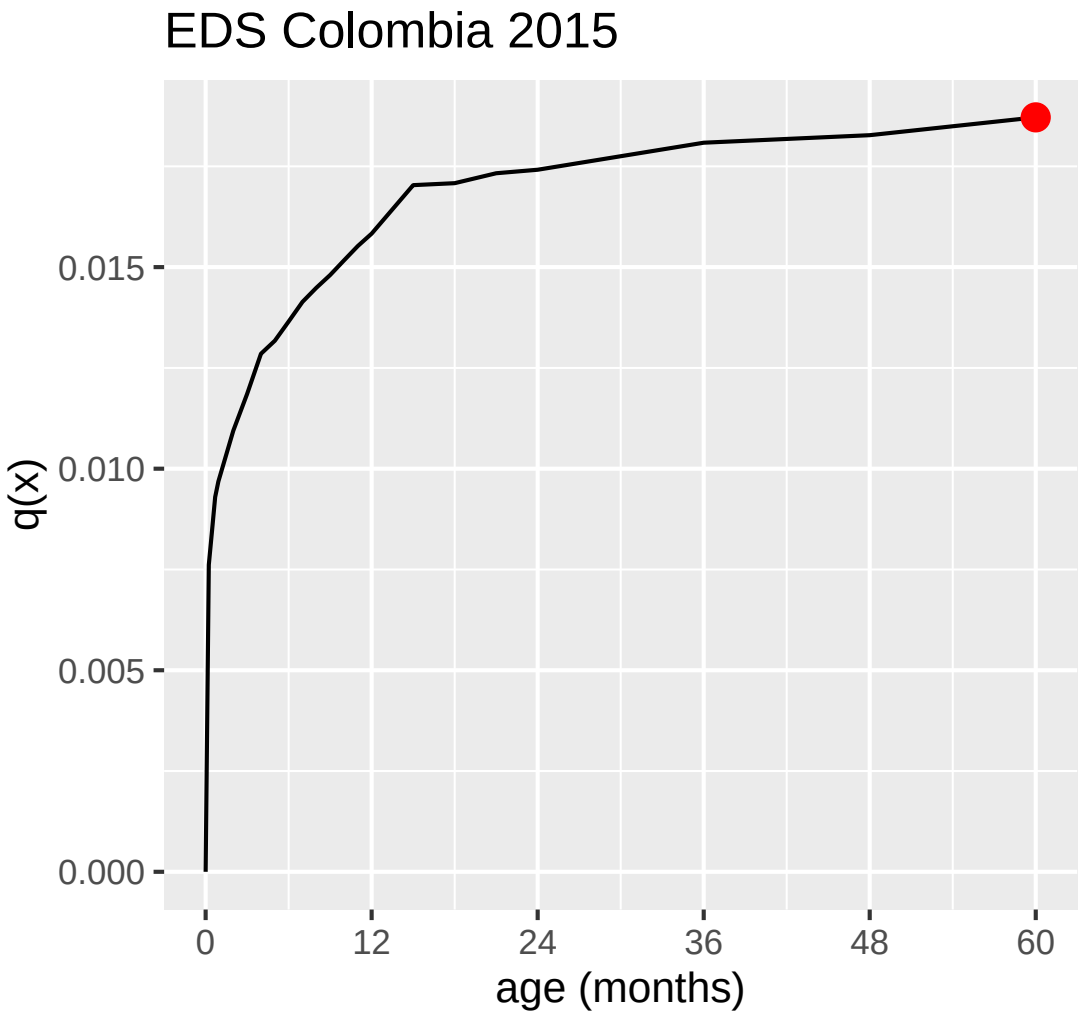
Andrea Verhulst
University of Pennsylvania, verhulst@sas.upenn.edu

Patrick Gerland
United Nations, gerland@un.org

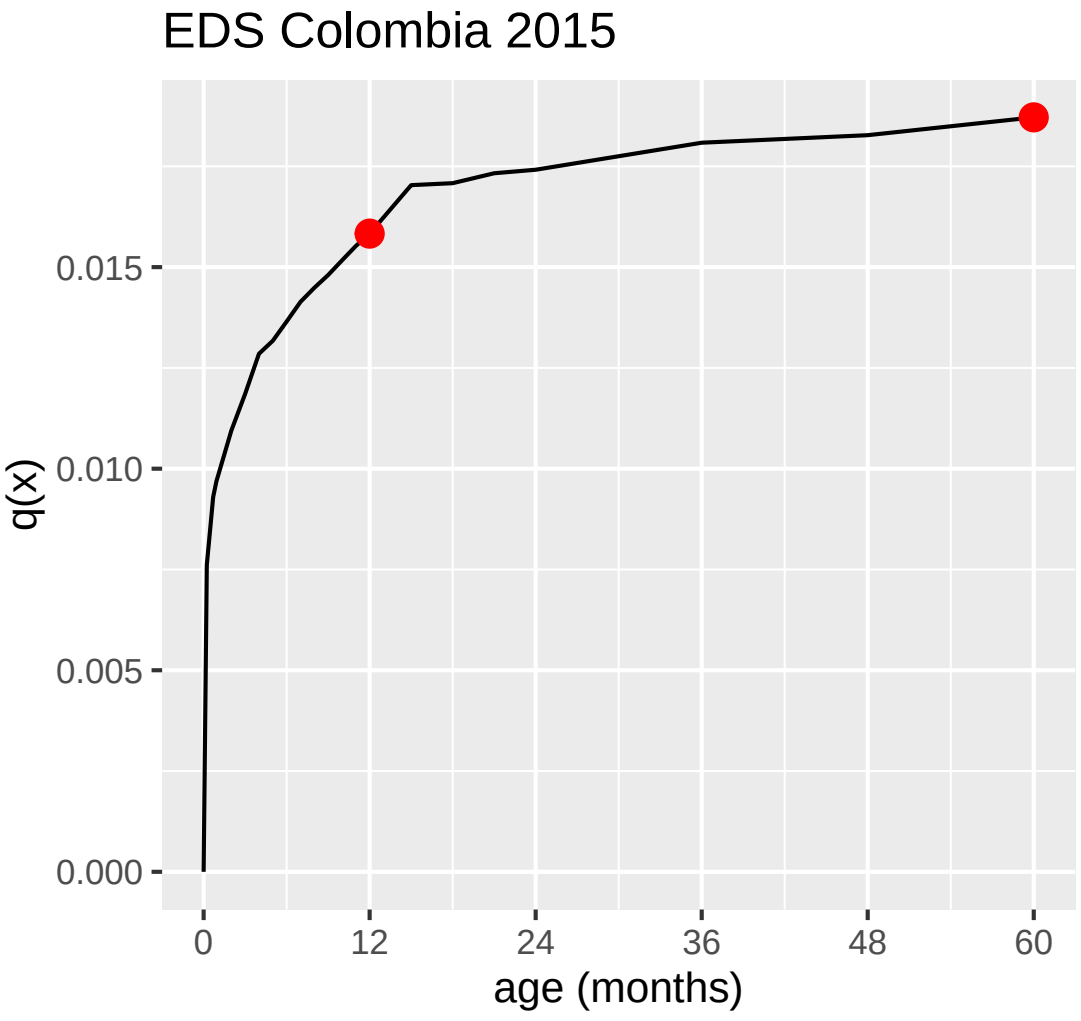
Probabilidad cumulativa de fallecer q(x)



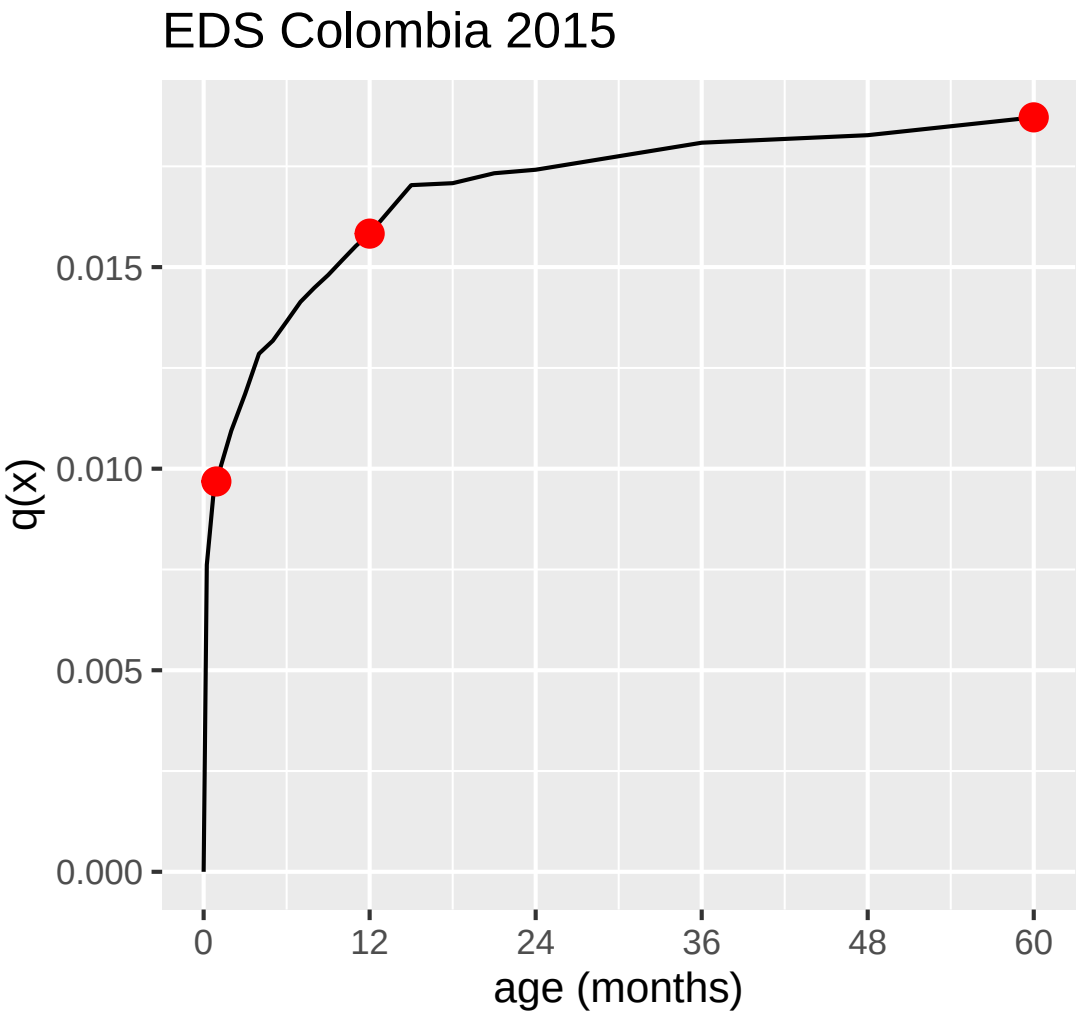
Probabilidad cumulativa de fallecer q(x)



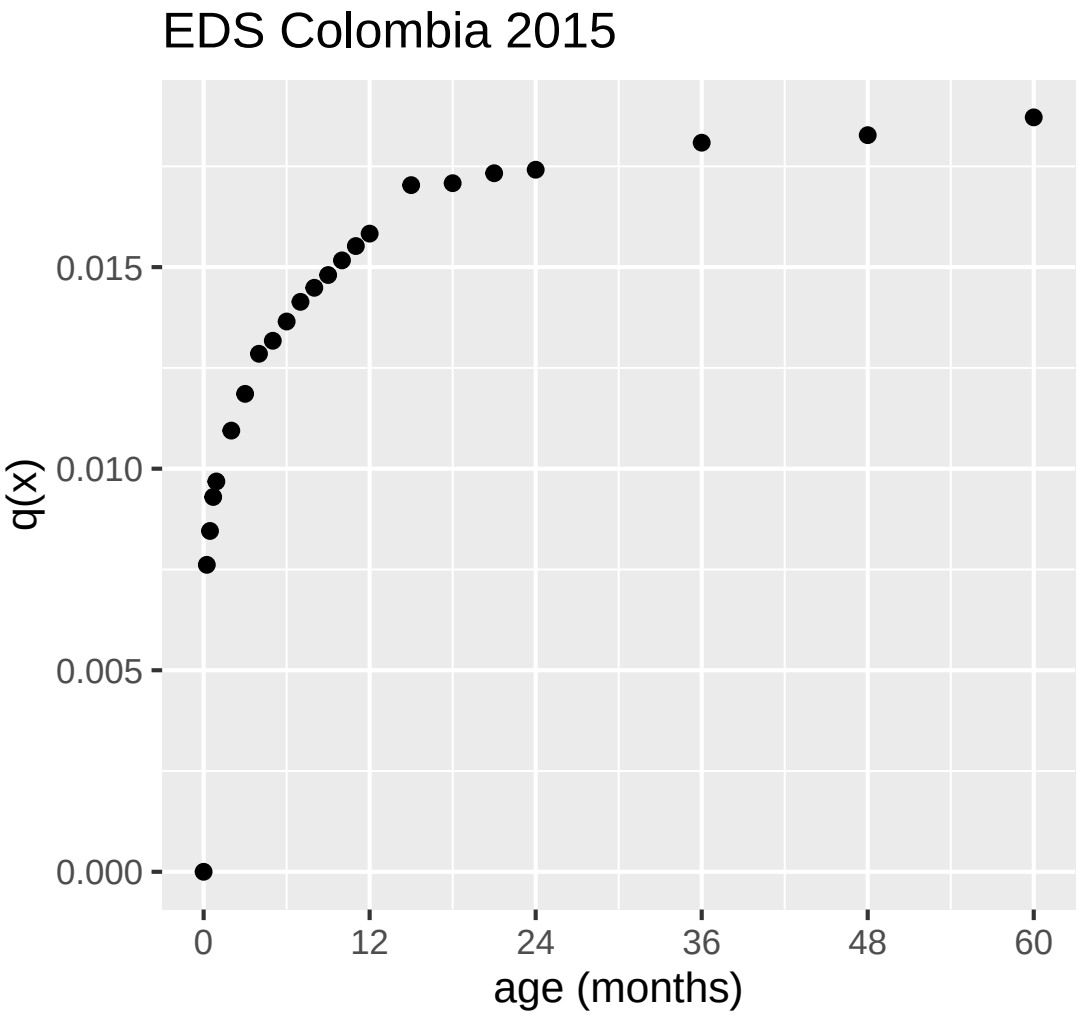
Probabilidad cumulativa de fallecer q(x)



Probabilidad cumulativa de fallecer q(x)



Probabilidad cumulativa de fallecer q(x)



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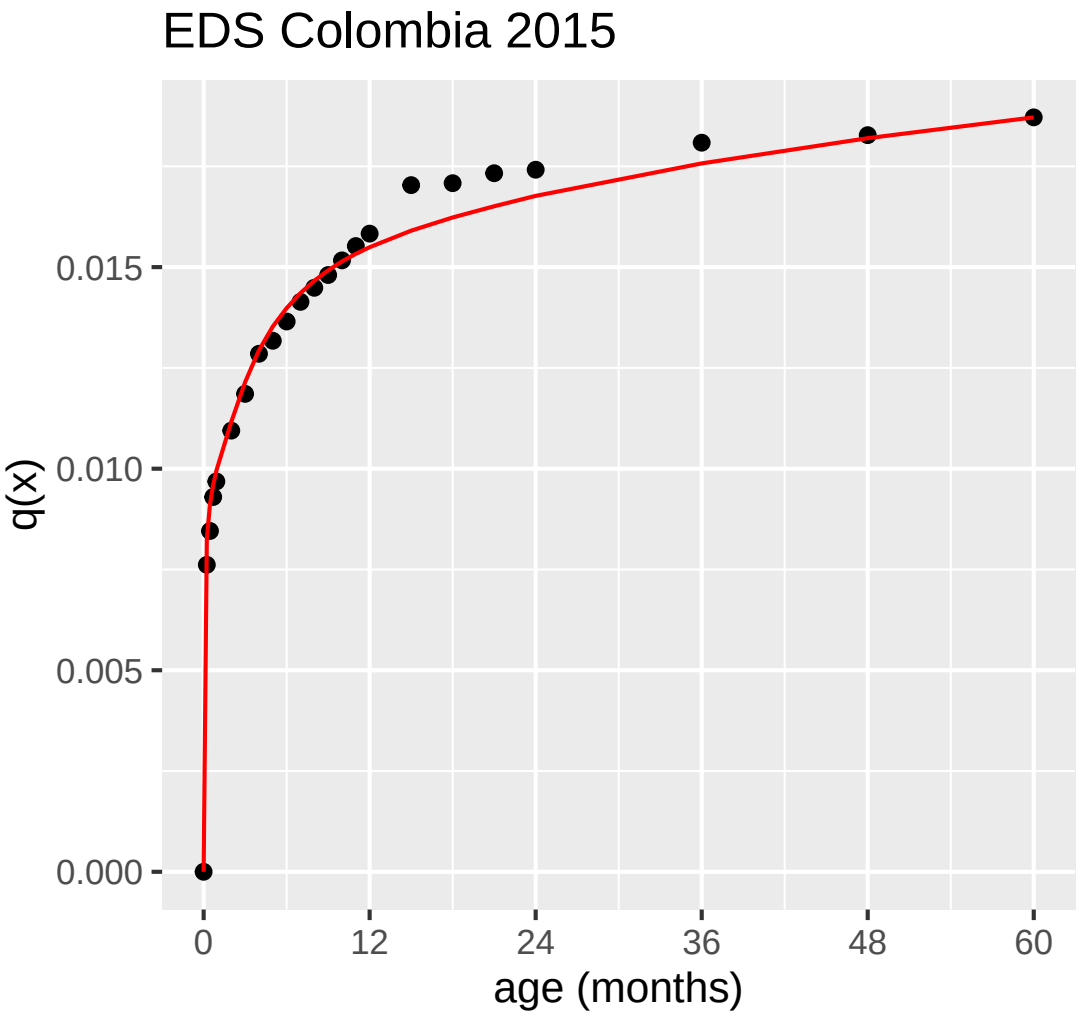
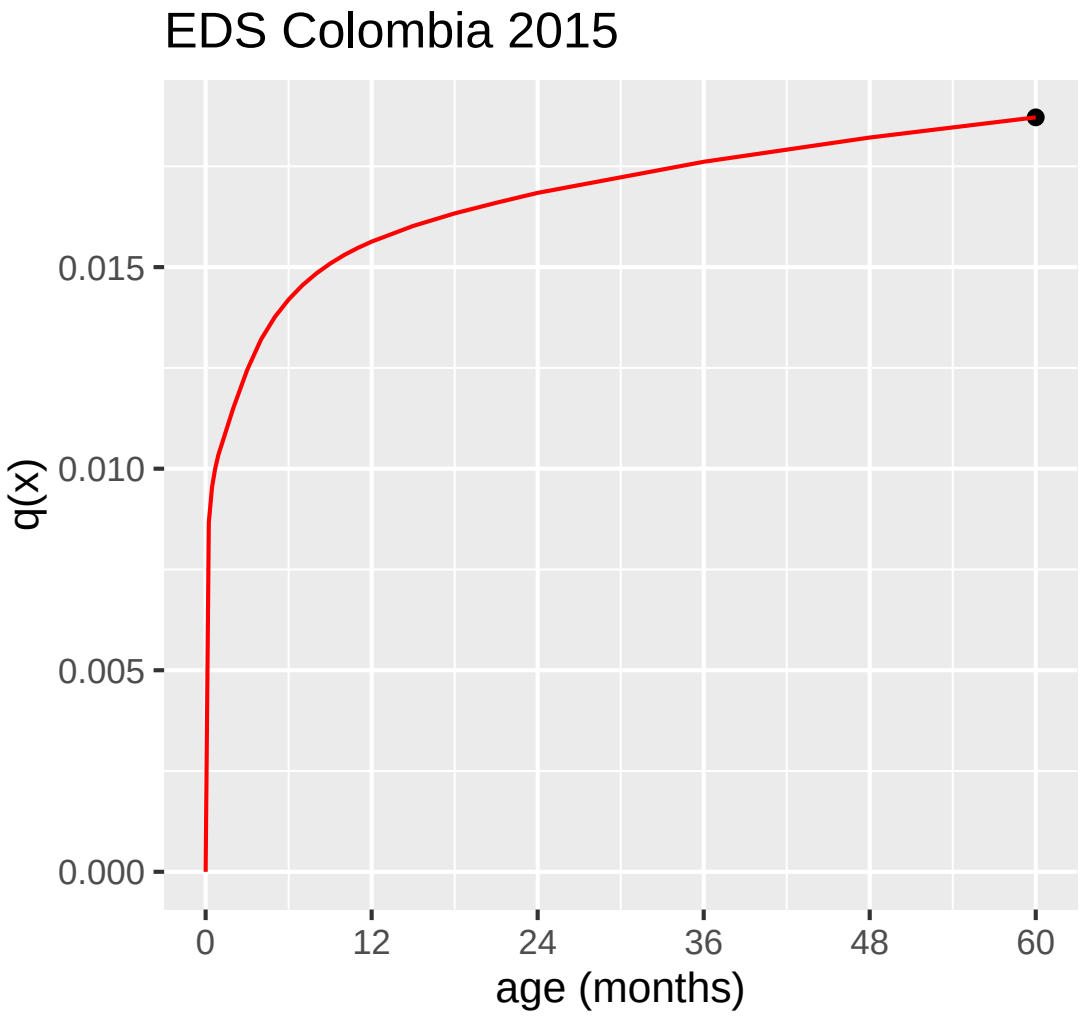
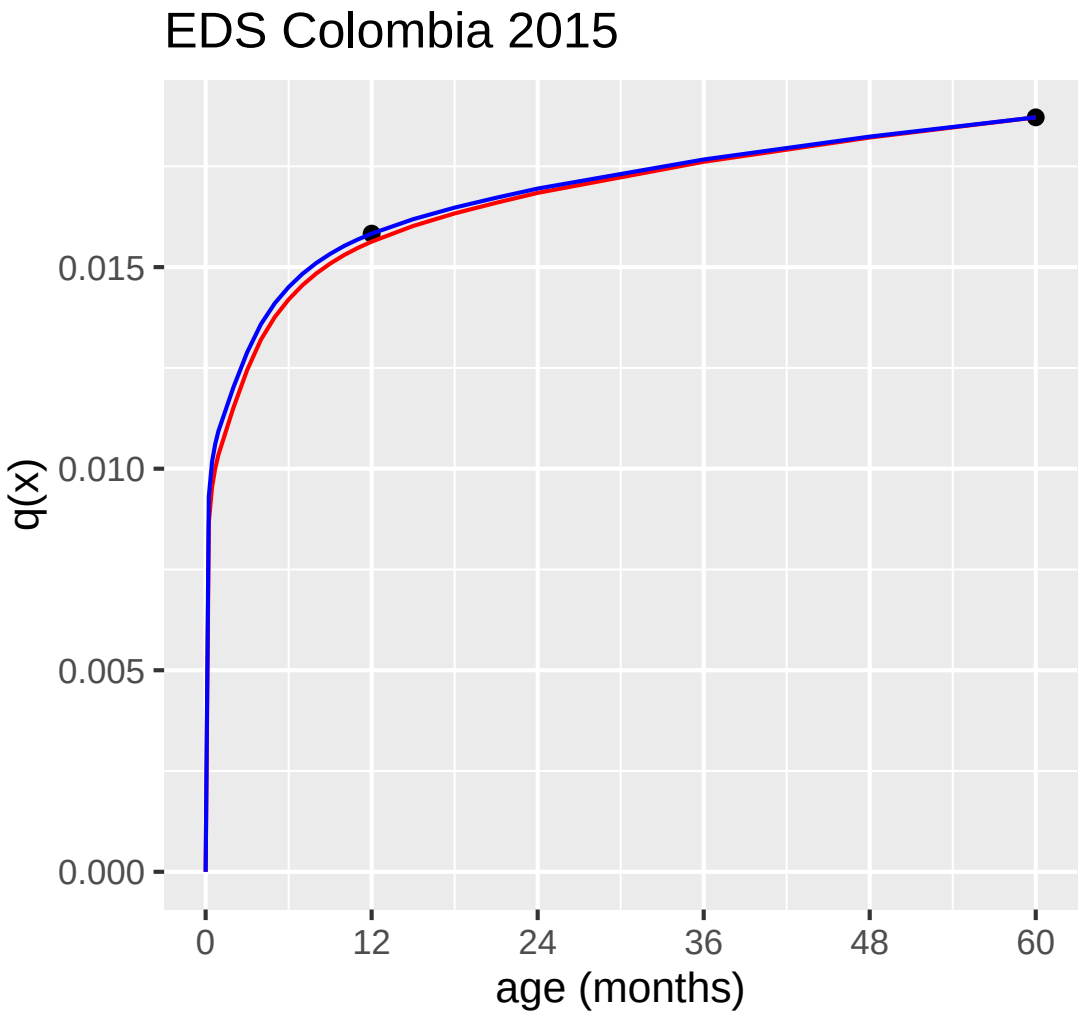


Probabilidad cumulativa de fallecer q(x)



Probabilidad cumulativa de fallecer q(x)

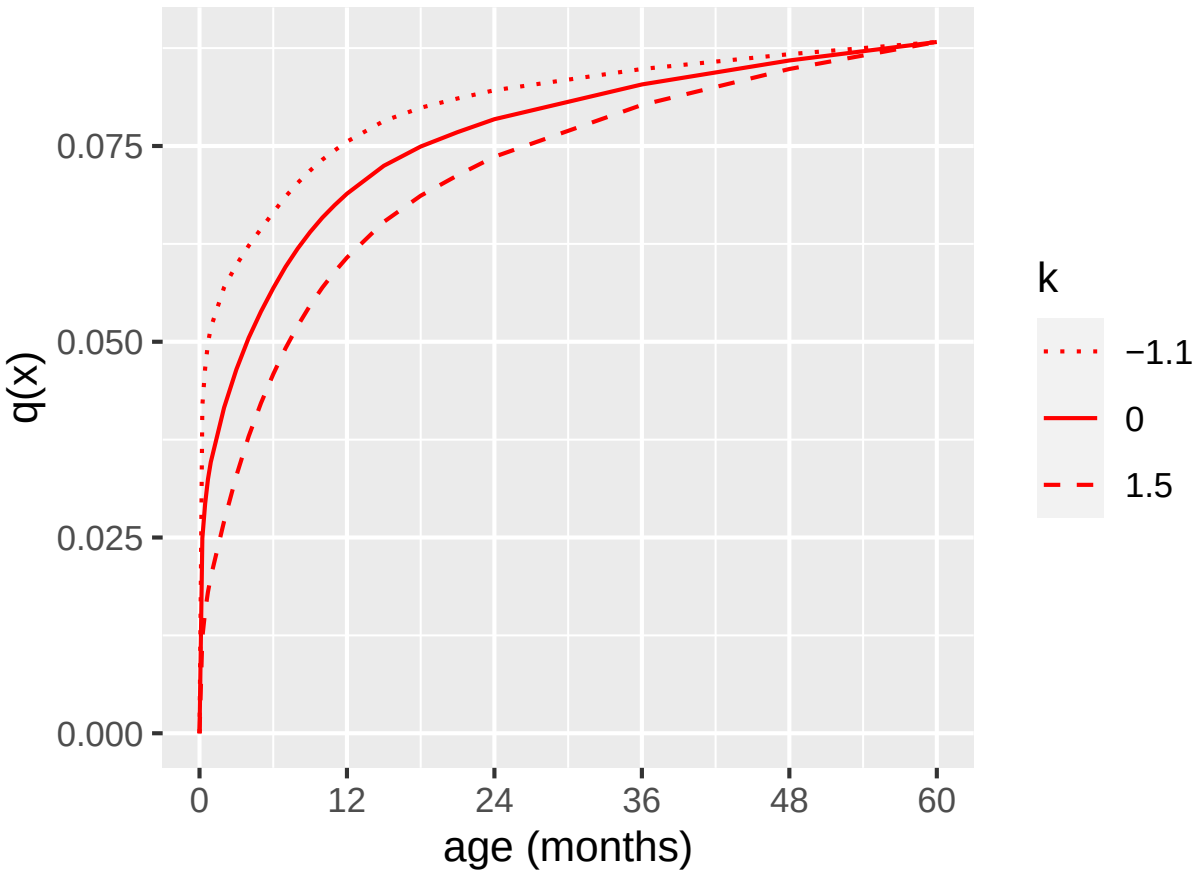


Modelo log-quadrático

$$ln[q(x)] = a_x + b_x ln[q(5)] + c_x ln[q(5)]^2 + v_x k$$

- x = 7d, 14d, 21d, 28d, 2m, 3m, 4m, 5m, 6m, 7m, 8m, 9m, 10m, 11m, 12m, 15m, 18m, 21m, 2y, 3y, 4y, 5y
- U5MR (=q(5)) determina el nivel absoluto de la mortalidad
- k determina el patrón de edad

Efecto de k

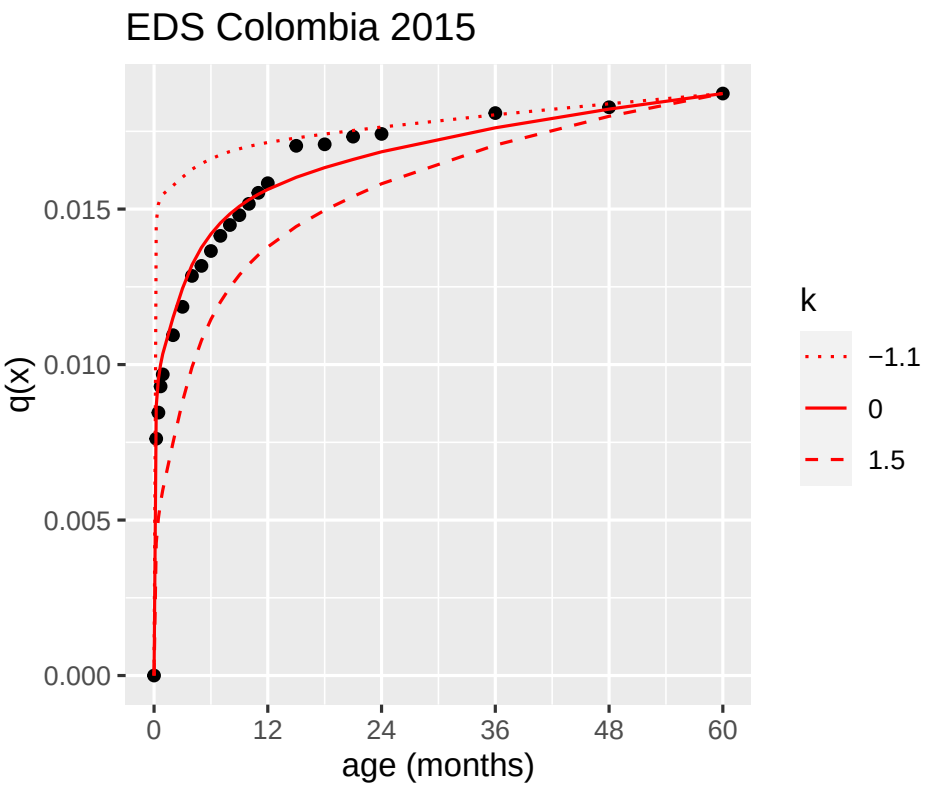


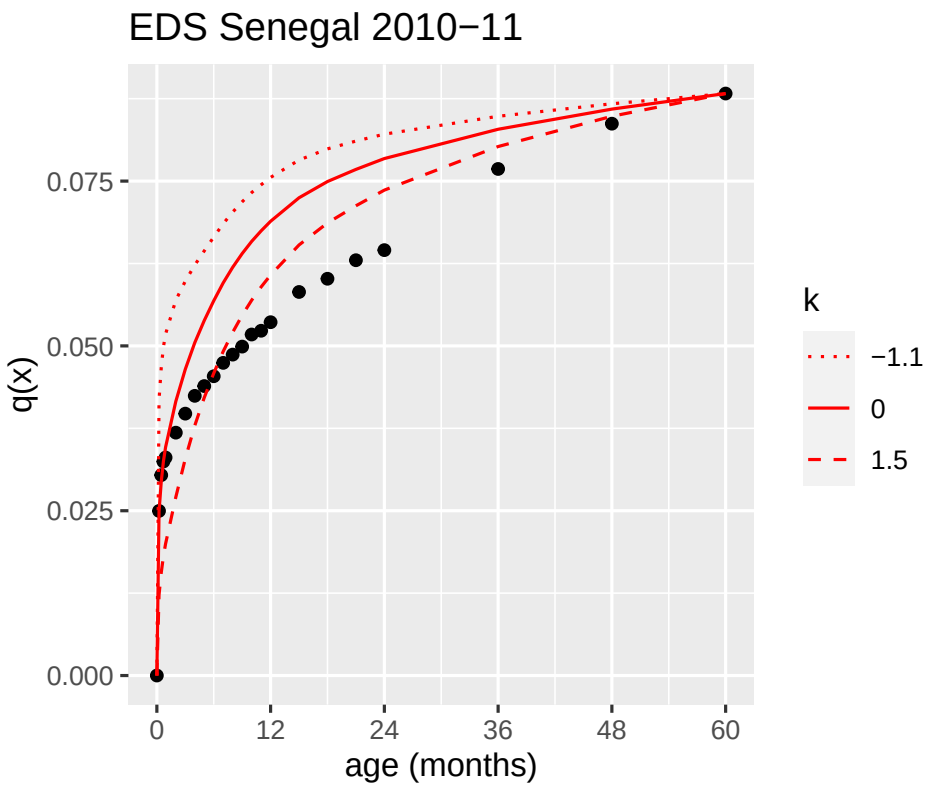
Datos

Under-5 Mortality Database (U5MD)

- 1741 distribuciones de defunciones (estadísticas vitales) recolectadas en 25 paises (principalmente europeos) entre 1841 y 2016
- 1219 distribuciones con 22 grupos de edad estandarizados y por sexo fueron incluidas en el modelo

Limitación geográfica





Aplicaciones

- Suavizamiento del patrón de edad
- Corrección de errores sistemáticos en los datos
- Buscar patrones de edad diferentes de la experiencia Europea
- Estudiar trajectorias epidemiológicas
- **Estimación indirecta (y evaluación de las estadísticas vitales)**
- etc.

Ejemplo en Asia Central

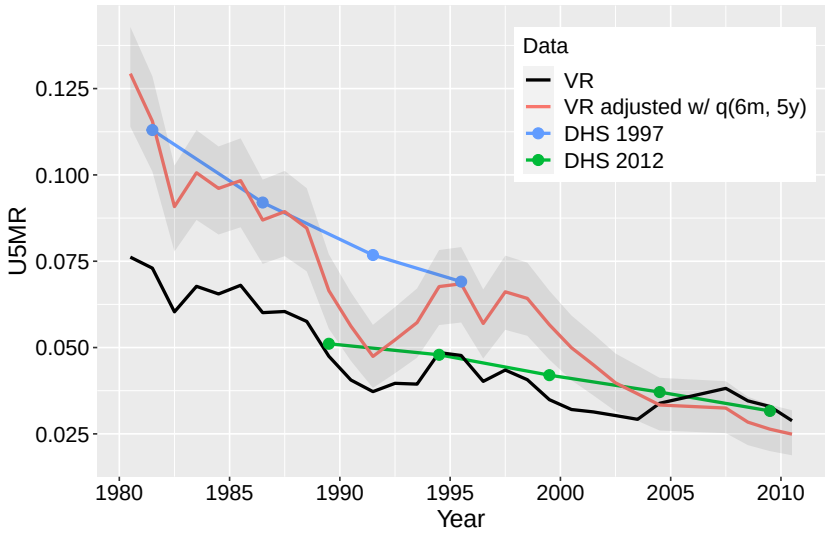
- Tres paises: Kyrgyzstan, Tajikistan y Turkmenistan
- Datos detallados por meses
- Periodo 1980-2010 (colapse de la Unión Soviética en los 1990s)
- Cobertura de las estadísticas vitales mejoró y empeoró en el tiempo
- Encuestas de Demografía y Salud (EDSs) disponibles para comparar

Metodología

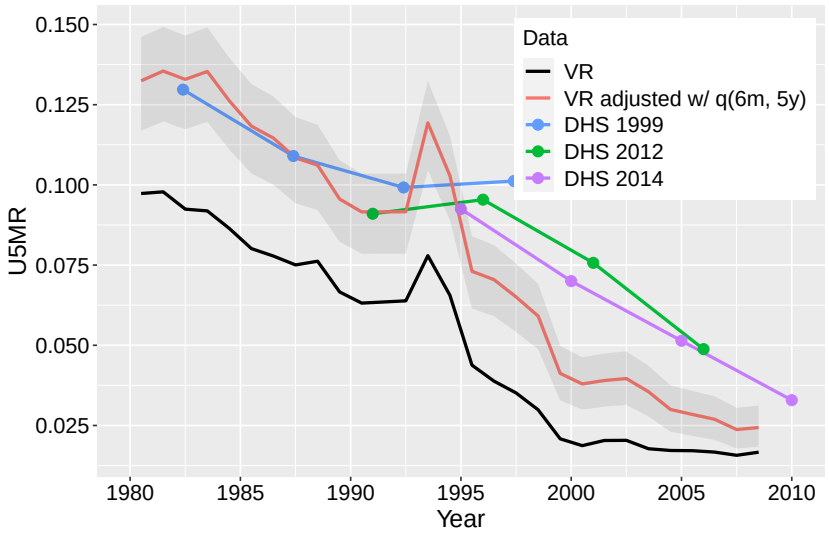
- Asumimos que el subregistro de las defunciones está concentrado en las edades tempraneras
- Escogemos un predictor que excluye las edades tempraneras
  - q(28d, 5y)
  - q(3m, 5y)
  - q(6m, 5y)
  - q(9m, 5y)
- Problema: no se puede estimar k sin la mortalidad neonatal. Asumimos $k = 0$

Resultados

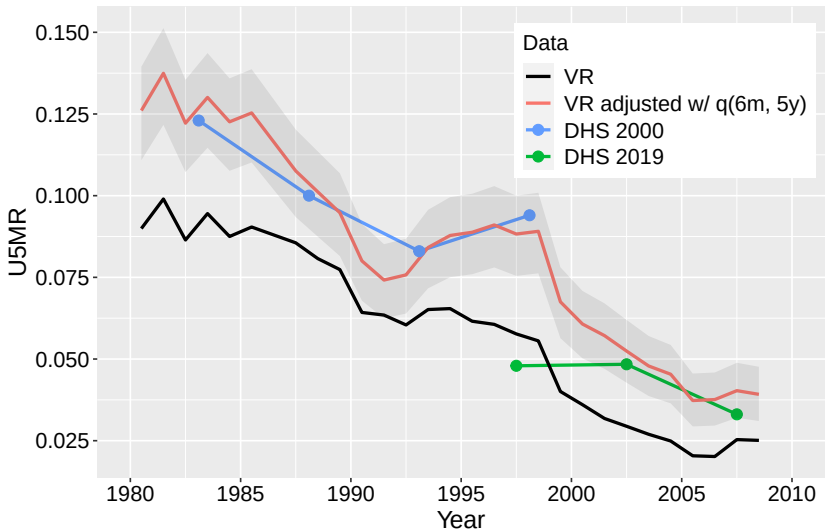
Kyrgyzstan



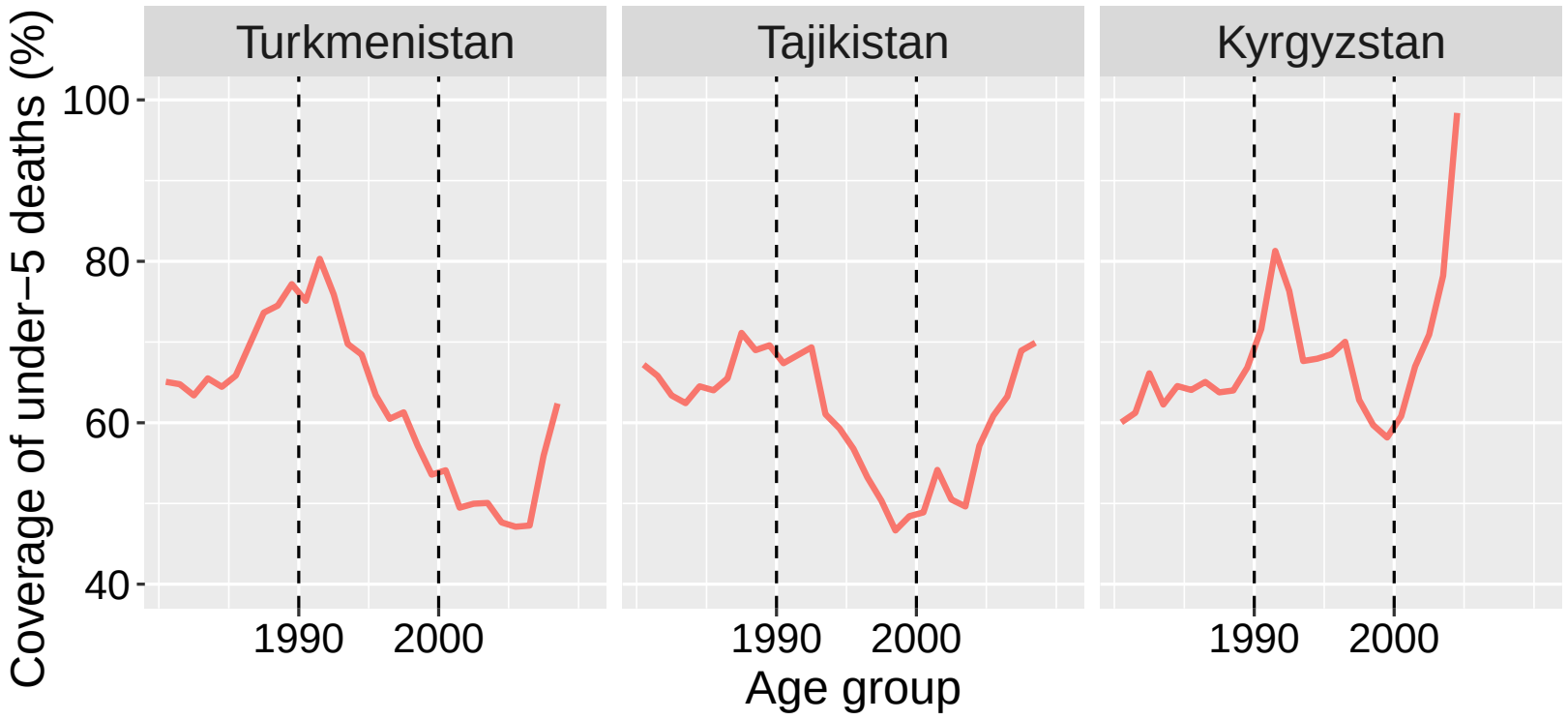
Tajikistan



Turkmenistan

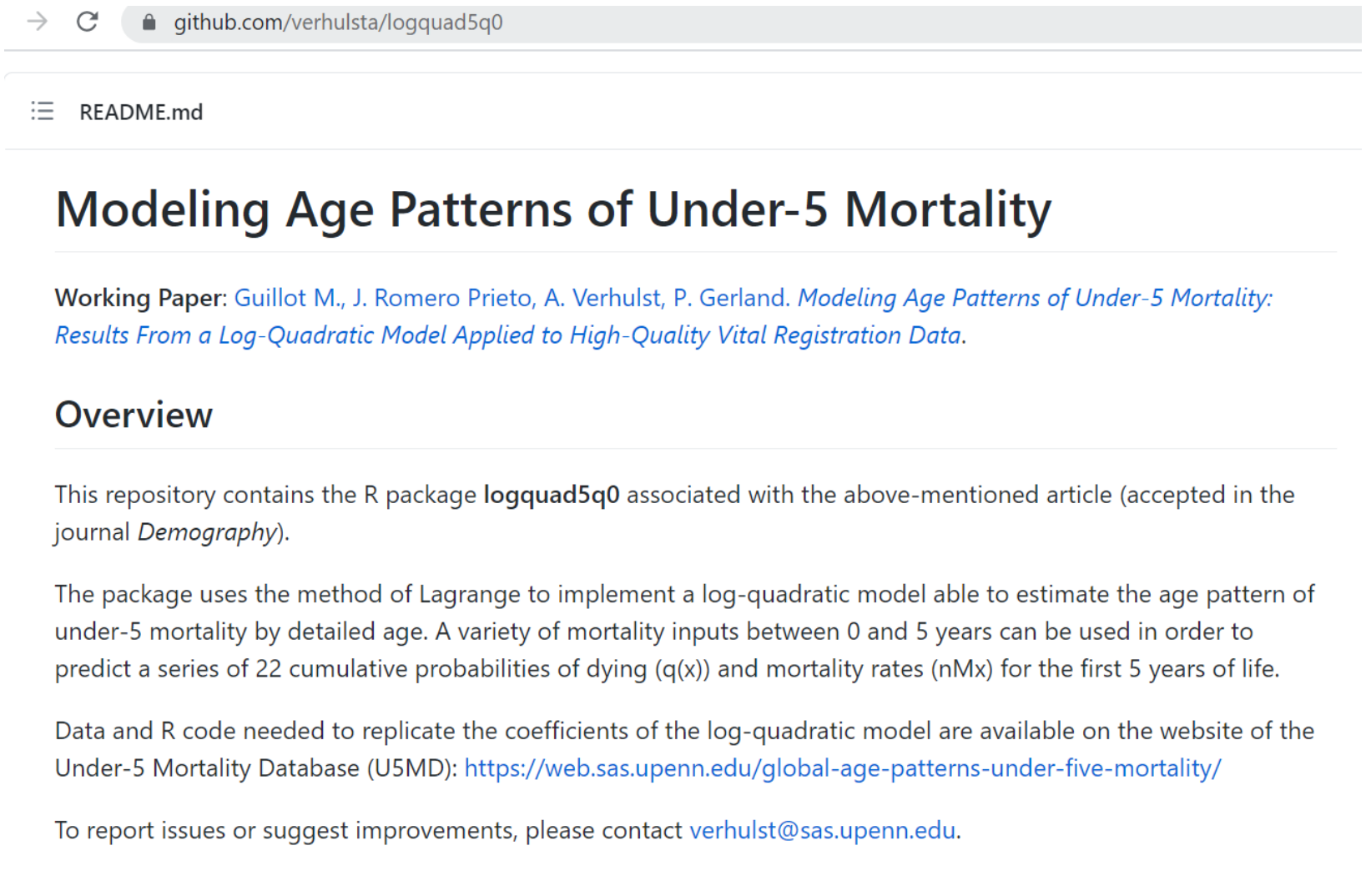


Resultados


Turkmenistan
Tajikistan
Kyrgyzstan
Coverage of under−5 deaths (%)
100
80
60
40
1990
2000
Age group

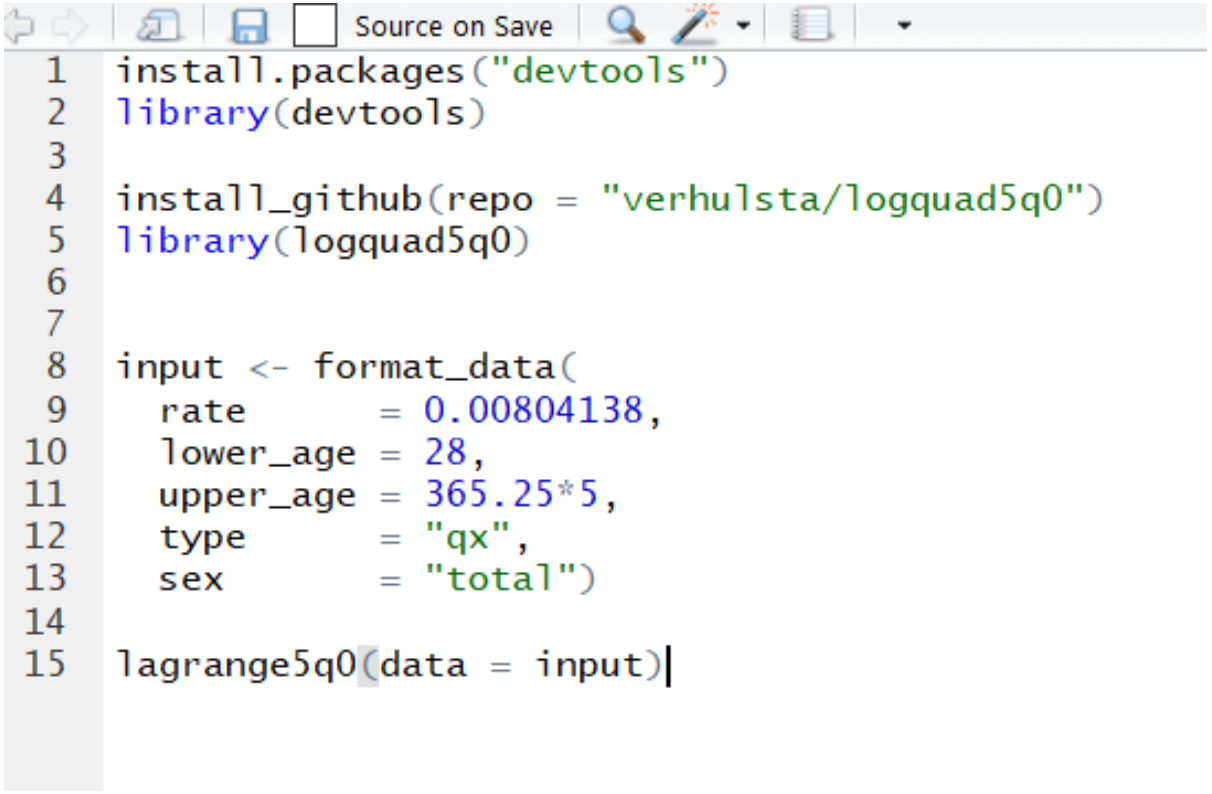
R Package

Github: `https://github.com/verhulsta/logquad5q0`



R Package

Código



R Package

Resultados

```
> lagrange5q0(data = input)
$`q(5y)`
[1] 0.01788194

$k
[1] 0

$predictions
   lower_age_q lower_age_m upper_age        p_qx  lower_p_qx upper_p_qx         p_mx   lower_p_mx   upper_p_mx
45           0      0.0000    7.0000 0.008313321 0.004020311 0.01476086 0.4355903420 0.2101968879 0.7759414949
46           0      7.0000   14.0000 0.009150188 0.004660089 0.01575300 0.0440511400 0.0335282128 0.0525703941
47           0     14.0000   21.0000 0.009594396 0.005038679 0.01623223 0.0233974444 0.0198505646 0.0254120401
48           0     21.0000   28.0000 0.009920333 0.005327918 0.01656408 0.0171745358 0.0151707328 0.0176042012
49           0     28.0000   60.8750 0.011029420 0.006378567 0.01760347 0.0124526828 0.0117417126 0.0117485744
50           0     60.8750   91.3125 0.011925981 0.007251126 0.01844123 0.0108836580 0.0105425521 0.0102376879
51           0     91.3125  121.7500 0.012643533 0.007956707 0.01913265 0.0087177142 0.0085318549 0.0084559077
52           0    121.7500  152.1875 0.013176978 0.008497548 0.01964299 0.0064850734 0.0065439275 0.0062451665
53           0    152.1875  182.6250 0.013587627 0.008914731 0.02005155 0.0049946284 0.0050501671 0.0050020148
54           0    182.6250  213.0625 0.013923522 0.009253756 0.02039886 0.0040869591 0.0041055909 0.0042537634
55           0    213.0625  243.5000 0.014198472 0.009533290 0.02068497 0.0033464487 0.0033862164 0.0035052725
56           0    243.5000  273.9375 0.014428631 0.009769973 0.02092409 0.0028020187 0.0028678742 0.0029303857
57           0    273.9375  304.3750 0.014627942 0.009973487 0.02113500 0.0024269842 0.0024665244 0.0025852801
58           0    304.3750  334.8125 0.014795482 0.010149225 0.02130696 0.0020405029 0.0021302898 0.0021083195
59           0    334.8125  365.2500 0.014942808 0.010300429 0.02146438 0.0017945936 0.0018331823 0.0019302294
60           0    365.2500  456.5625 0.015310138 0.010685180 0.02184600 0.0014918872 0.0015553268 0.0015603061
61           0    456.5625  547.8750 0.015605663 0.011000334 0.02213862 0.0012006587 0.0012744349 0.0011967955
62           0    547.8750  639.1875 0.015857133 0.011270365 0.02238148 0.0010219586 0.0010922840 0.0009935407
63           0    639.1875  730.5000 0.016091768 0.011520296 0.02261101 0.0009537741 0.0010112493 0.0009392430
64           0    730.5000 1095.7500 0.016827380 0.012282197 0.02335259 0.0007479233 0.0007710780 0.0007590267
65           0   1095.7500 1461.0000 0.017402370 0.012861185 0.02395145 0.0005850016 0.0005863594 0.0006133622
66           0   1461.0000 1826.2500 0.017881940 0.013326455 0.02447226 0.0004881833 0.0004714424 0.0005337383
```

Tips para hacer un paquete

Rstudio Webinar
https://www.rstudio.com/resources/webinars/

Garrett Grolemund:

Managing - Part 1 (Projects in RStudio):
https://www.rstudio.com/resources/webinars/managing-part-1-projects-in-rstudio/

Managing - Part 2 (Github and RStudio):
https://www.rstudio.com/resources/webinars/managing-part-2-github-and-rstudio/

GRACIAS