

INDONESIAN MORTALITY TABLE IV

Indonesian Actuarial Conference

Ballroom I Hotel JS Luwangsa

Jakarta, 17 October 2019

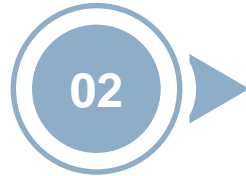


PERSATUAN AKTUARIS INDONESIA
(THE SOCIETY OF ACTUARIES OF INDONESIA)

Agenda



Background



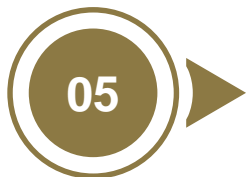
Project Team



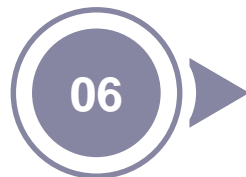
Timeline



Data Collection
Process



Data Profile



Methodology



Data Analysis



Result



Background



Project Team



- Asep Suwondo
- Arie Munandar
- Abdul Rahmat
- Abdul Rahmat Jamil
- Muhammmad Ridwan
- Pebriantho PS
- Yani Supriatni
- Paula Meilina Dwihapsari
- Muchammad Ali Fahmi
- Muhammad Maulana Yasin



- Togar Pasaribu
- Martua Sianturi
- Riska Asri Pertiwi



- Nico Demus
- Nurul Hadi
- Ubadah
- Yusuf Hidayat Kalla
- Arya Sapta Jaladri



- Nurdin Kosasih
- Rina Elvirosa
- Benny Hadiwibowo
- Harnoko Dwi Yogo

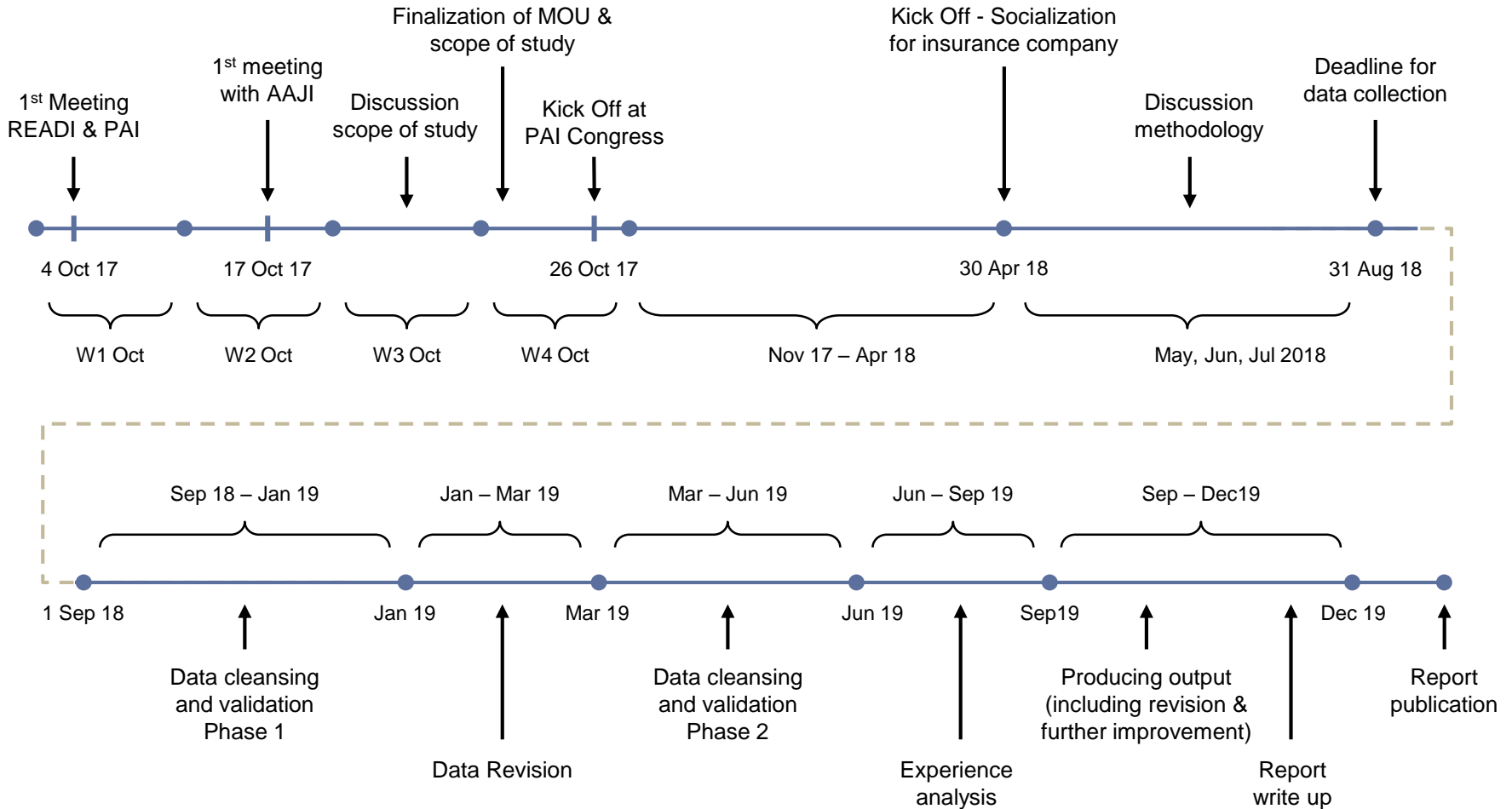


- Prof. Ken Seng Tan
- Felix Go
- Bill Duggan
- Fasrul

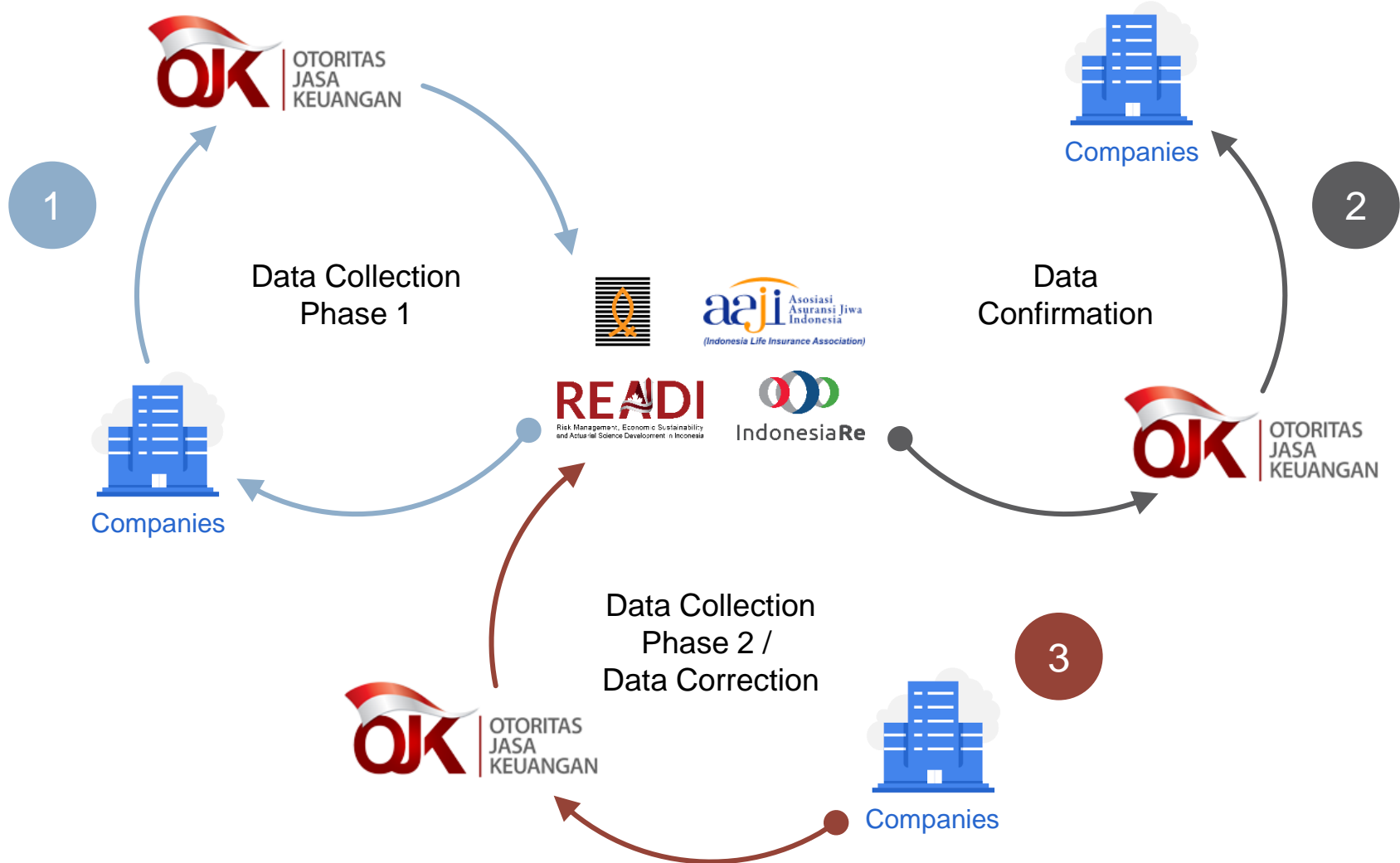


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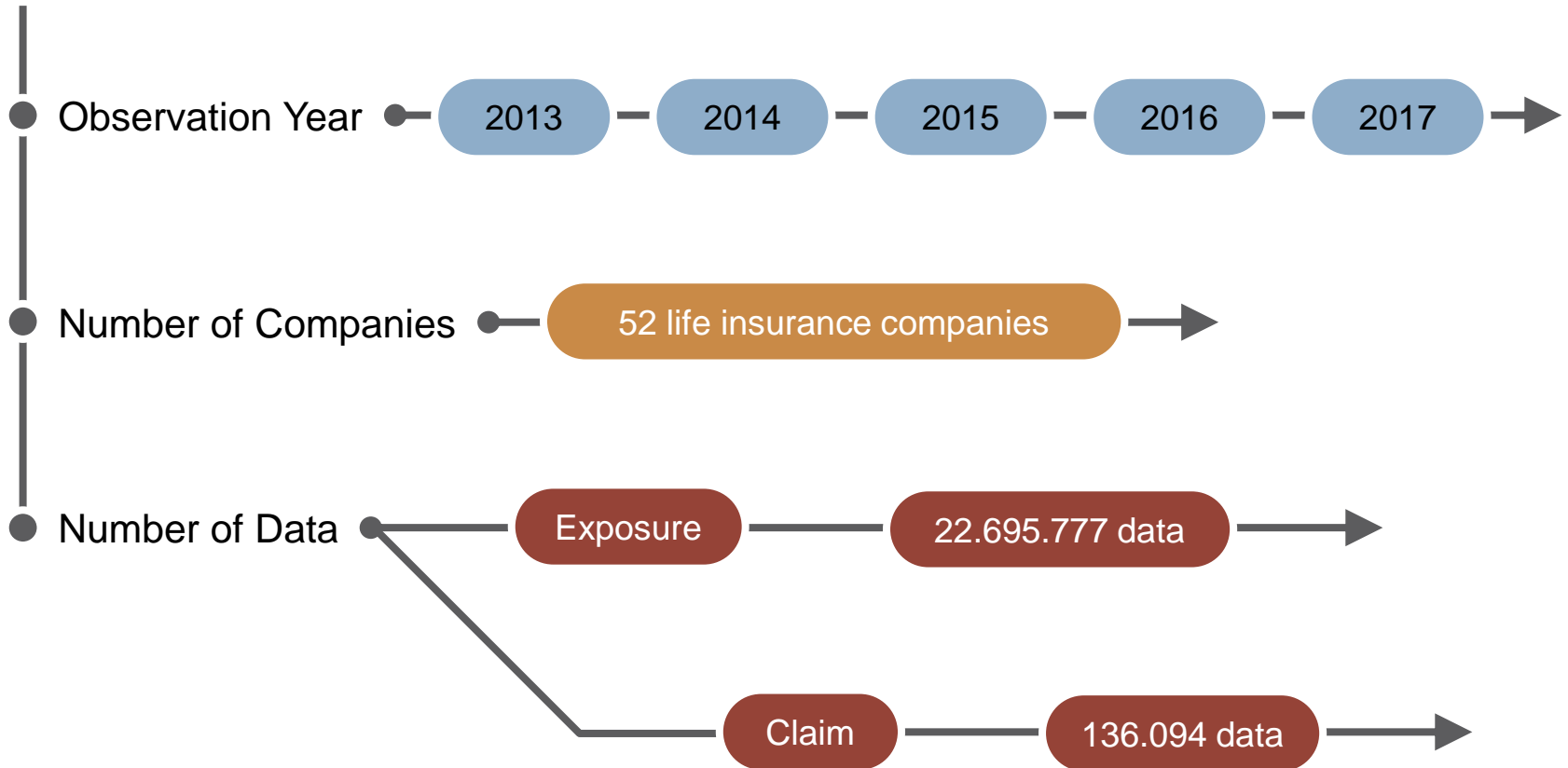
Timeline



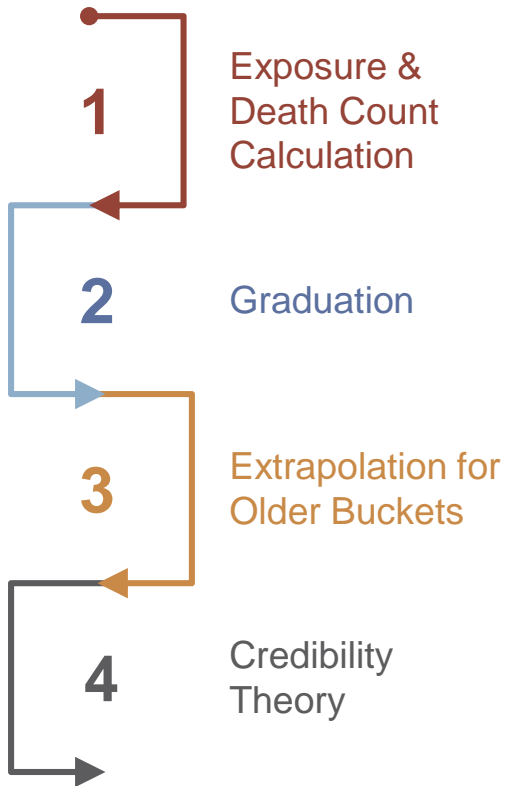
Data Collection Process



Data Profile



Methodology



Exposure & Death Count Calculation

Entry Age is recalculated as age nearest birthday and calculated as follows :

$$ANB = \text{Round} \left[\frac{||\text{DOB} - \text{Comm. Date}||}{365.25} \right]$$

For age x , the exposure E_x is calculated as follows

$$E_x = l_x - \sum_{i=1}^M (1 - t_i)$$

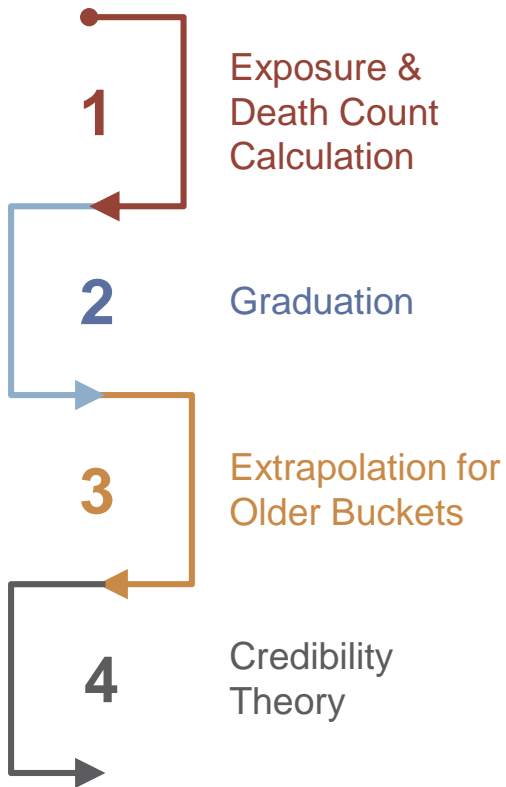
where M is the number of lives withdrawing during the year life i is withdrawing at time t_i

For number of deaths d_x , mortality rate is calculated as follows :

$$q_x = \frac{d_x}{E_x}$$



Methodology



Graduation

- Using Whittaker-Henderson Method
- This is done by using MortalityTables, a package in R

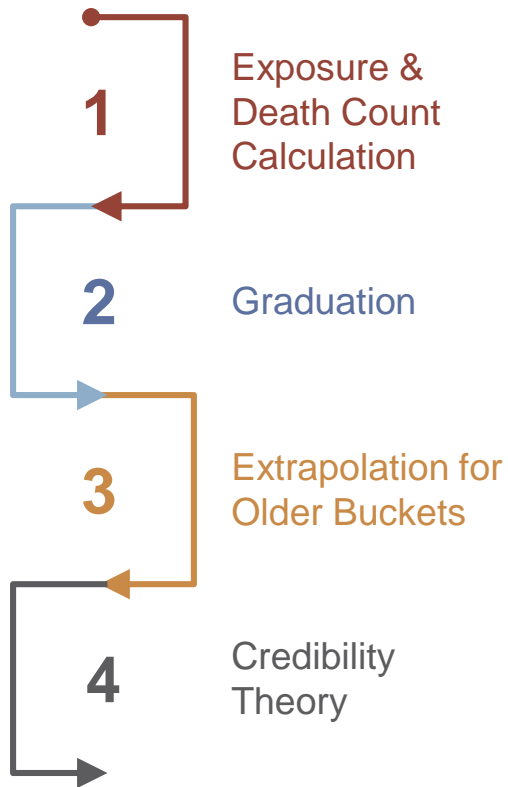
Extrapolation for Older Buckets

- Using Makeham Law

$$q_x = 1 - \left[\exp(-A) \cdot \exp\left(\frac{-Bc^x(c-1)}{\ln c}\right) \right]$$

- The parameters for above function are fitted based on Nelder-Mead optimization approach via R package MortalityLaws.

Methodology



Credibility Theory

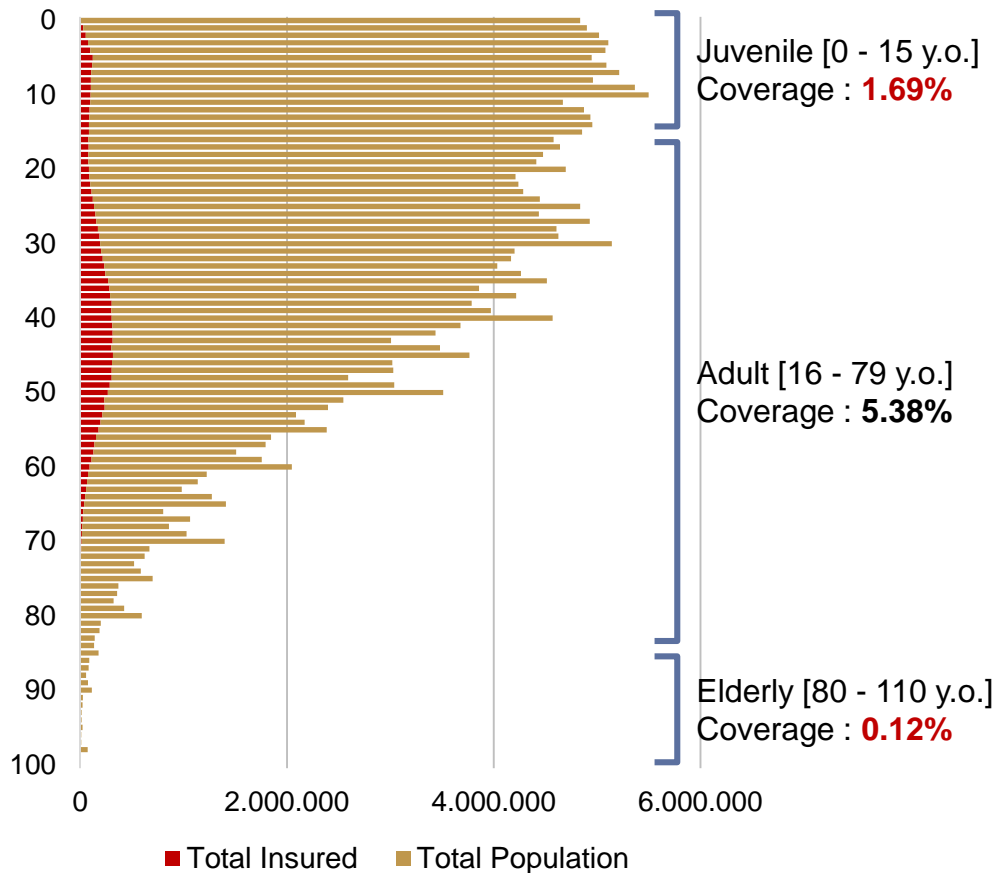
- Number of claims observed for juvenile and elderly ages are less than the minimum number of claims needed for full credibility
- Using the partial credibility approach to calculate new rate of those ages (a weighted average of the current observed rate and the existing rate)

$$\text{New Rate} = Z * [\text{Current Obs. Rate}] + (1 - Z) * [\text{Existing Rate}]$$

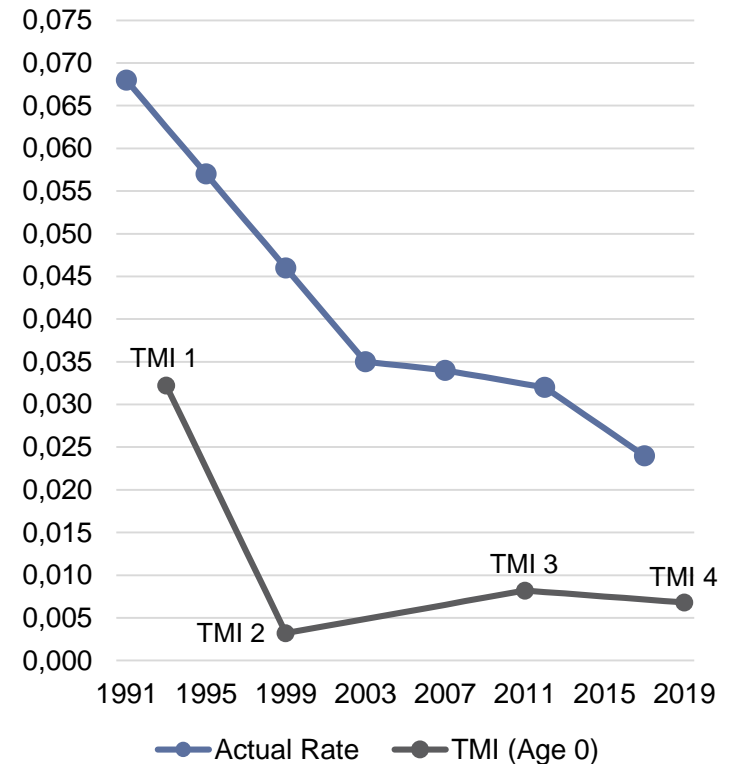
$$\text{where } Z = \sqrt{\frac{\text{number of claims observed}}{\text{number of claims needed for full credibility}}}$$

Data Analysis

Total Insured compared to Total Population



Infant Rate

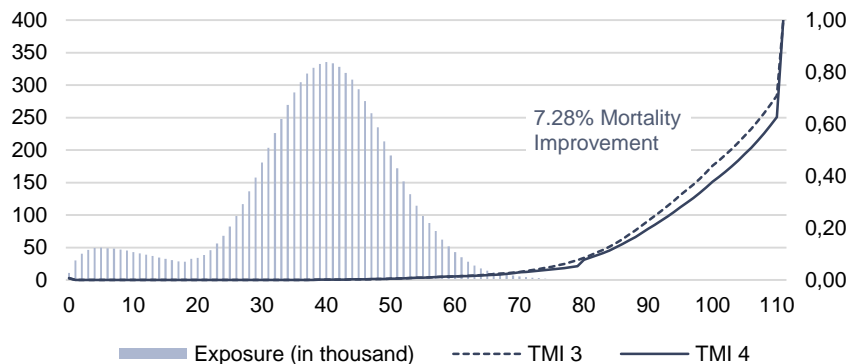


Source : Profil Kesehatan Indonesia Tahun 2017, Ministry of Health Republic of Indonesia

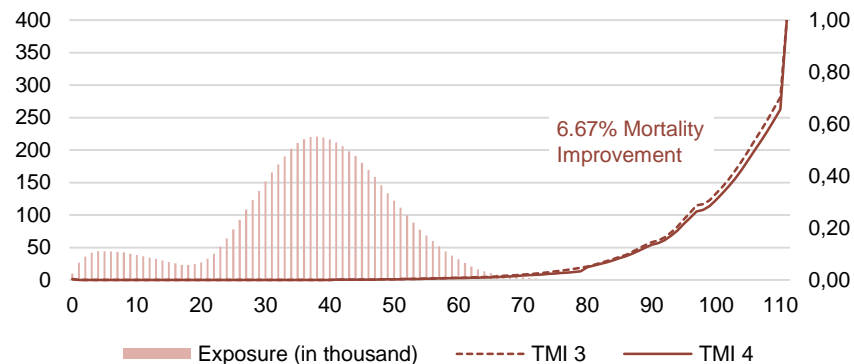


Results

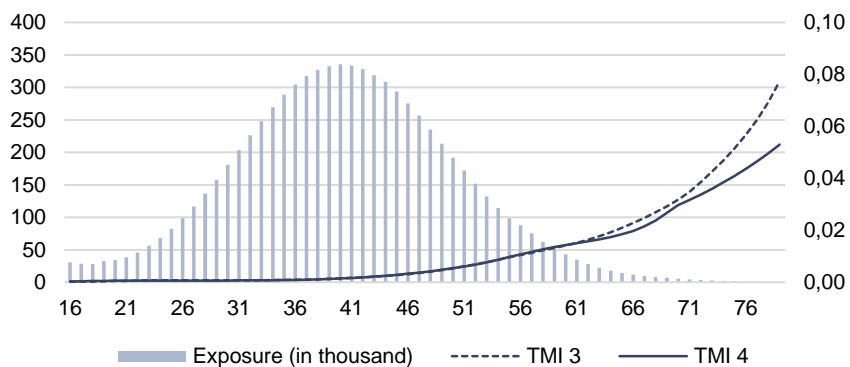
Mortality Table (Male)



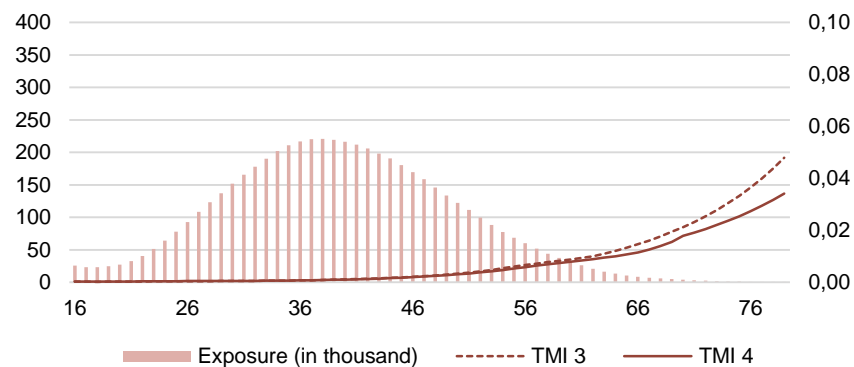
Mortality Table (Female)



Mortality Table (Male) – Adult

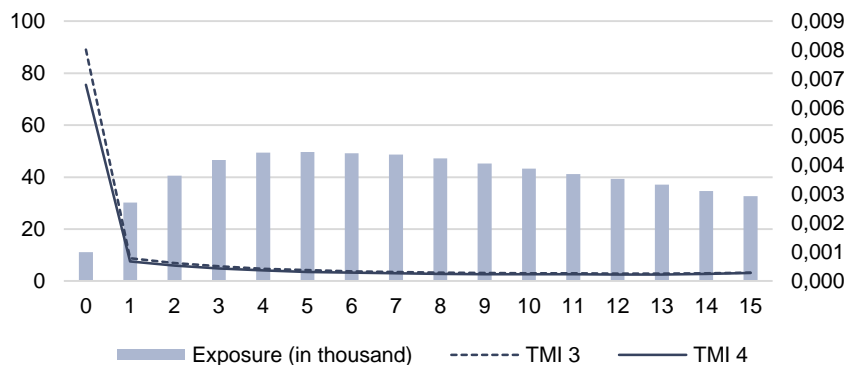


Mortality Table (Female) – Adult

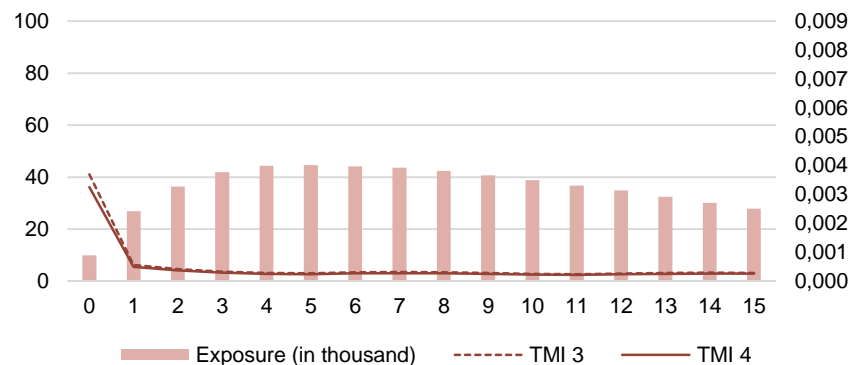


Results

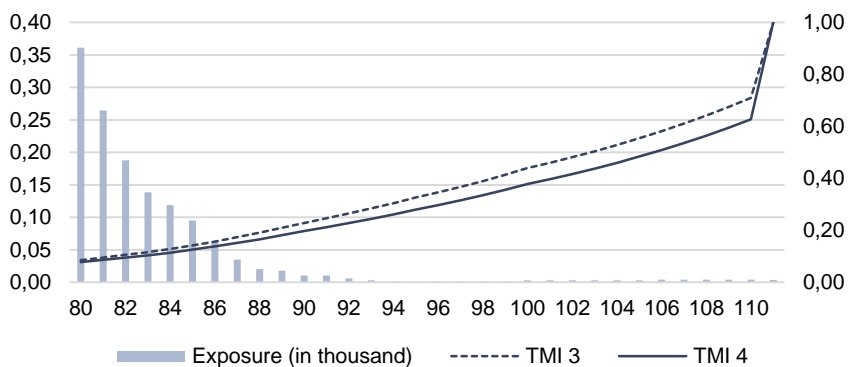
Mortality Table (Male) – Juvenile



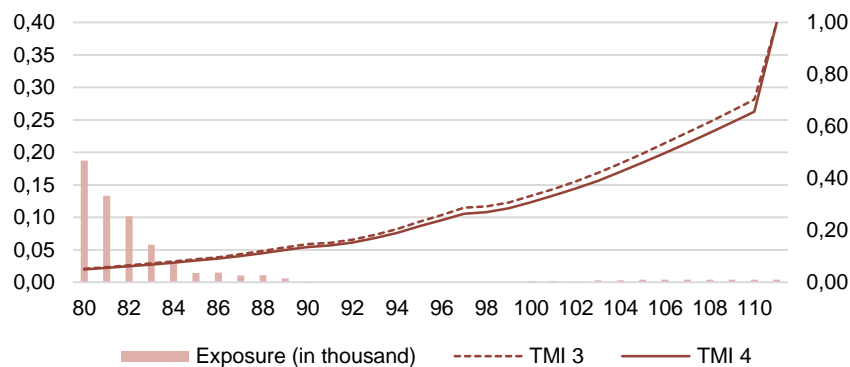
Mortality Table (Female) - Juvenile



Mortality Table (Male) - Elderly



Mortality Table (Female) - Elderly



Mortality Data Handover Jakarta, 16 July 2019



Location : Rumah AAJI
JI. Talang Betutu No.17
Jakarta 10230 - Indonesia

Mortality Project Consignment Bogor, 16 September 2019



Location : Wisma Arga Sonya (IndonesiaRe)
JI. Raya Puncak, Cisarua
Bogor 16720 - Indonesia





PERSATUAN AKTUARIS INDONESIA
(THE SOCIETY OF ACTUARIES OF INDONESIA)

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