Progression rate analysis

Construct the time to active TB as a mixture model with 2 components.

$$p(\text{infected}) \times p(\text{infected at T=t} \mid \text{infected}).$$

The conditional probability p(infected at T=t | infected) is produced from Sutherland () and extrapolating assuming an exponential decay to 1 in lifetime. The marginal probability p(infected) is the chance of being infected in a lifetime.

The reason to do it like this is so that we can easily see the value of p(infected) for different estimates found in literature, without modifying p(infected at T=t | infected).

From Pareek (2011), they chose a conservative rate for LTBI to active TB of 5% over 20 years. Marks et al (2000) calculated a progression rate of 6.7% over 40 years. Choudhury (2013) estimated 13% over 10 years or 16.3% over 15 years. 2006 NICE economic appraisal said LTBI testing is cost-effective over 18% chance over 15 years and 2001 NICE economic appraisal reduced this to 12%.

```
load(file = "../ext-data/year_prob.activetb_cens_exituk.RData")

year_prob.activetb_cens_exituk %>% cumsum %>% divide_by(max(.)) %>% plot(type = 'l')
```

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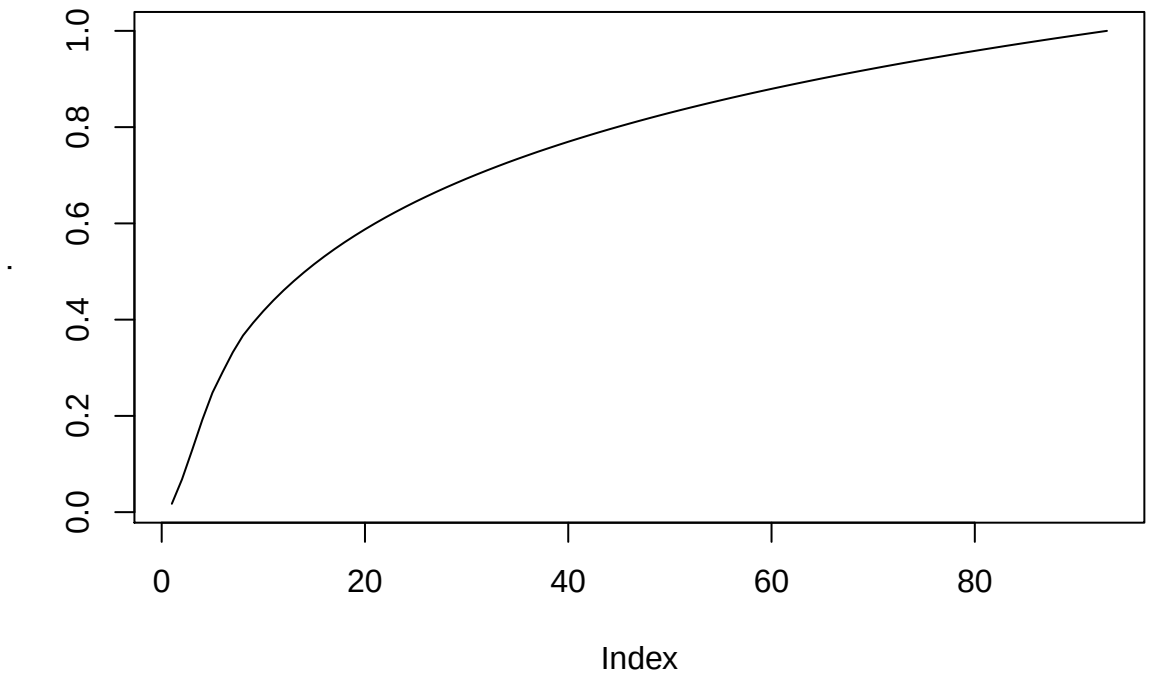


```
LIFETIME_RISK <- 0.163  #Choudhury (2013) 15 years
LIFETIME_RISK <- 0.18   #2006 NICE economic appraisal
LIFETIME_RISK <- 0.067  #Marks (2000) 40 years
```