

The background of the slide is a dense collection of various coins, including Indian Rupees and US Dollars, with a red string or cord looping through them. The coins are scattered and overlapping, creating a textured, metallic appearance.

# Income Protection Model

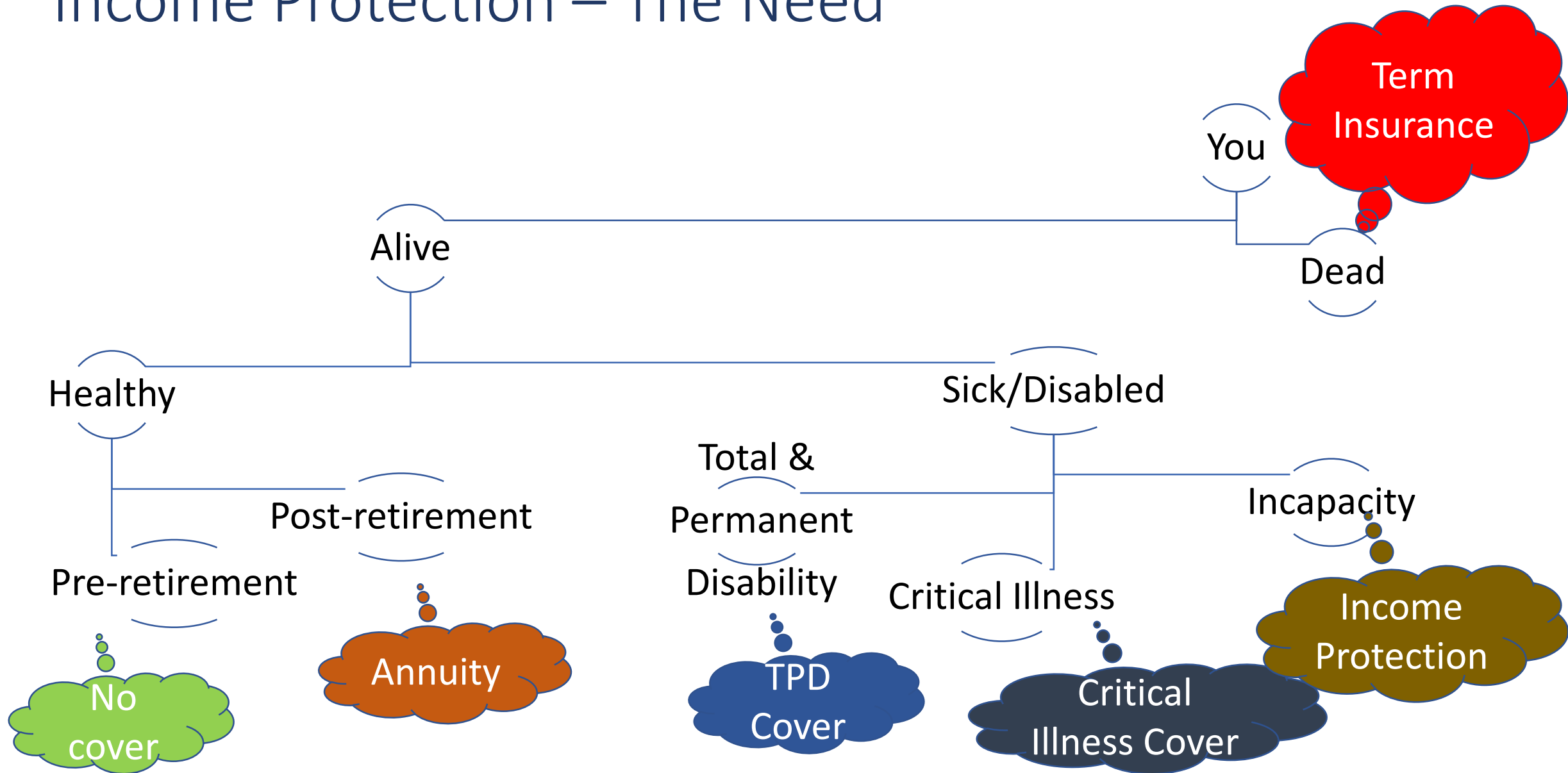
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**Institute of Actuaries of India:**  
**5th Capacity Building Seminar on**  
**Health Care Insurance, Gurugram**  
**4-Dec-2017**

# Agenda

- Income Protection – The Need (Why?)
- Income Protection – The Features (What?)
- Income Protection – The Modelling (How?)
- Summary
- Questions

# Income Protection – The Need



# Income Protection – Incapacity

- Incapacity – Occupation Classes

- Own occupation – Unable to perform own occupation.



- Suited occupation – Unable to perform occupation suitable to education



- Any occupation – Unable to perform any occupation



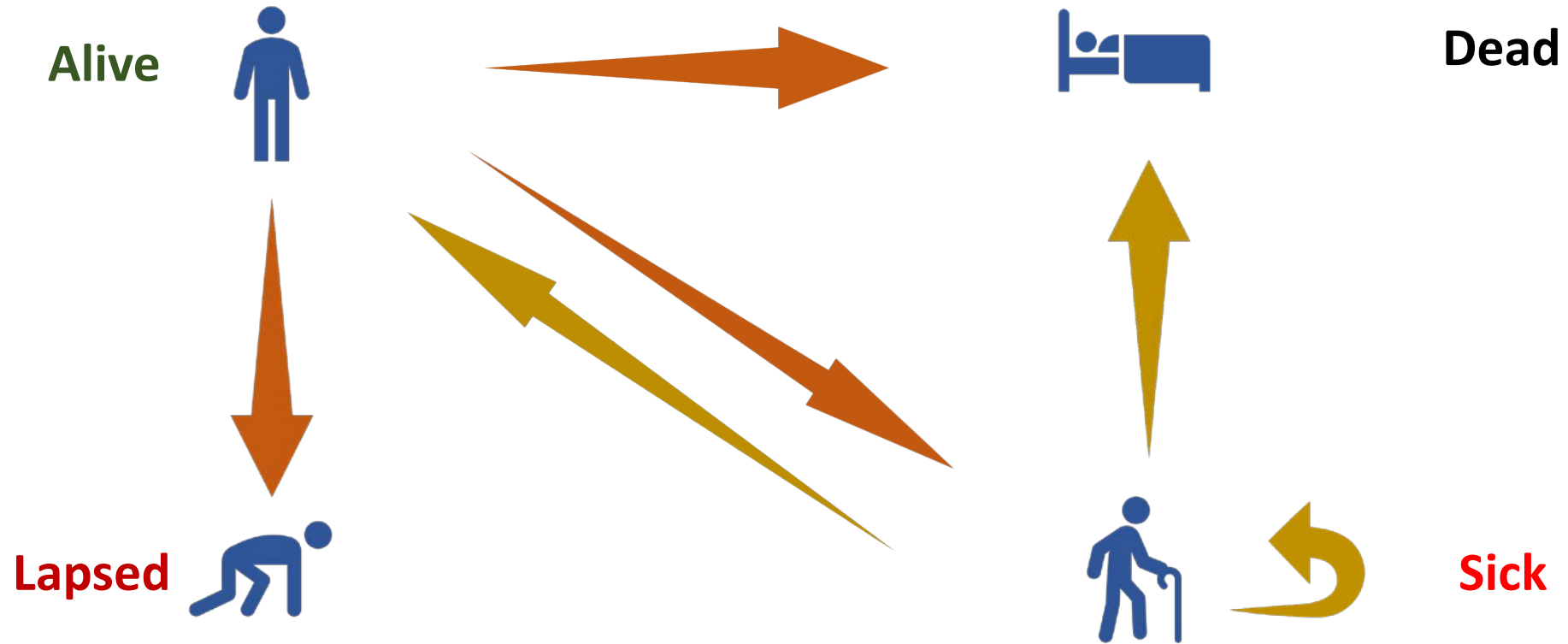
- Activities of daily living – Unable do carry out daily chores (like dressing, eating etc)



# Income Protection – The Features

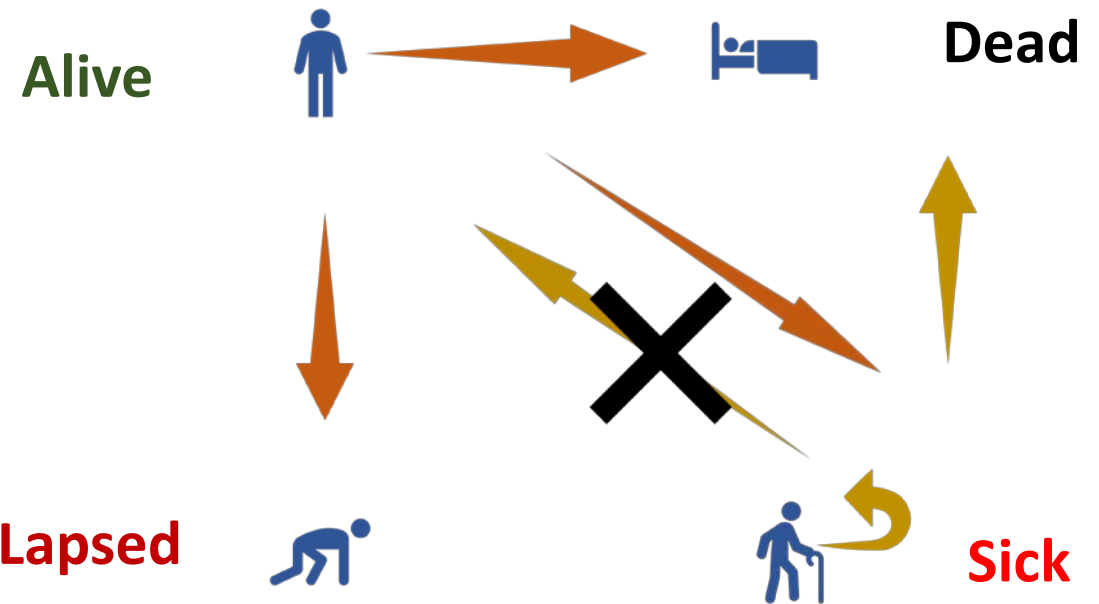
Features Type	Description
<b>Benefit Amount</b>	~50-60% of gross income (subject to a cap)
<b>Benefit Type</b>	Fixed; Renewable; Increasing with inflation
<b>Benefit Term</b>	Fixed Term; Retirement Age – Current Age
<b>Policy Term</b>	Fixed Term; Retirement Age – Current Age
<b>Premium Term</b>	Fixed Term; Retirement Age – Current Age
<b>Premium</b>	Fixed; Renewable; Increasing with inflation
<b>Waiting Period</b>	0, 4, 8, 13, 26, 52 weeks (aka Deferred Period)
<b>Waiver of Premium</b>	During the period of claim

# Income Protection – The Modelling



# Modelling Claim Cost : Assumptions - Case A

- Benefit Amount = 1 Unit
- Policy Term = 10 years
- Premium Term = 10 years
- Death Rate <sub>Active Lives</sub> = 4/year
- Sick Rate <sub>Active Lives</sub> = 30/year
- Lapse Rate = 4/year
- Death Rate <sub>Sick Lives</sub> = 3/year
- Recovery Rate <sub>Sick Lives</sub> = 0/year
- Waiting Period = 0 years



In reality, death rate for sick lives is two-dimensional table and depends on age and duration of sickness

# Modelling Claim Cost: Case A - Calculations (I)

Time	# BOY	# Deaths	# New Sick	# Lapses	# EOY
1	1000	4	30	6	960
2	960	4	30	6	920
3	920	4	30	6	880
4	880	4	30	6	840
5	840	4	30	6	800
6	800	4	30	6	760
7	760	4	30	6	720
8	720	4	30	6	680
9	680	4	30	6	640
10	640	4	30	6	600

Time	0	1	2-7	8	9
1	30	27	...	6	3
2	30	27	...	6	3
3	30	27	...	6	3
4	30	27	...	6	3
5	30	27	...	6	3
6	30	27	...	6	3
7	30	27	...	6	3
8	30	27	...	6	3
9	30	27	...	6	3
10	30	27	...	6	3





# Modelling Claim Cost: Case A -Calculations (II)

Time	# BOY	#New Sick	Claim cost
1	1000	30	30
2	960	30	57
3	920	30	81
4	880	30	102
5	840	30	120
6	800	30	135
7	760	30	147
8	720	30	156
9	680	30	162
10	640	30	165

Time	0	1	2	3	4	5	6	7	8	9
1	30	27	24	21	18	15	12	9	6	3
2	30	27	24	21	18	15	12	9	6	3
3	30	27	24	21	18	15	12	9	6	3
4	30	27	24	21	18	15	12	9	6	3
5	30	27	24	21	18	15	12	9	6	3
6	30	27	24	21	18	15	12	9	6	3
7	30	27	24	21	18	15	12	9	6	3
8	30	27	24	21	18	15	12	9	6	3
9	30	27	24	21	18	15	12	9	6	3
10	30	27	24	21	18	15	12	9	6	3

No of lives who fell sick in 6<sup>th</sup> year and continue to remain sick for 4 more years

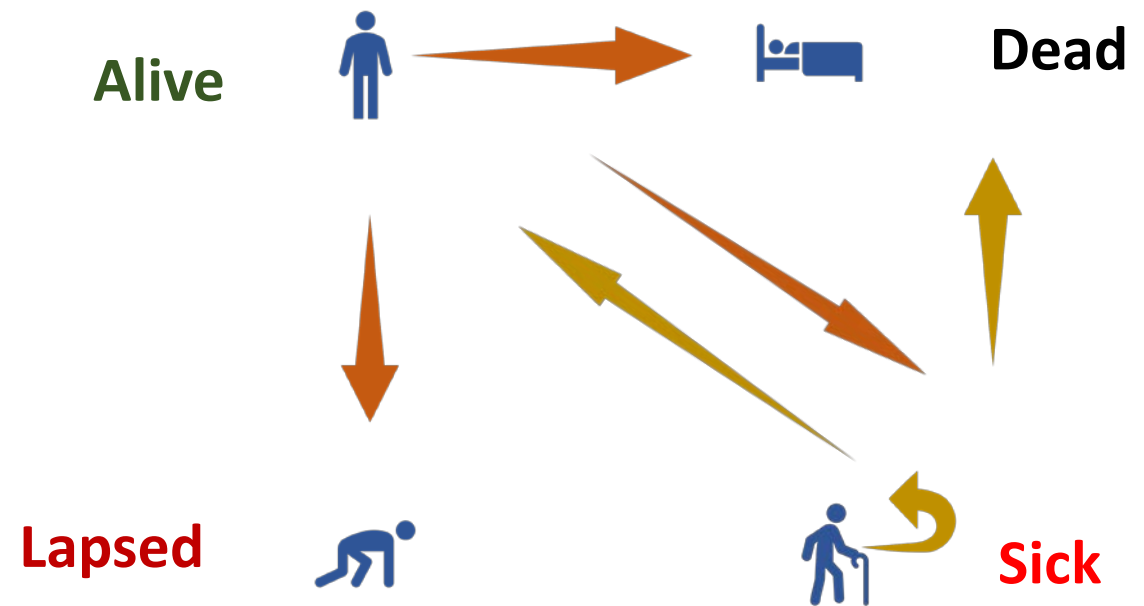
# Modelling Claim Cost: Case A-Calculations (III)

**Total  
Claim  
Cost  
=  
1,155**

Claim cost each life	Claim cost each year	Time	0	1	2	3	4	5	6	7	8	9
165	30	1	30	27	24	21	18	15	12	9	6	3
162	57	2	30	27	24	21	18	15	12	9	6	3
156	81	3	30	27	24	21	18	15	12	9	6	3
147	102	4	30	27	24	21	18	15	12	9	6	3
135	120	5	30	27	24	21	18	15	12	9	6	3
120	135	6	30	27	24	21	18	15	12	9	6	3
102	147	7	30	27	24	21	18	15	12	9	6	3
81	156	8	30	27	24	21	18	15	12	9	6	3
57	162	9	30	27	24	21	18	15	12	9	6	3
30	165	10	30	27	24	21	18	15	12	9	6	3

# Modelling Claim Cost : Assumptions - Case B

- Benefit Amount = 1 Unit
- Policy Term = 10 years
- Premium Term = 10 years
- Death Rate  $_{Active\ Lives} = 4/year$
- Sick Rate  $_{Active\ Lives} = 30/year$
- Lapse Rate = 4/year
- Death Rate  $_{Sick\ Lives} = 2/year$
- Recovery Rate  $_{Sick\ Lives} = 1/year$
- Waiting Period = 0 years



In reality, recover rate for sick lives is two-dimensional table and depends on age and duration of sickness

# Modelling Claim Cost: Case B -Calculations

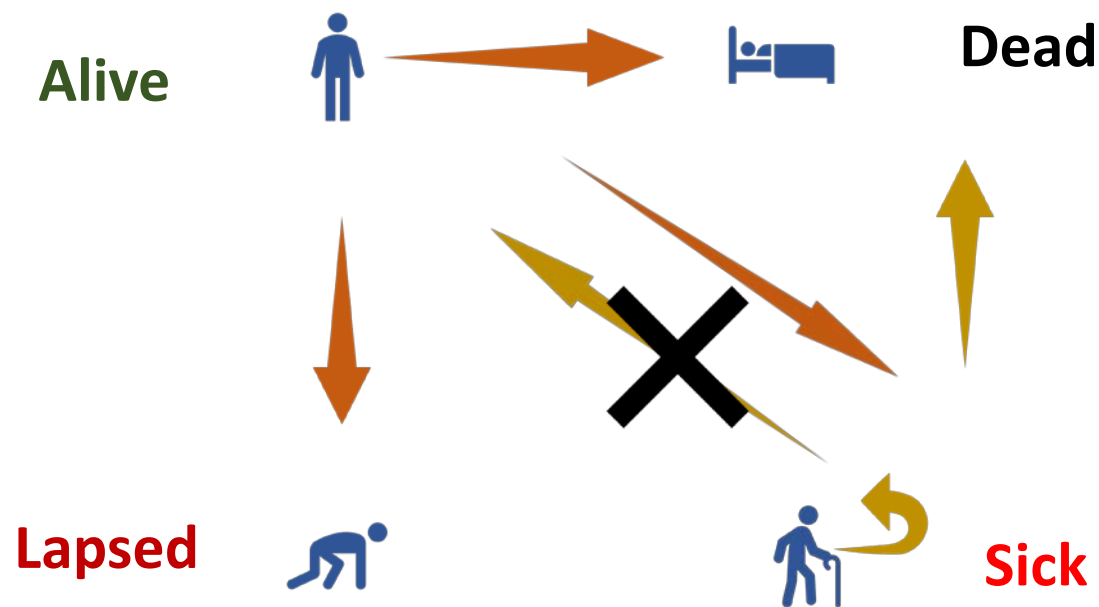
Time	# BOY	# New Sick	Recov eries	Claim cost	Time	0	1	2	3	4	5	6	7	8	9
1	1000	30	0	30	1	30	27	24	21	18	15	12	9	6	3
2	960	30	1	57	2	30	27	24	21	18	15	12	9	6	3
3	921	30	2	81	3	30	27	24	21	18	15	12	9	6	3
4	883	30	3	102	4	30	27	24	21	18	15	12	9	6	3
5	846	30	4	120	5	30	27	24	21	18	15	12	9	6	3
6	810	30	5	135	6	30	27	24	21	18	15	12	9	6	3
7	775	30	6	147	7	30	27	24	21	18	15	12	9	6	3
8	741	30	7	156	8	30	27	24	21	18	15	12	9	6	3
9	708	30	8	162	9	30	27	24	21	18	15	12	9	6	3
10	676	30	9	165	10	30	27	24	21	18	15	12	9	6	3

At Time 2



# Modelling Claim Cost : Assumptions - Case C

- Benefit Amount = 1 Unit
- Policy Term = 10 years
- Premium Term = 10 years
- Death Rate  $_{Active\ Lives} = 4/year$
- Sick Rate  $_{Active\ Lives} = 30/year$
- Lapse Rate = 4/year
- Death Rate  $_{Sick\ Lives} = 3/year$
- Recovery Rate  $_{Sick\ Lives} = 0/year$
- **Waiting Period = 1 year**



# Modelling Claim Cost: Case C -Calculations

Claim cost	# Sick Lives	Time	0	1	2	3	4	5	6	7	8	9
			0	30	1	30	27	24	21	18	15	12
105	135	0	30	27	24	21	18	15	12	9	6	3
117	147	7	30	27	24	21	18	15	12	9	6	3
126	156	8	30	27	24	21	18	15	12	9	6	3
132	162	9	30	27	24	21	18	15	12	9	6	3
135	165	10	30	27	24	21	18	15	12	9	6	3

Total Claim Cost = 855

Total 1,155

While modelling, how much premium one should expect in the 10<sup>th</sup> year?

# Summary

- Income Protection is crucial for those alive but in state of “incapacity”
  - Own occupation
  - Suited occupation
  - Any occupation
  - Activities of daily living
- Income Protection covers for a proportion of salary while sick
- Income Protection claims cost requires accounting for
  - Lives who fell sick at each policy year
  - Current state of those live
  - Recovery Rate
  - Waiting Period



# Questions

## Thank you!

For further information, please contact

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