ACTUARIAL TRAINING

(SOCIAL SECURITY BOARD OF MYANMAR)

SICKNESS, MATERNITY, HEALTH, DEATH, EMPLOYMENT INJURY

MYANMAR 2014, DECEMBER 15-17

Day 2

PLAN OF THE PRESENTATION

- Specific Statistical Requirements for Sickness, Maternity, Death benefits, Health and Employment Injury for Actuarial valuation and Management
- Financing Sickness, Maternity, Disability, Death benefits, Health and Employment Injury
- Actuarial Projections of Sickness, Maternity, Death benefits, Health and Employment Injury Benefits

Specific Statistical Requirements for Sickness, Maternity, Disability, Death benefits for Actuarial valuation and Management

DATA FOR ACTUARIAL VALUATION

- For all:
  - Macroeconomic data
  - Demographic data
  - Financial data
  - Contributors
  - Eligibility conditions
- To estimate the cost we need
  - Frequency
  - Severity
  - Time value

SHORT TERM BENEFITS

- Sickness
- Maternity
- Death
- Health benefits
- Employment Injury
  - Short term and Long term
    - But for Myanmar…..more short term

FINANCIAL SYSTEM

- Pay-as-you-go
  - Short payment duration
  - Predictable expenditure
- Basic equilibrium
  - Contributions for next year

  … expected to meet …
  - Expenditure on benefits and administration of next year

- Have to take into account coverage rules, eligibility conditions, formula to pay benefits and waiting period

CONTINGENCY RESERVE

- To maintain stable contribution rate
- Supports the scheme in periods of reduced contribution base or higher expenditure
- Level of reserve depends on:
  - Capacity to adjust rapidly the contribution rate
  - Variability of experience on benefits
- Between 3 months and 1 year of expenditure
- Total cost of benefits
  - Set aside assets to pay the benefit
  - Have to calculate the present value

PROJECTED REVENUE FOR A YEAR

Number of contributors

X

Average covered earnings

X

Contribution rate

PROJECTED EXPENDITURE FOR A YEAR

(Number of persons insured
X
Frequency of occurrence of contingency
X
Average number of days of benefit per case (duration)
X
Average amount of benefit per day)

+ Administrative expenses

SICKNESS

- New scheme
  - Lack of data
  - Low awareness of sick persons about their rights
- Recent changes
  - Need adjustments to frequency, duration, amounts
- Seasonal employment
  - Eligibility to sickness benefits gradually lost
  - May use of sickness benefits if not eligible to unemployment insurance
- Level of earnings
  - Certain sectors with particular earnings levels claim more

MATERNITY

- Fertility of the female insured population vs general fertility rate
- Duration of benefit
  - Low benefit levels encourage to return to work before end of period
  - Link with rights under labour laws
- Benefit recipient
  - Mother vs father (may affect duration)
- Adoption
  - Need to consider not only birth

DEATH

- Mortality experience can be different from the general population

AN EXERCISE

- Exercise6.docx
- Exercise6.xlsx
- Exercise6 SOL.xlsx

Going through ILO sickness and maternity models

Exercice7 – Build your own death benefit model

Health benefits

General approach

Members of different sex and age groups use a certain amount of services over a given period,

- Assumptions to be made concerning the development of prices over time

HEALTH CARE IS COMPLEX

Factors influencing the health status of the population (environment, age structure, lifestyles, standards of living)

- morbidity and mortality

Interactions between health care providers and the general public

Expenditure and revenue

- national health care system
- health care scheme (private, social security..)

FACTORS AFFECTING THE HEALTH STATUS

Factors affecting the health status :

- income levels and poverty
- education, especially of girls and women
- food, water and sanitation
- cultural and social factors
- health-related policies and interventions.
- technology medical development

THE FACTORS THAT INFLUENCE THE FINANCIAL EQUILIBRIUM

- *Demographic and labour force factors*
- *Economic factors* : employment, wage, income levels, prices and interest rates
- *Health status*
- *Medical technology*
- *Medical practices*
- *Governance factors* : eligibility, benefits provided
- Cost sharing, user fees, fees and co-payments
  - All forms of co-payments reduce the solidarity in the system to some extent (financial burden shifted from the healthy to the sick)
  - exemptions or reductions in these co-payment amounts for people with low incomes or high levels of need.

SOCIAL INSURANCE SCHEME

Can have more than one scheme

- Rural vs Urban:
  - Hightech treatment or medicines or health care in large cities may differ with those in rural areas
    - Lower income population can pay more related to service received
- A risk when competition between schemes is adverse selection
  - enrollment of persons with low health risks (as private insurance)
  - Regulation can help

SOCIAL INSURANCE SCHEME

The financing system

- (PAYG)
- fully-funded systems,
- partial funding
- Remember : short-term benefits
- the amount of contributions collected in one period = the expected amount of benefit expenditure + administrative expenditure + (or -) changes in contingency reserves

SOCIAL INSURANCE SCHEME

Contributions depends on :

- the scope, nature and price of benefits provided
- the amount of administrative cost
- the level of earnings on which contributions are calculated
- the participation of the State in the financing of the scheme.

There is cross-subsidization:

- from the healthy to the ill
- from high- to low-income persons
- from single persons and small families to larger families

THE OUTFLOW OF FUNDS: PAYING FOR SERVICE DELIVERY

Fee-for-service (Canada)

- *Definition of a list of services*
  - complex and requires considerable administrative capacity as do payment calculations and billing control
- *Determination of the price of a specific service unit.*
- *Definition of special rules and restrictions*
- Fee-for-service payments encourage a greater quantity of care
- Inadequate prices in a fee schedule might create distortions in medical practice,
  - moving towards high-profit items on the fee schedule
- Fee-for-service system may require supplementary mechanisms
  - total expenditure ceilings
  - quantity restrictions.

THE OUTFLOW OF FUNDS: PAYING FOR SERVICE DELIVERY

Capitation (SSO)

- a flat-rate fee (may be differentiated by age and sex of the covered persons)
  - for every covered person enrolled with an individual provider
- the net income of providers is maximized by minimizing their production costs
  - quality control and competition among providers are necessary to ensure a minimum quality standard
- The capitation method is often combined with bonus and fee-for-service elements
  - to steer provider behaviour to less costly health-promoting activities, such as preventive care.

THE OUTFLOW OF FUNDS: PAYING FOR SERVICE DELIVERY

- ***Salary (Myanmar)***
  - Pay for number of hours or period of time
  - does not depend on the volume or structure of services provided, or the number of patients treated
  - does not even directly depend on the quality of treatment.
- ***Budgeting (Myanmar)***
  - prospective budget is fixed for a provider unit(hospital)
  - cover all expenses over a defined period
- **Case *payment***
  - payments may be made to providers according to specific fees for the treatment of specific illnesses
  - morbidity risk is born by the payer, while the provider bears the risk of expenditure per case

DATA (1)

- *Coverage data*
  - size and structure of the population which finances
  - the population which is entitled to benefits
- *Utilization and infrastructure data*
  - infrastructure of the medical delivery (# of beds, hospitals, outpatient care unit, staff…)
  - the pattern and intensity of the utilization of the infrastructure by the covered population
- *Price data*
  - health care goods and services
  - directly incurred or purchased from providers
  - Capitation, salary, fee-for services
- *Expenditure and revenue data*
  - Administration…contribution..others

DATA (2)

Accounts

- Income and expenditure statements, balance sheets
- Initial reserves

Revenue side

- Number of contributors to scheme
- Average insurable earnings per contributor per scheme by age and sex
- Number of dependent spouses and children per contributor by age, sex and scheme
- Other income
- Co-payments
- Investment income
- Public subsidies

DATA (3)

Expenditure side

- Ambulatory care expenditure
- Total number of ambulatory care cases
- Number of cases per capita by sex (active age group, younger age group, and
- pensionable age group)
- Expenditure on hospital care
- Total number of hospital days
- Number of hospital days per capita by sex (active age group, younger age group, and
- pensionable age group)
- Dental care expenditure
- Total number of dental care cases
- Number of cases per capita by sex
- Pharmaceutical expenditure
- Total number of prescriptions
- Number of prescriptions per capita by sex
- Other benefit expenditure
- Administrative expenditure
- Transfers to other schemes
- Transfers to reserves

IF DATA ARE NOT GOOD

1. *Initiating new statistical coverage.*
   - ideal solution
   - describes exactly what data are required
   - how they should be collected by the scheme or the system
2. *Sampling*
3. *Assumptions*
4. *Proxies (international data)*

THE MODEL

1. Determining the scope of the model (national system or social security scheme)
2. Defining the logical structure of the model
3. Establishing the data framework and legal description
4. Mapping the model mathematically
5. Sensitivity testing

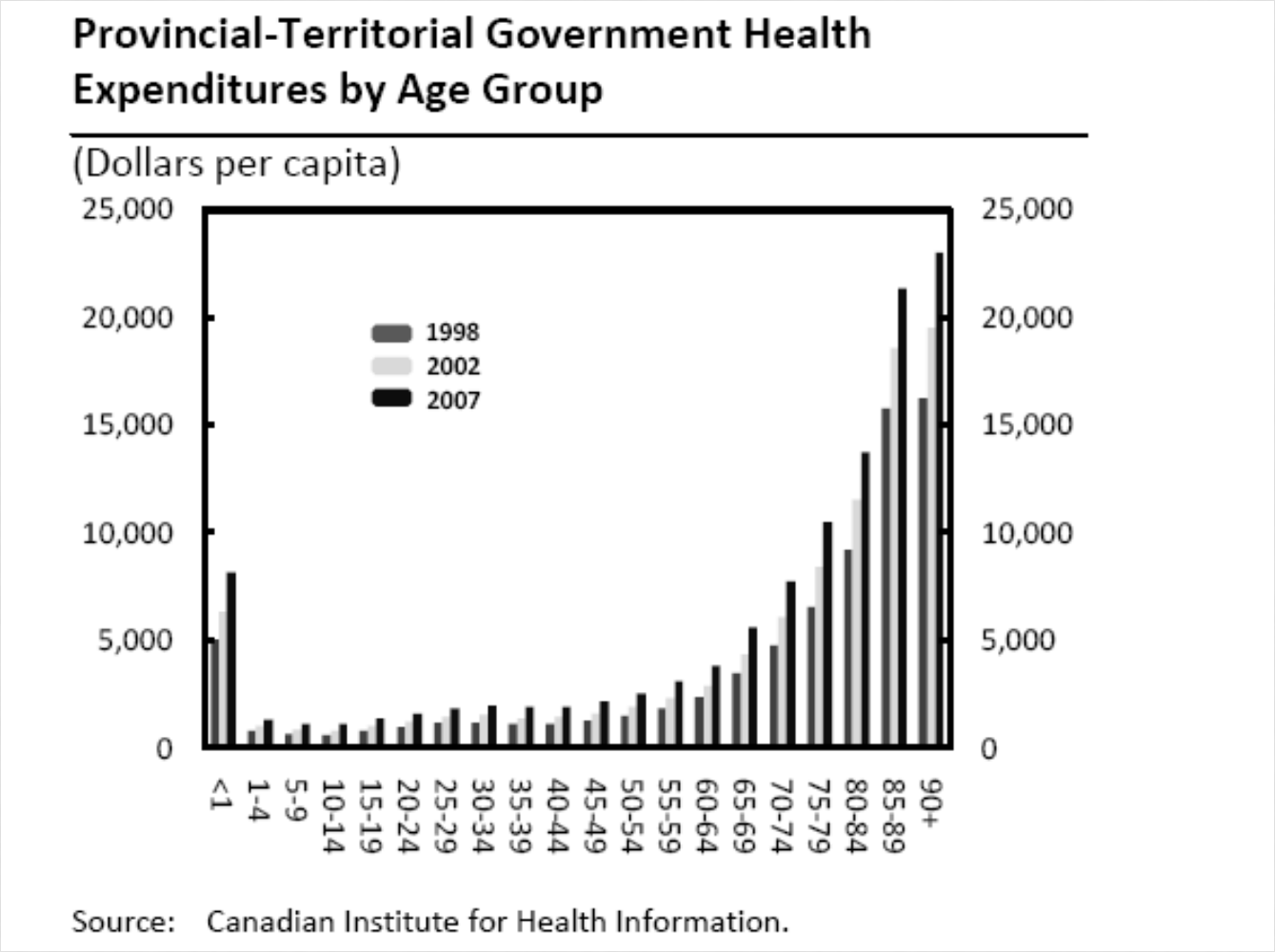
THE SCOPE……A MACRO APPROACH

3 key drivers*:

- Age structure of the population
- Income
  - As individuals' income rise, their demand for health care services will also rise
  - income elasticity of health expenditure can be closed to 1
    - Growth in GDP per capita
- Improvements in the quality and efficiency of the health care system (enrichment factor)
  - Can be estimated residually through analysis of experience

*OECD, Canada's PBO, U.S. Congressional Budget Office

EXAMPLE OF HEALTH EXPENDITURE PER CAPITA BY AGE



HEALTH PROJECTION
GROWTH IN HEALTH EXPENDITURES PER CAPITA

$$EXPP_t = EXPP_{t-1} * (\frac{GDPP_t}{GDPP_{t-1}}) * (\frac{AGE_{t/t-1}}{AGE_{t-1}}) * (1 + X_t)$$

where

$EXPP_t$	=	nominal health expenditure per capita
$GDPP$	=	nominal GDP per capita
AGE	=	ageing component of per capita expenditure
X	=	enrichment factor

HEALTH PROJECTION
GROWTH IN HEALTH EXPENDITURES PER CAPITA

$$AGE_t = \sum_i (EXPP_i * \frac{POP_i}{POP_t})$$

where

$EXPP_i$	=	Health expenditure per capita for a given age group i
POP_i	=	Number of individuals in a given age group
POP_t	=	Total population

2. DEFINING THE LOGICAL STRUCTURE OF THE MODEL

logical relationships between the data and information needed as inputs for the model, the structure of model calculations, and the desired model output

- Population, labor force, and economy
- Inflation, interest rate, wage
- Contributing and covered population (employed persons, self-employed persons, contributing pensioners…)
- Assessment base (low, maximum)

2. DEFINING THE LOGICAL STRUCTURE OF THE MODEL

- Other income
  - the government subsidies….
- *Co-payments*
  - flat rate (per day, per item, per prescription)
  - percentage (of the price or fee)
  - payments by the patient for charges in excess of certain ceilings (fixed by health insurance)
  - exclusion of certain benefits
- Expenditure and income, utilization rates, unit costs
  - To project unit costs
    - Medical inflation rates, wages of medical staff, technological progress indicators, staff wage rates, inflation
- Method of financing
  - PAYG, contribution rate…

3. ESTABLISHING THE DATA FRAMEWORK AND LEGAL DESCRIPTION

Population coverage

- Population groups/institutions financing the scheme
- Population groups eligible for benefits under the scheme (children, dependent
- family members, etc.)

Benefits provided

- Type and extent of benefits provided to covered persons
- Eligibility conditions (for each type of benefit)

Pattern of delivery and remuneration of providers

- Type of participating providers and relationships with them (e.g. physicians, hospitals;
- under global contract, owned or employed by financing agent, etc.)
- 3.2 Remuneration of providers (fee-for-service, capitation, budget, etc.)

Financing rules

- General method and sources of financing (contributions, general taxes, earmarked taxes)
- Actuarial equilibrium (definition of the level of reserves to be maintained during a defined period)
- Determination of the contribution rate or tax rate, if applicable

4. MAPPING THE MODEL MATHEMATICALLY

- Translation of real-world observations of the demographic, economic, expenditure and revenue structure of the model into mathematical equations
  - categories of benefits
  - subgroups of the protected or insured population
  - age and gender groups
- Projection periods
- Next….

5. SENSITIVITY TESTING

- Alternative scenarios for :
  - mortality, migration rates, or different values for variables that drive certain categories of health care expenditure
  - Utilization rate
- theoretical effects, when it is not possible to observe these effects statistically
  - (income elasticity of health care utilization)
- optimistic, pessimistic and realistic

THE MODEL OF SSB

Breakdown

- Inpatient
- Outpatient
- Reimbursement

When possible, refinement taking into account different kind of expenditure

- Salary, drugs, maintenance…

THE MODEL OF SSB

No history for analysis

- Contributors
- Beneficiaries
- Cost of each component
- Utilization rate

HOSPITAL CARE (INPATIENT)

$TEHC_t = Covpop_{s,x,t} \times UR_{s,x,t} \times AHD_{s,x,t} \times CHD_{s,x,t}$

Where,

$TEHC_t$ = Total expenditure for hospital care
$Covpop_{s,x,t}$ = population covered
$UR_{s,x,t}$ = utilisation rate
$AHD_{s,x,t}$ = average hospital days
$CHD_{s,x,t}$ = average cost of a day

CONSIDERATIONS

Have to take into account change of cost over years

Breakdown by

- Cost of room
- Management
- Cost of medical treatment

For capitation may have to take into account:

- Top-down approach or bottom-up
- Economy of scale
- New provider

Going through ILO health model

Employment Injury benefits

TYPES OF BENEFITS

- Temporary incapacity cash benefits
- Permanent disability pensions
- Survivors' pensions
- Medical expenses
- Rehabilitation

ONE FINANCING APPROACH (MIXED SYSTEM)

- PAYG for:
  - Temporary incapacity cash benefits
  - Medical expenses and rehabilitation
- Full-funding for:
  - Permanent disability pensions
  - Survivors' pensions

PAYG FOR TEMPORARY INCAPACITY

Cost =

Number of persons insured

X

Frequency of occurrence of incapacity

X

Average number of days of benefit per case

X

Average amount of benefit per day of incapacity

PAYG FOR MEDICAL EXPENSES AND REHABILITATION

- Cost = (Number of cases) X (Cost per case)
- Expenses generally included:
  - Hospital
  - Doctor
  - Dentist
  - Nurse
  - Drugs
  - Prosthesis

ANOTHER FINANCING APPROACH (FULL-FUNDING FOR ALL BENEFITS)

- Temporary incapacity benefits and permanent disability pensions seen as a continuous benefit
- Survivors' pensions
- Medical expenses and rehabilitation use development factors
- The scheme should have assets equal to the value of pensions awarded before the date of valuation
- The scheme must collect in contributions each year the present value of all future payments related to the accidents of that year

FULL FUNDING DEFINED

Cost for year t = PV of future payments related to accidents occurring in year t

Reserve (end of t) = PV of future payments related to all accidents having occurred before the end of year t

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Rationale: To avoid cross-subsidization between different cohorts of employers

RESERVE PROGRESSION UNDER FULL-FUNDING

$$V_{t+1} = V_t (1+i) + Cost_t (1+i)^{1/2} - Payments_t (1+i)^{1/2}$$

FINANCIAL STATEMENT

Compare on valuation date:

- Assets of the scheme

with

- Total liabilities on long-term benefits

Difference = Surplus or deficit to be amortized over a certain number of years

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PRESENT VALUE OF DISABILITY AND SURVIVORS' PENSIONS

- Takes into account:
  - Survival in the status of beneficiary
  - Future indexing of pensions
- Disability:
  - Mortality
  - Recovery
- Death:
  - Mortality
  - Remarriage (in some cases)

CONTINUATION TABLE

- Used to determine the survival in the status of beneficiary (considers death and recovery)
- Built from statistics on past terminated cases
- Useful to estimate the effect of:
  - introducing a waiting period, or
  - extending the maximum duration of benefit
- Then treat temporary incapacity and disability pension as a combined benefit

Continuation table

Duration of benefit	Number of beneficiaries still receiving benefits
1 day	10,000
2 days	9,500
3 days	9,000
4 days	8,000
1 week	7,000
2 weeks	6,000
3 weeks	5,000
1 month	3,000
2 months	2,000
3 months	2,500
4 months	2,000
…	…
1 year	1,000
2 years	800
…	…

RISK RATING SYSTEM

- The risk of employment injury varies widely among different economic activities
- Structure of risk classification depending on the economic activities
- Need good data base

EXPERIENCE RATING SYSTEM

- System to allocate the total cost of a year among the different enterprises according to their risk level

$$\text{Rate} = \frac{\text{Total cost for all enterprises}}{\text{Total insurable earnings}} \times \text{Risk relativity factor}$$

Depends on the size of the employer
Need good data base

EMPLOYMENT INJURY MODEL FOR SSB

- Based on PAYG
  - Few new pensions paid
    - Commuted value
  - Less complex

Going through ILO Employment Injury model