Causal modelling

Challenges for its development and usefulness for programme management

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Why do we need such causal analysis?

• Analysis of routine surveillance of national TB control programmes is based on epidemiological descriptive techniques.

  Time-Place-Persons description is very instructive,
  but does it provide enough information for rational decision making to solve the perceived problems?
  And what about social-economic factors?

• Description answers the questions: who, where, when (how)
  but not why.
Scatterplot of S+ notification rate vs. TB suspects' examination rate, Bangladesh 2008

\[ y = 0.0329x + 22.586 \]

\[ R^2 = 0.1614 \]

\[ p = 0.047 \]
Why few TB suspects examined in certain upazilas?

- Microscopy centres exist?
  - functional?
- accessible?
- acceptable?
- Do treatment centres have drugs?
- Referral by private practitioners?
- Incidence?, etc......
1 cause only?

- 1 problem – 1 cause - 1 action ??

- Generally > 1 cause
  multicausal, multifactorial
  (interlinked)
  causal web Prof MacMahon, Harvard

How can we know those causes objectively?
How to know the causes?

• Research (epidemiological, sociological, anthropological, etc)
  cost
  expertise
  long duration
Down to earth alternative = desirable
causal modelling
Causal modelling

A **causal model** = simplified representation of a complex reality

Def: An organized and hierarchical set of hypotheses linking together the potential factors that are presumed to play a role in a given outcome that one intends to change

Technique developed by ITM, Antwerp

A causal modelling exercise = teamwork
Building a causal model

1. Make comprehensive list of potential causes
2. Structure causes in layers of influence
3. Explore the plausibility of the presumed causal link(s)
4. Finalise the model
5. Prioritise relevant actions to combat the problem at hand (starting point of causal model)
6. Develop list of indicators
1. List factors

**Brainstorming session**

**Members:** persons who know the problem at hand

**Moderator**

**Idea generation:**

– In a comprehensive way
– Unbiased (= free of errors)
- No need for exhaustiveness

**Nominal group technique**
Nominal Group Discussion

1. Eligible participants gather
2. Moderator explains the issue at hand
3. Participants have possibility to ask questions to become optimally prepared for the task
4. Each write down the main cause
5. Possibility to explain what was written
6. Then more causes are added
Endproduct of a nominal group session

- A list of causes
- Ranking of the causes following degree of importance, as felt by the participants
2. Structuring the causes

How to build a causal model?

Steps in the model building:
1. Out of the list of potential causes, determine the direct (=immediate) causes:

...............
2. Then identify the factors affecting these causes
How to build a causal model?

INITIAL DEFAULT

- Rejects diagnosis
- Prefers Private P.
- ........
- ........

Better care
Diagnosis secret
........

3. Next identify the more distant causes
4. Constantly check the plausibility of the presumed causal links!!

INITIAL DEFAULT

- Rejects diagnosis
- Prefers Private P.
- ............
- ............

- Better care
- Diagnosis secret
- ............

- Perception HS
- Fear stigma
Expected output

⇒ Better understanding of the **interrelationships between several potential determinants** of a given outcome

⇒ Understanding how a given factor influences the particular outcome, either directly or indirectly

⇒ Understanding the **pathway of potential influence** (necessary for correct action taking)
Once the model finished.....

➔ **Prioritize** the causes

➔ **Select the 2-3 main causes** for action

*Harvard Business Magazine:*

*Selecting 15 Causes = selecting none!*
Complexity of the model

- Keep it as simple as possible

- Although complex models are possible
  Example developed in Kerala 2006

Issue: exploration of use of routine NSP data as proxy for incidence determination
How to measure programme implementation?

- Complex
- 35 indicators
- Focus on shift over the last 3 years
- Scoring via consensus generating techniques
- Global score
- Correlation between global score and NSP notification rate
Scatterplot of NSP rate of change and RNTCP, 12 TUs of Kollam-Kottayam-Pathanamthatta 2003-2006 score

\[ y = -1.2769x + 36.427 \]

\[ R^2 = 0.5265 \]

\[ p=0.008 \]
main factors?

leadership capacity of district officer
Staff positions filled
Staff trained/ updated
Supportive supervision
feedback
In summary

- Descriptive data alone might be insufficient
- Causes multifactorial
- Not easy to know/structure them
- **Causal modelling approach**
  - teamwork
  - making a list/ nominal group technique
  - structuring in a model (simple)
  - prioritisation
  - basis for decision making
  - basis for cause-specific action taking
Thank you