A multilevel approach to health systems analysis using RISS (Reporting-by-Intranet Statistical System)

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e.health services research

Clinical Epidemiology

Modern Epidemiology

Evidence-Based Medicine

Health Economics

Quality of Care Research

Public Health

Health Services Research

Outcomes Research

Population-based Health Research

Internet

Intranet

JAVA

CORBA

GNU/Linux

Distributed Computing

Object Oriented Programming

Code reusability

Open Source Connectivity

Biostatistics

Machine learning

Data Mining

Bayesian Statistics

Neural Networks

Computer-Intensive Methods

Meta-learning

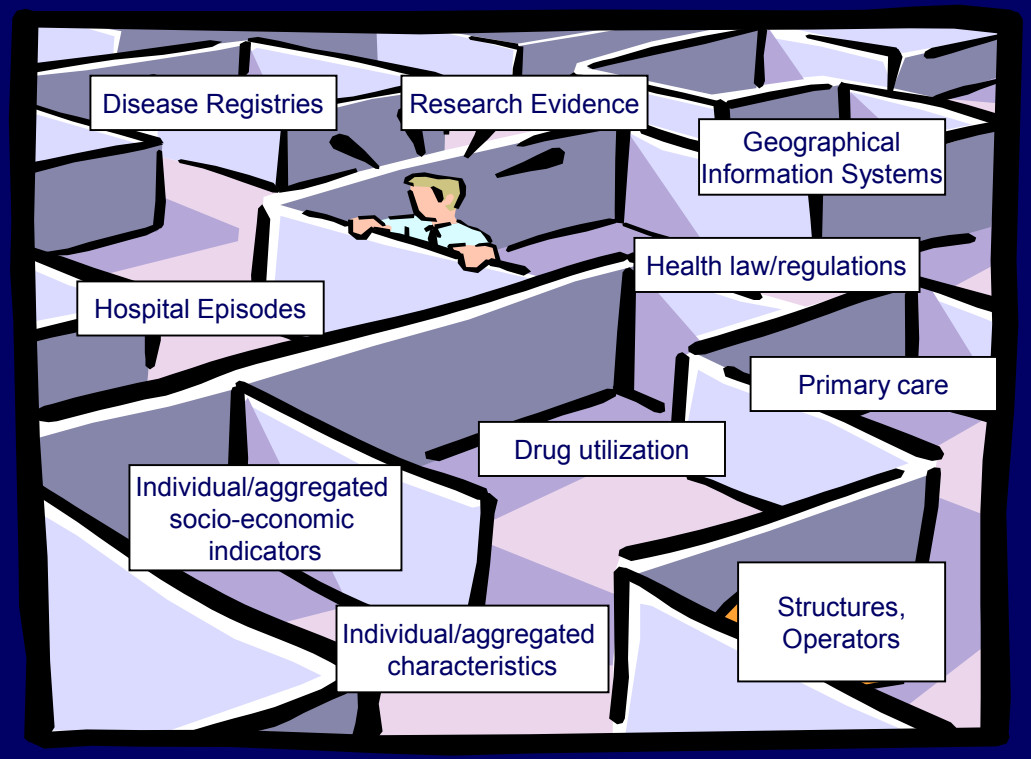
Statistical Sciences

Population-based health research

Information from multiple sources

Multidisciplinary and Multidimensional
Cross-sectional and Longitudinal
Experimental and Observational
Administrative and Ad Hoc
Systematic and Non-Systematic

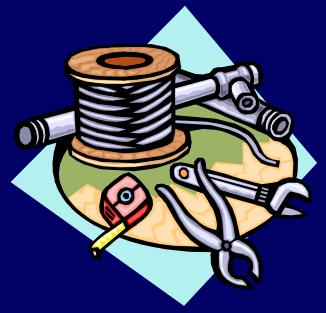
"Data-Warehouse"



Statistical Sciences

Bias/Variance

Sampling techniques
Adjustment
Correlation
Subgroups analysis
Causal pathways

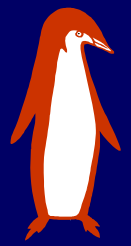


Sampling Techniques
Markov Chains Monte Carlo
Gibbs sampling
Random Effects Models
Generalized Mixed Models
Bayesian Mixed Models
Multilevel models
Hierarchical Regression Models
Multilevel linear models
Marginal models
Generalized Estimating Equations

Open source connectivity

Public Access to Re-usable sources

Software engineering
Developers' networks
Standard browsing
Remote access



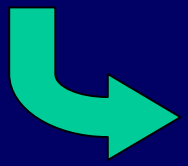
Free Software Foundation/
GNU's not Unix (GNU)
Language Compilers-C,C++
Linux
Connectivity
Web-server technology
Java
Browser technology
Cross-platform applications

Population-based fallacies

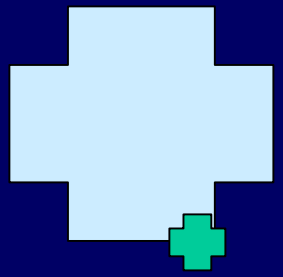
Ecological fallacy
drawing inferences at the individual level based on group-level data

Atomistic fallacy
drawing inferences at the group level based on individual data

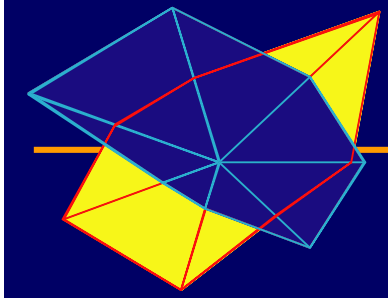
Psychologistic fallacy
assuming that individual-level outcomes can be explained only in terms of individual-level characteristics (opposite:sociologistic)



"Confounding"



Micro-macro level variables *interaction* !!



Real-time Information Distribution

RISS

http://statbone.cmns.mnegri.it

Reporting-by-Intranet Statistical System

Objective:

- ***Automating processes of data-warehousing and statistical analysis for complex and fragmented databases***
- ***Delivering results in the form of widely accessible and interpretable reports***

Procedures:

- **BROWSE**
- **REPORT/LIST**
- **REPORT/INDEX**
- **STANDARD**
- **MAPS**
- **GENMOD**

- ***Supported by CMNS, Regione Puglia, SAS, SUN Microsystems***
- ***Version 6.12, modules AF, BASE, STAT, GRAPH***
- ***Standardized Browser Outputs (HTML+Javascript)***
- ***Designed for remote analysis through SAS/CONNECT***

Open Source – Script “logic”

Version spec

SAS datasets:

Population and geographical data

Network Script:
.net file

Operational Database
.db file

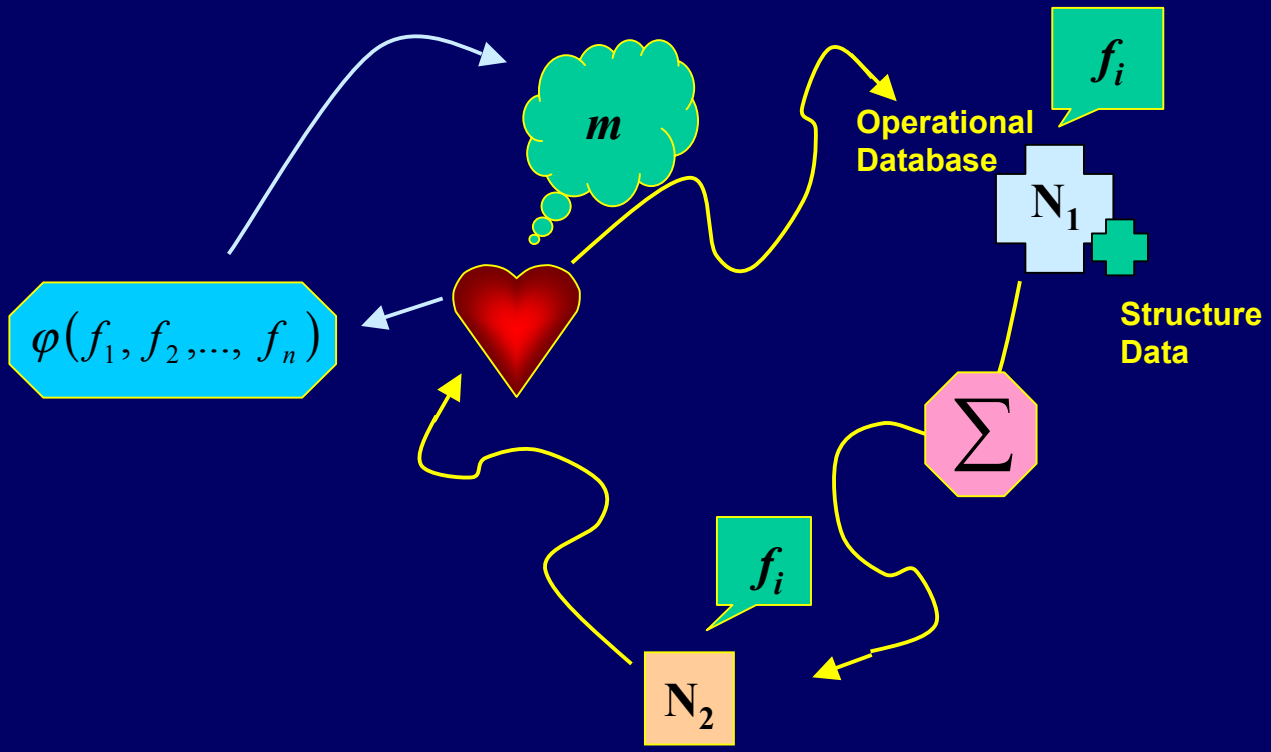
Structure Database
.st file

Environment databases
.env file

SAS programs
.mak file (main)
.mak file (custom)

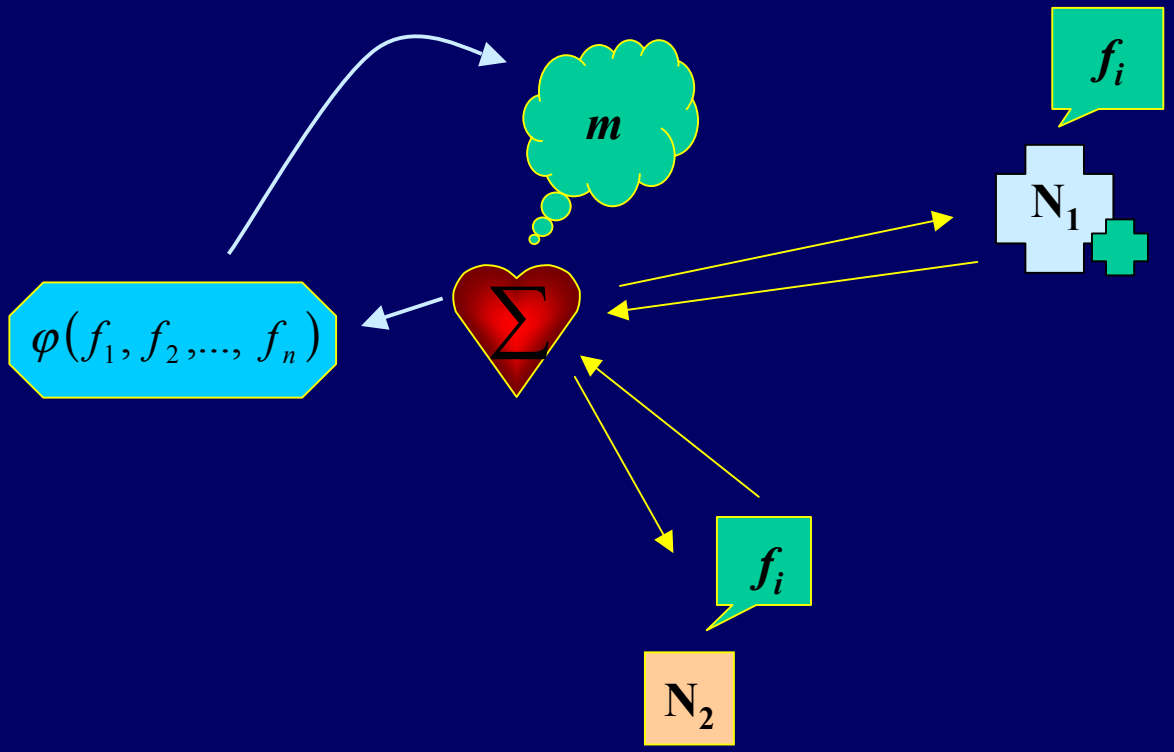
Population Datasets
.sd2 file

Cumulative meta-analysis

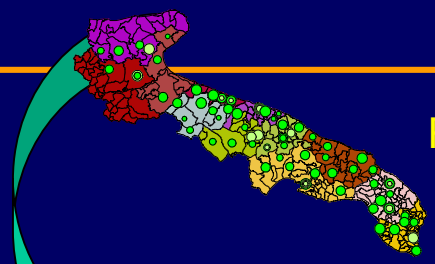


Touch+Pile-Up+Meta-Analyze (TPA)
Distributed/Fragmented, Multilevel Hierarchical Network

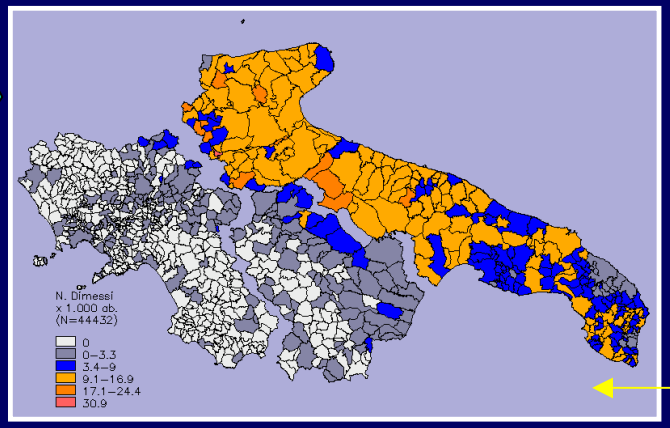
Parallel processing



An ‘admin’ RISS version: RISS-H



Regione Puglia – Southern Italy, 114 Hospitals



Diabetes

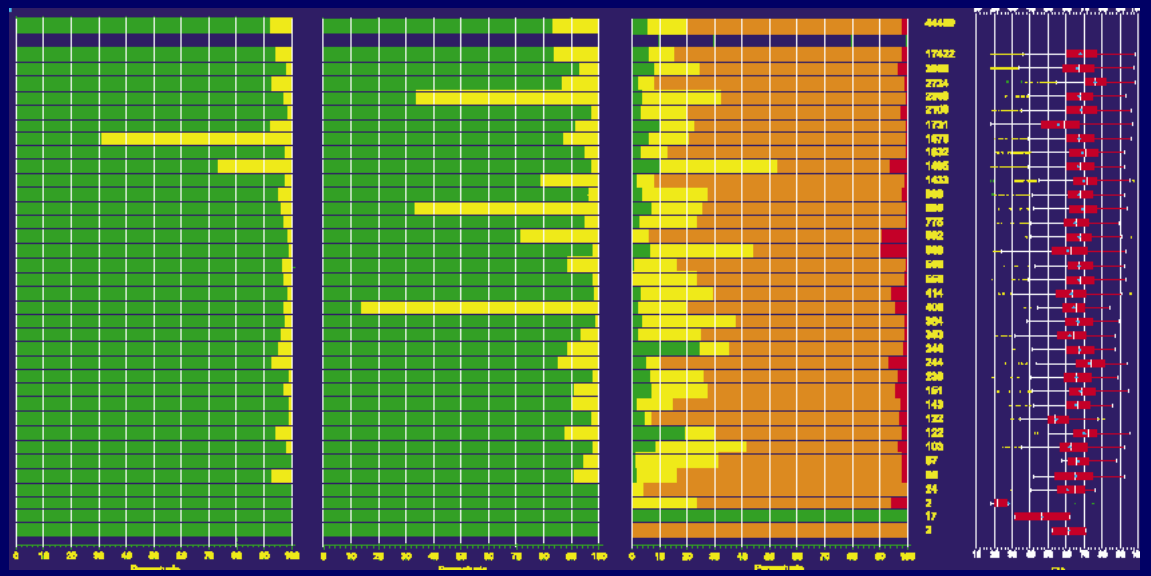
- List Hospitals x Diabetes
- List Hospitals x Complications

Complications Yes/No (Binary Variables)

LOS classes (Categorical Variables)

AGE (Continuous)

Specialties (Nominal variables)



An ‘epi’ RISS version: RISS-Q

QuED
Qualità ed esito in Diabetologia

- List Clinical Variables QuED centers
- Index SF-36 QuED centers

e.health systems

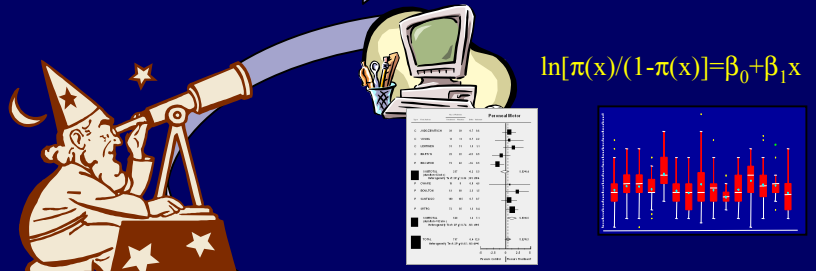
LAYER 3

(MICRO-LEVEL)

Implementation

Population-based Approach
Vs
Disease Management

DHS
SHCN



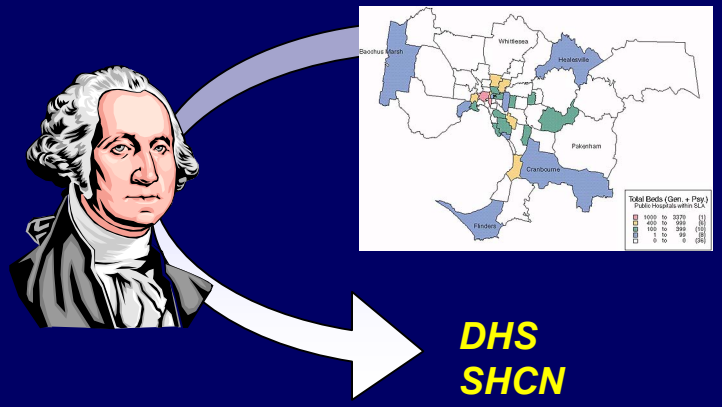
LAYER 2

(META-LEVEL)

Research

Evidence-based Medicine
Vs
Clinical Practice

NHMRC
SHCN



LAYER 1

(MACRO LEVEL)

Governance

Health needs
Vs
Health services

DHS
SHCN

Service Mapping
Provider resources

Medical databases
CARDIAB

Ambulatory Data
Diabetes Centres

Educational programs
Diabetes Australia

Surveys
PRE: AusDiab - POST: Ad-hoc
Quality of Life in Diabetes (SF-36)

→ Diabetes Register

Clinical guidelines
Scientific Associations
Cochrane Library

Patient outcomes
Medical records

Clinical Variability
Intranet Shared Information System
Multilevel models

Public Health Data
Burden of Disease
Census data, AusDiab

Operational Databases
Hospital Databases
Pharmaceutical prescriptions

Regulations
Case-Mix/DRG

Geographical data
Census, Boundaries