



SOCIETY OF ACTUARIES

**Health Spring Meeting
May 2008**

**Session # 13: Actuaries and Public Health:
From Analysis to Action**

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Actuaries and Public Health: The Value of Public Data

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Today's Agenda

- ❖ From data to information
 - How it all started, where we are now
- ❖ Sources
- ❖ Methods, measures and bias
- ❖ Examples of applied information
 - Products
 - Underwriting

Turning Data into Information

- ❖ Data by itself is useless
- ❖ Started during London's Black Plague
 - 1603 – lists of the dead to inform the King
 - “Bills of Mortality”
- ❖ 1665 – John Graunt summarized lists
 - Considered father of actuarial science, demography and epidemiology
- ❖ Summaries help evaluate status and trends

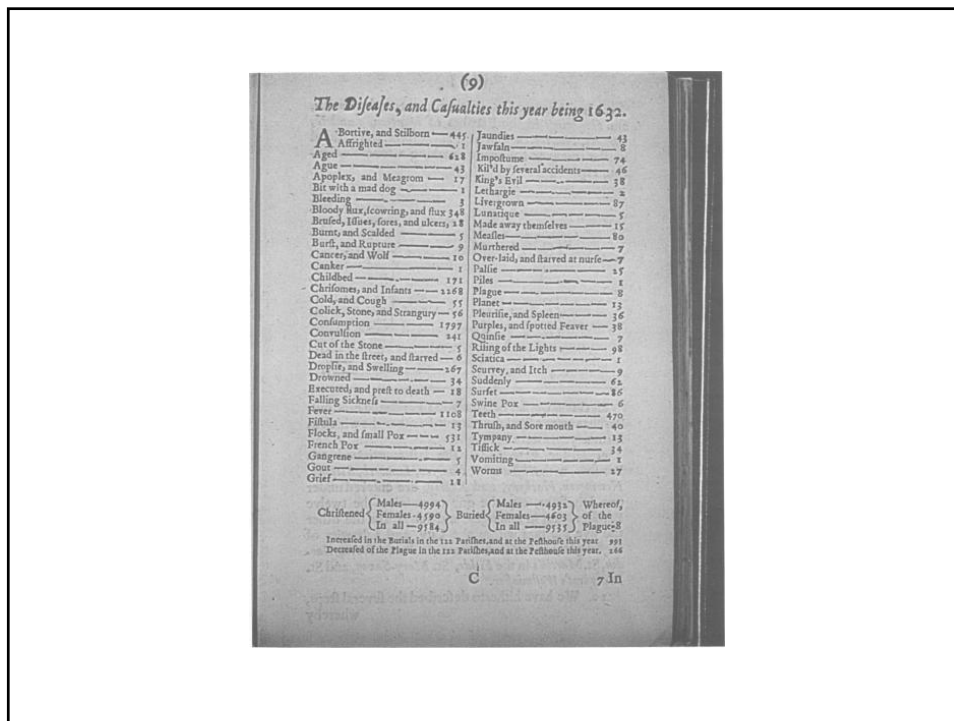


Table C. Deaths and percentage of total deaths for the 10 leading causes of death: United States, 2003-2004

Cause of death (based on the International Classification of Diseases, Tenth Revision, 1992)	Rank ¹	2004		2003	
		Deaths	Percent of total deaths	Deaths	Percent of total deaths
All causes	2,397,615	100.0	2,448,288	100.0
Diseases of heart	1	632,498	27.2	685,089	28.0
Malignant neoplasms	2	553,888	23.1	556,902	22.7
Cardiovascular diseases	3	150,074	6.3	157,689	6.4
Chronic lower respiratory diseases	4	121,987	5.1	126,382	5.2
Accidents (unintentional injuries)	5	112,012	4.7	109,277	4.5
Diabetes mellitus	6	73,138	3.1	74,219	3.0
Alzheimer's disease	7	65,965	2.8	63,457	2.6
Influenza and pneumonia	8	59,664	2.5	65,163	2.7
Nephritis, nephrotic syndrome and nephrosis	9	42,480	1.8	42,433	1.7
Septicemia	10	33,373	1.4	34,069	1.4

... Category not applicable.

¹Rank based on number of deaths.

Source: Center for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System, Mortality, 2003-2004.

Previous SOA Discussions

- ❖ Denise Love, National Association of Health Data Organizations
 - Health Section News, August 2005
 - Spring Meeting, June 2003
- ❖ Manning Feinleib, National Center for Health Statistics
 - The Actuary, November 1988

U.S. Population Data Resources

- ❖ National Center for Health Statistics
 - www.cdc.gov/nchs
- ❖ Health Care Research & Quality
 - www.ahrq.gov
- ❖ National Association of Health Data Organizations
 - www.nahdo.org

U.S. Population Data Resources, con't

- ❖ Healthcare Cost & Utilization Project
 - www.hcupnet.ahrq.gov
- ❖ Centers for Medicare & Medicaid Services
 - www.cms.hhs.gov
- ❖ Substance Abuse & Mental Health Statistics
 - oas.samhsa.gov
- ❖ Health Resources & Services Administration
 - www.hrsa.gov

Population Study Organizations

- ❖ Direct Federal supervision and staffing
 - NHANES, NHCS, NHIS...
- ❖ Federally funded, university-run grants
 - Framingham, www.framinghamheartstudy.org
- ❖ Private funding and staffing
 - Mayo Clinic, Cleveland Clinic

Much Analysis Already Done

- ❖ National Library of Medicine
 - Search and retrieve medical articles
 - <http://www.ncbi.nlm.nih.gov/PubMed>
- ❖ Studies of public and similar data
 - Peer-reviewed journals
 - Consensus findings
 - Policy implications and recommendations

Population Metrics

❖ Rates

- Numerator counts individuals, events and outcomes of interest
- Denominator counts population at risk

❖ Ratios

- Numerator is rate of study interest
- Denominator is rate of reference

Population Metrics, con't

❖ Incidence

- Measures rates of new events, outcomes
- Numerator counts new events, outcomes
- Denominator counts population at risk

❖ Prevalence

- Measures rate of all events, outcomes
- Numerator counts all events, outcomes
- Denominator counts population at risk

Population Study Types

- ❖ Cross-sectional (lower cost)
 - Survey over short period of time
 - Snapshot of prevalence
 - Incidence not well measured
- ❖ Longitudinal (higher cost)
 - Cohort – same individuals followed up
 - Good measurement of prevalence
 - Good measurement of incidence

Uses of Cross Sectional Studies

- ❖ String of cross-sectional study results
 - Look at trends in the snapshots
 - Occurrences of possible new trends
 - Credible for short-term phenomena
- ❖ Best studies
 - Largest numbers available
 - High frequency of outcomes of interest
 - Most representative of population of interest

Uses of Longitudinal Studies

- ❖ Longitudinal studies
 - May/may not validate shorter study results
 - Credible for long-term phenomena
- ❖ Best studies
 - Largest numbers available
 - Few lost during selection and follow-up
 - Longest duration of follow-up

Correlating Cause & Effect

- ❖ Association is not causation
- ❖ Causation has higher standard of proof
 - Must make sense biologically
 - Must make sense clinically
 - Evidence must be consistent
 - Exceptions must be analyzed closely
 - Resolution is valuable to the public

Correlating Cause & Effect, con't

- ❖ Mature issues
 - Often validated by multiple studies
 - Consensus published by diverse teams
 - Evaluated by practice guidelines
 - See www.guidelines.gov for evaluation criteria
- ❖ New issues
 - Often points of controversy
 - Resources dedicated to resolving questions
- ❖ Issues unique to insurance

Types of Bias

- ❖ Selection bias
 - Study group limited by time, place, person
 - Significant numbers declining to participate
 - Significant numbers leaving study early
- ❖ Measurement bias
 - Problems with data intake, completeness
 - Lost or missing measurements
 - Measurements not the ones of interest

Ideal Studies

- ❖ Looks at the precise individuals, events, or outcomes of interest
- ❖ Institutional and peer-reviewed
- ❖ Large and long-term
- ❖ Used as foundation for national policy
- ❖ Used as foundation for practice or treatment guidelines

Foreign Studies

- ❖ Scandinavia, Great Britain, Canada
 - Excellent resources, well-run
 - Universal care = universal participation
 - General access to data by public
 - Many publications of results
 - Perspective on universal care systems
- ❖ May look at problems similar to yours

Life Insurance Examples

- ❖ HIV/AIDs epidemic in early 1980s
 - Warning came from public health authorities
 - At that time, AIDS was a death sentence
- ❖ Solution: test blood for HIV antibodies
 - Vast mobilization and change in practice
 - Many more applicants asked for blood
 - Compelling interest was understandable

Life Insurance Examples, con't

- ❖ Availability of blood led to innovation
- ❖ Framingham Study results led way
 - Cholesterol-based risk widely accepted
 - Able to profile better from worse risks
 - Able to offer preferred risk products
- ❖ Hard evidence = better underwriting
 - Started with need but led to opportunity

Life Insurance Examples, con't

- ❖ Cognitive testing for elderly
- ❖ Use of BMI instead of build
- ❖ “New” laboratory tests
 - Diabetes – hemoglobin A1c
 - Tumor markers – PSA, CEA
 - Coronary artery disease – NT proBNP
 - Alcohol abuse - CDT

Life Insurance Approach

- ❖ Improvements in product design
 - More pricing categories, access to more markets
 - Splitting groups into smaller buckets
- ❖ Improvements in underwriting
 - Less dependence on attending physician reports
 - More certainty with lab-confirmed results
 - Better tests take the place of less predictive tests
- ❖ Unlike health insurance, risk management not as big an issue

Life Insurance Approach, con't

- ❖ Constant referral to medical literature
 - New ideas
 - New ways to foresee trends
 - New ways to interpret experience
- ❖ Imperfect studies are still useful
 - Pieces of an emerging puzzle
 - Can validate trends seen elsewhere

The Value of Public Data

- ❖ Market intelligence
 - Epidemics (AIDS, obesity)
 - Trends in disease and treatment
- ❖ Innovation
 - New products, underwriting
 - Risk management
- ❖ Validation

Actuaries As Contributors

- ❖ Good candidates in theory
 - Deep practical knowledge of field
 - Excellent analytical skills
 - Access to useful, valuable data
- ❖ Putting this into practice
 - Giving back to the medical community
 - Letting the public see a public benefit
 - Improving your standing and influence

Questions?

- ❖ Reach me at:
 - dolanvp@consultancy.com
 - 707.463.3200
- ❖ Thank you!