IEH Institute of Environment and Health

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Introduction to Critical Reviews

Reviewing a single paper

IGHRC

The Interdepartmental Group on Health Risks from Chemicals

Using the peer-reviewed published research literature

- Research influences practice
- Research influences policy
- Peer review strengthens confidence that research scientifically sound and worthwhile

Why decision makers need to be able to understand published literature

- Able to read and interpret research to assess its contribution to policy and practice

Alternative is to

- Accept statements made in summaries, discussions, conclusions

Using the peer-reviewed published research literature

Good	Poor
reliable conclusions	unreliable conclusions
positive/appropriate practice/policy	unjustified risk/inconvenience inferior treatment/intervention
good use of resources	wasteful
accurate/informative – increases scientific knowledge	may generate false lines of study
progress future research	block future ‘good’ research
promote good methodology	promote inferior methodology

What to look for in a report about a study (1)

- Hypothesis
- Type of study – appropriate
- Data sufficiently well reported to determine if study properly conducted

What to look for ..... (2)

- Choice of subjects
  - randomisation for intervention studies
  - cases adequately identified, controls from similar populations
  - sample subjects representative of target population in cross sectional studies

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What to look for ..... (3)

- Outcomes measures
  - objective
  - blinding
  - control of confounders
  - same in study and comparison population

What to look for ..... (4)

- Exposure measures
  - compliance adequately monitored
  - not influenced by case/control status

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What to look for ….. (5)

- Date and location
- Study population, clear description, size, characteristics
- Referent population, clear description, size, characteristics

Measurement of exposure and other variables

- Environmental, inborn or inherent characteristics
  - Interview
  - Questionnaire
  - Diary
  - Records
  - Biological measurement/methodology
  - Environmental levels/methodology
  - Dose

Measurement of outcome

- Disease, state of health, health-related event, death
  - Interview
  - Questionnaire
  - Clinical
  - Biological measurement/diagnostic procedure
  - Records/registries/death certificate
  - Biomarkers/intermediate endpoint

Measurement

- All procedures used in measurement described in sufficient detail to allow reproduction of measurements
- Validation
  - How well does the ‘instrument’ measure what it is intended to measure e.g. food frequency questionnaires against biological measurements
- Reliability
  - How consistent is test when used under similar circumstances

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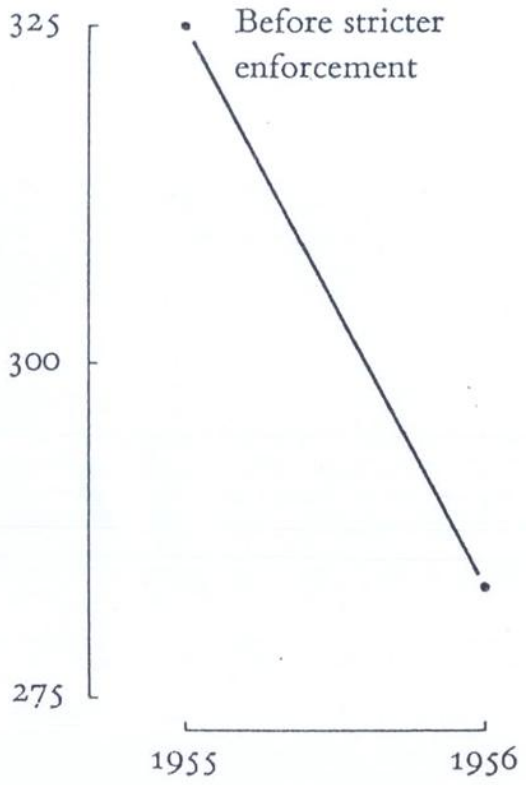
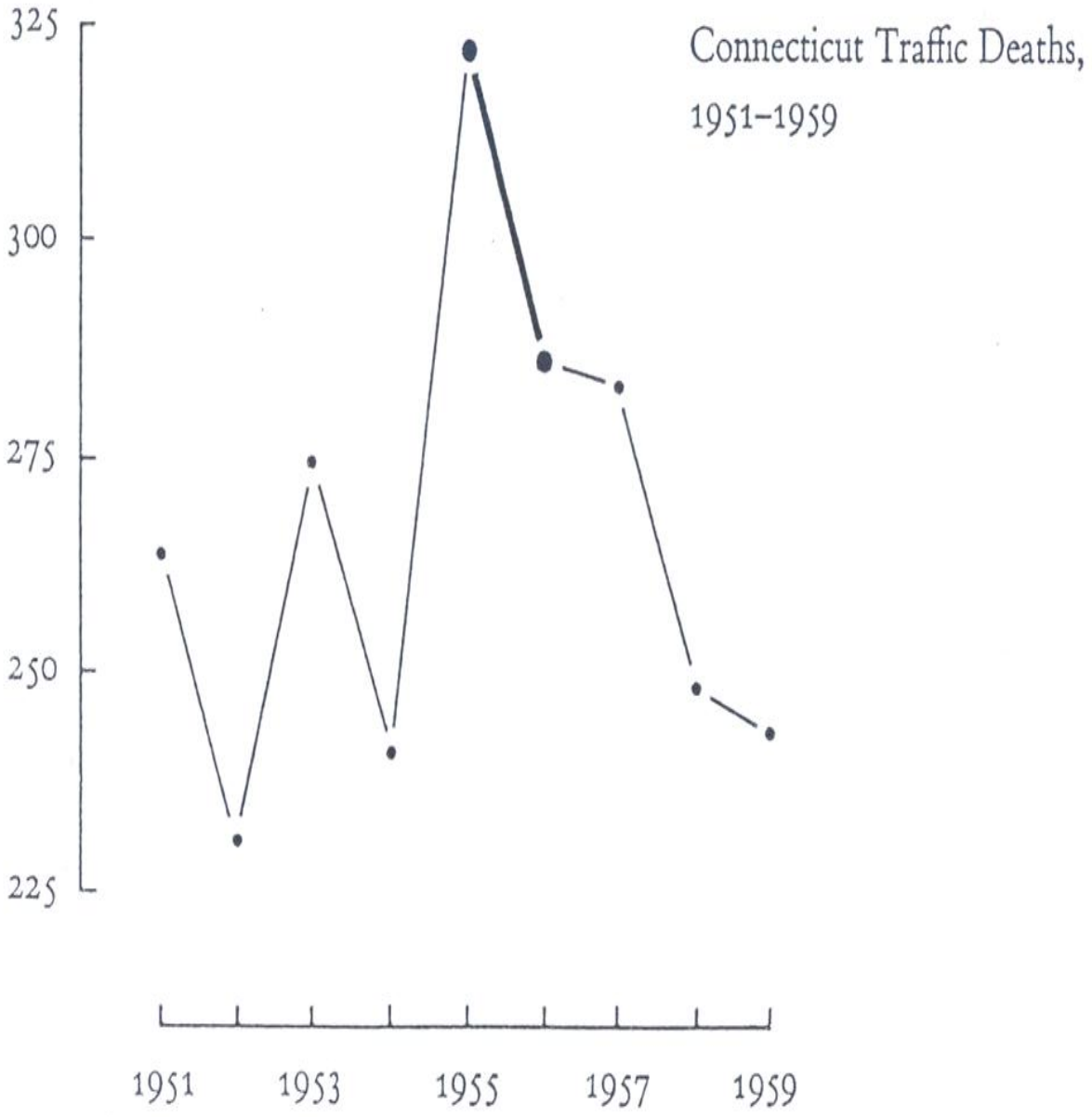
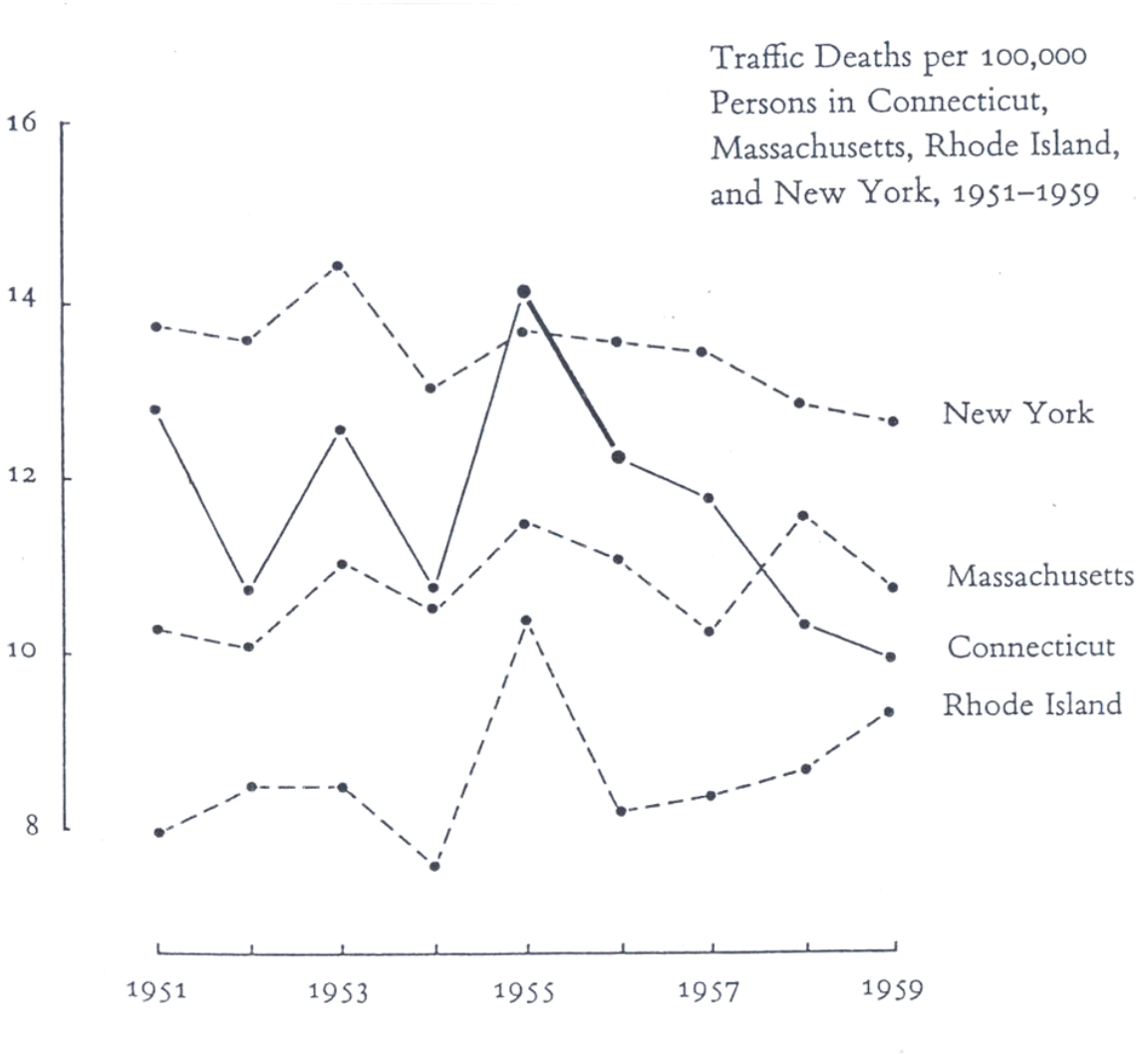
Presentation of data

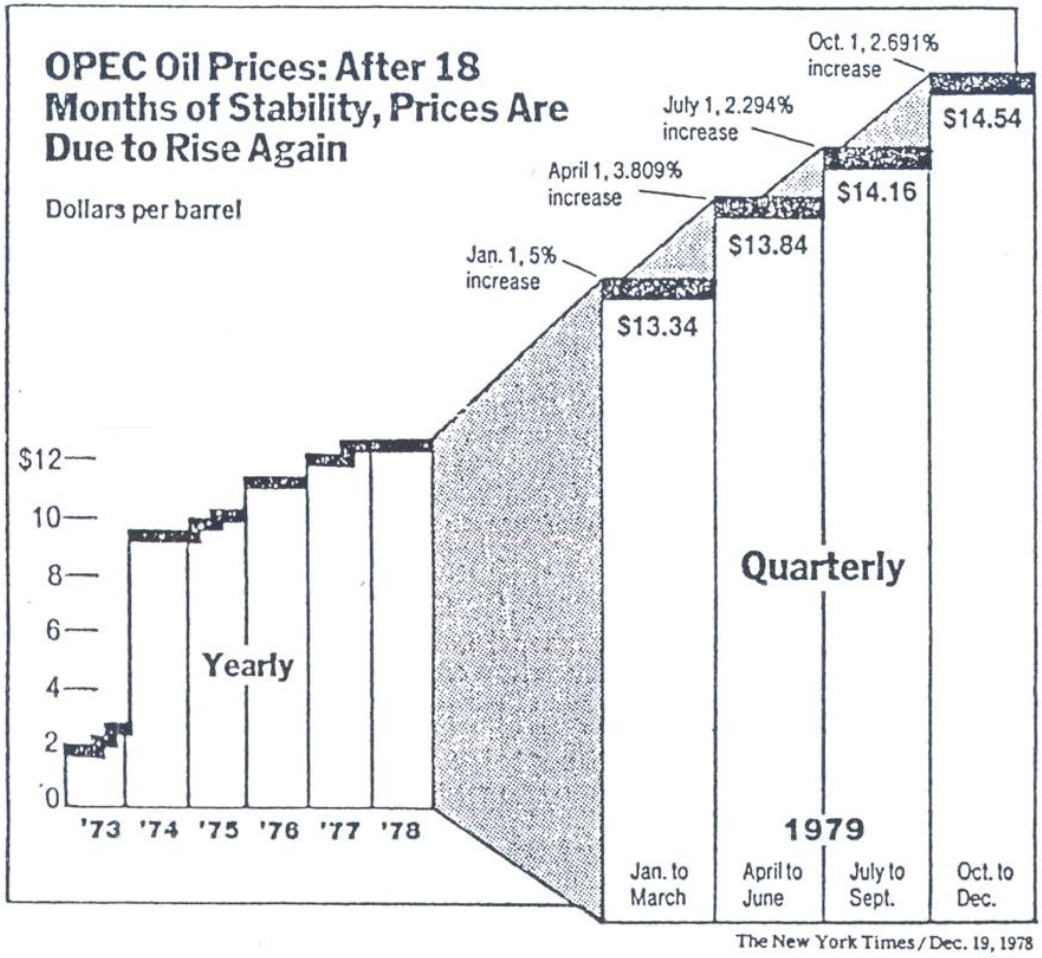
- Informative titles of tables/graphs
- Data sources given (can check original sources)
- Units of measurements clear and consistent
- Clearly labelled axes
- Scales, if at all possible start with zero
- Report number of observations on which summary measure based
- Tables, graphs, summary measures represent data accurately



Connecticut Traffic Deaths, Before (1955) and After (1956) Stricter Enforcement by the Police Against Cars Exceeding Speed limit


Connecticut Traffic Deaths,
1951–1959
325
300
275
250
225
1951
1953
1955
1957
1959


Traffic Deaths per 100,000 Persons in Connecticut, Massachusetts, Rhode Island, and New York, 1951–1959
16
14
12
10
8
1951
1953
1955
1957
1959
New York
Massachusetts
Connecticut
Rhode Island


OPEC Oil Prices: After 18 Months of Stability, Prices Are Due to Rise Again
Dollars per barrel
Oct. 1, 2.691% increase
July 1, 2.294% increase
April 1, 3.809% increase
Jan. 1, 5% increase
$14.54
$14.16
$13.84
$13.34
$12
10
8
6
4
2
0
Yearly
'73 '74 '75 '76 '77 '78
Quarterly
1979
Jan. to March
April to June
July to Sept.
Oct. to Dec.
The New York Times / Dec. 19, 1978

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Interpreting data

- Bias
- Confounding
- Chance
- Statistical analysis
- Clinical/Statistical significance

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Criteria for causality

- Temporal relationship
- Biological plausibility
- Consistency
- Strength of association
- Exposure-response relationship
- Specificity
- Reversibility
- Coherence

Summary (1)

- Object/Hypothesis
  - Clear description of study objectives
- Design
  - Clear description
  - Study population
  - Sample selection
  - Nature of control group or equivalent
- Measurement
  - Clear description of how main variables measured
  - Clear definitions of outcome measures
  - Validity, reliability

Summary (2)

- Presentation
  - Clearly and objectively presented with sufficient detail to allow reader to make a judgement
  - Internally consistent
- Analysis/Interpretation
  - Appropriate choice of statistical analysis, properly conducted, fully described (or referenced)
  - CIs, significance levels etc, as appropriate
  - Bias, confounding, chance
  - Appropriate criteria for causality

Summary (3)

- Conclusions
  - Justified by the findings
  - Relevant to questions asked