



# Public health implications of poor vitamin D measurement

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# Public health: the importance of accuracy

## Questions:

1. What is the prevalence of vitamin D deficiency in different populations?
2. Does this need public health management, e.g. food fortification?

- Inaccurate (biased low) measurement may create a public health problem – widespread vitamin D deficiency – where none really exists

- Accurate measurement is required to determine the optimal level

OR

- Assessment of prevalence of “deficiency” is meaningless if not using the same assay on which cut-point decisions have been made

# Public health: the importance of accuracy

Prevalence of vitamin D deficiency (<50nmol/L) in an Australian Study:

(different aliquots of the same sample)

- |                                   |               |
|-----------------------------------|---------------|
| 1. Diasorin Liaison Total, Lab 1: | 46% (355/765) |
| 2. LC-MS/MS, Lab 3:               | 17% (128/765) |
| 3. Diasorin Liaison Total, Lab 2: | 36% (76/209)  |
| 4. LC-MS/MS, Lab 3:               | 20% (41/209)  |

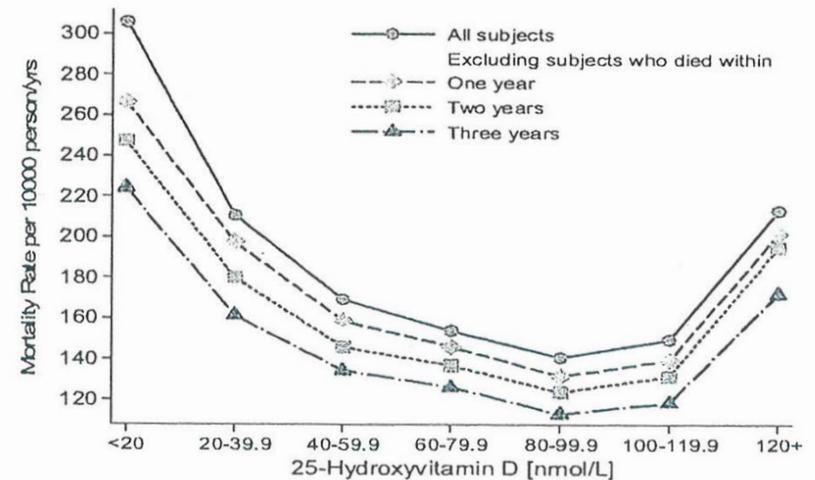
Is vitamin D deficiency common in Australia?

Similar data to those from Lab 1 have led to calls for mandatory fortification of foods

# Public health: the importance of accuracy

- More is not necessarily better
- U-shaped associations shown for a range of health outcomes, e.g. prostate cancer, tuberculosis, frailty, schizophrenia etc.
- Assays that read spuriously low, may be putting people's health at risk by pushing them, unknowingly, into the upswing of the U

25-(OH)D and All-Causes Mortality  
Adjusted for Age, Sex, Race/Ethnicity, & Season  
US NHANES III (1988-94) and 2006 Follow-Up



# Public health research: precision (and accuracy)

- The problem of misclassification of the exposure
  - Is vitamin D deficiency a risk factor for disease X?

## Correct

|                      | Disease X | No disease |
|----------------------|-----------|------------|
| Vitamin D deficiency | ☹ ☹ ☹ ☹ ☹ | 😊😊😊😊😊      |
|                      | ☹ ☹ ☹ ☹ ☹ | 😊😊😊😊😊      |
|                      | ☹ ☹ ☹ ☹ ☹ | 😊😊😊😊😊      |
|                      | ☹ ☹ ☹ ☹ ☹ |            |
|                      | ☹ ☹ ☹ ☹ ☹ |            |
|                      | ☹ ☹ ☹ ☹ ☹ |            |
| Normal vitamin D     | ☹ ☹ ☹ ☹ ☹ | 😊😊😊😊😊      |
|                      |           | 😊😊😊😊😊      |

Disease is twice as common in those with vitamin D deficiency compared to normal vitamin D (30/45, cf. 5/15)

## Misclassified due to imprecise assay

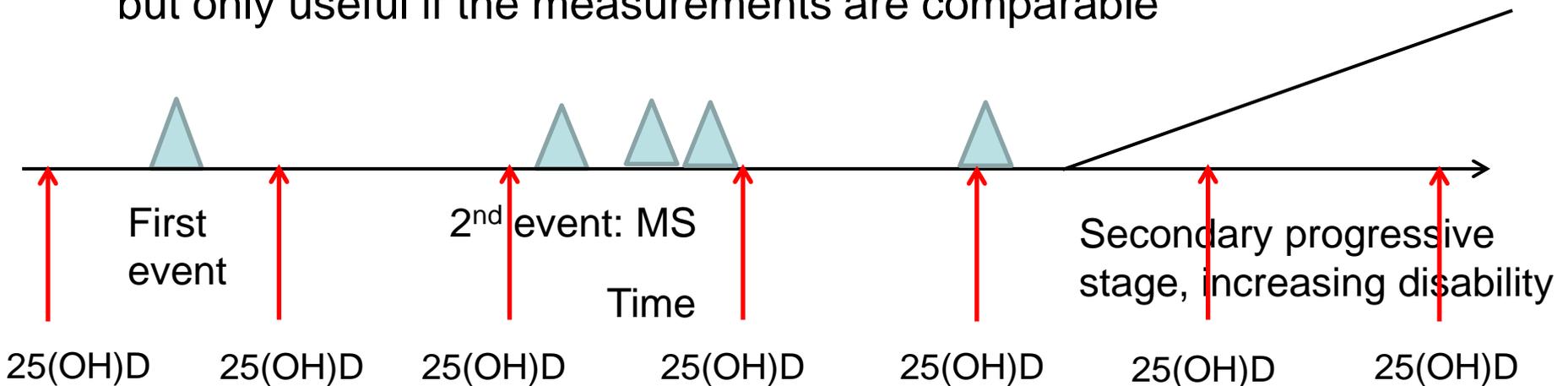
|                      | Disease X | No disease |
|----------------------|-----------|------------|
| Vitamin D deficiency | ☹ ☹ ☹ ☹ ☹ | 😊😊😊😊😊      |
|                      | ☹ ☹ ☹ ☹ ☹ | 😊😊😊😊😊      |
|                      | ☹ ☹ ☹ ☹ ☹ | 😊😊😊        |
|                      | ☹ ☹ ☹     |            |
| Normal vitamin D     | ☹ ☹ ☹ ☹ ☹ | 😊😊😊        |
|                      | ☹ ☹ ☹ ☹ ☹ | 😊😊😊😊😊      |
|                      | ☹ ☹ ☹ ☹   | 😊😊😊😊😊      |
|                      | ☹ ☹ ☹     |            |

No evidence of increased disease risk in relation vitamin D deficiency

## 2. Research: longitudinal data

### A. Cohort studies, e.g in multiple sclerosis research

Repeated measures very useful to answer questions of prevention, reduction of relapse rate, prevention of secondary progression etc – but only useful if the measurements are comparable



**B. National Health Surveys:** consistency of measurement allows the creation of a huge international cohort with repeated measures over time – a rich data resource

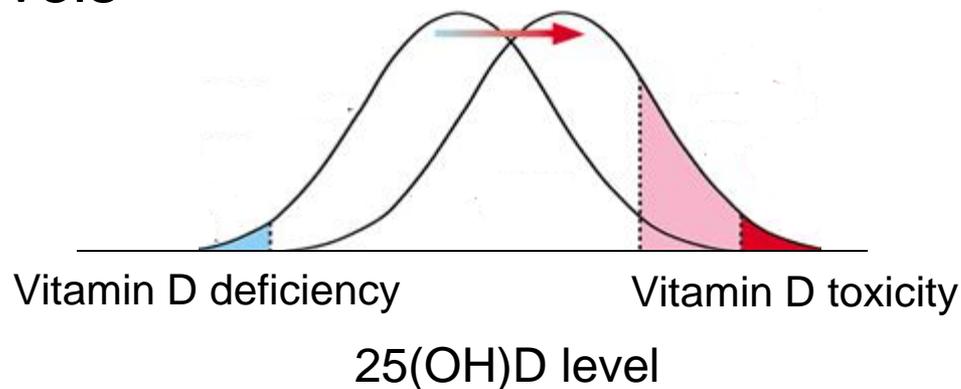
# Public health importance of standardisation of vitamin D measurement

## Vitamin D is not innocuous

- Both high and low levels may increase health risks

## Mandatory food fortification is a BIG decision

- Shifting the mean of the population shifts some people to high levels



Research dollars may be wasted and incorrect findings result from inaccurate and imprecise assays