

Causal Inference and Treatment Effect: A Comparative Framework for Remote Indigenous Evaluations

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Objective

To identify:

The evaluative strategies of interventions that seek to maximise

- the efficacy and
- the effectiveness

of child developmental and educational interventions in remote Indigenous community settings.

An overview of the presentation:

1. *Defining* the problem: efficacy and effectiveness in evaluation studies
2. Reviewing the *Let's Start* experience: diversity, treatment and outcome
3. *Exploring* the counterfactual framework for multilevel analysis
4. *Developing* an evaluative strategy for multilevel modelling with Stata resources

1. Effectiveness /Efficacy: a Continuum or Binary?

*'Intervention studies can be placed on a continuum, with a progression from efficacy trials to effectiveness trials.

Efficacy can be defined as the performance of an intervention under ideal and controlled circumstances,

whereas

effectiveness refers to its performance under 'real-world' conditions.

However, the distinction between the two types of trial is a continuum rather than a dichotomy, as it is likely impossible to perform a pure efficacy study or pure effectiveness study.'*

From Efficacy and Evaluation

If intervention studies for remote Indigenous communities were to be placed on a continuum between efficacy and effectiveness,

then

How might any one program be evaluated in both multilevel and longitudinal modalities within a counterfactual framework?

2. Evaluating *Let's Start*: 2006-2018

What is *Let's Start*?

- A Parent -Child-Teacher school-based intervention
- Aimed at reducing problem behaviours in a teacher-referred sample of primary school students
- Delivered over nine consecutive weeks with a six-month follow-up assessment.
- Based on the Exploring Together Preschool Program and implemented in Darwin, Palmerston and the Tiwi Islands from 2006-2009.

Evolution of *Let's Start*

Stage 1: Let's Start Exploring Together 2006-2009

Three group model, Darwin & remote communities; social learning theory, parenting management training & behavioural focus



Stage 2: Let's Start redevelopment 2010-2015

Revised two group model; focus on parent-child relationships; manualisation, development of training approach; 2-4s program



Stage 3: Let's Start Parent-Child Project 2016-2018

Retrospective study; Implementation trial and evaluation redesign

Referral, Attrition and Outcome Evaluation Challenges

- **Selection bias arising from truncation of the sample due to high rates of attrition.**
- **Instabilities in the treatment process itself as different models have been trialed during the later stages of the program.**
- **Influence of unobserved variables shared by both treatment and outcome (endogeneity).**
- **Unexpected interactions between gender, Indigeneity and referral status.**

Stage Three: Development and Design

The Centre is now undertaking a **complete redesign of the evaluation models for Let's Start**, in the form of two cohort studies with community and population data from the SA-NT Linkages Project:

- From 2005-14 data : **retrospective cohort longitudinal study** with a single remote population (Tiwi).
- From 2016-18, in parallel with this retrospective study, we are **designing a prospective study** built on the experience of the program.

A Preferred Research Protocol

NSW Indigenous Child Health and Development Study

Title of paper*: (BMJ Open Access, September 2015)

What factors contribute to positive early childhood health and development in Australian Aboriginal children?

Protocol for a population-based cohort study using linked administrative data (The Seeding Success Study)

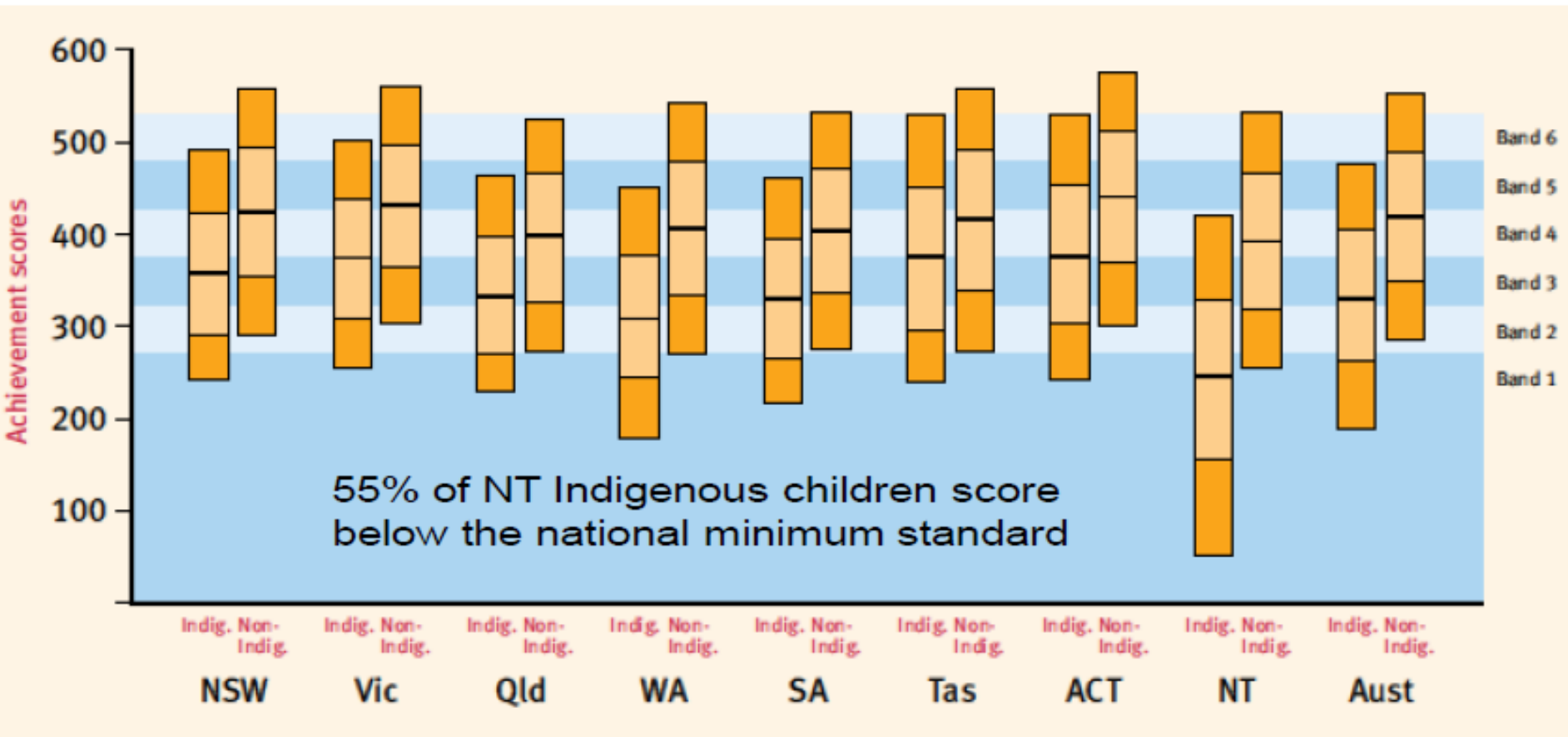
Kathleen Falster,1,2,3 Louisa Jorm,3,4 Sandra Eades,5 John Lynch,6 Emily Banks,1,2 Marni Brownell,7 Rhonda Craven,8 Kristjana Einarsdóttir,9 Deborah Randall,3,4 on behalf of the Seeding Success Investigators

Adapting the Protocol

Efficacy, Modelling and Design

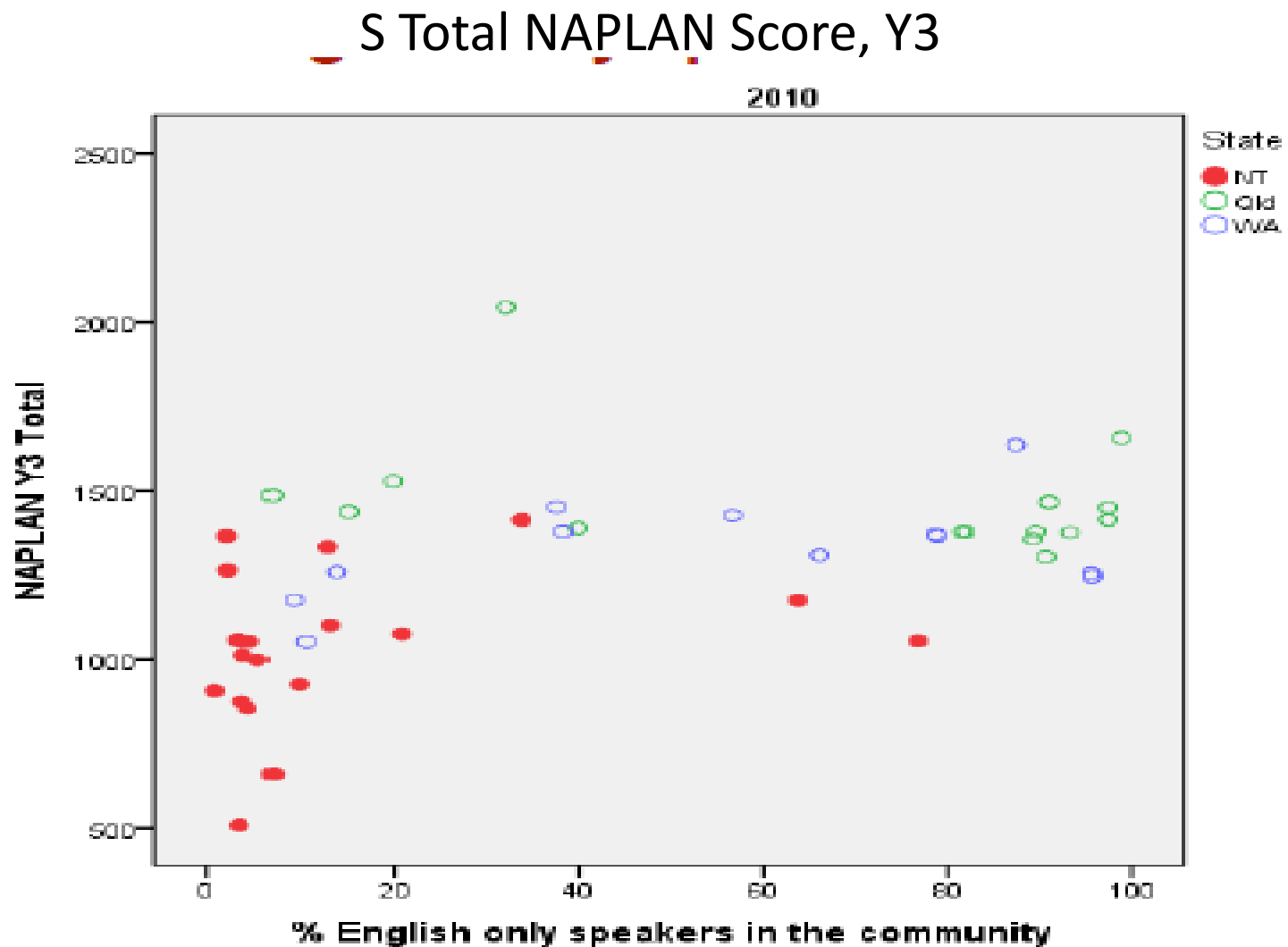
- To what extent our study communities should be treated as a distinctive population?
- If not, whether a propensity score analysis/potential outcomes model is compatible with multilevel techniques?
- What patterns of confounding indicate unremovable treatment endogeneity in cross-cultural settings?

Jurisdictions and Reading Scores: Northern Territory in Context



(Source: NAPLAN National Report for 2010) ¹⁵

Community Residents % English Only



*Source: McKenzie & Silburn, 2011, repeated in Silburn, S. *Closing the gap in early child development outcomes in the Northern Territory*, available on Centre for Child Development and Education website.

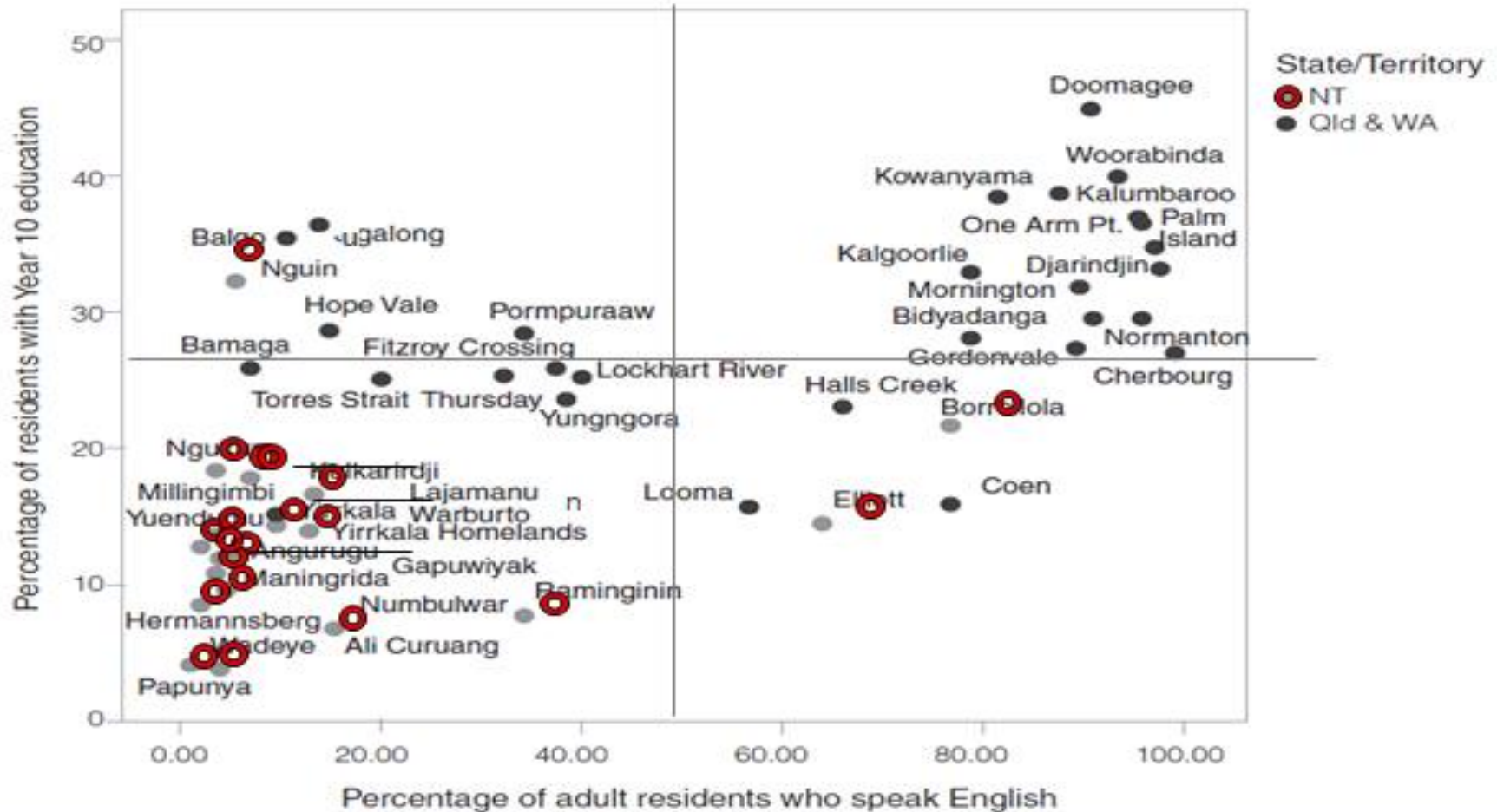
% Community Residents Yr 10 Education Total NAPLAN Score Yr 3 Similar Schools in NT, Qld and WA



*Source: McKenzie & Silburn, 2011, repeated in Silburn, S. *Closing the gap in early child development outcomes in the Northern Territory*, available on Centre for Child Development and Education website.

% English Language Only and % Yr 10 Education*

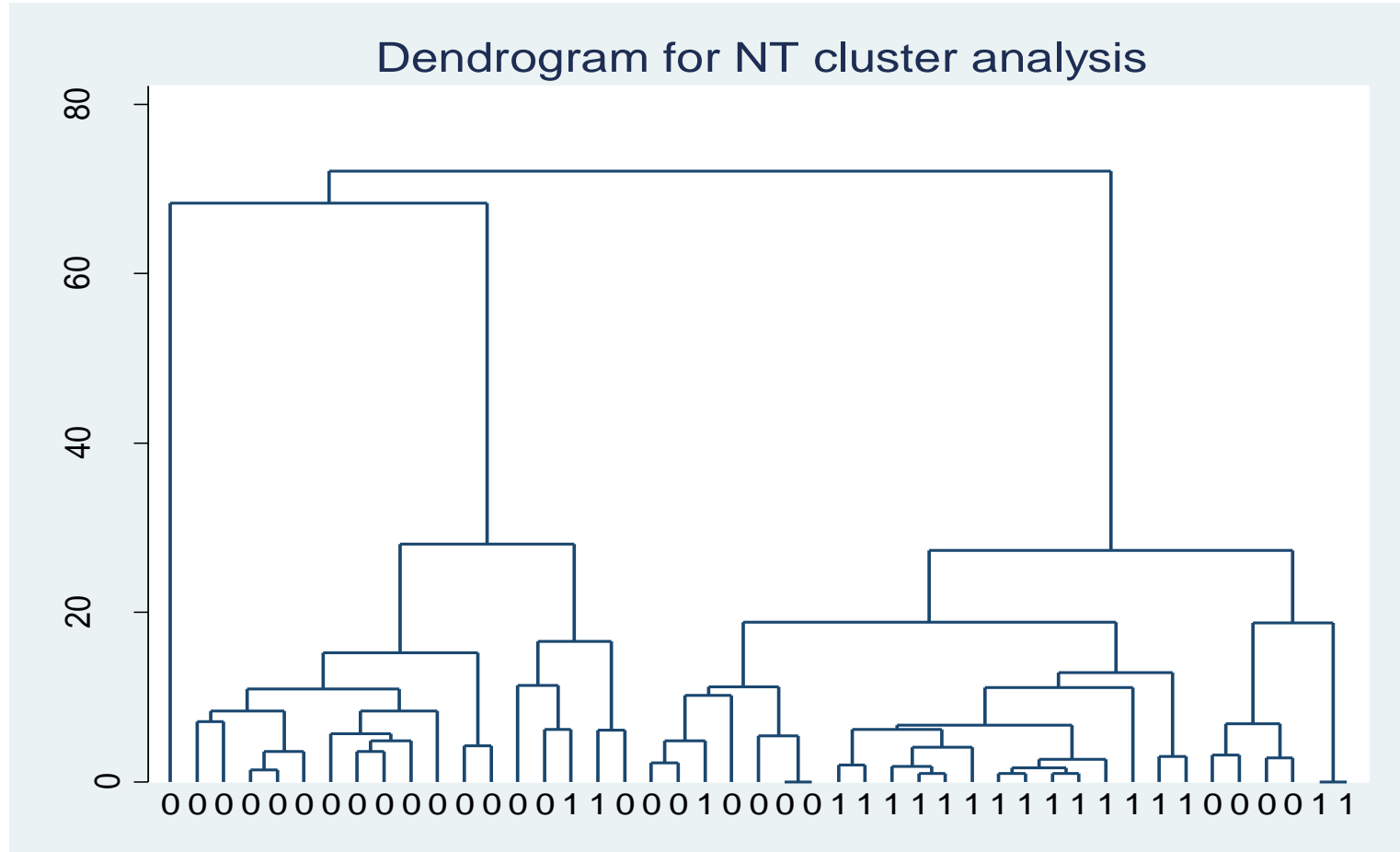
Similar Schools in NT. Old and WA



Source: McKenzie, J. Presentation *Linkages Project*,
Menzies School of Health Research, April, 2015

Community Clusters by State

% English only by %Education Yr 10

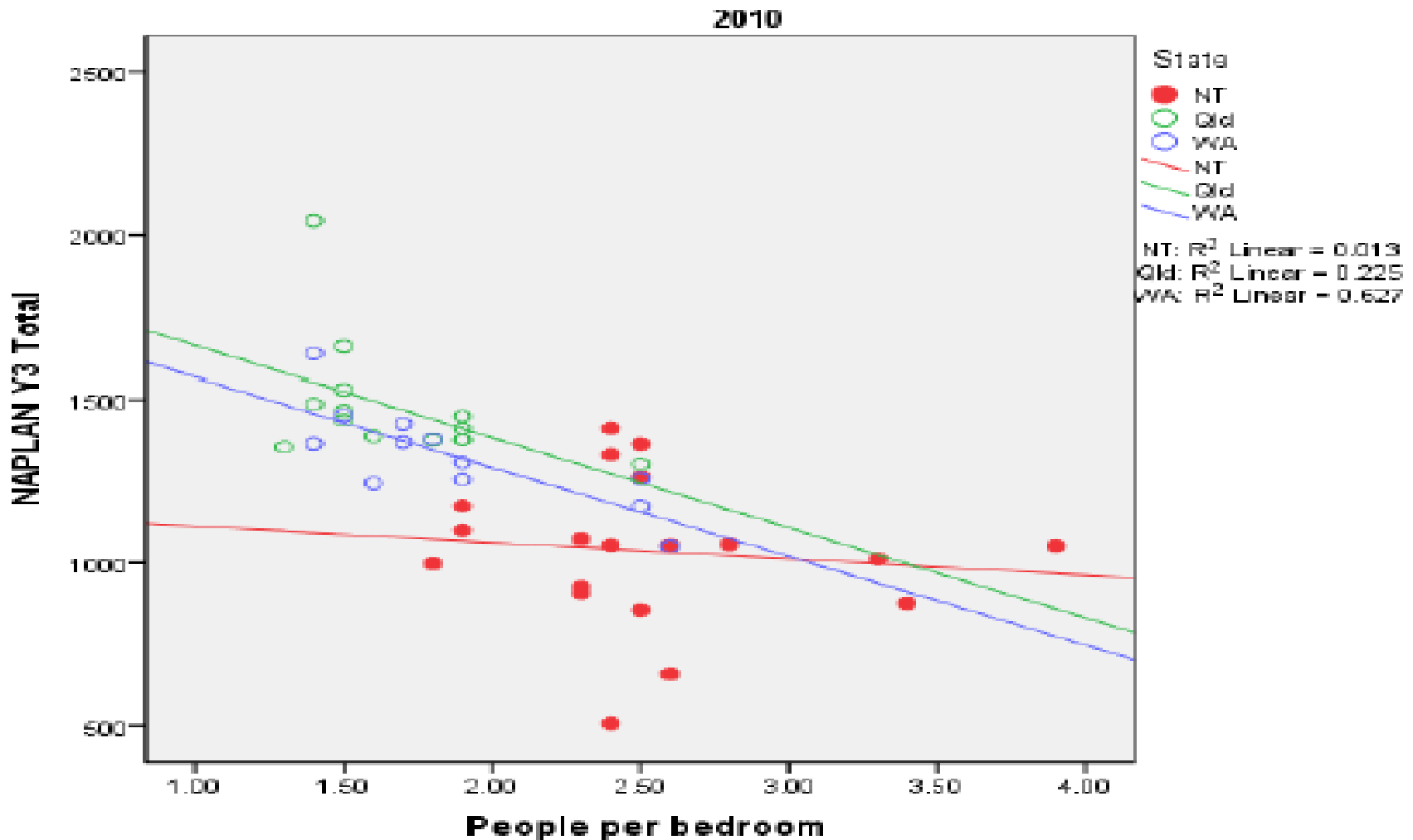


***Qld,WA =0
(16/18 cases)***

***Northern Territory=1
(17/27 cases)***

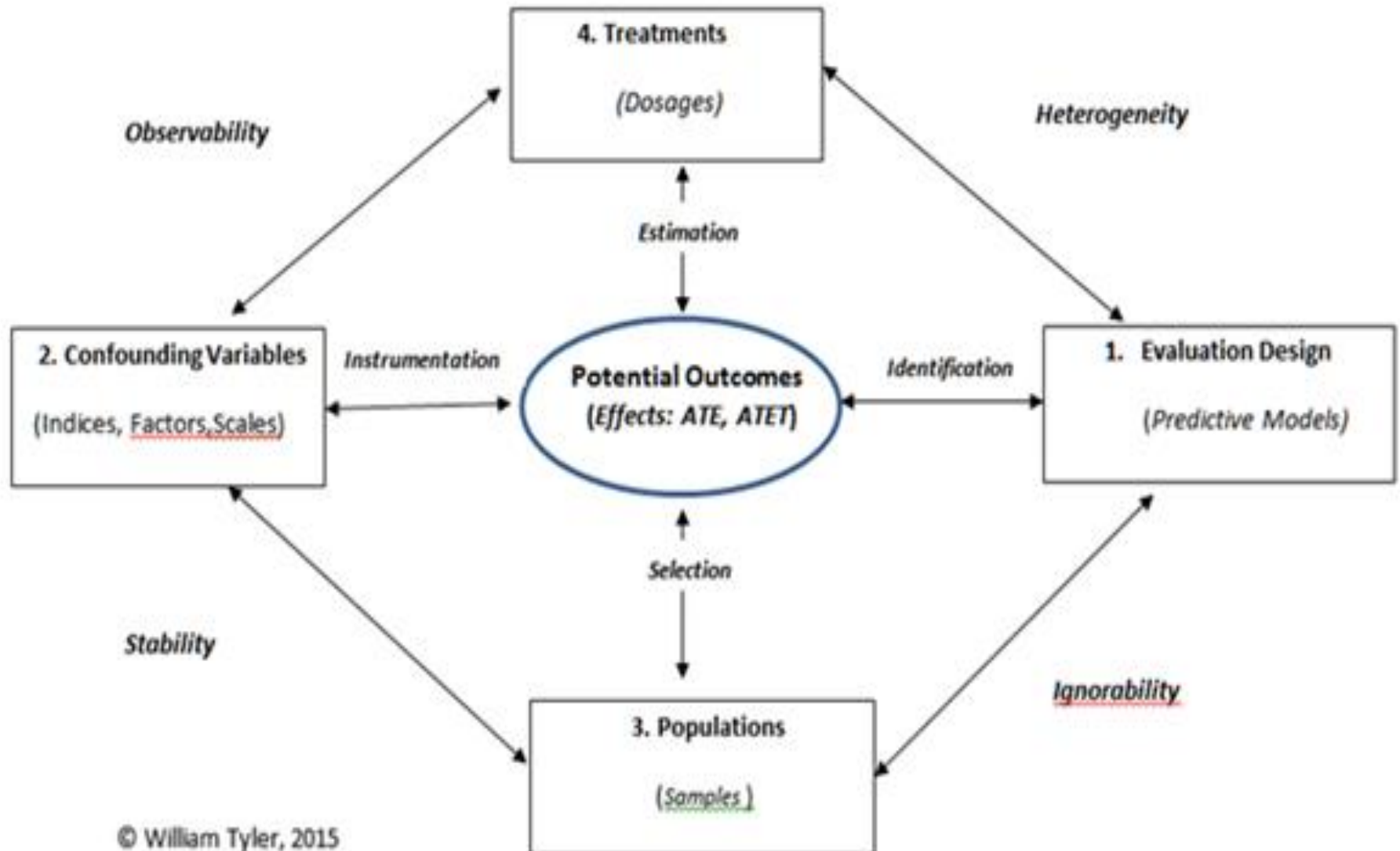
Clusters and Causality

No of Persons per Bedroom and Educational Outcome
: A Study in Contrasts



4. Developing an Evaluative Strategy

An Exploratory Counterfactual Framework



Applying the Framework

Guidelines for Cross-Cultural Treatment Effects

1. Identification: Switching, mediation and moderation models ; also possible use of qualitative comparative analysis for counterfactual necessary/sufficient conditioning.

2. Instrumentation: categorical for covars , latent class analysis where theoretically interpretable, correction of distributional characteristics with ebalance Stata module.

3. Sample Selection : test sensitivity of model to the assumption of strong ignorability. Splitting of clusters if appropriate.

4. Estimation: propensity score analysis, matching on covariates / aipw for double robustness and heteroscedasticity correction , count or event outcomes.

Conclusions and Queries

- Do the clusters identified represent two or more populations for evaluation and policy purposes?
- Are efficacy and effectiveness positioned on a single continuum, or to be viewed as composite of several socio-cultural dimensions?
- To what extent is efficacy of a social science-based intervention inversely related to the recognition of in cultural/ linguistic diversity and economic marginalisation?