WEIGHT ADJUSTMENT TO MITIGATE ATTRITION BIAS IN LONGITUDINAL SURVEY

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Introduction

- Attrition in longitudinal surveys can make the initial panel unrepresentative over time, leading to bias.
- One solution is non-response weighting using propensity score.

Goals

- To investigate the determinants of attrition.
- To apply the attrition weight based on the response propensity model incorporating covariates from two previous waves.

Methods

Data Americans' Changing Lives (ACL), Wave 4 (2001/2002), Wave 5 (2011), Wave 6 (2019), and the Current Population Survey (CPS) of 2019**.**

Target Population ACL respondents born after 1961 (aged 58 years old and above in 2019).

Statistical Modelling

Outcome is response indicator in wave 6, which is response (coded as 0), non-response (coded as 1), and death (coded as 2). Predictors are socio-economic variables in waves 4 and 5.

Multinomial Logistic Regression

$$P(S_{i,t} = j | x_{it_0}) = \frac{\exp(\boldsymbol{\beta}_j' \boldsymbol{x}_{\boldsymbol{it_0}})}{\sum_{j=0}^{2} \exp(\boldsymbol{\beta}_j' \boldsymbol{x}_{\boldsymbol{it_0}})}$$

Where $P(S_{i,t} = j | x_{it_0})$ is the probability of being in the response category j $(j = 0,1,2)$ by household i at time t. The reference category of outcome is response $(j = 0)$. $\boldsymbol{x}_{\boldsymbol{it_0}}$ is the vector of previous wave variables. $\boldsymbol{\beta}_j'$ is the vector of coefficient.

Attrition Adjustment Factor

The weight adjustment is the inverse of predicted probability for each sample, $[P(S_{i,t} = j | x_{it_0})]^{-1}$. The individual final weight is calculated by multiplying the longitudinal weight from wave 5 with its attrition weight.

ACL Attrition Trend 1986-2019

Figure 1. Cumulative Percentage of Vital Status of ACL Respondents 1986-2019

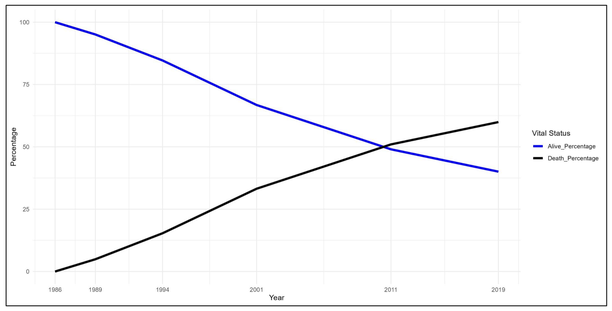
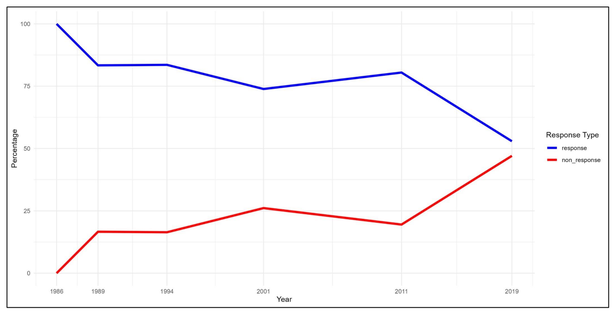


Figure 2. Percentage of ACL Responses 1986-2019



Estimation Comparison of ACL 2019 to CPS 2019 (%)

Characteristics	Unweighted	Weighted	CPS
(1)	(2)	(3)	(4)
Sex			
Male	40	47.4	46.1
Female	60	52.6	53.9
Race			
Non-Black	81	91	90
Black	19	9	10
Age			
58-64 y.o.	30	25.8	35.6
65-79 y.o.	54	49.1	49.8
>= 80 y.o.	16	25.1	14.6

Results

- There is a distinct socio-economic characteristic among attritors compared to respondents who completed the survey in 2019.
- Age and proxy respondents 2011 were significant factors for non-response and mortality in 2019, highlighting that aging respondents contribute significantly to attrition in longitudinal surveys due to health conditions.
- Our proposed weight adjustment can reduce bias to most key variables of interest, such as sex, race, and age, but the bias is not fully eliminated.

Practical Recommendation

- The effectiveness of non-response weighting depends on the model specification and the response rates. High response rates can destabilize the model, while low rates diminish the efficiency of the adjustment, necessitating further calibration.
- There is a trade-off between avoiding model misspecification and reducing bias. Researchers should iteratively explore models and examine weight performance to achieve both goals.
- Incorporating variables from more than two previous waves is recommended for studies with shorter intervals.

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