

# **DPV Codes and Response Rates in the National Children's Study**

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# 1. INTRODUCTION: National Children's Study (NCS)

- Led by *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD).
- Consortium of federal agencies:
  - National Institutes of Health
  - Environmental Protection Agency
  - Centers for Disease Control and Prevention
- Planned to enroll families to study the impact of the environment on health outcomes of children, following them from mother's pregnancy through age 21.
- The NCS Vanguard study enrolled approximately 5,000 families across the country; NORC was responsible for ongoing data collection with approximately 50% of the participants.



# 1. INTRODUCTION

## BACKGROUND

- Diminishing response rates threaten survey results.
- Attrition tends to increase over time in longitudinal surveys.
- NCS participant addresses used to:
  - complete mail surveys
  - complete in-person specimen collections
  - link existent data related to neighborhood area characteristics
- Our research: **Delivery Point Validation (DPV) codes and residential (Resi) flags** are analyzed to identify and potentially correct unreliable addresses prior to mass mailings.

# 1. INTRODUCTION

## RESEARCH QUESTIONS

- Can DPV codes and residential flags **identify unreliable NCS respondent addresses**?
- What are **common errors found** within the NCS mailing addresses based on DPV codes and residential flags?
- How **demographically different** are the NCS participants who pass DPV codes and residential flags from those who fail?
- Can DPV codes and residential flags **reduce non-deliverable mailing rates and/or increase response rates**?

## 2. DATA SOURCE: Delivery Point Validation Codes

### HOW DO THEY WORK?

- **Origin:** Created by USPS in 2007 for pricing & sorting in mass mail shops.
- **Purpose:** DPV codes could be used proactively to identify unreliable addresses in surveys which include mailing addresses.
- **Possible Codes:** Pitney Bowes SmartMailer codes:
  - error codes
  - informational codes
  - presort error codes (did not use in this research)
  - <blank> – indicates delivery point verified
- **Limitations:**
  - vintage issues
  - rural addresses
  - built-in protection against illegal phishing

## 2. DATA SOURCE: Mail Standardization & Append

- Standardize address & append codes
  - DPV code: SmartMailer N.15.01 by Pitney Bowes
  - Residential flag: Valassis V8.14
- Hypothetical Example:
- Address Collected: Jane Doe  
426-D Community  
Hollywood, IN 46272

## 2. DATA SOURCE: Mail Standardization, Which One?

**Jane Doe**

**426 Community Place, Apt D**

**Hollywood, IN 46272-1234**

Community Pl

**Dr. McClintic's Four Eyes**

**426 Community Court, Suite D**

**Hollywood, IN 46272-1233**

Community Ct

Southpointe Dr

Southp

### 3. METHODS: Previous Methods

**East Regional Operations Center (ROC) updated the addresses before each NCS mailing, using tools:**

- Instrument data
- Move status (self-reported or identified)
- Primary caregiver status changes
- Previous mailing non-deliverable status
- Stop mail status:
  - final refusals
  - in locating
- Special notes/circumstances

### 3. NEW METHODS: Use DPV Codes & Residential Flags

- If DPV code not blank or business address indicated, define as unreliable.
- Compare non-blank DPV coded addresses to ***addresses collected historically***. Update if:
  - a **more complete version of the same address** is available
  - previous instrument indicates a **mailing address**
- If **business address indicated, investigate** for potential correction.
- Test updated addresses to ensure delivery point validated.

### 3. NEW METHODS: Address Identifying and Updating

#### East ROC results:

- **12%** (132 out of 1,084 addresses) were found via DPV codes and residential flags to be invalid, missing information, or a business address.
- Of those, **33%** (43 addresses) were updated with pre-existing address data.

## 4. RESULTS: Unreliable Identifies Undeliverable?

Can DPV codes and residential flags identify unreliable NCS respondent addresses?

### Historic Review of Undeliverable Rate from Fall 2014 Newsletter

Code Type	# Addresses	# Undelivered	% Undelivered
DPV – E codes	31	5	16%*
DPV – I Codes	100	9	9%*
Residential Flag – Business	3	1	33%*
No Code and a Residential Address	952	30	3%

Note: DPV Codes and residential flags are not mutually exclusive.

\*Denotes statistically significant from the undeliverable rate for no code or flag.  $p < 0.01$ ; one-sided t-test.

## 4. RESULTS: Common Errors Found

	Description	Count	Updated	% Updated
DPV	E: <b>Street Name</b> Not Found in Zip Code Area	16	5	31%
	E: <b>House Number</b> or Range Invalid	6	2	33%
	E: Data Indicates Address <b>Undeliverable</b>	9	4	44%
	I: <b>Apt or Suite Number</b> <b>Missing</b>	9	4	44%
	I: <b>Apt or Suite # Invalid</b>	79	26	33%
	I: <b>Missing Company Name</b>	12	1	8%
Resi	<b>Business*</b>	3	1	33%

\*Note: DPV codes and Residential flags are not mutually exclusive.

## 4. Results: DEMOGRAPHICS

How demographically different are NCS participants with unreliable addresses?

Primary Caregiver Characteristics	Unreliable Addresses	All Other Addresses
# Addresses	134	982
Income: < \$25k	43%	22%
Income >= \$100k	8%	33%
Hispanic	23%	9%
Non-white	35%	20%
Language: Non-English	15%	6%

Note: Unreliable addresses are those that did not have a blank DPV code or were a business address. Primary caregiver characteristic statistics exclude unknown or missing information. Proportions shown represent statistically significant differences btw unreliable addresses & others.  $p < 0.01$ ; one-sided t-test.

## 4. Results: Improve Reliability?

Can DPV codes and residential flags reduce non-deliverable mailing rates and/or increase response rates?

### Expected Change in Undeliverable Rate in Updated Addresses

Rate for Failed Address; Fall 2014 Newsletter	Anticipated Rate After Updates Made
16%	3%*

**Response Rate** is a function of **mail deliveries** which is a function of **address quality**.

Note: NCS Data Collection efforts ceased in December 2014 before a mailing with the new updates was possible.

\*Denotes statistically significant from the undeliverable rate for no DPV code.  $p < 0.05$ ; one-sided t-test.

n = 43

## 5. In Summary

- Preliminary results indicate DPV codes and residential flags did identify unreliable addresses in the East ROC for NCS, particularly among hard to reach populations.
- NCS data collection ceased in December 2014, but estimated undeliverable rate shows promise.
- Mailing before and after DPV coding planned in unrelated longitudinal studies.

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