

# Measurement Issues Related to Research on Subsidies:

## Common Challenges in the Study of Continuity of Subsidy Participation

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# What are we trying to study? Research questions on continuity typically include...

- **For how long** do children receive child care subsidies without an interruption in subsidized care?
- What child, family, provider and community characteristics are associated with more stable subsidy receipt?
- How stable are subsidized arrangements during a spell of subsidy receipt?
- Which child care subsidy policies are associated with more stable subsidy receipt?
- Are child care subsidy policies associated with the stability of subsidized arrangements?

# Some measures of duration and continuity of subsidy use

- Length of a spell
- Number of spells
- Cumulative time using subsidy over a fixed period of time
- Hours in subsidized care

## What is a spell?

A continuous period of time without a break in subsidized child care.

# Challenges of Defining a Spell of Subsidy Receipt

- Defining a “**spell**” of subsidy receipt:
  - Who’s spell is it? Family versus child
  - When does it start? When does it end?
  - How long a break defines the end of a continuous spell?
  - What defines use or receipt of subsidized services?

# What is the unit of analysis?

- A child receives the subsidized care, but a family may have more than one child receiving subsidized care. One child may continue while another stops receiving subsidized care. Thus, family spells may not be the same length as child spells.
- Depending on the question of interest, subsidy participation may be measured at the family level or the child level.
  - For questions related to family outcomes such as parental employment, it may be more appropriate to look at family spells of subsidy receipt.
  - For questions related to child outcomes it may be more appropriate to use child spells.

# Unit of analysis: More Challenges

- Another issue is whether to select a focal child or include all children in a family.
  - The subsidy participation of children from the same family is likely to be highly correlated. Using multiple children from one family weights more heavily the experience of larger families.
- Another measurement issue is whether to use characteristics as of the first month of a spell, the current month, or perhaps an average.
- Children (or families) may have more than one spell. Including multiple spells in the analysis creates another set of analytical challenges.

# How to define a “spell”

- Subsidy participation should be defined based on **when the child was cared for** rather than when payment was made.
- Subsidy participation should be defined based on receipt of subsidized services rather than eligibility ... but what about missed days due to illness or holidays?
- The length of time used to define the end of a spell should reflect an actual break in subsidized services regardless of whether eligibility continued or when payment was received.
- Use of one versus two months to define an end of a spell: Compare the results and determine, if possible, why some families are returning so quickly.

# Two key issues with regard to subsidy duration and stability

1. Sample: Who to include / exclude when looking at participation over time.
2. Censoring: Missing information on start or end date of a spell of subsidy use.



# Who to Include and Exclude in a Study of Participation over Time

- Analysis of “spell data” is different from either cross-sectional or time-series data analysis. Special attention must be paid to issues related to who is included (and excluded) even when using the full population or administrative data.
- Each month of participation is a unit of observation, and some families / children have more units (months) than others.

# Two approaches

- A **point-in-time** or stock sample is based on the families receiving subsidy at a point in time (one month or one year for example).
- An **entry cohort** or flow sample is based on the families who enter the subsidy system during a period of time, that is, they begin spells of participation.
- These two approaches to defining the study population yield **very** different results in terms of spell length.

# Example to compare the 2 approaches

Two hospital beds

- 1) One patient in the bed for 30 days
- 2) 30 patients, each in for one day

## Point-in-time approach

On any particular day, two patients are in the two beds, and the mean spell length for these two patients is:

$$(30 + 1)/2 = \mathbf{15.5 \text{ days}}$$

## Entry cohort approach

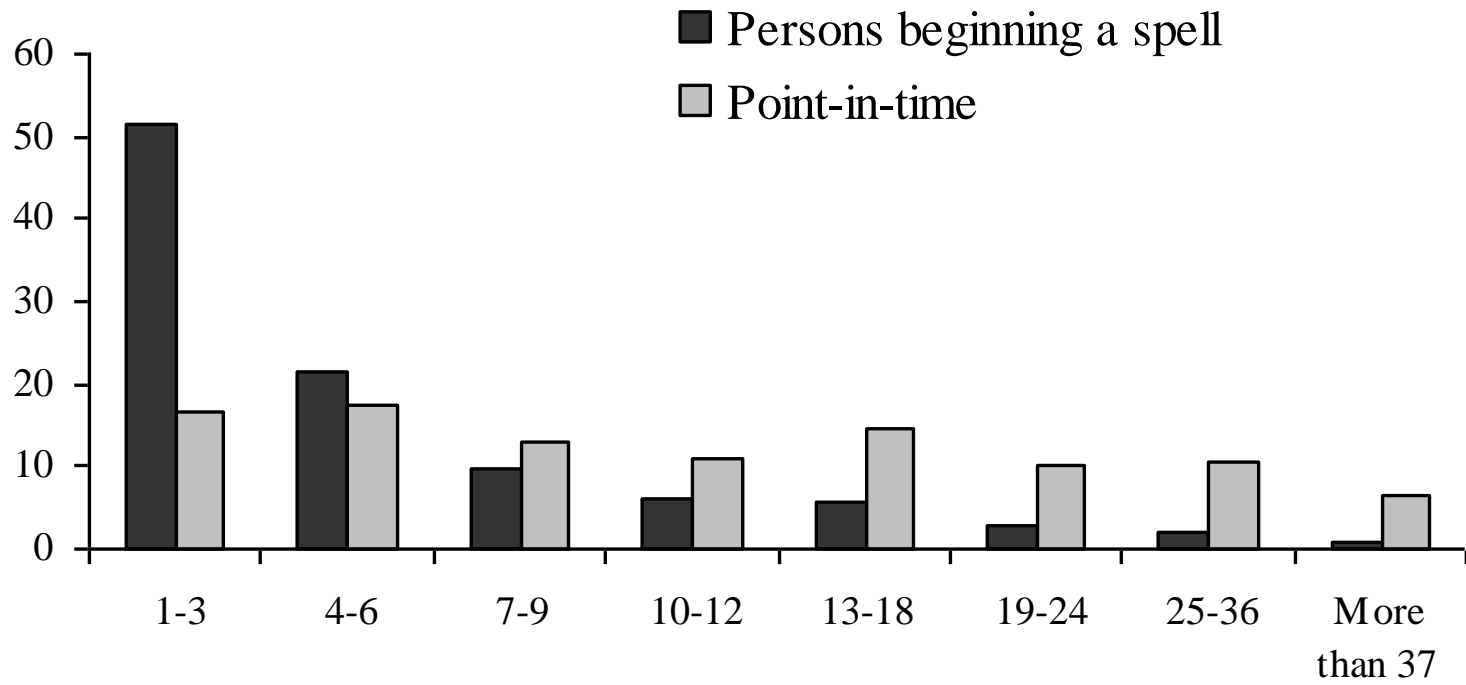
At the end of the month, the average spell length for the 31 patients who were in the beds that month is:

$$30 * 1 \text{ day} + 1 * 30 \text{ days} = 60/31 = \mathbf{1.9 \text{ days}}$$

# Measures of subsidy spell length differ dramatically depending on the approach

Median spell length (months)	Point-in-time	Entry cohort
State A	11.3	3.9
State B	16.5	5.7

**% of persons**



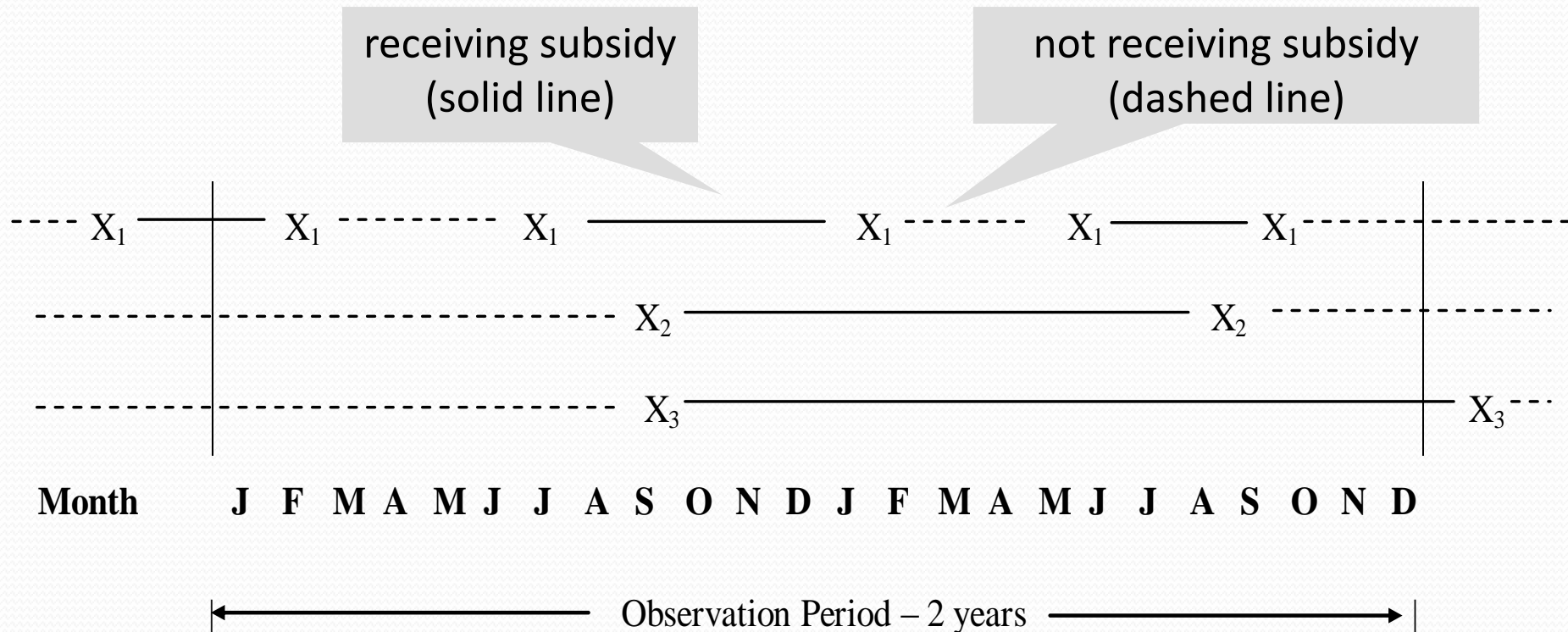
**Spell length in months**

## **Censoring: Spells that begin before the observation period or end after it**

- Most studies of cash assistance receipt or child welfare exclude “left-censored spells”, that is, those with start dates prior to the observation period.
- Spells that are right-censored, that is, whose end date is after the end of the observation period, should be included and event-history analysis methods used to account for the right censoring.
- Medians are more appropriate to use than means because of both right-censoring and the skewed distribution of the spell lengths.

# Left- and Right-censored cases

A spell is left-censored if it began before the observation period (looking to the *left* on the timeline). A spell is right censored if it continues after the end of the observation period. If we consider a two-year observation period, the pattern of subsidy use for child  $X_1$ , child  $X_2$  and child  $X_3$  might look like this:



# Appropriate Analytical Methods

- Event history or survival analysis methods should be used to account for censoring of spells that continue past the observation window.
- Estimation of spell lengths: Kaplan-Meier and AFT models can be used to estimate median spell length and survival functions and account for right-censoring.
- Can be used to compare subgroups.



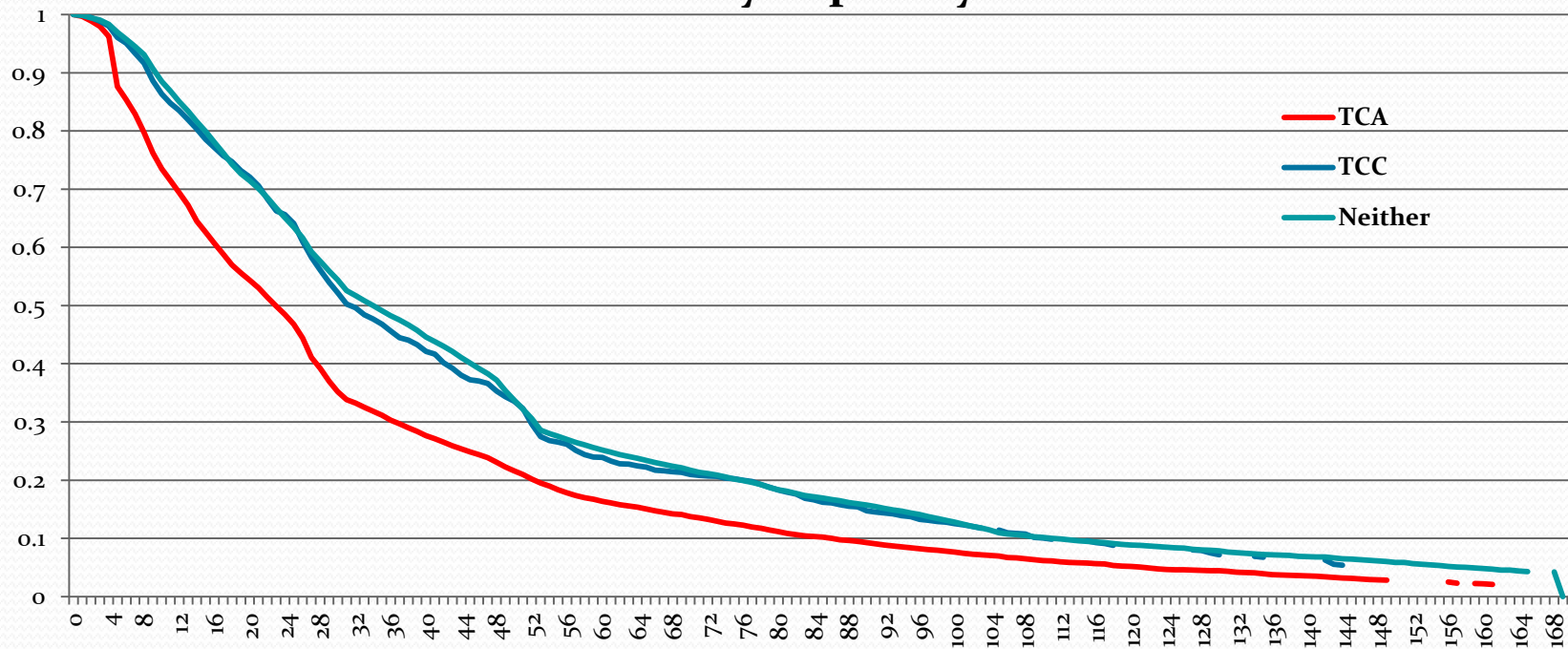
# Estimated Spell Lengths (Kaplan-Meier)

<u>Number of months</u>	<u>25th percentile</u>	<u>Median</u>	<u>75th percentile</u>
All children	4	8	>16 months
Male	4	8	>16 months
Female	4	8	>16 months
<u>On TANF</u>			
No	4	9	>16 months
Yes	3	7	>16 months
<u>Reason for subsidy</u>			
Employment	4	8	>16 months
Training/Education	3	6	14
Employment & Training/Education	4	10	>16 months
Other	3	4	7
<u>Type of Care</u>			
Center	3	7	>16 months
Family child care provider	4	8	>16 months
In-home	4	10	>16 months
Relative	4	9	>16 months

Note: Characteristics are based on the first month of the spell.

# Survival plot shows the proportion remaining on subsidy at each time period, by subgroup: Those on TCA (TANF) leave sooner (have shorter spells)

Survival analysis plot by TCA status



Note: Kaplan-Meier method. sample is child's first non-left censored spell. Spell defined as a break of more than 7 days between voucher periods

# Estimation of multivariate models of subsidy exit

Cox regression (and AFT models) can be used to estimate the association between the probability of leaving the subsidy program and various child, family and provider characteristics.

- The dependent variable is a binary (0,1) variable that indicates whether the child continued to receive subsidy or ended a subsidy spell in that time period.
- A hazard ratio greater than one means that variable is associated with a higher probability of exit and therefore with *shorter* spells of subsidy receipt.
- Conversely, a hazard ratio smaller than one means that variable is associated with a lower probability of exit and therefore with *longer* spells of subsidy receipt.

# Cox Regression Model Output: Association between characteristics and likelihood of exiting subsidy program in a given time period.

Child/Family characteristics (for example)	Hazard Ratio
Age group (ref=infant)	
--preschool	1.14***
--school age	1.19***
Not on TANF	0.71***
Provider type (ref = center)	
--Family	1.00
--Informal	1.01
Reason for needing childcare (ref = employment and training)	
--employment including on-the-job training	0.91***
--education/training only	1.15***
Copay level (ref = no/low copay)	
--Medium	0.90***
--High	0.94***
*** p<0.001, ** p<0.01, * p<0.05	

# Stability of Subsidized Arrangements

- A number of different measures can be used to describe the stability of child care arrangements within a spell of subsidy receipt.
- Challenges:
  - Data usually include only subsidized arrangements, and we don't know what happens when they leave subsidy.
  - Concurrent arrangements may be difficult to distinguish from changes in provider.
  - Length of time on subsidy is an important consideration when looking at stability of arrangements:
    - Having only one provider in a spell of 3 months isn't the same as having one provider for 12 months.

# Key Objective: Comparability of Study Findings

To ensure that findings from different studies are comparable, we should

- Reach consensus on the appropriate methods to use for studying subsidy continuity and dosage.
- In each study, provide details on how the sample was constructed and how censored spells were dealt with.
- Describe the definition of a spell and what length of time was used to determine the end of a spell.
- Use comparable analytic methods and provide results using different methods.