

Video 16 of 21: Weighting Frame integration

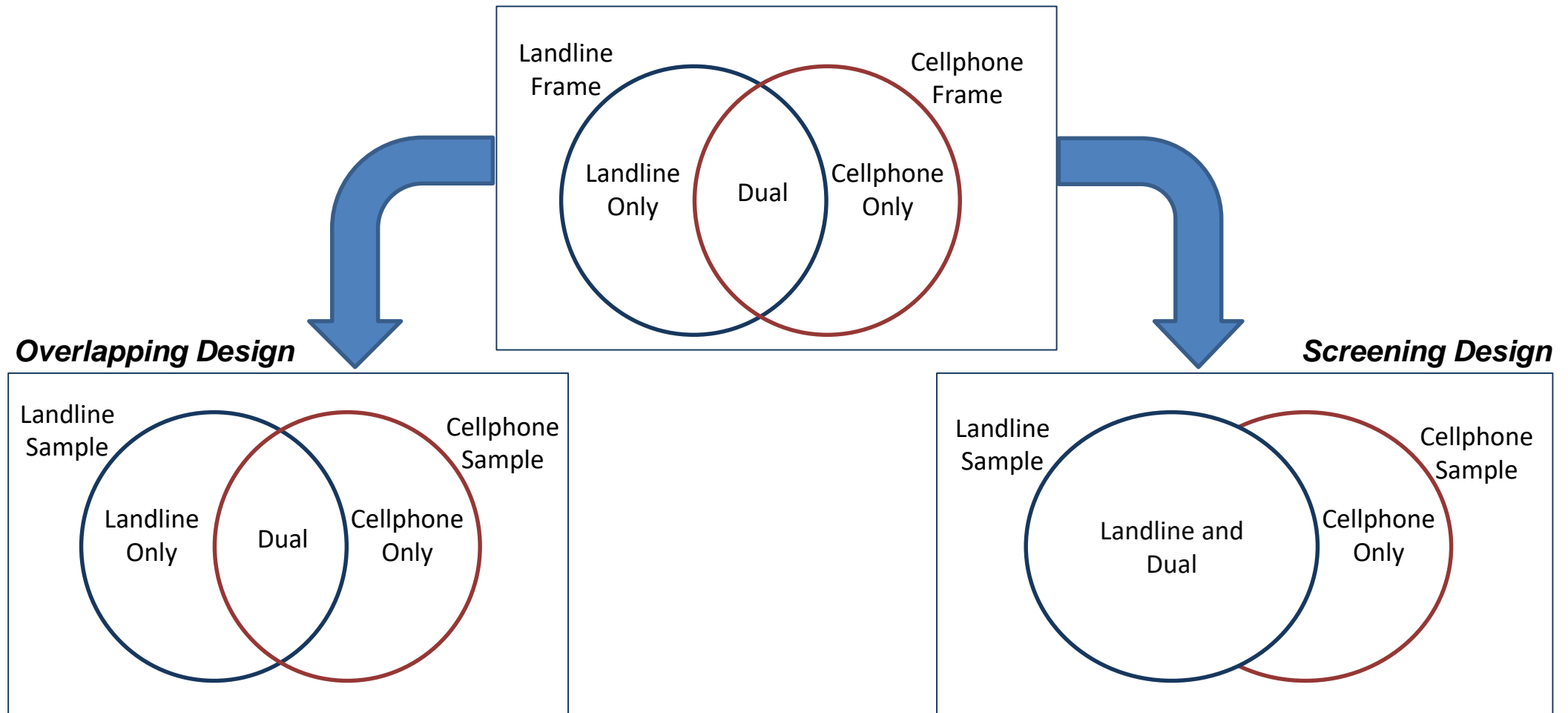
Sampling



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Frame integration in dual frame designs (I)



Frame integration in dual frame designs (II)

- Sampled cases in the overlapping domain have higher chance of being selected
- Need to collect information about domain membership. In the case of a dual-frame phone survey (NHIS questions):
 1. Is there at least one telephone **INSIDE** your home that is currently working and is not a cellphone?
 2. Do you or anyone in your family have a working cellphone?
 3. How many working cellphones do you or people in your family have?
- Two dominant approaches for adjusting for overlap:
 - Composite estimator
 - Single frame estimator

Frame integration in dual frame designs (III)

- Single frame estimator computes the probability of inclusion based on the following probability property:

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$P(A) \times P(B)$, if A and B independent

- In a dual-frame phone sample:

$$d_{0i} = \begin{cases} 1/\pi_L, & \text{if } i\text{th case is landline only} \\ 1/\pi_C, & \text{if } i\text{th case is cellphone only} \\ 1/(\pi_L + \pi_C - \pi_L\pi_C), & \text{if } i\text{th case is dual} \end{cases}$$

- where π_L and π_C are the selection probabilities of landline and cellphone samples, respectively

Frame integration in dual frame designs (IV)

- Assuming a simple random sample in each frame

Frame	Frame count	Sample count	Selection Probability
Landline	N_L	n_L	$\pi_L = n_L/N_L$
Cellphone	N_C	n_C	$\pi_C = n_C/N_C$

Sample	Landline only	Cellphone only	Dual
Landline	π_L	-	$\pi_L + \pi_C - \pi_L\pi_C$
Cellphone	-	π_C	$\pi_L + \pi_C - \pi_L\pi_C$
Base weight	$1/\pi_L$	$1/\pi_C$	$1/(\pi_L + \pi_C - \pi_L\pi_C)$

Frame integration in dual frame designs (V) - Example

- Assuming a simple random sample in each frame

Frame	Frame count	Sample count	Selection Probability
Landline	10,005,759	120	$120/10,005,759 = 8.00 \times 10^{-6}$
Cellphone	15,008,639	100	$132/15,008,639 = 9.99 \times 10^{-6}$

Sample	Landline only	Cellphone only	Dual
Landline	8.00×10^{-6}	-	1.80×10^{-5}
Cellphone	-	9.99×10^{-6}	1.80×10^{-5}
Base weight	125,072	100,058	55,588

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