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## Behavior risk factor surveillance system in a Changing Environment

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## Outline

- Background
- Challenges
- Behavioral Risk Factor Surveillance System (BRFSS)
- Improvements
- Conclusion
- Future

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## Behavioral Risk Factor Surveillance System (BRFSS)

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- Monthly state-based RDD survey of health issues
- 50 states, District of Columbia, Puerto Rico, Guam, and Virgin Islands
- 430,000+ adult interviews conducted in 2007
- From 2002 to 2007:
  - completed 1,950,000 interviews
  - Dialed 18,500,000 telephone numbers

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## Purposes of Public Health Surveillance

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- Assess public health status
- Define public health priorities
- Evaluate programs
- Stimulate research

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## BRFSS Strengths

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- Timely
- Standardized
- Useful
- Flexible

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## Vaccine Shortage – Timeline

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- Oct 5: Vaccine shortage announced
- Oct 5: Initial discussions within CDC
- Oct 19: Call with BRFSS state coordinators
- Oct 19-26: New questions developed and cognitively tested
- Oct 27: CATI specifications to states
- Nov 1: Data collection began



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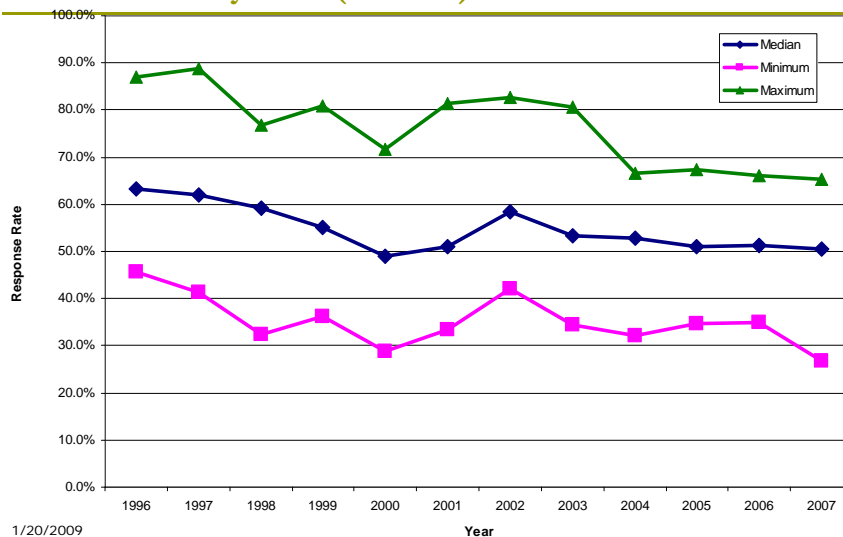
## Problems Facing RDD

- **Telephone coverage:**
  - Households with no telephones (2-3%)
  - Cell phone only households (13-15%)
  - No directory of cell phone numbers
  - Number portability and erosion of geographic specificity
- **Declining response rates**
  - decreasing significantly in the last 10 – 15 years.
  - Decline has occurred for most types of surveys— particularly telephone and in-person interviews
- **Non response:** Inability to obtain data from selected respondent
- **Measurement error:** occurs when a respondent's answer to a question is inaccurate
- **Cost:** where telephone: 2-3 times more expensive than mail or web.
- Rising number of language spoken in US

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## Response rate trends: Behavioral Risk Factor Surveillance System (BRFSS)

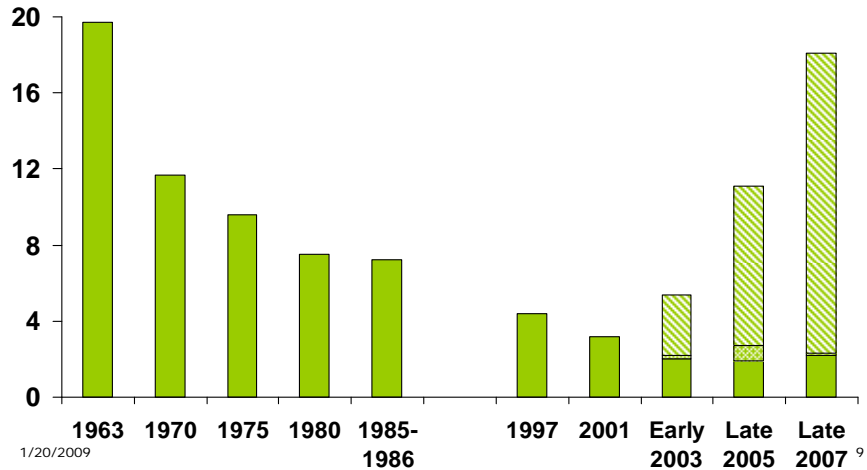


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## Percentage of U.S. Households Without Landline Telephones

■ Based on National Health Interview Survey data



## Extending the Utility of the BRFSS Data

- **SMART-BRFSS (Statistical Metro-/Micropolitan Risk Trends)**
  - Cities & counties with 500+ observations
- **GIS and mapping capability**
  - State and county-level
- **Linking to other data sources**
  - EPA data
- **Launching follow-up surveys of subpopulations identified in BRFSS**
  - Asthma Follow-up

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## Ensuring validity of BRFSS Estimates

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- Monitoring data collection process
- Refining post-survey adjustments
- Testing alternative way of collecting data
  - Cell phone interviewing

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## Monitoring 54 monthly surveys

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- BRFSS data collection process is semi-centralized
- States:
  - In charge of own data collection
  - Conduct front-line monitoring
- Centers for Disease Control (CDC):
  - Provides sample
  - Weighting
  - Quality reports

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## Web-based systems are key

- Data transfer via upload/download site
- Automated quality control programs
  - State level and CDC level
- Monthly detailed reports to states:
  - Key quality indicators
  - Deviations from norm and/or past trends within state
- Year-end quality report
  - Comparison across states
- Newest tool: Simplified web-based / color coded system

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DACH/BSB Intranet - Data Quality Report - Microsoft Internet Explorer

Address: http://brfss.nccd.cdc.gov/BRFSSIntranet/Report/DataQualityRptW.asp

**Data Quality Report**

Year: 2007 Display: All states Numbers Go

**Total Monthly Issues**  
Select a number to view that month's submissions. \* Resubmitted Issues

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
<a href="#">Details</a> AL	5	3	3	4								
<a href="#">Details</a> AK	3	5	3	2	3							
<a href="#">Details</a> AZ	7	6	8	8								
<a href="#">Details</a> AR	5	6	6	6	6							
<a href="#">Details</a> CA	7*	7	7	6								
<a href="#">Details</a> CO	4*	4*	3*	4								
<a href="#">Details</a> CT	9	6	7	8								
<a href="#">Details</a> DE	6*	4*	5	5								
<a href="#">Details</a> DC	6	6	6	7								
<a href="#">Details</a> FL	4	4	4*									
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<a href="#">Details</a> GU			5	4*								
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<a href="#">Details</a> IL												

start Inbo... DAC... RPR... Criti... SAS ... BSB ... Scre... Micro... 10:55 AM

## Data Quality Report

[Back to Total Monthly Issues](#)

Issues

State XX : June Submissions	Submissions
	7/7/2008 8:02:00 AM
Completes <b>i</b>	752
Partial Completes (Number) <b>i</b>	24
Partial Completes (Percent) <b>i</b>	3.09
Terminations <b>i</b>	6.17
Household, no eligible respondent <b>i</b>	
CASRO response rate <b>i</b>	59.89
Cooperation rate <b>i</b>	79.39
Refusal rate <b>i</b>	12.28
Income missing values, Male <b>i</b>	13.07
Income missing values, Female <b>i</b>	12.77
Discrepancy in sex <b>i</b>	8.57
Discrepancy in percent White, Non-Hispanic <b>i</b>	1.45
Discrepancy in age, 18-24 <b>i</b>	-10.50
Discrepancy in age, 65-74 <b>i</b>	8.72
Assignment of interviewers <b>i</b>	20
Records with insufficient number of call attempts <b>i</b>	
1/20/2009 Number of Calls per complete <b>i</b>	27.50

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Issues

## Current BRFSS Weighting System

- Use poststratification
  - Forces categories of selected variables in the sample to equal predetermined proportions (census). It is a form of standardization.
- Controls for:
  - Age by sex
  - Race/Ethnicity (in some states)
  - Region (in some states)
- Problems:
  - Small sample cells produce highly variable weights and require collapsing
  - No factor to account for socioeconomic status

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## Current BRFSS Weighting Methodology

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- The Current BRFSS weighting methodology can be divided into two sections:
  - Design Weights
  - Post-stratification

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## New BRFSS Weighting Methodology

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- The New BRFSS weighting methodology can be divided into two sections:
  - Design Weights
  - Raking Ratio Estimation (Raking)

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## Raking

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- Using raking methodology will allow the distribution of sample to properly represent the state distributions with respect to:
  - Age group by gender
  - Detailed race/ethnicity
  - Education
  - Marital status
  - Gender by race/ethnicity
  - Age group by race/ethnicity
  - Telephone service interruption
  
- The ASWS uses raking control variables

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## ASWS Weight Trimming

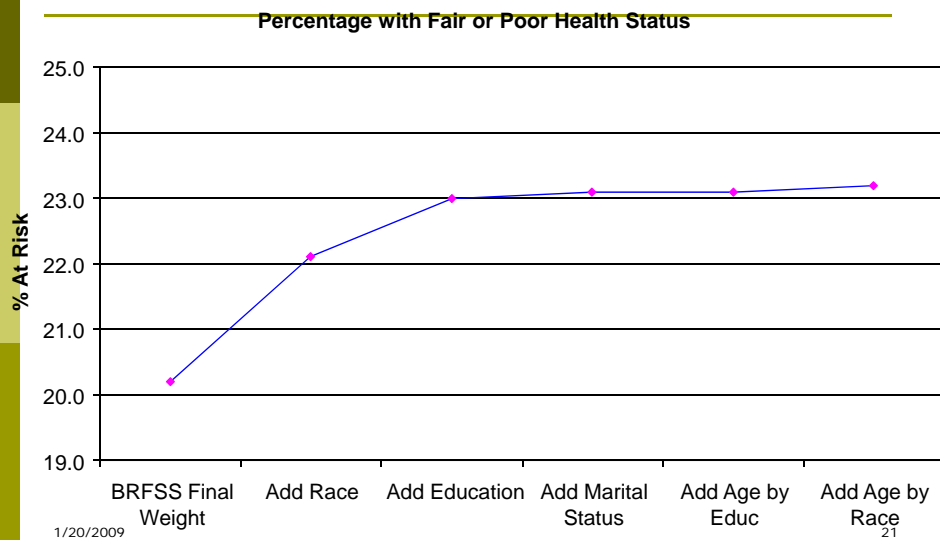
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- Weight trimming refers to increasing the value of extremely low weights and decreasing the value of extremely high weight values to reduce their impact on the variance of the estimates.
  
- The objective of weight trimming is to reduce the mean squared error (MSE) of the key outcome estimates.

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## Changes in estimate of health status



## Implications for users of BRFSS data

- Break in time series
- Plan to release both classic (old) and new weights
- Full changeover in 2010
- Health condition and risk factor estimates will likely be higher

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## Finding new ways of collecting data:

Cell phones  
Mail survey

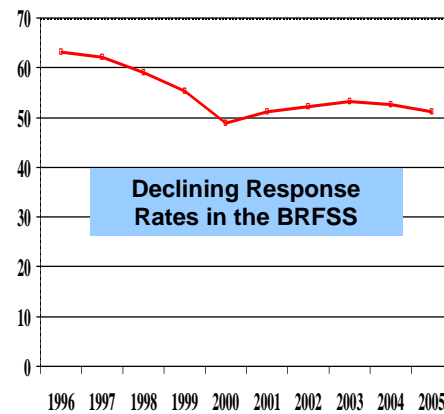


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## Declining participation in telephone surveys

- Response rates continue to decline in RDD surveys
  - noncontacts (call avoidance)
  - active refusals
  - "ring – no answers"



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## Cell phones and telephone surveys

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- Reliance on cell phones increasing:
  - Nearly 70% of households in US have a working cell phone
- Conducting surveys via cell phones can be operationally challenging:
  - Cell phone frame very inefficient (no list)
  - Cannot use autodialers
  - Charges for incoming calls/minutes used
  - Safety concerns

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## 2008 BRFSS Cell Phone Pilot Survey

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- 18 States is participating in the survey
- The operational protocol was finalized on Feb. 28, 2008.
- 2008 BRFSS core questions are used for interview:

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## Cell phone sample

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- Marketing Systems Group (MSG):
  - All designated cellular 1,000 banks
  - Stratified by area code and exchange within a state
  - Systematic random sample of numbers

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## Sample Size

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Target Number of Completed Interviews per state

- Minimum: 250 completed interviews for adults who only have a cell phone over 12 months or 21 interviews per month.
- Maximum: 10% of the total interviews in a state

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## Features of the U.S. RDD cell phone frames

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- Couldn't accurately identify
  - whether the number is currently working
  - where the user of the number currently resides
  - if the number belongs to a person who lives in a household with a landline
- No commercially available files with detailed info such as name, address, ZIP code, or demographic info linked to cell phones numbers on the frame.

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## Features of the U.S. RDD cell phone frames (Continued)

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- Provide excellent national coverage of US cell phone population but not local cell phone population
  - Most wireless service areas or exchange (prefix) boundaries are not clearly defined by county
  - The exchange associated with a wireless phone number represents the original point of purchase
  - Subscribers can move to a different city or state and keep their cell phone number.

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## How to deal with an out-of-state cell phone number

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- ❑ The interview should continue
- ❑ Ask the actual state of residence
- ❑ At the end of data collection, all these cases will be transferred to appropriate states where they are currently living.

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## Within-household Selection Issue in RDD Cell Phone Samples

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- ❑ A cell phone is thought as a private and personal form of communication.
- ❑ The person who answers the cell phone will turn out to be the respondent, with no screening for others who possibly use the phone.

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## Screening questions

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- Introduction
- Confirmed telephone number
- Is this a cellular telephone?
- Are you 18 years of age or older?
- Are you a resident of (state)?
- "Do you also have a landline telephone that is used to make and receive calls?"
  - No – Start to interview
  - Yes – Termination

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## Eligibility for survey

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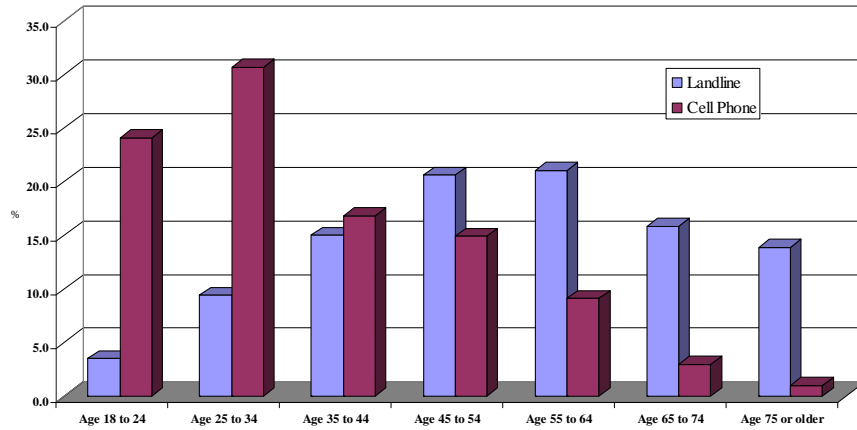
1. The correct telephone number has been reached
2. The telephone number belongs to a cell phone.
3. The screener respondent is 18 years of age or older.
4. The screener respondent live a private residence.\*
5. The screener respondent is a current resident of the state from which their telephone number is selected.\*
6. The screener respondent does not have a landline telephone at home.

\* There is an exemption.

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## Age distribution by survey mode\*

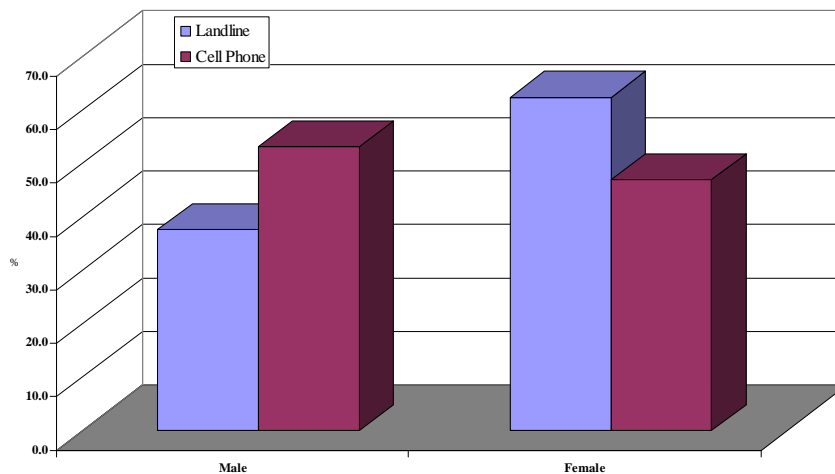


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\*un-weighted

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## Gender distribution by survey mode\*

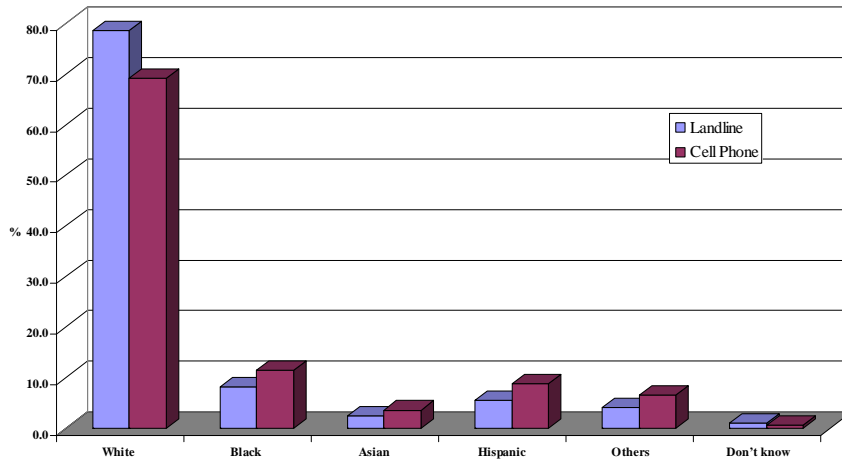


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\* un-weighted

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## Ethnicity distribution by survey mode\*

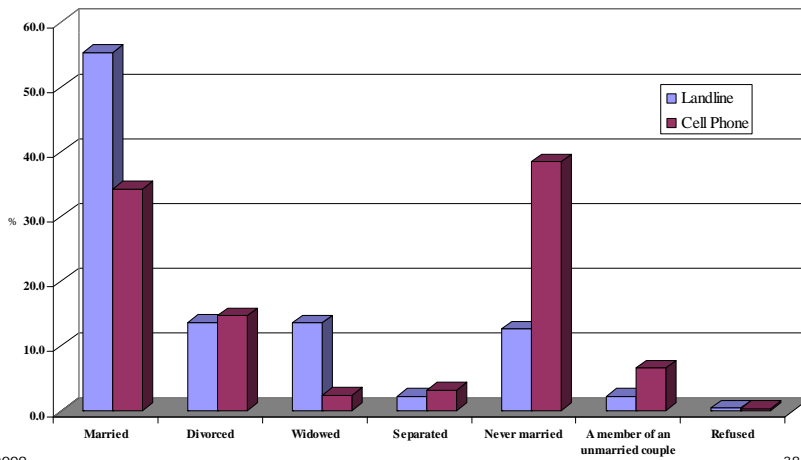


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\* un-weighted

## Martial Status by survey mode\*

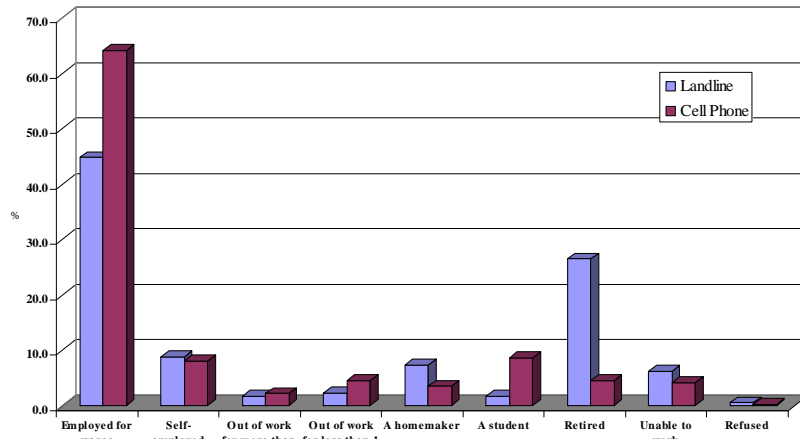


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\* un-weighted

## Employment status by survey mode\*

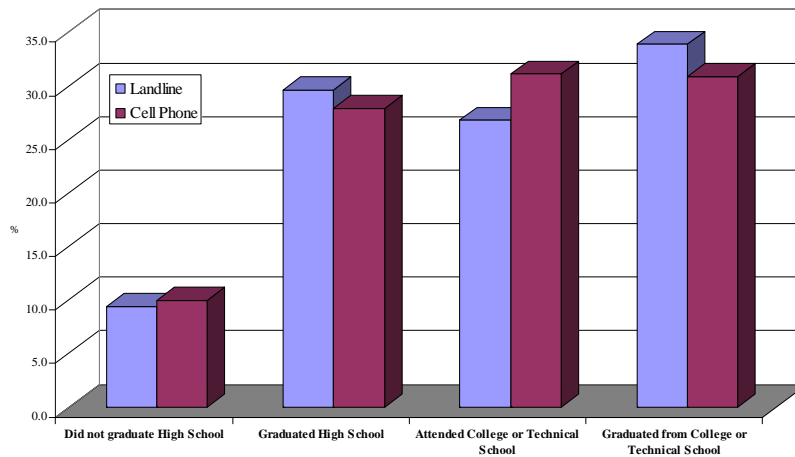


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\* un-weighted

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## Education level by survey mode\*

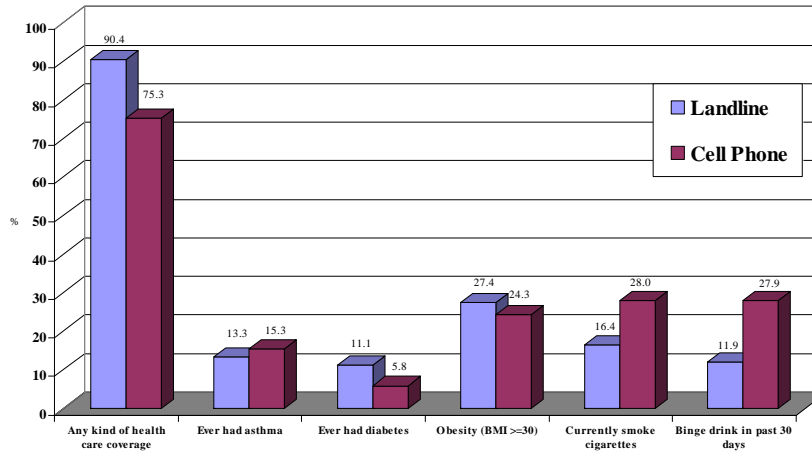


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\* un-weighted

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## Prevalence of Key Health Indexes by Survey Modes\*



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\* un-weighted data

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## BRFSS 2009 Mail pilot survey

- Eleven states
- Selected replicates will be reverse matched to obtain addresses for about 60% of the sample telephone numbers
  - Telephone number with an address match where no respondents was selected
  - Telephone number with an address match where adult respondent is selected and the interview has not been completed
  - Telephone number without an address match where adult respondent is selected and the interview has not been completed
- Mixed mode data collection:
  - Initial mail survey
  - Postcard reminder after a week
  - Second mail survey (to non-respondent)

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- BRFSS core questionnaire



## Within household randomization

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- An address match Where no adult respondent is selected:
  - Rotate the next and last birthday respondents selection technique to randomly select one adult
- An address match Where adult respondent is selected:
  - Use the name of the selected respondents
- Without an address match, where adult is selected
  - Use name of selected respondents and try to get address

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## Operational considerations

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## Multimode: Operational Considerations

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- Population of interest
- Comparability
- Questionnaire design or format may change by different mode.

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## Concluding thoughts

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- Producing valid survey estimates is a multi-phase process
- Assessing validity is often quite difficult, involving a mix of scientific and subjective judgment
- Ensuring validity is a necessity for the long-term survival of any health surveillance system

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## 2009 BRFSS

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- Cell phone in 50 states (250+)
- Mail survey 11 states
- Physical measure in two states

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## Data Collection Time Period

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- January – December 2009  
Time period can be flexible  
(e.g., April – December)
- A minimum of 21 interviews per month

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For more information on BRFSS:

[www.cdc.gov/brfss](http://www.cdc.gov/brfss)



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