

Customized Efficient Data-Driven SAS Based System Tailored To Clients Needs.

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ABSTRACT

The Pregnancy Risk Assessment Monitoring System (PRAMS) is a surveillance project of the Centers for Disease Control and Prevention (CDC) and state health departments. The PRAMS collects state-specific, population-based data on maternal attitudes and experiences before, during, and shortly after pregnancy. The PRAMS collected data is available online via the CDC's PRAMS On-Line Data for Epidemiologic Research (CPONDER). CPONDER is an online query system which allows users to retrieve and explore statistical and comparative analysis from the PRAMS surveillance data in both tabular and graphical format.

CPONDER was designed to be a data-driven, high performance system capable of handling large amounts of pre-processed data. A unique requirement of the system is that it must provide the ability to handle data incompatibility between states. Data may be compatible in earlier years but become incompatible in later years. Much of the data behind the CPONDER system was processed using two major tools: SAS® and SUDAAN. Advanced SAS functions were utilized such as SAS dictionary tables, callable SUDAAN, PROC SQL and highly complex SAS macros.

Our paper provides further details of the CPONDER system and the data processing tasks under the hood. Unique sample codes are also provided for illustration purposes.

INTRODUCTION

In today's current research and development environments, users need systems to provide on-demand information. There are many approaches to provide this function. A metadata based system approach was developed and implemented in full scale by Abolafia and Dilorio [1] in a New Drug Application (NDA) to the US Food and Drug Administration (FDA) submission project containing over twenty study databases, an integrated database, and over one thousand displays. RTI International used a similar approach to design and develop the CDC's web-based PRAMS On-Line Data for Epidemiologic Research (CPONDER) system. PRAMS, or the Pregnancy Risk Assessment Monitoring System, is a CDC surveillance project performed by state health departments that collects state-specific, population-based data on maternal attitudes and experiences before, during, and shortly after pregnancy. CPONDER allows users to access data collected through PRAMS surveys. Users design their own analysis by choosing from an indexed list of available variables, and then create statistical and comparative analyses tables and graphics.

CPONDER is a data-driven, high performance system capable of handling large amounts of pre-processed data. A unique system requirement was having handling data between states that has become incompatible. For example, in early data collections, states may have used the same data collection instrument. Over time, states change and update the questions on their surveys but do not coordinate the changes. Therefore, the data between states can become incompatible. To give CPONDER high performance capability, and to help overcome the data incompatibility issue, we used SAS® and SUDAAN to process much of the data. We used advanced SAS functions, and also used SAS dictionary tables, callable SUDAAN, PROC SQL, and highly complex SAS macros to achieve our results.

To help deliver performance and overcome the data incompatibility, we wrote custom programs for using metadata tables and wrote macros to gather information from the SAS dictionary tables. We paid special attention to metadata design. We also were careful in designing the user interface and developing the tools that helped users access the metadata. Just as Abolafia and Dilorio did, we repurposed metadata throughout the life cycle of the project. Using metadata for the client-supplied datasets was greatly simplified by the macros we developed. We also paid special attention to software development and maintenance issues.

Statistical summaries of PRAMS survey data were pre-processed by SAS programs and loaded into a SQL database. Examples of statistical summaries include weighted percentage or mean, confidence interval, and sample size. In addition to the statistical data, our SAS programs also load a set of indexed data for querying purposes. For example, it loads PRAMS states and years for surveys that were conducted; topics and questions in the surveys, and various categorical breakdowns such as gender, race, and income. Since both the statistical and indexing data were processed together, we were able ensure that the metadata and data were consistent. CPONDER web pages present the index data as pick lists, which allows users to intuitively explore vast amounts of data easily and quickly.

SYSTEM DESIGN OVERVIEW

As a web-based query system, CPONDER users access data collected through PRAMS surveys and design their own analysis by choosing variables from an indexed list. Depending on whether users choose a categorical or continuous variable, CPONDER includes descriptive statistics in the form of proportions and means, respectively, in their report.

Users can perform two types of analyses; cross tabulation and means. The system indexes 60 variables by class and topic for selection as the outcome variable in the analyses. In addition, there are 13 control variables for use in breaking out or stratifying the requested analysis. Classes represent high-level categories of topics, and topics further refine the lists of grouped variables. This indexing makes it easier for users to find a variable within the data dictionary. Analyses may include a single state and year, a single state and multiple years, or multiple states and a single year.

Once the request has run, the user receives results in table form, in most cases accompanied by a graph. Users can copy the results into a word processing document or spreadsheet and save the image of the graph. Online help is available at each step of the process. A link to the PRAMS internet site lets users access general information, including participating states, questionnaires, and other publications and analyses.

Various sample outputs from CPONDER are described and shown in Appendix A, including:

- Example 1: Simple query – single state and year
- Example 2: Query with break-out – single state and year
- Example 3: Query for multiple years (trending)

CPONDER WEBSITE

The CPONDER website was developed on a Microsoft ASP.NET framework with a Microsoft SQL Server database in the back end. The site has a set of input pages that allow the user to select their query parameters. There are also several generic output pages for displaying analysis results. The SQL database was carefully designed to handle large amounts of data and was highly optimized for performance.

Also, a critically important design feature is that the contents of almost all web pages are driven by data stored in the database. This feature gave us great flexibility and extensibility as new survey and different data become available in the future. Figure 1. presents the process flowchart.

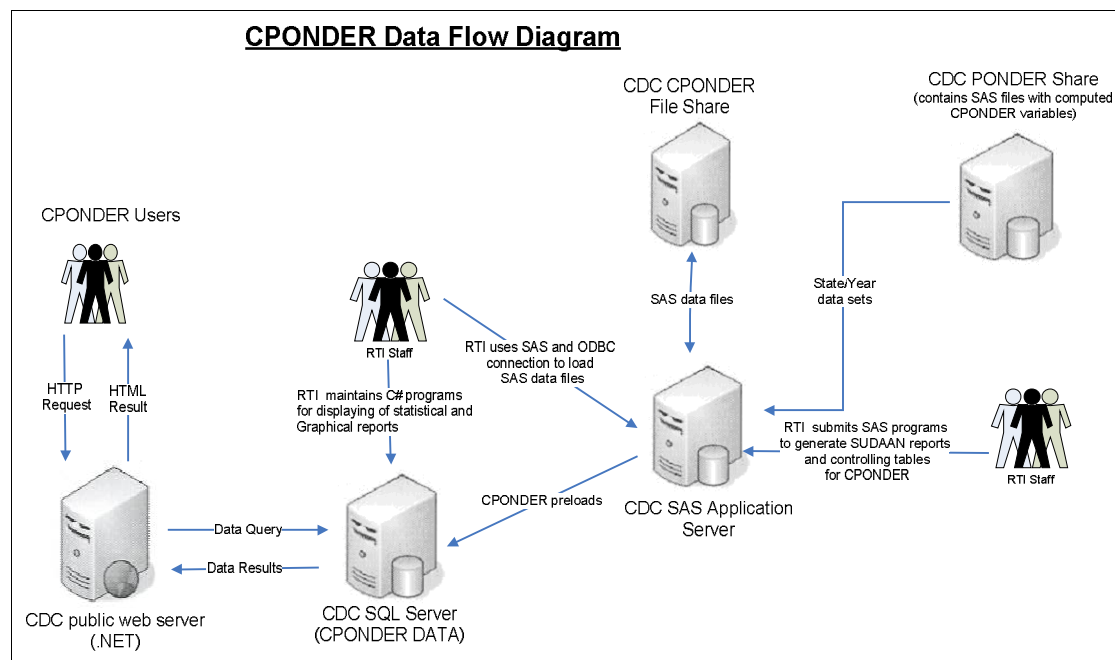


Figure 1. CPONDER Data Flow Diagram

DATA PRE-PROCESSING USING SAS

One of CPONDER's salient features is how we incorporated RTI's SUDAAN (Version 9) software to generate analyses and produce estimates and standard errors that account for the PRAMS' complex sampling design. SUDAAN is statistical software for analyzing correlated data, including correlated data in complex sample surveys. SUDAAN's strength is its ability to compute standard errors of ratio estimates, means, totals, regression coefficients, and other statistics according to the sample design. We were able to incorporate SUDAAN's procedures easily into the SAS code.

All the calculations in the tables are made using dynamic SAS programs driven by metadata. We use SAS macros, PROC SQL, callable SUDAAN, and SAS dictionary tables to create files loaded into a SQL data base.

A SAS program, listed below, creates delimited files that are uploaded into SQL results tables. The results are appended to the already existing results in the SQL tables. The inputs to this program are the state-year data files. This program reads the variable_metatable table to determine which variables are CPONDER variables, distinguishing categorical variables, continuous variables, and break-out or control variables. It creates a SUDAAN program that runs PROC CROSSTAB to get frequencies for the categorical variables and runs 2 way cross tabulations for those variables with all the break-out variables. The variable_levels table is also used in this program to get the number of levels for the categorical and break-out variables. These values are needed for the SUDAAN procedures.

The output results are stored in temporary SAS output files. These files are then processed within the same program to create delimited files. The text files are delimited with a “^” rather than a comma because some of the response labels have embedded commas. Processing each input file appends new results to the delimited files. There are 14 delimited files, one for the frequency and means without any break-out variables, and 13 with crosstabs and subgrouped means for each of the 13 break out variables.

Below is a partial listing of the variable_metatable table.

varname	cp_topID	cp_cat	cp_cntrl	cp_VarID	cp_BOC ID	Cpond boc	Cpond topc	cpondlab
PAB_HUS	1	1	0	20	.		Abuse - Physical	During the 12 months before you got pregnant, did your husband or partner push, hit, slap, kick, choke, or physically hurt you in any other way?
PAD_HUS	1	1	0	21	.		Abuse - Physical	During your most recent pregnancy, did your husband or partner physically hurt you in any way?
EXP_ANY	24	1	0	12	.		Smoke Exposure	Indicator of whether baby is exposed to cigarette smoke.
BIRTHWGT	13	1	1	7	1	Birth Weight	Morbidity - Infant	The baby's weight, classified as low birth weight (LBW) if the weight was less than or equal to 2500 grams or normal birth weight (NBW) if the weight was greater than 2500 gram

Figure 2. Subset of the VARIABLE-METATEABLE table

The variable_metatable table, shown in Figure 2, has the following CPONDER fields:

VarName-- the variable name,

Cp_cat—a categorical variable (no=0,yes=1) that can be selected within a topic,

Cp_cntrl—a break out category variable (no=0,yes=1) ,

Cpondtopc—the CPONDER topic that the variable is a member of, which may be different from the PONDER topic,

Cpondlab—the text of the question that can be selected within a topic,

Cpondboc—the text for the break out categories for the break out variables,

Cp_varid—a sequential number assigned to variables that is used to link the variable name and other information to the results tables,

Cp_topid—sequential number assigned to unique CPONDTPC used to link variables to topics for selection of question,

Cp_bocid—sequential number assigned to unique CPONDBOC used to link cp_cntrl variables to the break out category text.

Each of these fields would be updated for any new variables added to CPONDER. The sequential numbers for the three id fields (cp_varid, cp_topid, cp_bocid) would be assigned the next available number. Once this table has been updated, it is processed to create several delimited files that are used to update corresponding SQL server tables.

SAS CODE

The inputs into this program are the state-year data files. The program processes one state-year dataset at a time. This program is managed through the *variable_metatable* SAS data set to determine which variables are CPONDER variables, distinguish categorical variables from the continuous ones, and both from the break-out or control variables.

The program consists of the following 3 logical sets:

1. Preparing the variables for the analyses.
2. Running SUDAAN analyses.
3. Converting SUDAAN statistical reports into *.csv data sets to load into the SQL data base.

STEP 1. Preparing the variables for the analyses.

The code below creates the *&catct* macro variable, which is a counter that indicates the number of the categorical variables from the *variable_metatable* available in the selected data set. The *variable_metatable* is a leading table. The data dictionary is dynamically created data set containing all the variable names for the specified state and year data combination.

```
proc sql noprint;
  select count(distinct VarName) into :catct
  from ponder.variable_metatable as vm, dictionary.columns as dc
  where vm.cponder = 1 and vm.CP_Cat = 1 and vm.varName = dc.name and
        %upcase(dc.libname) = "PONDER" and %upcase(dc.memname) = "&ST.200&YR." ; quit;

%global catcnt ;
%let catcnt = &catct ;
```

The following code creates the *&xt1-&&xt&catcnt* and *&xid1-&&xid&catcnt* macro variables, which contain the categorical variable names and variable IDs from the submitted data set, that were found in the *variable_metatable*.

```
proc sql noprint;
  select distinct varName, cp_VarID into :xt1 - :xt&catcnt, :xid1 - :xid&catcnt
  from ponder.variable_metatable as vm, dictionary.columns as dc where vm.cponder = 1
  and vm.CP_Cat = 1 and vm.varName = dc.name and
        %upcase(dc.libname) = "PONDER" and %upcase(dc.memname) = "&ST.200&YR." ; quit;
```

Since the number of variables is unknown to the user, the macro *gl* is used for listing of the global macro variables.

```
%macro gl;
%do i=1 %to &catcnt;
xtv&i xtid&i
%end;
%mend;

%global %gl;
```

After creating of the global macro variables, their values are set to the values of the temporary macro variables. So now the *&xtv1-&&xtv&catcnt* and *&xtid1-&&xtid&catcnt* macro variables contain the variable names and corresponding variable IDs.

```
%do k = 1 %to &catcnt ;
  %let xtv&k = &&xtv&k ;
  %let xtid&k = &&xtid&k ;
%end ;
```

This code listed below creates the *&bgct* macro variable, which is a counter of the break-out variables from the table *variable_metatable* that are available in the selected data set.

```
proc sql noprint;
  select count(distinct VarName) into :bgct
  from ponder.variable_metatable as vm, dictionary.columns as dc
  where vm.cponder = 1 and vm.CP_Cntrl = 1 and vm.varName = dc.name and
  %upcase(dc.libname) = "PONDER" and %upcase(dc.memname) = "&ST.200&YR." ;
quit;
%global bgcnt ;
%let bgcnt = &bgct ;

%macro glbg;
%do i=1 %to &bgcnt;
nbg&i nbgid&i nbgvid&i
%end;
%mend;

%global %glbg;
```

This code creates the *&bg1-&&bg&bgcnt*, *&bgid1-&&bgid&bgcnt*, and *&bgvid1-&&bgvid&bgcnt* macro variables, which are the breakout, the link IDs used to link the breakout category with its text, and the break-out variables ID from the submitted data set that are contained in the *variable_metatable* dataset.

```
proc sql noprint;
  select distinct varname, cp_BOCID, cp_Varid into :bgl - :bg&bgcnt. ,
  :bgidl - :bgid&bgcnt., :bgvidl - :bgvid&bgcnt.
  from ponder.variable_metatable as vm, dictionary.columns as dc where vm.cponder = 1
and vm.CP_Cntrl = 1 and vm.varName = dc.name and
  %upcase(dc.libname) = "PONDER" and %upcase(dc.memname) = "&ST.200&YR." ;
quit;

%global %glbg;

Data _null_;
%do k = 1 %to &bgcnt ;
  %let nbg&k = &&nbg&k ;
  %let nbgid&k = &&nbgid&k ;
  %let nbgvid&k = &&nbgvid&k ;
%end;
data xtabdata; set ponder.&st.200&yr ;
  if inqx ;
  proc sort data=xtabdata; by stratumc; run;
```

The program processes each categorical variable sequentially by incrementing the counter from 1 to the *&catcnt* macro variable, which is the number of categorical variables.

```
%do i = 1 %to &catcnt ;
  %if "&&xtv&i" ne "" %then %do ;
```

As a preliminary step, we get levels for each variable and all break out variables. These levels are needed as input data for SUDAAN procedure.

```
data _null_ ;
```

```

set ponder.variable_levels(where = (
  VarName = "&&xtv&i"
  %do j = 1 %to &bgcnt ;
    %if "&&nbj" ne "" %then %do;
      or varname = "&&nbj" and "&&xtv&i" ne "&&nbj"
    %end;
  %end; ));
if VarName = "&&xtv&i" then do;
  call symput ('xtlevel',left(num_levels));
end;
%do k = 1 %to &bgcnt ;
  if VarName = "&&nbk" then do;
  call symput ("nbk.level",left(num_levels)); end;
%end;

```

STEP 2. Running SUDAAN analyses.

Here is a sample of the callable SUDAAN procedure for calculating cross-tabulations for the SAS xtabdata dataset.

```

proc crosstab data=xtabdata filetype=sas design=strwor noprint;
  nest
  stratumc / missunit;
  totcnt totcnt;
  samcnt samcnt ;
  weight wtanal;

```

We use the option *design=strwor* if any of the strata contain large sampling fractions. The option *noprint* indicates that the report will only be saved into the data set. The statement *nest* lists in order the variables whose values identify the design stages by which the data file must be sorted. The *stratumc* is the stratified variable; *totcnt* lists in order the variable(s) whose values are the population counts at each sampling stage; *samcnt* lists in order the variable(s), whose values are the sample counts at each sampling stage; *weight* identifies the variable whose values and the analysis weights are used in computing.

Depending on the availability of SAS macro variables, the program dynamically sets the subgroups, levels, and tables statements as follows:

The code below creates the subgroups and level statements through checking for availability of the break-out variable and making sure that it is not the categorical variable itself.

```

subgroup
  &&xtv&i /* variable name */
  %do j = 1 %to &bgcnt ; /*break-out loop*/
    %if "&&nbj" ne "" and &&xtv&i ne &&nbj %then %do;
      &&nbj
    %end;
  %end; ;
levels
  &xtlevel
  %do j = 1 %to &bgcnt ;
    %if "&&nbj" ne "" and &&xtv&i ne &&nbj %then %do;
      &&nbj.level
    %end;
  %end; ;

```

The *tables* statement below runs a cross-tab of the categorical variable by each break-out variable, again excluding itself.

```

tables
  &&xtv&i (
  %do j = 1 %to &bgcnt ;
    %if "&&nbj" ne "" and &&xtv&i ne &&nbj %then %do;
      &&nbj
    %end;

```

```

        %end; )
    %end;

output nsum wsum rowper lowrow uprow
    / filename=ponder.cp_xtab_&st.&yr._&&xtv&i filetype=sas replace ; run;
%end;

```

The *ponder.cp_xtab_&st.&yr._&&xtv&i* SAS data set is a statistical report created by the SUDAAN procedure. Below is a partial listing of the SUDAAN report.

TABLNO	Z_TKLABR	BIRTHWGT	_C1	_C2	_C3	NSUM	WSUM	ROWPER	LOWROW	UPROW
1	0	-2	0	-2	-2	997	76483.57	100.00	.	.
1	NO	-2	1	-2	-2	145	8657.61	11.32	9.11	13.98
1	YES	-2	1	-2	-2	852	67825.96	88.68	86.02	90.89
2	0	LBW = <2500g	0	1	-2	448	6141.64	100.00	.	.
2	NO	LBW = <2500g	1	1	-2	87	1159.22	18.87	15.58	22.68

Figure 3. SUDAAN Report—Partial Listing

Where,

- “nsum” is the sample size,
- “wsum” is the weighted size,
- “rowper” is the row percentage,
- “lowrow” is the low percentage, and
- “uprow” is the upper percentage.

STEP 3. Converting SUDAAN statistical reports into *.csv data sets for loading into SQL data base.

Further, the program reads the report created by SUDAAN, tailors it to the client's specifications, and outputs results to the *.csv datasets, which are loaded into SQL database using another SAS program.

Here, the program creates macro variable *&vfor* that contains the format of the processed variable.

```

data _null_; set contents;
    if _n_ = 1 then call symput('size',nobs);
    if name = "&&xtv&i" then do;
        call symput('vfor', compress(format || "."));
    end;

```

Further, the program reads the report created by SUDAAN, tailors it to the client's specifications, and outputs results. The report was created for each state-year-variable.

The macro variable *&bgcnt* contains the number of break-out variables. It should be decreased by one in case the selected variable is one of the available break-out variables.

```

data _null_; set ponder.cp_xtab_&st.&yr._&&xtv&i ;
if _n_ = 1 then do;
    call symput('bocnt',&bgcnt);
    %do k = 1 %to &bgcnt;
        if &&xtid&i = &&nbgrid&k then do ;
            nbcnt = &bgcnt - 1;
            call symput ('bocnt',nbgcnt);
        end;
    %end;
end;

```

Next we create the text files for loading into SQL database. The tbl_result_1.csv table contains all the frequencies for each of the categorical variables. Each tbl_result_*.csv table contains all the crosstabs we output into the corresponding break-out file. In our example BIRTHWGT variable is the one of break-out variables for Z_TKLABR categorical variable.

```
data dl; set ponder.cp_xtab_&st.&yr._&&xtv&i; by tableno ;
if last.tableno then do;

outfile = compress(pathname("ponder") || "\tbl_result_1.csv");

file myfile filevar = outfile mod ; *mod option appends data to previous outputs.

put _qn2 z2. ^" _qa2 ^" _qn2 &vfor ^1^" rowper 4.1 ^&cpst^ " cpyr ^" _qn2;
put _qn2 z2. ^" _qa2 ^" _qn2 &vfor ^2^" lowrow 4.1 " - " uprow 4.1 ^&cpst^ " cpyr
^" _qn2;
put _qn2 z2. ^" _qa2 ^" _qn2 &vfor ^5^" nsum 5. ^&cpst^ " cpyr ^" _qn2;
put "99^" _qa2 ^^9^" missn ^&cpst^ " cpyr ;
end;
else do ;

outfile = compress(pathname("ponder") || "\tbl_result_" || _aboc{siboc} || ".csv");

file myfile filevar = outfile mod ; *mod option appends data to previous outputs.

put _qn2 ^" _bcn ^" _qa2 ^" _qn2 &vfor ^" _boca{siboc} ^" _bcn{siboc} ^1^"
rowper 4.1 ^&cpst^ " cpyr ^" _qn2;
put _qn2 ^" _bcn ^" _qa2 ^" _qn2 &vfor ^" _boca{siboc} ^" _bcn{siboc} ^2^"
lowrow 4.1 " - " uprow 4.1 ^&cpst^ " cpyr ^" _qn2;
put _qn2 ^" _bcn ^" _qa2 ^" _qn2 &vfor ^" _boca{siboc} ^" _bcn{siboc} ^5^"
nsum 5. ^&cpst^ " cpyr ^" _qn2;
put "99^99^" _qa2 ^^" _boca{siboc} ^^9^" missn ^&cpst^ " cpyr ;
end; end;
```

The SAS program loads all the text files automatically into the SQL CPONDER database.

CONCLUSION

CPONDER was designed to be a data-driven, high performance system capable of handling large amounts of pre-processed data. One of CPONDER's unique requirements is being able to process data that is incompatible between states. Much of the data behind the CPONDER system was processed using two major tools: SAS and SUDAAN. We employed advanced SAS functions to create the system, and also used SAS dictionary tables, callable SUDAAN, PROC SQL, and highly complex SAS macros. The metadata design was an important factor in this system, and we repurposed metadata throughout the project's life cycle.

REFERENCES

1. Abolafia, Jeffrey and DiIorio, Frank. "Managing the Change and Growth of a Metadata-Based System." Invited paper presented at SAS Global Forum 2008, San Antonio, TX, March 16 - 19, 2008.

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APPENDIX A

EXAMPLE 1: SIMPLE QUERY – SINGLE STATE AND YEAR

The output shown below was produced from a query with the following parameters:

- State: Colorado
- Year: 2000
- Category: Pregnancy Intention
- Variable: Indicator for whether mother wanted to become pregnant at the time of pregnancy

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CPONDER: CDC's PRAMS On-line Data for Epidemiologic Research
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Break Out Categories

Colorado - 2000
Pregnancy Intention
Indicator for whether mother wanted to become pregnant at time of pregnancy .

	NO	YES
%	39.8	60.2
CI	37.1 - 42.6	57.4 - 62.9
n	831	1300

Number of Missing (unweighted)¹: 50

¹Missing includes: not applicable, don't know, not recorded, no responses and legitimate skips

%=Percent, CI=95% Confidence Interval for Percent, n=Sample Size
 Cell Size Percentages are weighted to population characteristics.
 * = Not available, if the unweighted sample size was less than 30.

Indicator for whether mother wanted to become pregnant at time of pregnancy .
 Colorado 2000

Select another year for Colorado

Select another state for 2000

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EXAMPLE 2: BREAK-OUT QUERY – SINGLE STATE AND YEAR

Example 2 displays the results by Marital Status from the same query as in Example 1.

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CPONDER: CDC's PRAMS On-line Data for Epidemiologic Research
[CPONDER Home](#) | [Select Another Question](#) | [Compare to Another State or Year](#) | [All Available States](#)

Break Out Categories
 Break Out by Marital Status

Colorado - 2000
Pregnancy Intention

Indicator for whether mother wanted to become pregnant at time of pregnancy .

Marital Status		NO	YES
MARRIED	%	29.2	70.8
	CI	26.5 - 32.2	67.8 - 73.5
	n	478	1143
OTHER	%	70.2	29.8
	CI	64.7 - 75.2	24.8 - 35.3
	n	353	157

Number of Missing (unweighted)¹: 50

¹Missing includes: not applicable, don't know, not recorded, no responses and legitimate skips

%=Percent, CI=95% Confidence Interval for Percent, n=Sample Size
 Cell Size Percentages are weighted to population characteristics.
 * = Not available, if the unweighted sample size was less than 30.

Indicator for whether mother wanted to become pregnant at time of pregnancy .
 Break Out By Marital Status
 Colorado 2000

	MARRIED	70.8	OTHER	29.8
	MARRIED	29.2	OTHER	70.2

Select another year for Colorado

Select another state for 2000

[Select Another Question](#) | [Compare to Another State or Year](#) | [All Available States](#)

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EXAMPLE 3: QUERY FOR MULTIPLE YEARS

Example 3 displays the results from the same query as in Example 1 except for all available years instead of just for year 2000.

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Break Out Categories

Colorado - All Available Years

Pregnancy Intention

Indicator for whether mother wanted to become pregnant at time of pregnancy .

Year		NO	YES
2000	%	39.8	60.2
	CI	37.1 - 42.6	57.4 - 62.9
	n	831	1300
2001	%	39.6	60.4
	CI	36.9 - 42.4	57.6 - 63.1
	n	852	1261
2002	%	38.9	61.1
	CI	36.3 - 41.5	58.5 - 63.7
	n	897	1377
2003	%	41.0	59.0
	CI	38.3 - 43.7	56.3 - 61.7
	n	861	1363
2004	%	39.3	60.7
	CI	36.2 - 42.5	57.5 - 63.8
	n	739	1218
2005	%	40.1	59.9
	CI	36.9 - 43.3	56.7 - 63.1
	n	761	1224
2006	%	39.8	60.2
	CI	36.7 - 43.1	56.9 - 63.3
	n	786	1217

Number of Missing (unweighted)(2000)¹: 50
 Number of Missing (unweighted)(2001)¹: 36
 Number of Missing (unweighted)(2002)¹: 21
 Number of Missing (unweighted)(2003)¹: 25
 Number of Missing (unweighted)(2004)¹: 18
 Number of Missing (unweighted)(2005)¹: 18
 Number of Missing (unweighted)(2006)¹: 20

¹Missing includes: not applicable, don't know, not recorded, no responses and legitimate skips

%=Percent, CI=95% Confidence Interval for Percent, n=Sample Size
 Cell Size Percentages are weighted to population characteristics.
 * = Not available, if the unweighted sample size was less than 30.

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