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/*****/
/*most current code by Brian 2015 after 84009 added June 1 2016*/
/*updated by Shelly July 2017*/
/*Kim Neerings went through the code 9/27/17 and Shelly made all
corrections*/
/*Tong Zheng updated code February 2018 to include all new small areas now
97*/
/*Shelly went through and corrected based on new 2018 Geographies MASTER
spreadsheet*/
/*Kim Neering went through the code 2/22/18 and Shelly made all corrections
on 2/27/18*/
/*Shelly updated the two map errors Kim found 9/12/18*/
/*****/
AssignedCounty=&county.;
zip_code=&zip.;
/*****/
/*Small Area */
/*****/
/*****;
**** The variable AssignedCounty is used iteratively to determine county from
zipcode when county is missing ;
**** ctycode is FIPS county used in BRFSS
data ;
/*****/
/*First: assign the small areas by county if no valid ZIP. This can only
happen for Counties that
are small areas or are a subset of a small area(Beaver, Carbon, Daggett,
Duchesne,
Emery, Garfield, Grand, Kane, Morgan, Piute, Rich, San Juan, Uintah,
Wasatch, Wayne)*/

dist_r=.;
sarea_r2 = . ;
if zip_code<84000 or zip_code>85000 then zipcode=.; *set
out of state and in valid zip codes to missing;
else zipcode=zip_code;

if zipcode=. then do;
    IF ( AssignedCounty IN (1, 9, 13)) THEN sarea_r2= 61;/*
Beaver/Garfield/Kane*/
    ELSE IF (AssignedCounty IN (4)) THEN sarea_r2 = 56.1;/*Carbon*/
    ELSE IF (AssignedCounty IN (8)) THEN sarea_r2 = 56.2;/*Emery*/
    ELSE IF (AssignedCounty IN (5, 24)) THEN sarea_r2 =
53.1;/*Daggett/Uintah*/
    ELSE IF (AssignedCounty IN (7)) THEN sarea_r2 = 53.2;/*Duchesne*/
    ELSE IF (AssignedCounty IN (10)) THEN sarea_r2 = 57.1;/*Grand*/
    *ELSE IF (AssignedCounty IN (19)) THEN sarea_r2 = 57.2;/*San Juan*/
    ELSE IF (AssignedCounty IN (16,28)) THEN sarea_r2 =
54.4;/*Piute/Wayne*/
    ELSE IF (AssignedCounty= 26) THEN sarea_r2 = 52;/*Wasatch*/
    ELSE IF (AssignedCounty=17) THEN sarea_r2= 4.1 ;/*Rich*/
    ELSE IF (AssignedCounty=15) THEN sarea_r2= 6.2 ;/*Morgan*/

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if AssignedCounty in (2,3,6,11,12,14,18,19,20,21,22,23,25,27,29) then
sarea_r2=96; *if zip_code is missing or invalid and they live in one of
these counties we aren't able to assign small area based on county;

**Assign dist_r to those with only a valid county no valid zipcode;

    if AssignedCounty in (2,3,17) then dist_r = 1;
    if AssignedCounty in (12,14,16,20,21,28) then dist_r = 2;
    if AssignedCounty = 6 then dist_r = 3;
    if AssignedCounty = 18 then dist_r = 4;
    if AssignedCounty in (4,8,10) then dist_r = 5.1;
    if AssignedCounty in (1,9,11,13,27) then dist_r = 6;
    if AssignedCounty = 22 then dist_r = 7;
    if AssignedCounty = 23 then dist_r = 8;
    if AssignedCounty in (5,7,24) then dist_r = 9;
    if AssignedCounty = 25 then dist_r = 10;
    if AssignedCounty = 26 then dist_r = 11;
    if AssignedCounty in (15,29) then dist_r = 12;
        if AssignedCounty in (19) then dist_r=13;

**Assign missing zipcodes to 99999;
    zipcode=99999;
END; *end if zipcode=. loop;

    IF (zipcode=99999 and AssignedCounty=.) THEN sarea_r2 = 98 ;
        *if neither zip code or county provided;
    if (zipcode=99999 and AssignedCounty=.) THEN dist_r=98;
        *if neither zip code or county provided;
    if (zipcode=99999 and AssignedCounty=.) THEN AssignedCounty=98;
        *if neither zip code or county provided;

/*Second assign the small areas by zip and county as long as they don't cross
county lines*/

/****lhd=1 Bear River*****/
/*1 Brigham City*/
    IF (AssignedCounty in (2) and zip_code= 84302 ) THEN sarea_r2 =1 ;
    /*2.1 Box Elder County (Other) V2*/
    ELSE IF AssignedCounty in (2) and zip_code in
(84301,84307,84309,84311,84313,84314,84316,84324,84329,84330,84331,84334,8433
6,84340) THEN sarea_r2 =2.1;
    /*2.2 Tremonton*/
    ELSE IF AssignedCounty in (2) and zip_code in (84337) THEN sarea_r2=
2.2 ;
    /*3.1 Logan V2*/
    ELSE IF AssignedCounty in (3) and zip_code IN (84321, 84322, 84323,
84326, 84332) THEN sarea_r2= 3.1 ;
    /*3.2 North Logan*/
    ELSE IF AssignedCounty in (3) and zip_code IN (84341) THEN sarea_r2=
3.2 ;
    /*4.1 Cache County (Other)/Rich County (All) V2*/
    ELSE IF AssignedCounty in (3,17) and zip_code IN (84028, 84038, 84064,
84086, 84304, 84305, 84308, 84318,
84320, 84325, 84327, 84328, 84333, 84338, 84339) THEN sarea_r2=
4.1 ;/*4.1 Oth Cache/Rich Co*/

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/*4.2 Hyrum*/
ELSE IF (AssignedCounty in (3) and zip_code IN (84319)) THEN sarea_r2=
4.2 ;
/*4.3 Smithfield*/
ELSE IF (AssignedCounty in (3) and zip_code IN (84335)) THEN sarea_r2=
4.3 ;

/*****lhd=12 Weber-Morgan*****/
/*5 Ben Lomond*/
*All of small area 5 zip codes cross borders;
/*6.1 Weber County (East)*/
ELSE IF (AssignedCounty in (29) and zip_code IN (84310,84317,84414))
THEN sarea_r2= 6.1;
/*6.2 Morgan County*/
ELSE IF ( AssignedCounty in (15) and zip_code in (84018)) THEN sarea_r2
= 6.2 ;
/*7 Ogden (Downtown)*/
ELSE IF ( AssignedCounty in (29) and zip_code in (84401, 84402)) THEN
sarea_r2 = 7 ;
/*8 South Ogden*/
ELSE IF (AssignedCounty in (29) and zip_code in (84403, 84408, 84415))
THEN sarea_r2=8 ;
/*9 Roy/Hooper*/
ELSE IF (AssignedCounty in (29) and zip_code in (84067)) THEN sarea_r2 =
9 ;
/*10 Riverdale*/
*All of small area 10 zip codes cross borders;

/*****lhd=3 Davis*****/
/*11 Clearfield Area/Hooper*/
ELSE IF (AssignedCounty in (6) and zip_code IN (84015, 84016, 84089))
THEN sarea_r2 = 11 ;
/*12 Layton/South Weber*/
ELSE IF (AssignedCounty in (6) and zip_code IN (84040, 84041)) THEN
sarea_r2 = 12 ;
/*13.1 Kaysville/Fruit Heights*/
ELSE IF (AssignedCounty in (6) and zip_code IN (84037)) THEN sarea_r2 =
13.1 ;
/*13.2 Syracuse*/
ELSE IF (AssignedCounty in (6) and zip_code IN (84075)) THEN sarea_r2 =
13.2 ;
/*14.1 Centerville*/
ELSE IF (AssignedCounty in (6) and zip_code IN (84014)) THEN sarea_r2 =
14.1 ;
/*14.2 Farmington*/
ELSE IF (AssignedCounty in (6) and zip_code IN (84025)) THEN sarea_r2 =
14.2 ;
/*15.1 North Salt Lake*/
ELSE IF (AssignedCounty in (6) and zip_code IN (84054)) THEN sarea_r2 =
15.1 ;
/*15.2 Woods Cross/West Bountiful*/
ELSE IF (AssignedCounty in (6) and zip_code IN (84087)) THEN sarea_r2 =
15.2 ;
/*16 Bountiful*/
ELSE IF (AssignedCounty in (6) and zip_code IN (84010, 84011)) THEN
sarea_r2 = 16 ;

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/*****lhd=4 Salt Lake*****/
/*17 Salt Lake City (Rose Park)*/
ELSE IF (AssignedCounty in (18) and zip_code in (84116, 84122)) THEN
sarea_r2 = 17 ;
/*18 Salt Lake City (Avenues)*/
ELSE IF (AssignedCounty in (18) and zip_code IN (84103, 84150)) THEN
sarea_r2 = 18 ;
/*19.1 Salt Lake City (Emigration Canyon)*/
ELSE IF (AssignedCounty in (18) and zip_code IN (84108, 84158)) THEN
sarea_r2 = 19.1;
/*20 Magna*/
ELSE IF (AssignedCounty in (18) and zip_code = 84044) THEN sarea_r2 =
20 ;
/*21 Salt Lake City (Glendale)*/
ELSE IF (AssignedCounty in (18) and zip_code IN
(84104,84110,84145,84151,84180)) THEN sarea_r2 = 21.1;
/*22.1 West Valley (Center)*/
ELSE IF (AssignedCounty in (18) and zip_code IN (84120, 84170)) THEN
sarea_r2 = 22.1 ;
/*22.2 West Valley (West) V2*/
ELSE IF (AssignedCounty in (18) and zip_code IN (84128)) THEN sarea_r2
= 22.2 ;
/*23.1 West Valley (East) V2*/
ELSE IF (AssignedCounty in (18) and zip_code IN (84119, 84125, 84126,
84127, 84130, 84131)) THEN sarea_r2 = 23.1;
/*24.1 Salt Lake City (Downtown) V2*/
ELSE IF (AssignedCounty in (18) and zip_code IN
(84101,84102,84111,84112,84113,84114,84133,84147)) THEN sarea_r2 = 24.1 ;
/*24.2 Salt Lake City (Southeast Liberty)*/
ELSE IF (AssignedCounty in (18) and zip_code IN (84105)) THEN sarea_r2
= 24.2 ;
/*25 South Salt Lake*/
ELSE IF (AssignedCounty in (18) and zip_code IN (84115, 84165)) THEN
sarea_r2 = 25 ;
/*26.1 Salt Lake City (Sugar House)*/
ELSE IF (AssignedCounty in (18) and zip_code IN (84106,84152)) THEN
sarea_r2 = 26.1 ;
/*26.2 Millcreek (South)*/
ELSE IF (AssignedCounty in (18) and zip_code IN (84124)) THEN
sarea_r2 = 26.2 ;
/*26.3 Millcreek (East)*/
ELSE IF (AssignedCounty in (18) and zip_code IN (84109)) THEN
sarea_r2 = 26.3 ;
/*27.1 Holladay V2*/
ELSE IF (AssignedCounty in (18) and zip_code IN (84117)) THEN sarea_r2 =
27.1 ;
/*28 Cottonwood*/
ELSE IF (AssignedCounty in (18) and zip_code IN (84121, 84171)) THEN
sarea_r2 = 28 ;
/*29.1 Kearns V2*/
ELSE IF (AssignedCounty in (18) and (zip_code=84118)) THEN sarea_r2 =
29.1;
/*30 Taylorsville (East)/Murray (West)*/
ELSE IF (AssignedCounty in (18) and zip_code=84123) THEN sarea_r2 = 30 ;
/*30.1 Taylorsville (West)*/
ELSE IF AssignedCounty in (18) and zip_code IN (84129) THEN sarea_r2 =
30.1; /*not data from ACS*/

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        /*31 Murray*/
        ELSE IF (AssignedCounty in (18) and zip_code IN (84107, 84157)) THEN
sarea_r2 = 31 ;
        /*32 Midvale*/
        ELSE IF (AssignedCounty in (18) and zip_code =84047) THEN sarea_r2 = 32 ;
        /*33.2 West Jordan (Northeast) V2*/
        ELSE IF (AssignedCounty in (18) and (zip_code =84084)) THEN sarea_r2 =
33.2;
        /*34.1 West Jordan (Southeast)*/
        ELSE IF (AssignedCounty in (18) and (zip_code=84088)) THEN sarea_r2 =
34.1;
        /*34.2 West Jordan (West)/Copperton*/
        ELSE IF (AssignedCounty in (18) and zip_code in (84006, 84081)) THEN
sarea_r2 = 34.2 ;
        /*35.1 South Jordan V2*/
        ELSE IF (AssignedCounty in (18) and zip_code in (84095)) THEN sarea_r2 =
35.1 ;
        /*35.2 Day Break*/
        ELSE IF (AssignedCounty in (18) and zip_code in (84009)) THEN sarea_r2 =
35.2 ;
        /*36.1 Sandy (West)*/
        ELSE IF (AssignedCounty in (18) and zip_code IN (84070, 84091)) THEN
sarea_r2 = 36.1 ;
        /*36.2 Sandy (Center) V2*/
        ELSE IF (AssignedCounty in (18) and zip_code IN (84094)) THEN sarea_r2
= 36.2 ;
        /*37 Sandy (Northeast)*/
        ELSE IF (AssignedCounty in (18) and zip_code IN (84090, 84093)) THEN
sarea_r2 = 37 ;
        /*38 Sandy (Southeast)*/
        ELSE IF (AssignedCounty in (18) and zip_code IN (84092, 84138)) THEN
sarea_r2 = 38 ;
        /*39.1 Draper*/
        *all of small area 39.1 zip codes cross borders;
        /*39.2 Riverton/Bluffdale*/
        *small area 39.2 zip code crosses borders;
        /*39.3 Herriman*/
        ELSE IF (AssignedCounty in (18) and zip_code IN (84096)) THEN sarea_r2
= 39.3 ;

/*****lhd=8 Tooele*****/
        /*40.1 Tooele County (Other)*/
        ELSE IF (AssignedCounty in (23) and zip_code in (84022, 84069, 84071,
84080)) THEN sarea_r2 = 40.1;
        /*40.2 Tooele Valley*/
        ELSE IF (AssignedCounty in (23) and zip_code in (84074)) THEN sarea_r2
= 40.2;

/*****lhd=10 Utah County*****/
        /*41.1 Eagle Mountain/Cedar Valley*/
        ELSE IF (AssignedCounty in (25) and zip_code IN (84005, 84013)) THEN
sarea_r2 = 41.1 ;
        /*41.2 Lehi*/
        ELSE IF (AssignedCounty in (25) and zip_code IN (84043)) THEN sarea_r2
= 41.2 ;
        /*41.3 Saratoga Springs*/

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ELSE IF (AssignedCounty in (25) and zip_code IN (84045)) THEN sarea_r2
= 41.3 ;
/*42.1 American Fork*/
ELSE IF (AssignedCounty in (25) and zip_code IN (84003)) THEN sarea_r2 =
42.1 ;
/*42.2 Alpine*/
ELSE IF (AssignedCounty in (25) and zip_code IN (84004)) THEN sarea_r2
= 42.2 ;
/*43 Pleasant Grove/Lindon*/
ELSE IF (AssignedCounty in (25) and zip_code IN (84042, 84062)) THEN
sarea_r2 = 43 ;
/*44 Orem (North)*/
ELSE IF (AssignedCounty in (25) and zip_code IN (84057, 84059)) THEN
sarea_r2 = 44 ;
/*45 Orem (West)*/
ELSE IF (AssignedCounty in (25) and zip_code =84058) THEN sarea_r2 = 45 ;
/*46 Orem (East)*/
ELSE IF (AssignedCounty in (25) and zip_code =84097) THEN sarea_r2 = 46 ;
/*47 Provo/BYU*/
ELSE IF (AssignedCounty in (25) and zip_code IN (84602)) THEN sarea_r2 =
47 ;
/*48.1 Provo (West City Center)*/
ELSE IF (AssignedCounty in (25) and zip_code IN (84601, 84603)) THEN
sarea_r2 = 48.1 ;
/*48.2 Provo (East City Center)*/
ELSE IF (AssignedCounty in (25) and zip_code IN (84605, 84606)) THEN
sarea_r2 = 48.2 ;
/*49.1 Salem City*/
ELSE IF (AssignedCounty in (25) and zip_code IN (84653)) THEN sarea_r2 =
49.1 ;
/*49.2 Spanish Fork*/
ELSE IF (AssignedCounty in (25) and zip_code IN (84660)) THEN sarea_r2
= 49.2 ;
/*49.3 Springville*/
ELSE IF (AssignedCounty in (25) and zip_code IN (84663)) THEN sarea_r2
= 49.3;
/*49.4 Mapleton*/
ELSE IF (AssignedCounty in (25) and zip_code IN (84664)) THEN sarea_r2
= 49.4 ;
/*50.1 Utah County (South) V2*/
ELSE IF (AssignedCounty in (25) and zip_code IN (84626,84633,84655))
THEN sarea_r2 = 50.1 ;
/*50.2 Payson*/
ELSE IF (AssignedCounty in (25) and zip_code IN (84651)) THEN sarea_r2
= 50.2 ;

/*****lhd=7 Summit*****/
/*51.1 Park City*/
ELSE IF (AssignedCounty in (22) and zip_code IN (84098)) THEN sarea_r2 =
51.1;
/*51.2 Summit County (East)*/
ELSE IF (AssignedCounty in (22) and zip_code IN (84024,84055,84061))
THEN sarea_r2 = 51.2;

/*****lhd=11 Wasatch*****/
/*52 Wasatch County*/

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ELSE IF (AssignedCounty in (26) and zip_code in (84032, 84049, 84082))
THEN sarea_r2 = 52;

/*****lhd=9 TriCounty*****/
/*53.1 Daggett and Uintah County*/
ELSE IF (AssignedCounty IN (5,24) and zip_code in
(84008,84026,84035,84039,84046,84063,84076,84078,84079,84085)) THEN sarea_r2
= 53.1;
/*53.2 Duchesne County*/
ELSE IF (AssignedCounty IN (7) and zip_code in (84001,84002,84007,84021,
84027, 84031,84051,84053,84072,84073)) THEN sarea_r2 = 53.2;

/*****lhd=2 Central******/
/*54.1 Nephi/Mona*/
ELSE IF (AssignedCounty IN (12) and zip_code in (84645,84648)) THEN
sarea_r2 = 54.1;
/*54.2 Delta/Fillmore*/
ELSE IF (AssignedCounty IN (14) and zip_code in (84624,84631,84635,
84640)) THEN sarea_r2 = 54.2;
/*54.3 Sanpete Valley*/
ELSE IF (AssignedCounty IN (20) and zip_code in
(84627,84634,84642,84647)) THEN sarea_r2 = 54.3;
/*54.4 Central (Other)*/
ELSE IF (AssignedCounty IN (12, 14,16, 20,21,28) and zip_code in
(84620,84621,84622,84623,84628,84630,84632,84636,84637,84638,84639,84643,
84644,84646,84649,84652,84656,84657,84662,84665,84667,84711,84715,84723,84724
,84728,84730,84732,84734,84739,84740,84744,84747,
84749,84750,84766,84773,84775)) THEN sarea_r2 = 54.4;
/*55.1 Richfield/Monroe/Salina*/
ELSE IF (AssignedCounty IN (21) and zip_code in (84654,84701,84754))
THEN sarea_r2 = 55.1;

/*****lhd=5.1 Southeast******/
/*56.1 Carbon County*/
ELSE IF (AssignedCounty IN (4) and zip_code in
(84520,84526,84529,84539,84542)) THEN sarea_r2 = 56.1;
/*56.2 Emery County*/
ELSE IF (AssignedCounty IN (8) and zip_code in
(84513,84516,84518,84521,84522,84523,84528,84537)) THEN sarea_r2 = 56.2;
/*57.1 Grand County*/
ELSE IF (AssignedCounty IN (10) and zip_code in (84515, 84540)) THEN
sarea_r2 = 57.1;

/*****lhd=13 San Juan******/
/*57.3 Blanding/Monticello*/
ELSE IF (AssignedCounty IN (19) and zip_code in (84511,84535)) THEN
sarea_r2 = 57.3;
/*57.4 San Juan County (Other)*/
ELSE IF (AssignedCounty IN (19) and zip_code in
(84510,84512,84530,84531,84534,84536)) THEN sarea_r2 = 57.4;

/*****lhd=6 Southwest******/
/*58 St. George*/
ELSE IF (AssignedCounty IN (27) and zip_code IN (84770, 84771, 84790,
84791)) THEN sarea_r2 =58 ;
/*59.1 Washington County (Other) V2*/

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ELSE IF (AssignedCounty IN (27) and zip_code in
(84733,84746,84763,84767,84774,84779,84782,84783,84784)) THEN sarea_r2 =59.1;
/*59.2 Washington City*/
ELSE IF (AssignedCounty IN (27) and zip_code in (84780)) THEN sarea_r2
=59.2;
/*59.3 Hurricane/La Verkin*/
ELSE IF (AssignedCounty IN (27) and zip_code in (84745)) THEN sarea_r2
=59.3;
/*59.4 Ivins/Santa Clara*/
ELSE IF (AssignedCounty IN (27) and zip_code in (84738,84765)) THEN
sarea_r2 =59.4;
/*60 Cedar City*/
ELSE IF ((AssignedCounty in (11) and zip_code IN (84721))) THEN sarea_r2
= 60 ;
/*61 Southwest LHD (Other)*/
ELSE IF AssignedCounty IN (1, 9, 11, 13) and zip_code in
(84710,84713,84714,84716,84718,84719,84729,84731,84735,84736,84741,84742,8475
1,84752,84753,84755,84758,84760,84761,84762,
84764,84772,84776) THEN sarea_r2=
61;

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*****Some zip codes cross county lines for these cases we need
to assign small area based on both the zip code and county***;
*****However if the county is missing or inconsistant and the zipcode crosses
county lines we will assign to the small area with the greatest HUD Res Rate;

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%macro bordercross(zip, cnty1, sal, cnty2, sa2, biggestsa, biggestc);
if zipcode=&zip and AssignedCounty=&cnty1 then sarea_r2=&sal;
else if zipcode=&zip and AssignedCounty=&cnty2 then sarea_r2=&sa2;
else if zipcode=&zip then do;
sarea_r2=&biggestsa;
AssignedCounty=&biggestc;
end;
%mend;

%bordercross (84017, 22, 51.2, 15, 6.2, 51.2, 22);
%bordercross (84020, 18, 39.1, 25, 41.2, 39.1, 18);
%bordercross (84023, 5, 53.1, 24, 53.1, 53.1, 5);
%bordercross (84029, 23, 40.1, 2, 2.1, 40.1, 23);
%bordercross (84033, 22, 51.2, 15, 6.2, 51.2, 22);
%bordercross (84034, 23, 40.1, 12, 54.4, 40.1, 23);
%bordercross (84036, 22, 51.2, 26, 52, 51.2, 22);
%bordercross (84050, 15, 6.2, 18, 19.1, 6.2, 15);
%bordercross (84052, 7, 53.2, 24, 53.1, 53.2, 7);
%bordercross (84056, 6, 11, 29, 10, 11, 6);
%bordercross (84060, 22, 51.1, 26, 52, 51.1, 22);
%bordercross (84066, 7, 53.2, 24, 53.1, 53.2, 7);
%bordercross (84068, 22, 51.1, 26, 52, 51.1, 22);
%bordercross (84083, 12, 54.4, 23, 40.1, 40.1, 23);
%bordercross (84312, 2, 2.2, 3, 4.1, 2.2, 2);
%bordercross (84315, 29, 9, 6, 11, 9, 29);
%bordercross (84404, 29, 5, 2, 2.1, 5, 29);
%bordercross (84405, 6, 12, 29, 10, 10, 29);
%bordercross (84409, 29, 10, 6, 12, 10, 29);
%bordercross (84412, 29, 5, 2, 2.1, 5, 29);
%bordercross (84501, 4, 56.1, 8, 56.2, 56.1, 4);
%bordercross (84525, 8, 56.2, 10, 57.1, 56.2, 8);

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%bordercross (84532, 10, 57.1, 19, 57.4, 57.1, 10);
%bordercross (84533, 19, 57.4, 13, 61, 57.4, 19);
%bordercross (84604, 25, 47, 26, 52, 47, 25);
%bordercross (84629, 20, 54.3, 25, 49.2, 54.3, 20);
%bordercross (84712, 9, 61, 16, 54.4, 54.4, 16);
%bordercross (84720, 11, 60, 27, 59.1, 60, 11);
%bordercross (84722, 27, 59.1, 11, 61, 59.1, 27);
%bordercross (84725, 27, 59.1, 11, 61, 59.1, 27);
%bordercross (84726, 9, 61, 13, 61, 61, 9);
%bordercross (84737, 27, 59.3, 11, 61, 59.3, 27);
%bordercross (84743, 16, 54.4, 1, 61, 54.4, 16);
%bordercross (84756, 11, 61, 27, 59.1, 61, 11);
%bordercross (84757, 27, 59.1, 11, 60, 59.1, 27);
%bordercross (84759, 9, 61, 11, 61, 61, 9);
%bordercross (84781, 27, 59.1, 11, 60, 59.1, 27);
%bordercross (84065, 18, 39.2, 25, 41.2, 39.2, 18);
%bordercross (84306, 2, 2.1, 3, 4.1, 2.1, 2);

if sarea_r2 NE . then do;
**assign dist_r based on county if small area has been assigned ;
  if AssignedCounty in (2,3,17) then dist_r = 1;
  if AssignedCounty in (12,14,16,20,21,28) then dist_r = 2;
  if AssignedCounty = 6 then dist_r = 3;
  if AssignedCounty = 18 then dist_r = 4;
  if AssignedCounty in (4,8,10) then dist_r = 5.1;
  if AssignedCounty in (1,9,11,13,27) then dist_r = 6;
  if AssignedCounty = 22 then dist_r = 7;
  if AssignedCounty = 23 then dist_r = 8;
  if AssignedCounty in (5,7,24) then dist_r = 9;
  if AssignedCounty = 25 then dist_r = 10;
  if AssignedCounty = 26 then dist_r = 11;
  if AssignedCounty in (15,29) then dist_r = 12;
  if AssignedCounty in (19) then dist_r=13;
end;
*****END*****;
if sarea_r2=. then AssignedCounty=.;
****We determined to give zipcode the benefit of the doubt so we need to set
county to missing and then reassign based on zip code;

/*Third assign the small areas by zip if zip does not match county and we
have not yet assigned a small area*/
if sarea_r2=. then do;
/****lhd=1 Bear River*****/
  IF zip_code= 84302 THEN sarea_r2 =1 ; /*1 Brigham City*/

  ELSE IF zip_code in
(84301,84307,84309,84311,84313,84314,84316,84324,84329,84330,84331,84334,8433
6,84340) THEN sarea_r2 =2.1;
  ELSE IF zip_code in (84337) THEN sarea_r2= 2.2 ;
  ELSE IF zip_code IN (84321, 84322, 84323, 84326, 84332) THEN sarea_r2=
3.1 ;
  ELSE IF zip_code IN (84341) THEN sarea_r2= 3.2 ;
  ELSE IF zip_code IN (84028, 84038, 84064, 84086, 84304, 84305, 84308,
84318,84320, 84325, 84327, 84328, 84333, 84338, 84339) THEN sarea_r2= 4.1 ;

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ELSE IF zip_code IN (84319) THEN sarea_r2= 4.2 ;
ELSE IF zip_code IN (84335) THEN sarea_r2= 4.3 ;

/*****lhd=12 Weber-Morgan*****/

*All of small area 5 zip codes cross borders;

ELSE IF zip_code IN (84310,84317,84414) THEN sarea_r2= 6.1;
ELSE IF zip_code in (84018) THEN sarea_r2 = 6.2 ;

ELSE IF zip_code in (84401, 84402) THEN sarea_r2 = 7 ;

ELSE IF zip_code in (84403, 84408, 84415) THEN sarea_r2=8 ;

ELSE IF zip_code in (84067) THEN sarea_r2 = 9 ;

    *All of small area 10 zip codes cross borders;

/*****lhd=3 Davis*****/

ELSE IF zip_code IN (84015, 84016, 84089) THEN sarea_r2 = 11 ;

ELSE IF zip_code IN (84040, 84041) THEN sarea_r2 = 12 ;

ELSE IF zip_code IN (84037) THEN sarea_r2 = 13.1 ;
ELSE IF zip_code IN (84075) THEN sarea_r2 = 13.2 ;

ELSE IF zip_code IN (84014) THEN sarea_r2 = 14.1 ;
ELSE IF zip_code IN (84025) THEN sarea_r2 = 14.2 ;

ELSE IF zip_code IN (84054) THEN sarea_r2 = 15.1 ;
ELSE IF zip_code IN (84087) THEN sarea_r2 = 15.2 ;

ELSE IF zip_code IN (84010, 84011) THEN sarea_r2 = 16 ;

/*****lhd=4 Salt Lake*****/

ELSE IF zip_code in (84116, 84122) THEN sarea_r2 = 17 ;

ELSE IF zip_code IN (84103, 84150) THEN sarea_r2 = 18 ;

ELSE IF zip_code IN (84108, 84158) THEN sarea_r2 = 19.1;

ELSE IF zip_code = 84044 THEN sarea_r2 = 20 ;

ELSE IF zip_code IN (84104,84110,84145,84151,84180) THEN sarea_r2 =
21.1 ;

ELSE IF zip_code IN (84120, 84170) THEN sarea_r2 = 22.1 ;
ELSE IF zip_code IN (84128) THEN sarea_r2 = 22.2 ;

ELSE IF zip_code IN (84119, 84125, 84126, 84127, 84130, 84131) THEN
sarea_r2 = 23.1;

ELSE IF zip_code IN (84101,84102,84111,84112,84113,84114,84133,84147)
THEN sarea_r2 = 24.1 ;

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ELSE IF zip_code IN (84105) THEN sarea_r2 = 24.2 ;

ELSE IF zip_code IN (84115, 84165) THEN sarea_r2 = 25 ;

ELSE IF zip_code IN (84106,84152) THEN sarea_r2 = 26.1 ;
ELSE IF zip_code IN (84124) THEN sarea_r2 = 26.2 ;
ELSE IF zip_code IN (84109) THEN sarea_r2 = 26.3 ;
ELSE IF zip_code IN (84117) THEN sarea_r2 = 27.1 ;

ELSE IF zip_code IN (84121, 84171) THEN sarea_r2 = 28 ;

ELSE IF zip_code=84118 THEN sarea_r2 = 29.1;

ELSE IF zip_code=84123 THEN sarea_r2 = 30 ;
ELSE IF zip_code IN (84129) THEN sarea_r2 = 30.1; /*not data from ACS*/

ELSE IF zip_code IN (84107, 84157) THEN sarea_r2 = 31 ;

ELSE IF zip_code =84047 THEN sarea_r2 = 32 ;

ELSE IF zip_code =84084 THEN sarea_r2 = 33.2;

ELSE IF zip_code=84088 THEN sarea_r2 = 34.1;
ELSE IF zip_code in (84006, 84081) THEN sarea_r2 = 34.2 ;

ELSE IF zip_code in (84095) THEN sarea_r2 = 35.1 ;
ELSE IF zip_code in (84009) THEN sarea_r2 = 35.2 ;
ELSE IF zip_code IN (84070, 84091) THEN sarea_r2 = 36.1 ;
ELSE IF zip_code IN (84094) THEN sarea_r2 = 36.2 ;

ELSE IF zip_code IN (84090, 84093) THEN sarea_r2 = 37 ;

ELSE IF zip_code IN (84092, 84138) THEN sarea_r2 = 38 ;

    *All of small area 39.1 zip codes cross borders;
    *small area 39.2 zip code crosses borders;

ELSE IF zip_code IN (84096) THEN sarea_r2 = 39.3 ;

/*****lhd=8 Tooele*****/

ELSE IF zip_code in (84022,84069,84071,84080) THEN sarea_r2 = 40.1;
ELSE IF zip_code in (84074) THEN sarea_r2 = 40.2;

/*****lhd=10 Utah County*****/

ELSE IF zip_code IN (84005,84013) THEN sarea_r2 = 41.1 ;
ELSE IF zip_code IN (84043) THEN sarea_r2 = 41.2 ;
ELSE IF zip_code IN (84045) THEN sarea_r2 = 41.3 ;

ELSE IF zip_code IN (84003) THEN sarea_r2 = 42.1 ;
ELSE IF zip_code IN (84004) THEN sarea_r2 = 42.2 ;

ELSE IF zip_code IN (84042,84062) THEN sarea_r2 = 43 ;

ELSE IF zip_code IN (84057,84059) THEN sarea_r2 = 44 ;

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ELSE IF zip_code =84058 THEN sarea_r2 = 45 ;

ELSE IF zip_code =84097 THEN sarea_r2 = 46 ;

ELSE IF zip_code IN (84602) THEN sarea_r2 = 47 ;

ELSE IF zip_code IN (84601,84603) THEN sarea_r2 = 48.1 ;
  ELSE IF zip_code IN (84605,84606) THEN sarea_r2 = 48.2 ;

ELSE IF zip_code IN (84653) THEN sarea_r2 = 49.1 ;
  ELSE IF zip_code IN (84660) THEN sarea_r2 = 49.2 ;
  ELSE IF zip_code IN (84663) THEN sarea_r2 = 49.3;
  ELSE IF zip_code IN (84664) THEN sarea_r2 = 49.4 ;

ELSE IF zip_code IN (84626,84633,84655) THEN sarea_r2 = 50.1 ;
  ELSE IF zip_code IN (84651) THEN sarea_r2 = 50.2 ;

/*****lhd=7 Summit*****/

ELSE IF zip_code IN (84098) THEN sarea_r2 = 51.1;
  ELSE IF zip_code IN (84024,84055,84061) THEN sarea_r2 = 51.2;

/*****lhd=11 Wasatch*****/

ELSE IF zip_code in (84032,84049,84082) THEN sarea_r2 = 52;

/*****lhd=9 Tri County*****/

ELSE IF zip_code in
(84008,84026,84035,84039,84046,84063,84076,84078,84079,84085) THEN sarea_r2 =
53.1;
  ELSE IF zip_code in
(84001,84002,84007,84021,84027,84031,84051,84053,84072,84073) THEN sarea_r2 =
53.2;

/*****lhd=2 Central*****/

ELSE IF zip_code in (84645,84648) THEN sarea_r2 = 54.1;
  ELSE IF zip_code in (84624,84631,84635, 84640) THEN sarea_r2 = 54.2;
  ELSE IF zip_code in (84627,84634,84642,84647) THEN sarea_r2 = 54.3;
  ELSE IF zip_code in
(84620,84621,84622,84623,84628,84630,84632,84636,84637,84638,84639,84643,
84644,84646,84649,84652,84656,84657,84662,84665,84667,84711,84715,84723,84724
,84728,84730,84732,84734,84739,84740,84744,84747,
84749,84750,84766,84773,84775) THEN sarea_r2 = 54.4;

  ELSE IF zip_code in (84654,84701,84754) THEN sarea_r2 = 55.1;

/*****lhd=5.1 Southeast*****/

ELSE IF zip_code in (84520,84526,84529,84539,84542) THEN sarea_r2 = 56.1;

  ELSE IF zip_code in (84513,84516,84518,84521,84522,84523,84528,84537)
THEN sarea_r2 = 56.2;

  ELSE IF zip_code in (84515, 84540) THEN sarea_r2 = 57.1;

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/*****lhd=13 San Juan*****/

    ELSE IF zip_code in (84511,84535) THEN sarea_r2 = 57.3;
    ELSE IF zip_code in (84510,84512,84530,84531,84534,84536) THEN sarea_r2
= 57.4;
/*****lhd=6 Southwest*****/

    ELSE IF zip_code IN (84770, 84771, 84790, 84791) THEN sarea_r2 =58 ;

    ELSE IF zip_code in
(84733,84746,84763,84767,84774,84779,84782,84783,84784) THEN sarea_r2 =59.1;
    ELSE IF zip_code in (84780) THEN sarea_r2 =59.2;
    ELSE IF zip_code in (84745) THEN sarea_r2 =59.3;
    ELSE IF zip_code in (84738,84765) THEN sarea_r2 =59.4;

    ELSE IF zip_code IN (84721) THEN sarea_r2 = 60 ;

    ELSE IF zip_code in
(84710,84713,84714,84716,84718,84719,84729,84731,84735,84736,84741,84742,8475
1,84752,84753,84755,84758,84760,84761,84762,
                        84764,84772,84776) THEN sarea_r2=
61;

END;
*****
*****;
* Assign AssignedCounty if zipcode recorded or small area has been assigned;
**removed zip codes that cross boarders since already got assigned 8/15/17
SW;

if AssignedCounty=. then do;
    IF sarea_r2 =1 then AssignedCounty=2;

    ELSE IF sarea_r2 in (2.1, 2.2) then AssignedCounty=2;

    ELSE IF sarea_r2 in (3.1, 3.2) then AssignedCounty=3;
    /*Small areas 4.1*****/
    ELSE IF zipcode in (84304, 84305, 84308, 84318, 84320, 84325, 84327,
84328, 84333, 84338, 84339) then AssignedCounty=3;

    ELSE IF zipcode in (84028, 84038, 84064, 84086) then AssignedCounty=17;
    ELSE IF sarea_r2 in (4.2, 4.3) then AssignedCounty=3;

    ELSE IF sarea_r2= 5 then AssignedCounty=29;

    ELSE IF sarea_r2= 6.1 then AssignedCounty=29;
    ELSE IF sarea_r2= 6.2 then AssignedCounty=15;

    ELSE IF sarea_r2 in (7, 8, 9, 10) then AssignedCounty=29;

    ELSE IF sarea_r2 in (11, 12, 13.1, 13.2, 14.1, 14.2, 15.1, 15.2, 16)
then AssignedCounty=6;

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ELSE IF sarea_r2 in (17, 18, 19.1, 20, 21.1, 22.1, 22.2, 23.1, 24.1,
24.2, 25, 26.1, 26.2, 26.3, 27.1, 28, 29.1, 30, 30.1, 31, 32, 33.2,
34.1, 34.2, 35.1, 35.2, 36.1, 36.2, 37,
38, 39.1, 39.2, 39.3) then AssignedCounty=18;

ELSE IF sarea_r2 in (40.1, 40.2) then AssignedCounty=23;

ELSE IF sarea_r2 in (41.1, 41.2, 41.3, 42.1, 42.2, 43, 44, 45, 46, 47,
48.1, 48.2, 49.1, 49.2, 49.3, 49.4, 50.1, 50.2) then AssignedCounty=25;

ELSE IF sarea_r2 in (51.1, 51.2) then AssignedCounty=22;

ELSE IF sarea_r2 = 52 then AssignedCounty=26;
/*****small area 53.1*****/
ELSE if zipcode in (84046) then AssignedCounty=5;
ELSE if zipcode in (84008, 84026, 84035, 84039, 84063, 84076, 84078,
84079, 84085) then AssignedCounty=24;

ELSE IF sarea_r2 = 53.2 then AssignedCounty=7;

ELSE IF sarea_r2 in (54.1) then AssignedCounty=12;
ELSE IF sarea_r2 = 54.2 then AssignedCounty=14;
ELSE IF sarea_r2 in (54.3) then AssignedCounty=20;
/*****small area 54.4*****/
ELSE IF zipcode in (84628, 84639) then AssignedCounty=12;

ELSE IF zipcode in (84636, 84637, 84638, 84644, 84649, 84656, 84728)
then AssignedCounty=14;
ELSE IF zipcode in (84723, 84732, 84740, 84750) then AssignedCounty=16;

ELSE IF zipcode in (84621, 84622, 84623, 84630, 84632, 84643, 84646,
84662, 84665, 84667) then AssignedCounty=20;
ELSE IF zipcode in (84620, 84652, 84657, 84711, 84724, 84730, 84739,
84744, 84766) then AssignedCounty=21;
ELSE IF zipcode in (84715, 84734, 84747, 84749, 84773, 84775) then
AssignedCounty=28;

ELSE IF sarea_r2 =55.1 then AssignedCounty=21;

ELSE IF sarea_r2 =56.1 then AssignedCounty=4;
ELSE IF sarea_r2 =56.2 then AssignedCounty=8;

ELSE IF sarea_r2 = 57.1 then AssignedCounty=10;

ELSE IF sarea_r2 in (57.3, 57.4) then AssignedCounty=19;

ELSE IF sarea_r2 in(58, 59.1, 59.2, 59.3, 59.4) then AssignedCounty=27;

ELSE IF sarea_r2 = 60 then AssignedCounty=11;

/*****small area 61*****/
ELSE IF zipcode in (84714, 84719, 84742, 84753, 84760, 84761, 84772)
then AssignedCounty=11;

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ELSE IF zipcode in (84716, 84718, 84735, 84736, 84764, 84776) then
AssignedCounty=9;
ELSE IF zipcode in (84710, 84729, 84741, 84755, 84758, 84762) then
AssignedCounty=13;
else if zipcode in (84713, 84731, 84751, 84752) then AssignedCounty=1;

end;

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```

**Assign dist_r to those with only a valid county no valid zipcode;

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```

if AssignedCounty in (2,3,17) then dist_r = 1;
if AssignedCounty in (12,14,16,20,21,28) then dist_r = 2;
if AssignedCounty = 6 then dist_r = 3;
if AssignedCounty = 18 then dist_r = 4;
if AssignedCounty in (4,8,10) then dist_r = 5.1;
if AssignedCounty in (1,9,11,13,27) then dist_r = 6;
if AssignedCounty = 22 then dist_r = 7;
if AssignedCounty = 23 then dist_r = 8;
if AssignedCounty in (5,7,24) then dist_r = 9;
if AssignedCounty = 25 then dist_r = 10;
if AssignedCounty = 26 then dist_r = 11;
if AssignedCounty in (15,29) then dist_r = 12;
if AssignedCounty in (19) then dist_r=13;

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*****
*****Clean

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up*****
*****;

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if sarea_r2=. then sarea_r2=99; *Unassigned need
assignment;
if sarea_r2=99 then AssignedCounty=99; *Unassigned need
assignment;
if sarea_r2=99 then dist_r=99; *Unassigned need
assignment;
if sarea_r2=97 then AssignedCounty=97; *crosses boarder can't
determine county;
if sarea_r2=97 then dist_r=97; *crosses boarder can't
determine county;

```

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*****;
*****There are zip codes that are between 84000-84999 that are not valid
**;
*or at least not assigned a small area. We need to use original county code
**;
*to determine dist_r and reassign county back to the original county**;
*and then assign small area based on the county**;
*****;

```

```

if sarea_r2 in (99) then do;
*****If original county code is not FIPS you will need to change this to
sequential numbers;
*if 1<=ctycode<=57 then CountyR=(ctycode+1)/2;
*else if 1>ctycode or ctycode>57 then CountyR=.;
*CountyR=ctycode;
*AssignedCounty=&county.;
if &county. in (2,3,17) then dist_r = 1;
if &county. in (12,14,16,20,21,28) then dist_r = 2;

```

```

if &county. = 6 then dist_r = 3;
if &county. = 18 then dist_r = 4;
if &county. in (4,8,10) then dist_r = 5.1;
if &county. in (1,9,11,13,27) then dist_r = 6;
if &county. = 22 then dist_r = 7;
if &county. = 23 then dist_r = 8;
if &county. in (5,7,24) then dist_r = 9;
if &county. = 25 then dist_r = 10;
if &county. = 26 then dist_r = 11;
if &county. in (15,29) then dist_r = 12;
  if &county. in (19) then dist_r=13;

IF (&county. IN (1, 9, 13)) THEN sarea_r2= 61; /* Beaver/Garfield/Kane*/
  ELSE IF (&county. IN (4)) THEN sarea_r2 = 56.1; /*Carbon*/
  ELSE IF (&county. IN (8)) THEN sarea_r2 = 56.2; /*Emery*/
  ELSE IF (&county. IN (5, 24)) THEN sarea_r2 = 53.1; /*Daggett/Uintah*/
  ELSE IF (&county. IN (7)) THEN sarea_r2 = 53.2; /*Duchesne*/
  ELSE IF (&county. IN (10)) THEN sarea_r2 = 57.1; /*Grand*/
  *ELSE IF (&county. IN (19)) THEN sarea_r2 = 57.2; /*San Juan*/
  ELSE IF (&county. IN (16,28)) THEN sarea_r2 = 54.4; /*Piute/Wayne*/
  ELSE IF (&county.= 26) THEN sarea_r2 = 52; /*Wasatch*/
  ELSE IF (&county.=17) THEN sarea_r2= 4.1 ; /*Rich*/
  ELSE IF (&county.=15) THEN sarea_r2= 6.2 ; /*Morgan*/

if AssignedCounty=99 then AssignedCounty=&county.;

end;
run;
proc freq;
tables assignedcounty*sarea_r2/list missing;
run;

```