

Utah Local Health District and Small Area Designation Algorithm Documentation

(effective November 22, 2017; updated October 10, 2018)

Why update the algorithm?

Previously, data records could be uncategorized by geography if a particular data element was missing. Records were assigned to local health districts (LHDs) based solely on the county variable and records were assigned to Utah Small Areas based on ZIP Code and county. This difference in methodology presented a number of issues such as a higher number of missing records, inconsistency between LHD data and Small Area data for Small Areas defined as a single LHD, and possible misclassification when the ZIP Code recorded did not fall within the boundaries of the county recorded.

It was determined that using both ZIP Code and county variables would address these issues by providing more assignable records, reducing the number of missing observations, providing consistent data for both LHD and Small Area by applying the same methodology to both, and reducing bias from misclassification by determining a set of rules to be applied to records with inconsistent ZIP and county data.

Analysis and Consideration

Several data sources for ZIP Code information were considered and analyzed to determine validity and geographical boundaries for ZIP Codes including: previous Utah Small Area boundary designations, shape file from Utah Automated Geographic Reference Center (AGRC), USPS ZIP lookup tool (https://tools.usps.com/go/ZipLookupAction_input), population data from the American Community Survey (ACS) 5-year table by ZIP Code Tabulation Areas (ZCTAs), Housing and Urban Development (HUD) United States Postal Service (USPS) ZIP Code Crosswalk Files (downloaded from https://www.huduser.gov/portal/datasets/usps_crosswalk.html), utah.hometownlocator.com, and zipcodedownload.com.

It was decided that AGRC would be the primary source for determining geographic designation of ZIP Codes. Therefore, a map was created on ArcGIS Online overlaying the AGRC shape files for Utah Small Areas and county. The map can be viewed at <http://arcg.is/0XKeSP>.

In analyzing Small Area assignment using both county and ZIP Code information, it was discovered that several ZIP Codes cross county boundaries and some crossed state boundaries. In these instances, residential ratios from the HUD USPS ZIP Code Crosswalk Files (downloaded from https://www.huduser.gov/portal/datasets/usps_crosswalk.html) were applied.

Rules

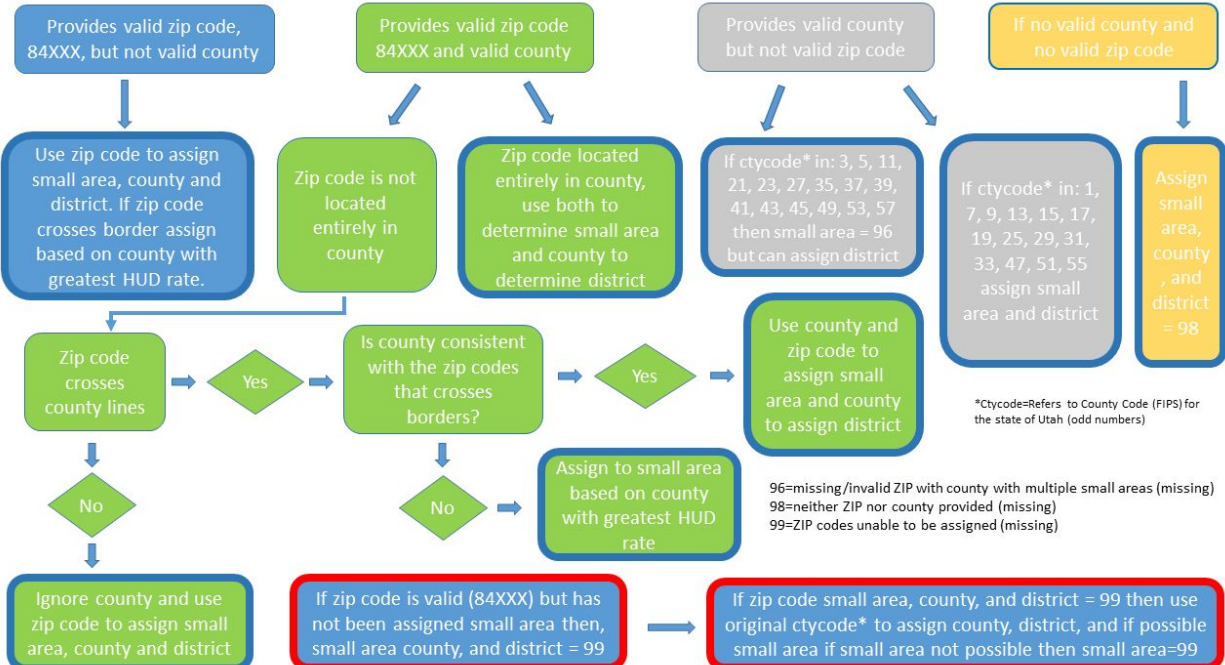
The following rules were developed to ascertain whether or not a **ZIP Code is valid and which data sources to use for geographic assignment.**

1. Only ZIP Codes beginning with “84---” will be considered valid.
2. If a ZIP Code is classified as a UNIQUE ENTITY ZIP by the USPS (with the exception of colleges and universities) AND is NOT in the AGRC file, assign it to missing; if it is in AGRC, assign it according to AGRC.
3. When a ZIP crosses a county boundary in AGRC and/or HUD, ZIPs are assigned appropriately to multiple counties, according to the source. If there was a discrepancy between AGRC and HUD, AGRC was used to determine assignment.
4. If ZIP Code is not in AGRC or HUD, but a valid ZIP Code according to USPS, utah.hometownlocator.com was used to find the geographic location of the ZIP Code.
5. If ZIP Code is not in AGRC or utah.hometownlocator.com (or if utah.hometownlocator.com pointed to an unusable ZIP), zipcodedownload.com was used to assign geographic location of ZIP Code.
6. If ZIP and county do not match, go with ZIP Code, unless ZIP Code is not assigned, then go with county.

The following rules explain the logic to **assign geographic areas:**

1. If there is *no valid ZIP Code and no valid county* then Small Area, county, and local health district will be assigned missing.
2. If there is a *valid county but not a valid ZIP Code*, then:
 - a. For counties that are Small Areas or are a subset of a Small Area you can assign the Small Areas and local health districts ([county FIPS](#) of **1, 7, 9, 13, 15, 17, 19, 25, 29, 31, 33, 47, 51, 55**)
 - b. For counties that have multiple Small Areas contained within them then code Small Area as missing but code local health district based on the county ([county FIPS](#) of **3, 5, 11, 21, 23, 27, 35, 37, 39, 41, 43, 45, 49, 53, 57**)
3. If there is a *valid ZIP Code and a valid county*, then:
 - a. Assess if the ZIP Code is located entirely within the county
 - i. When ZIP Code is located entirely within the county then use both county and ZIP Code to assign Small Area and county to assign local health district.

- ii. When the ZIP Code is not located entirely within the county (either ZIP Code crosses state or county lines, or the ZIP and county are not consistent).
 - 1. If the ZIP and county do not match then ignore county and use ZIP Code to assign Small Area, county, and local health district.
 - 2. If the ZIP Code crosses county lines and county is consistent with ZIP Code then use county and ZIP Code to assign Small Area and county to assign local health district.
 - 3. If the ZIP Code crosses county lines and county is not consistent with ZIP Code then assign to Small Area and county with greatest HUD rate. Then use that county to assign local health district.
- 4. If there is a valid ZIP Code but not a valid county, then:
 - a. Use ZIP Code to assign Small Area, county and local health district. If ZIP Code crosses border, assign Small Area and county based on county with the greatest HUD rate. Then assign local health district based on new county.
- 5. If, after going through steps above, there is a valid ZIP Code, but ZIP Code is not assigned to Small Area (e.g., some single entity ZIP Codes or post offices) then retain original county and use to assign local health district, and if possible Small Area, otherwise set Small Area to missing
 - a. For counties that are Small Areas or are a subset of a Small Area you can assign the Small Areas and local health districts ([county FIPS](#) of **1, 7, 9, 13, 15, 17, 19, 25, 29, 31, 33, 47, 51, 55**)
 - b. For counties that have multiple Small Areas contained within them then code Small Area as missing but code local health district based on the county ([county FIPS](#) of **3, 5, 11, 21, 23, 27, 35, 37, 39, 41, 43, 45, 49, 53, 57**)



Provides valid zip code, 84XXX, but not valid county

Use zip code to assign small area, county and district. If zip code crosses border assign based on county with greatest HUD rate.

Provides valid zip code 84XXX and valid county

Zip code is not located entirely in county

Zip code located entirely in county, use both to determine small area and county to determine district

Provides valid county but not valid zip code

If ctycode* in: 3, 5, 11, 21, 23, 27, 35, 37, 39, 41, 43, 45, 49, 53, 57 then small area = 96 but can assign district

If no valid county and no valid zip code

If ctycode* in: 1, 7, 9, 13, 15, 17, 19, 25, 29, 31, 33, 47, 51, 55 assign small area and district

Assign small area, county, and district = 98

Zip code crosses county lines

Yes

Is county consistent with the zip codes that crosses borders?

Yes

Use county and zip code to assign small area and county to assign district

No

Ignore county and use zip code to assign small area, county and district

No

Assign to small area based on county with greatest HUD rate

If zip code is valid (84XXX) but has not been assigned small area then, small area county, and district = 99

If zip code small area, county, and district = 99 then use original ctycode* to assign county, district, and if possible small area if small area not possible then small area=99

FIPS Codes for Counties in Utah

County	FIPS County Code
Beaver	1
Box Elder	3
Cache	5
Carbon	7
Daggett	9
Davis	11
Duchesne	13
Emery	15
Garfield	17
Grand	19
Iron	21
Juab	23
Kane	25
Millard	27
Morgan	29
Piute	31
Rich	33
Salt Lake	35
San Juan	37
Sanpete	39
Sevier	41
Summit	43
Tooele	45
Uintah	47
Utah	49
Wasatch	51
Washington	53
Wayne	55
Weber	57

Utah Small Area ID Numbers

Small Area	Small Area ID
Brigham City	1
Box Elder County (Other) V2	2.1
Tremonton	2.2
Logan V2	3.1
North Logan	3.2
Cache County (Other)/Rich County (All) V2	4.1
Ben Lomond	5
Weber County (East)	6.1
Morgan County	6.2
Ogden (Downtown)	7
South Ogden	8
Roy/Hooper	9
Riverdale	10
Clearfield Area/Hooper	11
Layton/South Weber	12
Kaysville/Fruit Heights	13.1
Syracuse	13.2
Centerville	14.1
Farmington	14.2
North Salt Lake	15.1
Woods Cross/West Bountiful	15.2
Bountiful	16
Salt Lake City (Rose Park)	17
Salt Lake City (Avenues)	18
Salt Lake City (Foothill/East Bench)	19.1
Magna	20
Salt Lake City (Glendale) V2	21.1
West Valley (Center)	22.1
West Valley (West) V2	22.2
West Valley (East) V2	23.1
Salt Lake City (Downtown) V2	24.1
Salt Lake City (Southeast Liberty)	24.2
South Salt Lake	25
Salt Lake City (Sugar House)	26.1
Millcreek (South)	26.2
Millcreek (East)	26.3
Holladay V2	27.1
Cottonwood	28
Kearns V2	29.1
Taylorsville (East)/Murray (West)	30
Taylorsville (West)	30.1

Small Area	Small Area ID
Murray	31
Midvale	32
West Jordan (Northeast) V2	33.2
West Jordan (Southeast)	34.1
West Jordan (West)/Copperton	34.2
South Jordan V2	35.1
Daybreak	35.2
Sandy (West)	36.1
Sandy (Center) V2	36.2
Sandy (Northeast)	37
Sandy (Southeast)	38
Draper	39.1
Riverton/Bluffdale	39.2
Herriman	39.3
Tooele County (Other)	40.1
Tooele Valley	40.2
Eagle Mountain/Cedar Valley	41.1
Lehi	41.2
Saratoga Springs	41.3
American Fork	42.1
Alpine	42.2
Pleasant Grove/Lindon	43
Orem (North)	44
Orem (West)	45
Orem (East)	46
Provo/BYU	47
Provo (West City Center)	48.1
Provo (East City Center)	48.2
Salem City	49.1
Spanish Fork	49.2
Springville	49.3
Mapleton	49.4
Utah County (South) V2	50.1
Payson	50.2
Park City	51.1
Summit County (East)	51.2
Wasatch County	52
Daggett and Uintah County	53.1
Duchesne County	53.2
Nephi/Mona	54.1
Delta/Fillmore	54.2
Sanpete Valley	54.3
Central (Other)	54.4

Small Area	Small Area ID
Richfield/Monroe/Salina	55.1
Carbon County	56.1
Emery County	56.2
Grand County	57.1
Blanding/Monticello	57.3
San Juan County (Other)	57.4
St. George	58
Washington County (Other) V2	59.1
Washington City	59.2
Hurricane/La Verkin	59.3
Ivins/Santa Clara	59.4
Cedar City	60
Southwest Local Health District (Other)	61
missing/invalid ZIP with county with multiple Small Areas (missing)	96
no valid ZIP; no valid county (missing)	97
neither ZIP nor county provided (missing)	98
ZIP codes unable to be assigned (missing)	99