HOSPITALIZATION AND MORTALITY IN ALBUQUERQUE ZIP CODES

A Preliminary Descriptive Analysis of Hospitalization and Deaths at the Sub-County Level

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INTRODUCTION

This report, prepared for the Secretaries of the Department of Health and the Environment Department of the State of New Mexico, is a tentative and preliminary effort to respond to the request to "help [residents of the Mountain View area of Albuquerque] in identifying health impacts, including disease and death, that result from traffic, noise, dust, industrial waste, etc." The request can be reformulated as a question, *"How great is the disease and death burden due to selected causes in diverse sub-county areas or neighborhoods of the Albuquerque Metropolitan Statistical Area (ABQ MSA), such as the Mountain View area in the South Valley?"*

Due to the time constraints of the request, a detailed and careful study of the Hospitalization and Death Registry data sets was not possible. Rather than attempt to reach hasty conclusions, the report utilizes descriptive methods to sketch out broad outlines from available data and to suggest future avenues of inquiry for resolving the question. Thus, the above question becomes: "Does a rapid, descriptive look at available data indicate that the issue merits further study?"

BACKGROUND

Comprehensive community assessment information relative to Albuquerque, the South Valley and the Mountain View area - as well as information regarding on-going community efforts to assess environmental hazards and impacts in those areas - can be found in the following attached documents:

- *Summary of Events in Mountain View*, July 2004, K. Richards, Bernalillo County Office of Environmental Health.
- *Community Health Profile and Community Health Improvement Plan*, June 2004, Bernalillo County Community Health Council.
- *Southwest Quadrant Profile 2004*, February 2004, Southwest Improvement Council for Wellness & Human Development.
- *South Valley Environmental Quality Profile*, May 2003, Bernalillo County Office of Environmental Health.
- *Mountain View 2003*, Julio Dominguez, South Valley Partners for Environmental Justice (MS PowerPoint presentation).
- *Health and Social Indicators – Albuquerque and Bernalillo County.* (Zip Code Maps and Data Tables), to be released July 2004, NMDOH/PHD/District 1/Epidemiologist (Contact T Scharmen).

METHODS

Exploratory Analysis – Questions of environmental health are best answered through geographic analysis. This report therefore describes death and hospitalization by zip code. Zip code is convenient because of its ubiquity in medical records, but it is ultimately inadequate to the task.

Data Sources – The following data sets were utilized:

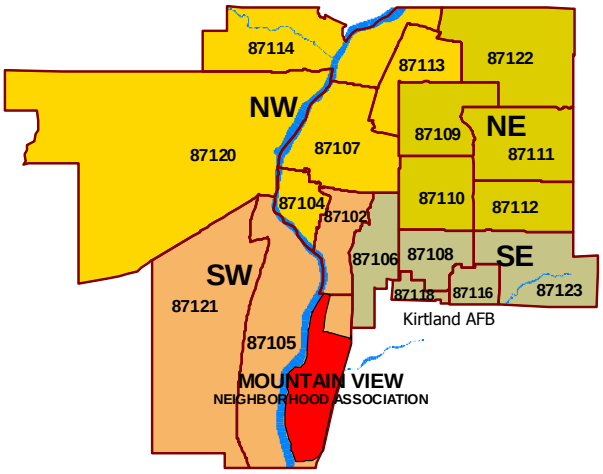
- Mortality Data Set: Deaths for Selected Causes, 1989-1991 and 1999-2001, for Albuquerque City zip codes, total of ~ 18,000 deaths (Source: NM Office of Vital Records)
- Hospitalization Data Set: Hospital Inpatient Discharge Data System (HIDDS), 1995-2002, entire State of New Mexico, total of ~ 2 million hospitalizations with patient resident zip code (Source: NM Health Policy Commission)

(Other data sets that were *not* requested due to time constraints, but that might be useful for this type of inquiry are: NM Children's Chronic Conditions Registry, NM Birth Defects Registry and NM Tumor Registry.

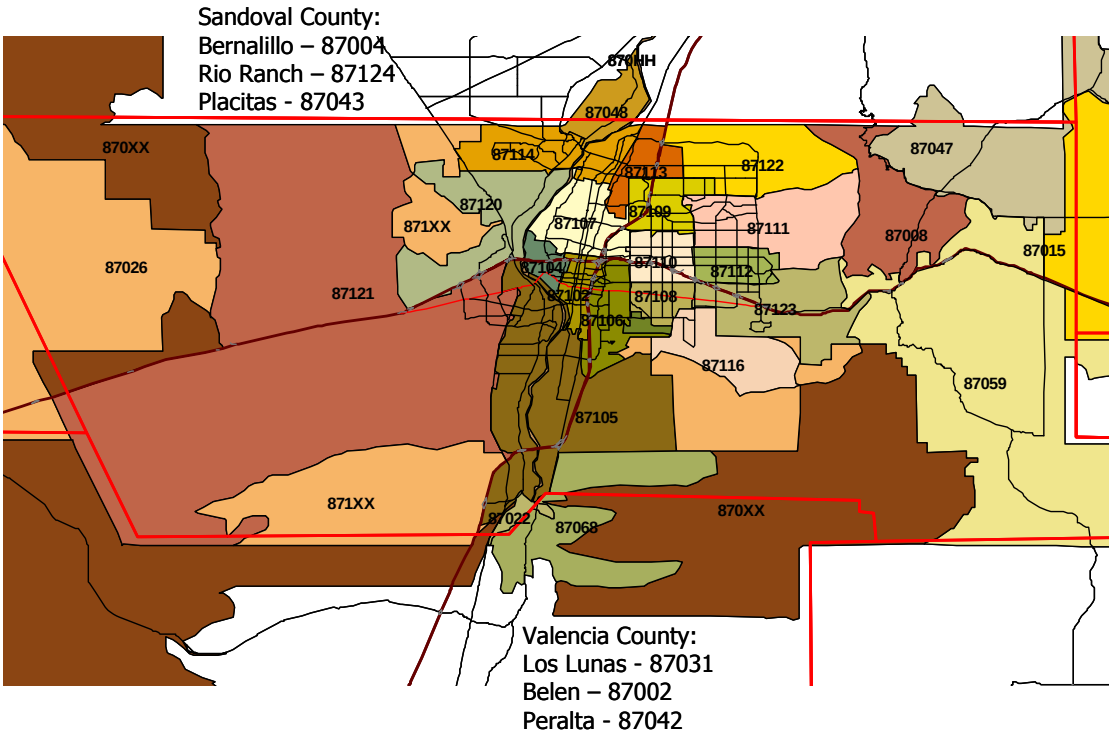
The mortality data set utilizes number of deaths aggregated into categories by the primary cause of death only. Table A list those categories. The hospitalization data set allows for 3 units of event analysis: number of patients, number of hospitalizations, and number of diagnoses. Only the latter two are utilized in this report. Upon acquisition, the morbidity data set was reduced to manageable size by selecting the geographies and outcomes of concern.

Select Zip Codes for the Albuquerque Metropolitan Statistical Area (ABQ MSA) – Data from the hospitalization set were selected based on a list of 29 zip codes chosen as representative of the ABQ MSA, which includes the city of Albuquerque, populated portions of Bernalillo County, and the villages of Bernalillo, Rio Rancho, Placitas and Corrales (in Sandoval County) and Bosque Farms, Los Lunas, Peralta and Belen (in Valencia County). Three zip codes that cover Kirtland AFB were excluded because HIDDS data does not cover federal hospitals and the small resident populations there have unusual demographics. The mortality data set included only the 20 zip codes in Bernalillo County that do not overlap county lines. In some of the tables in this report, zip code 87105 (where the Mountain View area is located) is highlighted.

Albuquerque Zip Codes



Bernalillo County and Adjacent Zip Codes



Select Causes of Mortality and Hospitalization – The HIDDS database includes ICD-9 codes for diagnoses and causes of hospitalization. A total of over 3300 ICD-9 codes were classified into 2 major categories: 1- those that are highly unlikely to be associated with environmental causes and 2- those that could possibly (even remotely) have an association with such causes. The categories were selected by an environmental health epidemiologist of the NMDOH Public Health Division, Office of Epidemiology. This report does *not* attempt to link those causes of morbidity and mortality to any environmental sources or exposures in the zip codes examined. The second category includes over 500 ICD-9s divided into 21 classifications. A list of these classifications is found in Table A. When referred to in the report, these classifications are called 'selected causes,' 'selected diagnoses,' or 'selected ICD-9s.' The mortality data was aggregated into these same categories by the Office of Vital Records; ICD-9s were included in the aggregation.

Table A - Classification of Selected Causes

Category of Cause	ICD-9 Codes Included
Malignant neoplasms of liver and intrahepatic bile ducts	155
Malignant neoplasms of trachea, bronchus and lung	162
Malignant melanoma of skin	172
Malignant neoplasms of kidney and renal pelvis	189.0,189.1
Malignant neoplasms of bladder	188
Malignant neoplasms of meninges, brain and other parts of central nervous system	191-192
Malignant neoplasms of lymphoid, hematopoietic and related tissue	200-208
Anemias	280-285
Diabetes mellitus	250
Nutritional deficiencies	260-269
Parkinson's disease	332
Alzheimer's disease	331.0
Hypertensive heart and renal disease	404
Ischemic heart diseases	410-414, 429.2
Essential (primary) hypertension and hypertensive renal disease	401 ,403
Chronic lower respiratory diseases	490-494, 496
Pneumoconioses and chemical effects	500-506
Chronic liver disease and cirrhosis	571
Nephritis, nephrotic syndrome and nephrosis	580-589
Congenital malformations, deformations, and chromosomal abnormalities	740-759
Accidental poisoning and exposure to noxious substances	E850-E869, E924.1

RESULTS

The first two sets of tables and figures detail the overall mortality and hospitalization numbers and rates across the zip codes in question. The terms 'selected causes' or 'selected diagnoses' refer to the categories of ICD-9 codes listed above.

Table 1 and Figure 1 illustrate mortality rates for ABQ MSA zip codes for the selected causes. Shaded cells in Table 1 indicate unavailable or unreliable data. The average rate for all zip codes ("ALL") and the rate for zip code 87105 are highlighted in the graphic.

Table 1 - Mortality - Crude Death Rate for Selected ICD-9s
ABQ MSA Zip Codes, 1999-2001

Zip Code	Deaths 99-01	Population 2000	Mean Annual Death Rate per 1000 for Selected Causes
87008	9	3048	0.98
87015		10737	
87026		3303	
87031		36056	
87043		3779	
87047		3259	
87048		7823	
87059	32	10206	1.05
87068		4597	
87102	208	22497	3.08
87104	72	11365	2.11
87105	428	54073	2.64
87106	138	25645	1.79
87107	262	30699	2.84
87108	382	37660	3.38
87109	267	40986	2.17
87110	406	38514	3.51
87111	392	54511	2.40
87112	344	43671	2.63
87113	62	7427	2.78
87114	146	31520	1.54
87120	145	44414	1.09
87121	145	39176	1.23
87122	47	12816	1.22
87123	247	36618	2.25
87124		52731	
All	**3732**	**544846**	**2.28**

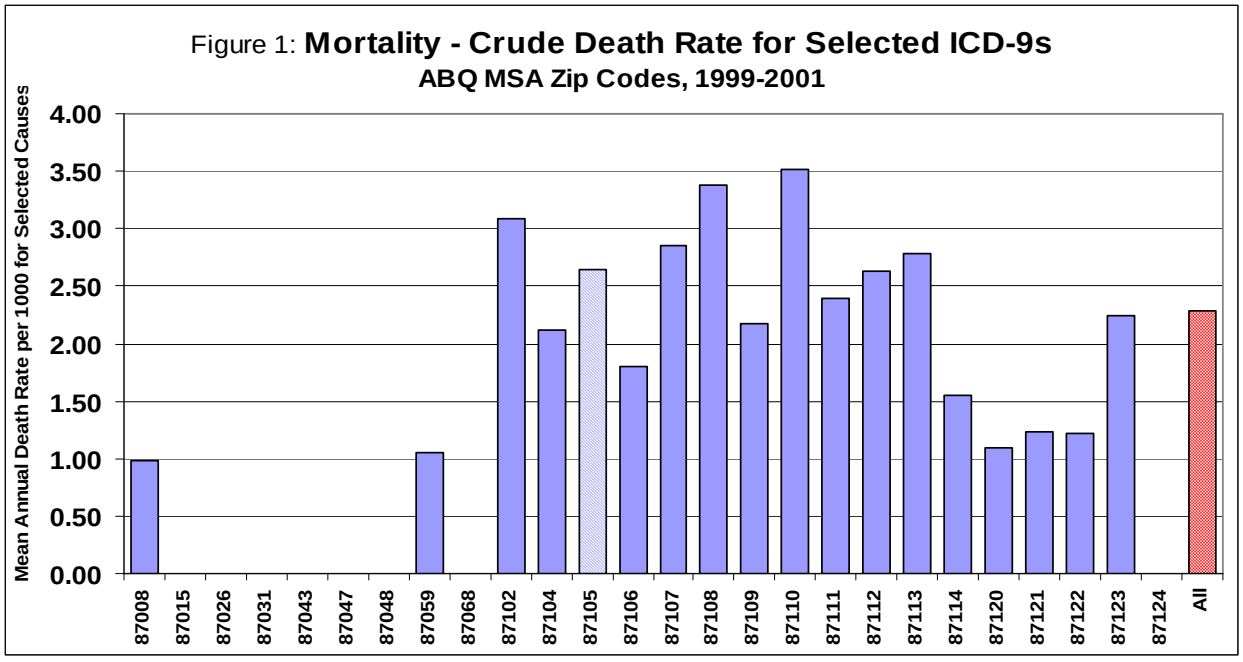
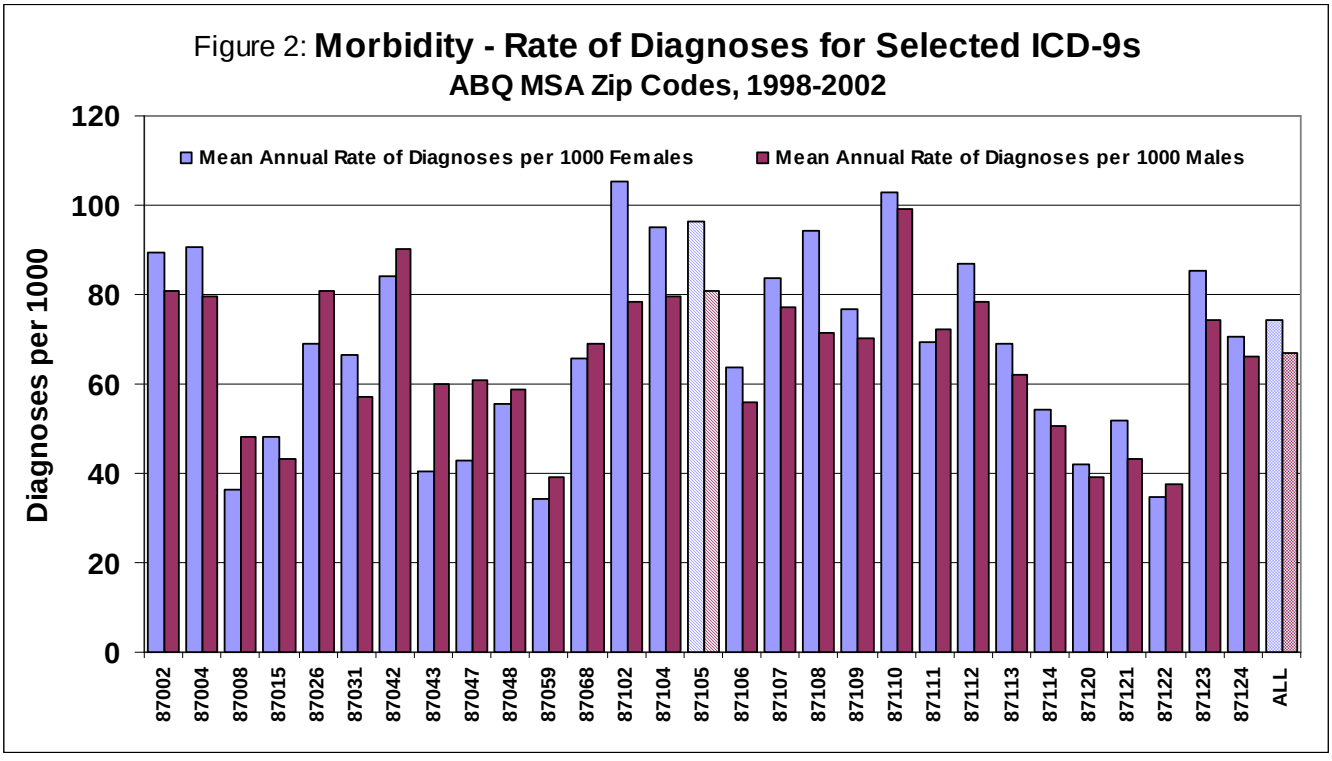


Table 2 and Figure 2 illustrate morbidity rates (hospitalizations & diagnoses) for ABQ MSA zip codes for the selected causes. The average for all zip codes ("ALL") and the rates for zip code 87105 are highlighted in the graphic. A cursory analysis of race/ethnicity in these data revealed that patients from zip codes with higher rates of hospitalization are almost twice as likely to be Hispanic or Native American (odds ratio=1.96; $p < 0.0001$).

Table 2 - Morbidity - Rate of Diagnoses for Selected ICD-9s
ABQ MSA Zip Codes, 1998-2002

Zip	Tot Sel Hosp Fem	Tot Sel Dx Fem	Tot Pop Fem	Mean Annual Rate of Hospitalizations per 1000 Females	Mean Annual Rate of Diagnoses per 1000 Females	Tot Sel Hosp Males	Tot Sel Dx Males	Tot Pop Males	Mean Annual Rate of Hospitalizations per 1000 Males	Mean Annual Rate of Diagnoses per 1000 Males
87002	2786	4792	10743	52	89	2190	4048	10003	22	81
87004	1116	1922	4237	53	91	810	1513	3798	21	80
87008	182	267	1468	25	36	210	382	1580	13	48
87015	835	1292	5349	31	48	666	1170	5388	12	43
87026	355	589	1709	42	69	328	645	1594	21	81
87031	3605	5875	17672	41	66	2828	5251	18384	15	57
87042	406	646	1540	53	84	331	661	1465	23	90
87043	260	404	1999	26	40	289	535	1780	16	60
87047	237	346	1609	29	43	260	501	1650	16	61
87048	718	1106	3978	36	56	648	1132	3845	17	59
87059	570	871	5069	22	34	529	1004	5137	10	39
87068	466	780	2380	39	66	405	766	2217	18	69
87102	3252	5774	10983	59	105	2386	4504	11514	21	78
87104	1600	2851	6003	53	95	1156	2129	5362	22	79
87105	7429	13068	27164	55	96	5670	10855	26909	21	81
87106	2454	4141	12974	38	64	1929	3533	12671	15	56
87107	3975	6670	15927	50	84	3026	5685	14772	20	77
87108	5462	9097	19319	57	94	3618	6545	18341	20	71
87109	5136	8277	21516	48	77	3535	6819	19470	18	70
87110	6284	10345	20095	63	103	4793	9152	18419	26	99
87111	6168	9801	28315	44	69	5005	9463	26196	19	72
87112	5985	9976	22980	52	87	4266	8089	20691	21	78
87113	826	1350	3918	42	69	604	1087	3509	17	62
87114	2792	4425	16320	34	54	2071	3859	15200	14	51
87120	3077	4771	22654	27	42	2360	4244	21760	11	39
87121	3213	5271	20392	32	52	2182	4055	18784	12	43
87122	764	1141	6556	23	35	660	1171	6260	11	37
87123	4818	8087	18964	51	85	3432	6558	17654	19	74
87124	5935	9642	27362	43	70	4488	8398	25369	18	66
ALL	**80706**	**133577**	**359195**	**45**	**74**	**60675**	**113754**	**339722**	**18**	**67**

Figure 2: **Morbidity - Rate of Diagnoses for Selected ICD-9s**
ABQ MSA Zip Codes, 1998-2002

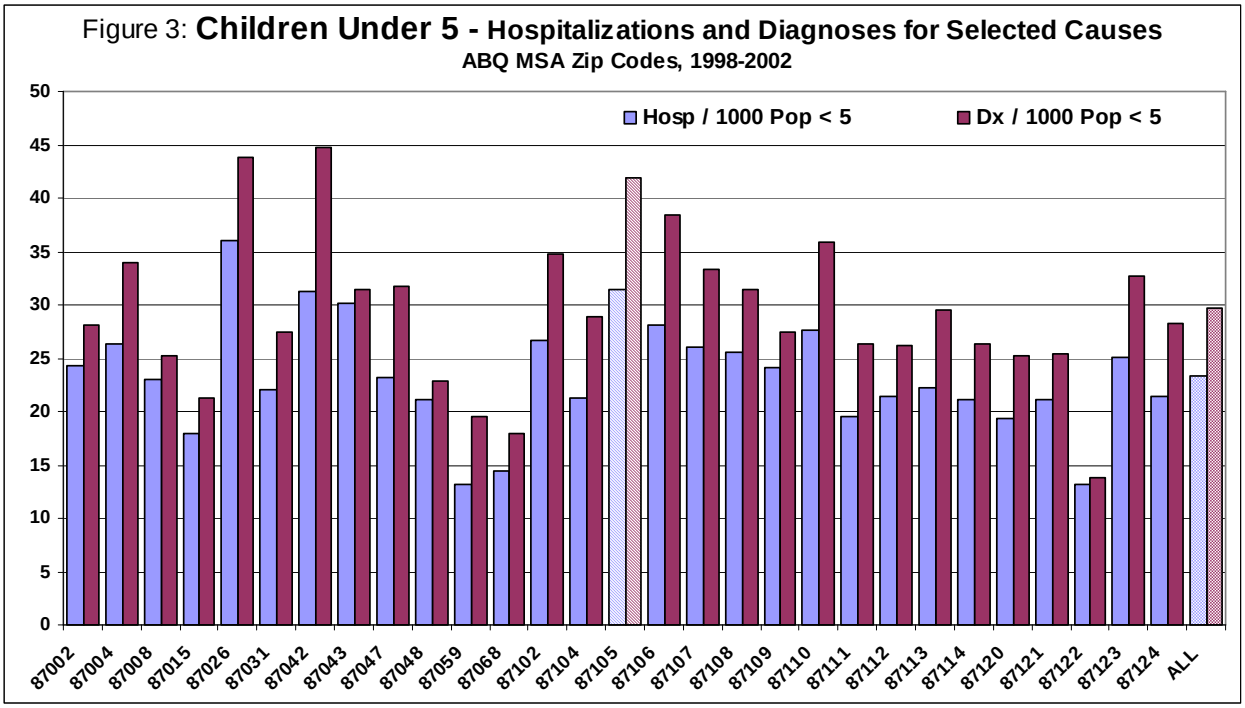


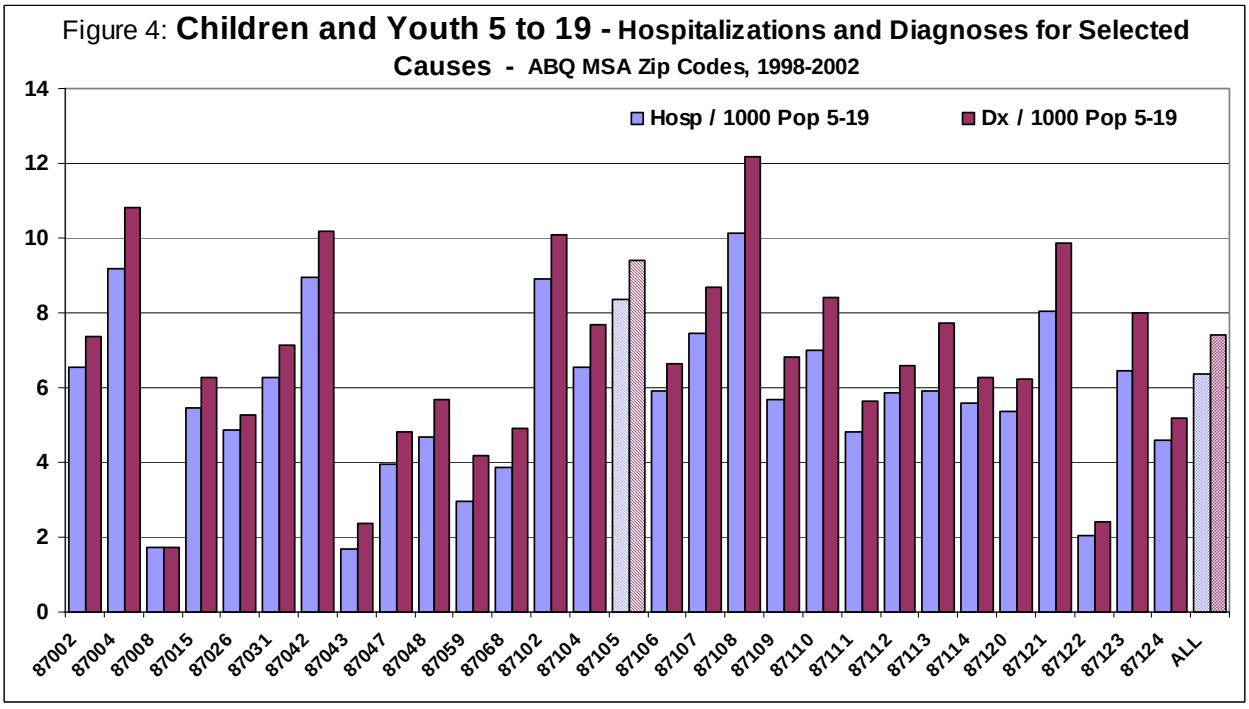
The table below ranks zip code 87105 (South Valley) for each of the 21 categories of selected ICD-9s. In each case, the first number represents the rank of the zip code and the second number the total number of zip codes for which a stable rate was calculated.

Table B - Zip Code 87105 Ranked by Mortality and Hospitalization Causes (Primary Cause Only)

Cause	Rank of Zip Code 87105 Rate among Mortality Causes	Rank of Zip Code 87105 Rate among Hospitalizations
Malignant neoplasms of liver and intrahepatic bile ducts	3/15	18/20
Malignant neoplasms of trachea, bronchus and lung	13/19	20/29
Malignant melanoma of skin	12/12	11/18
Malignant neoplasms of kidney and renal pelvis	2/13	10/28
Malignant neoplasms of bladder	9/12	21/28
Malignant neoplasms of meninges, brain and other parts of central nervous system	7/11	19/26
Malignant neoplasms of lymphoid, hematopoietic and related tissue	12/19	5/30
Anemias	-	11/30
Diabetes mellitus	5/20	4/33
Nutritional deficiencies	8/9	14/25
Parkinson's disease	6/13	7/24
Alzheimer's disease	13/17	19/26
Hypertensive heart and renal disease	1/1	5/24
Ischemic heart diseases	8/17	5/33
Essential (primary) hypertension and hypertensive renal disease	6/12	3/29
Chronic lower respiratory diseases	9/19	6/33
Pneumoconioses and chemical effects	6/6	3/11
Chronic liver disease and cirrhosis	2/16	2/31
Nephritis, nephrotic syndrome and nephrosis	5/16	4/31
Congenital malformations, deformations, and chromosomal abnormalities	4/15	3/33
Accidental poisoning and exposure to noxious substances	1/16	3/33
All Diagnostic Categories	**7/29**	**5/34**

Figures 3 through 6 compare Hospitalization and Diagnosis rates for the selected causes across all zip codes for each of 4 different age groups. (A person may have multiple hospitalizations, and each hospitalization may be attributed to multiple diagnoses.) The data tables from which these figures were derived can be found in an attachment.





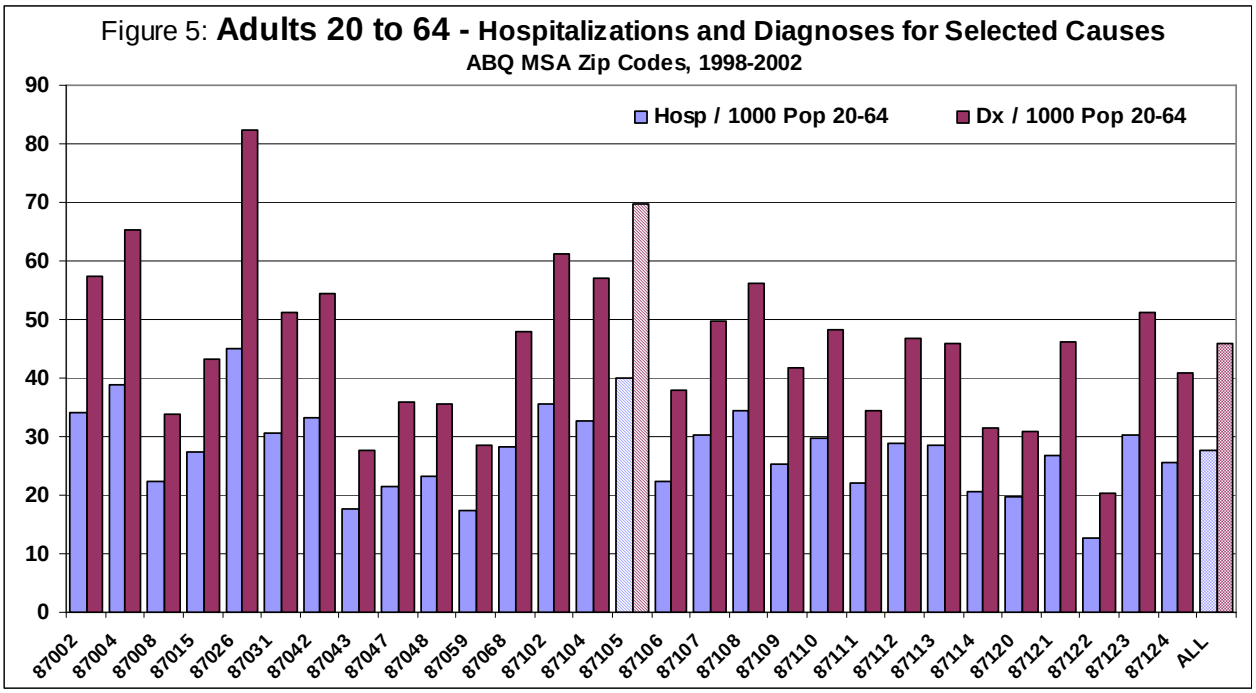


Figure 5: Adults 20 to 64 - Hospitalizations and Diagnoses for Selected Causes
ABQ MSA Zip Codes, 1998-2002
Hosp / 1000 Pop 20-64
Dx / 1000 Pop 20-64
90
80
70
60
50
40
30
20
10
0
87002
87004
87008
87015
87026
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ALL

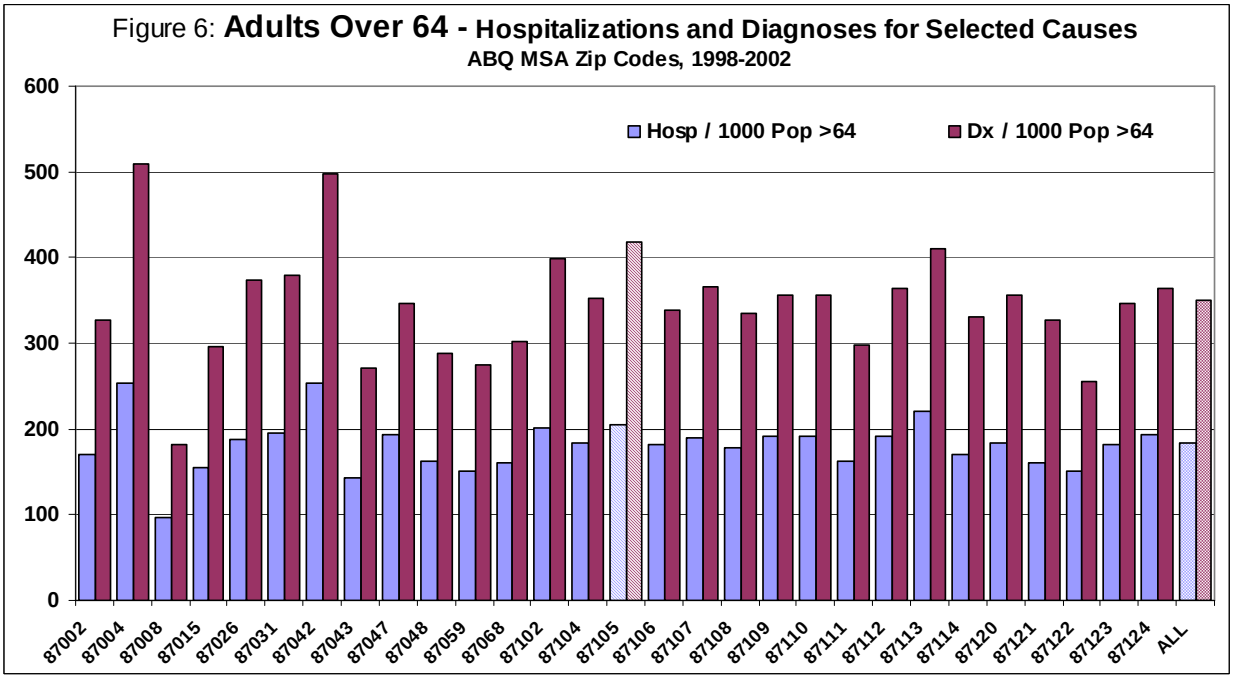
Figure 6: Adults Over 64 - Hospitalizations and Diagnoses for Selected Causes
ABQ MSA Zip Codes, 1998-2002
Hosp / 1000 Pop >64
Dx / 1000 Pop >64
600
500
400
300
200
100
0
87002
87004
87008
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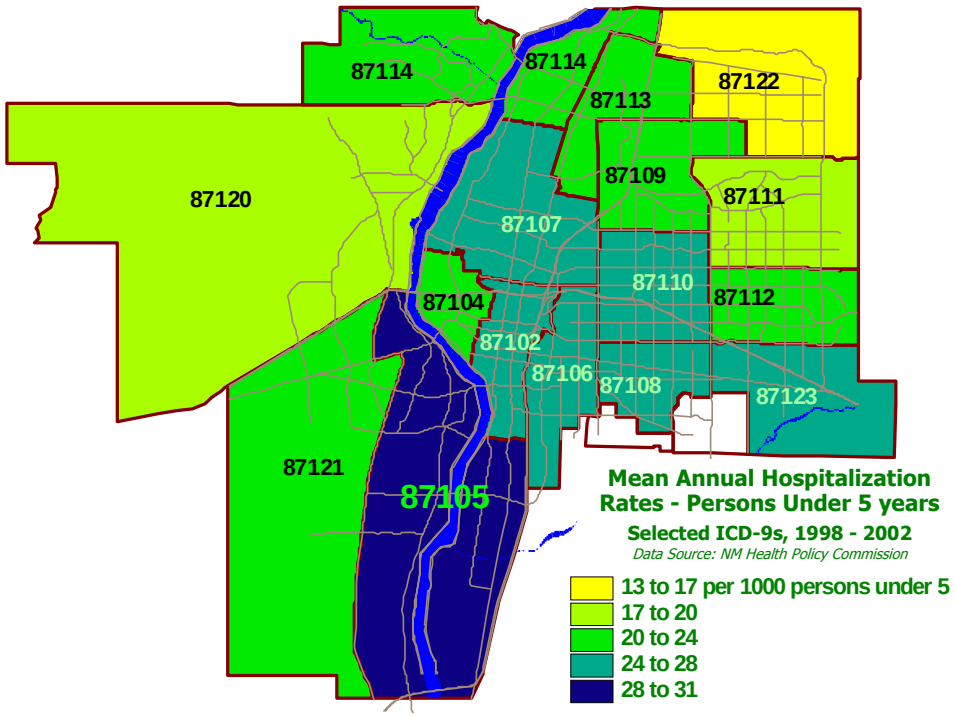
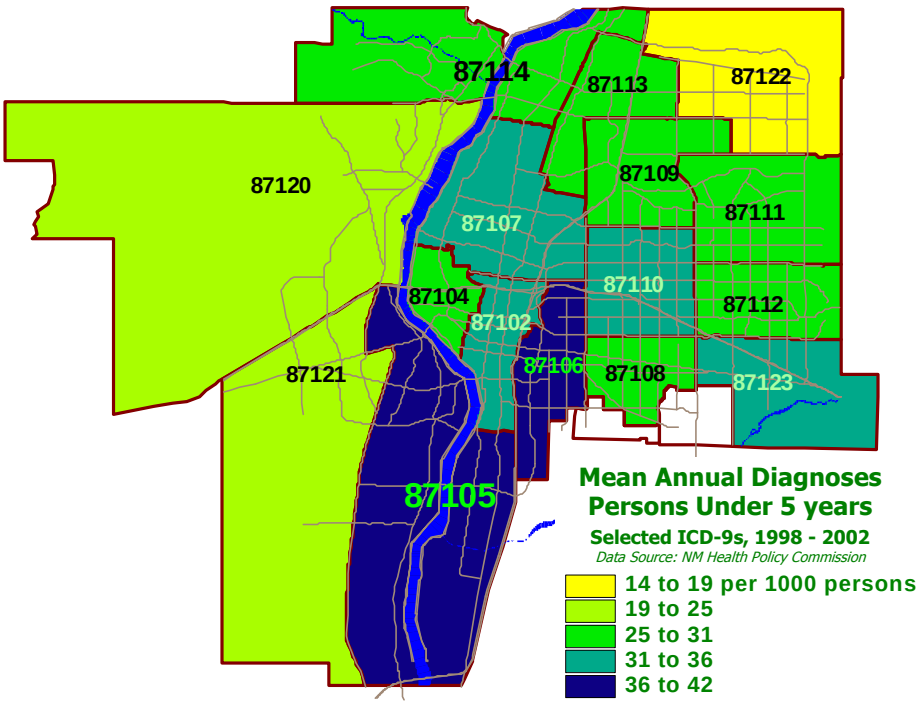
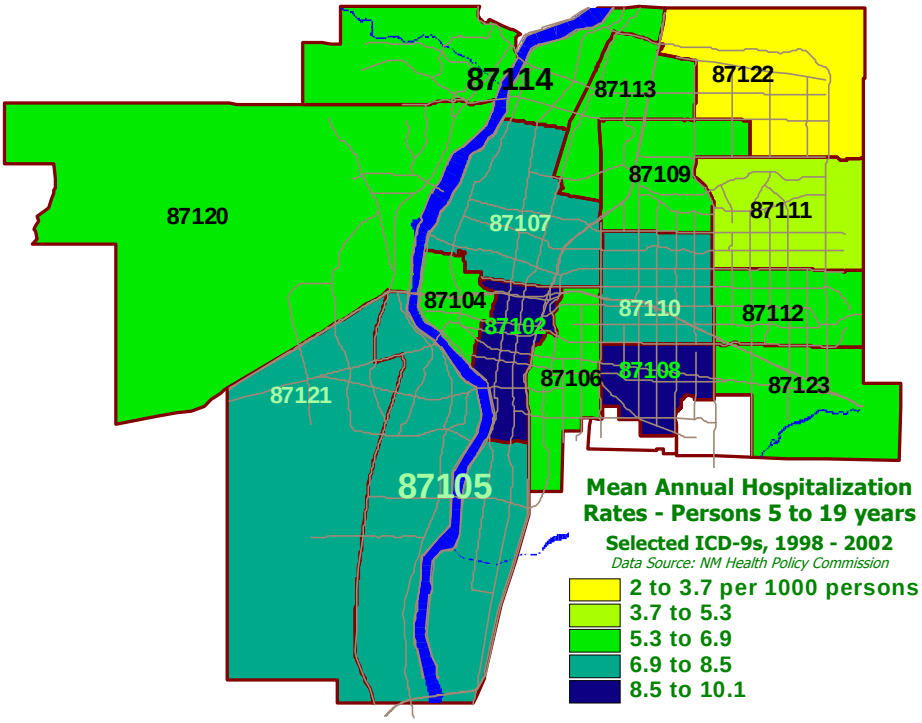
ALL

The following pages contain eleven maps that compare the hospitalization and diagnosis rates for the selected ICD-9s in the Albuquerque zip codes for 4 age groups from children to seniors. The final 3 maps include 2 that compare one category of ICD-9s, “Accidental poisonings and exposure to noxious substances” across the zip codes for two adult age groups, and 1 (from a different hospitalization data set) that compares asthma hospitalization rates for children 5 to 14 years of age. (Maps produced by Sarah Khanlian, MPH Epidemiology Intern.)



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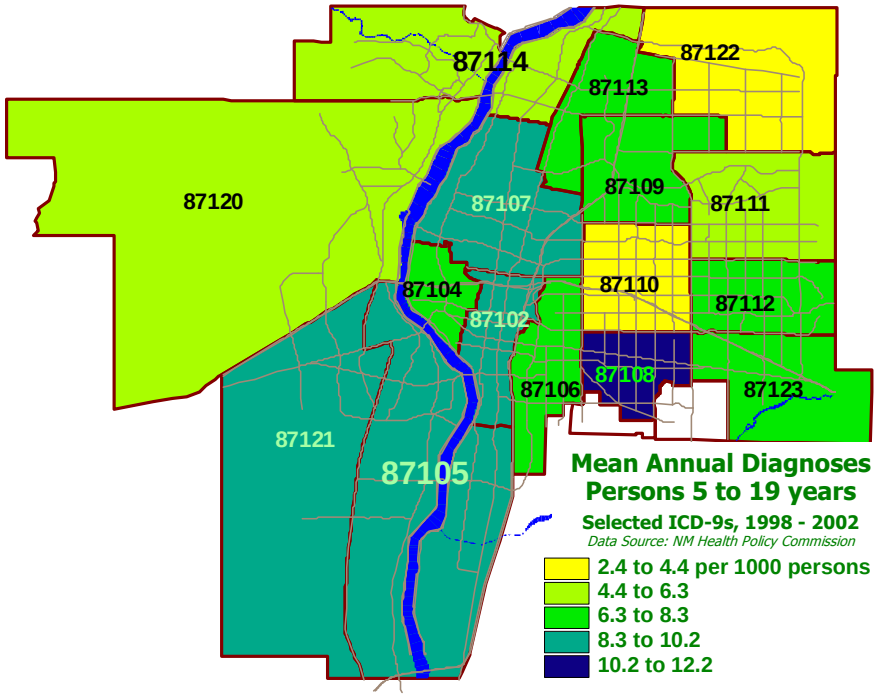
Mean Annual Hospitalization Rates - Persons 5 to 19 years
Selected ICD-9s, 1998 - 2002
Data Source: NM Health Policy Commission
2 to 3.7 per 1000 persons
3.7 to 5.3
5.3 to 6.9
6.9 to 8.5
8.5 to 10.1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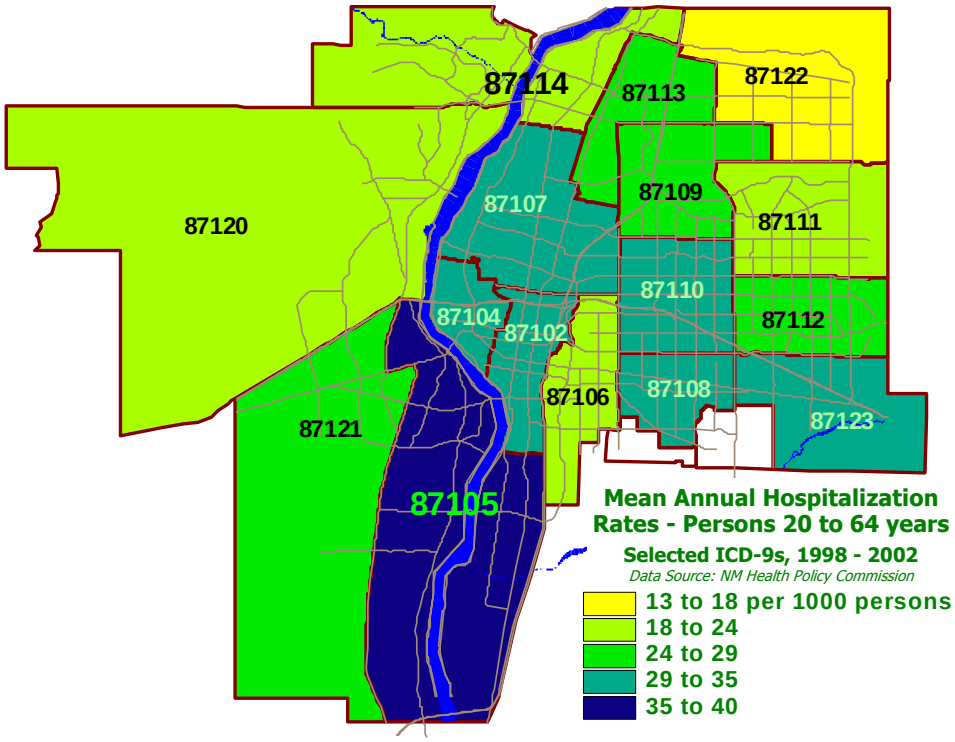
Mean Annual Diagnoses Persons 5 to 19 years
Selected ICD-9s, 1998 - 2002
Data Source: NM Health Policy Commission
2.4 to 4.4 per 1000 persons
4.4 to 6.3
6.3 to 8.3
8.3 to 10.2
10.2 to 12.2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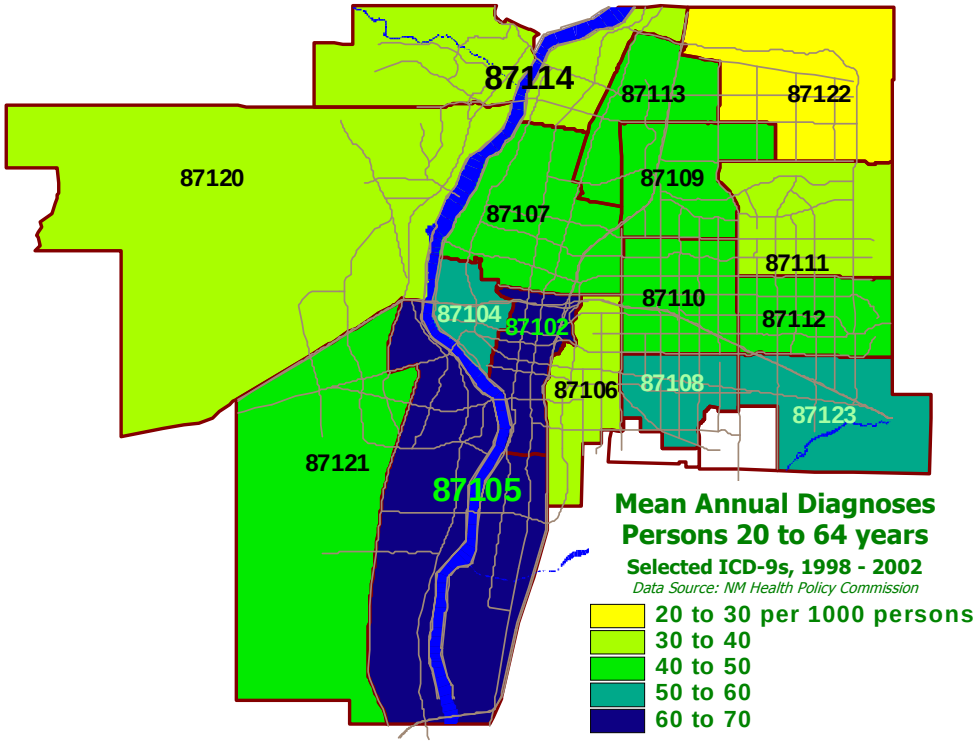
Mean Annual Hospitalization Rates - Persons 20 to 64 years
Selected ICD-9s, 1998 - 2002
Data Source: NM Health Policy Commission
13 to 18 per 1000 persons
18 to 24
24 to 29
29 to 35
35 to 40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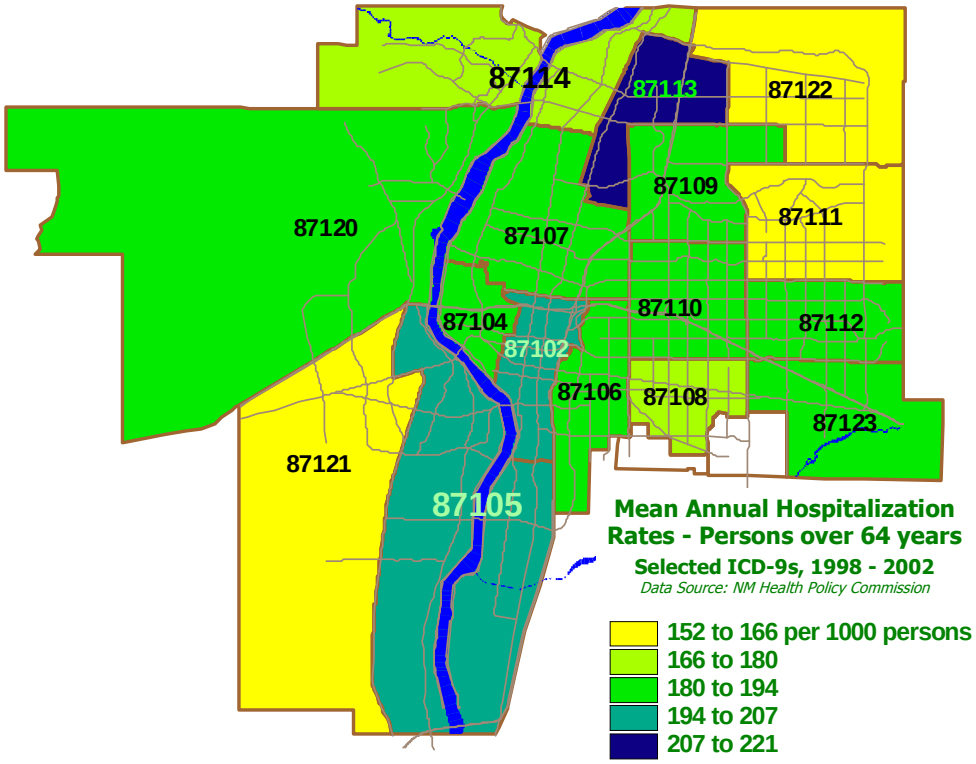
Mean Annual Diagnoses Persons 20 to 64 years
Selected ICD-9s, 1998 - 2002
Data Source: NM Health Policy Commission
20 to 30 per 1000 persons
30 to 40
40 to 50
50 to 60
60 to 70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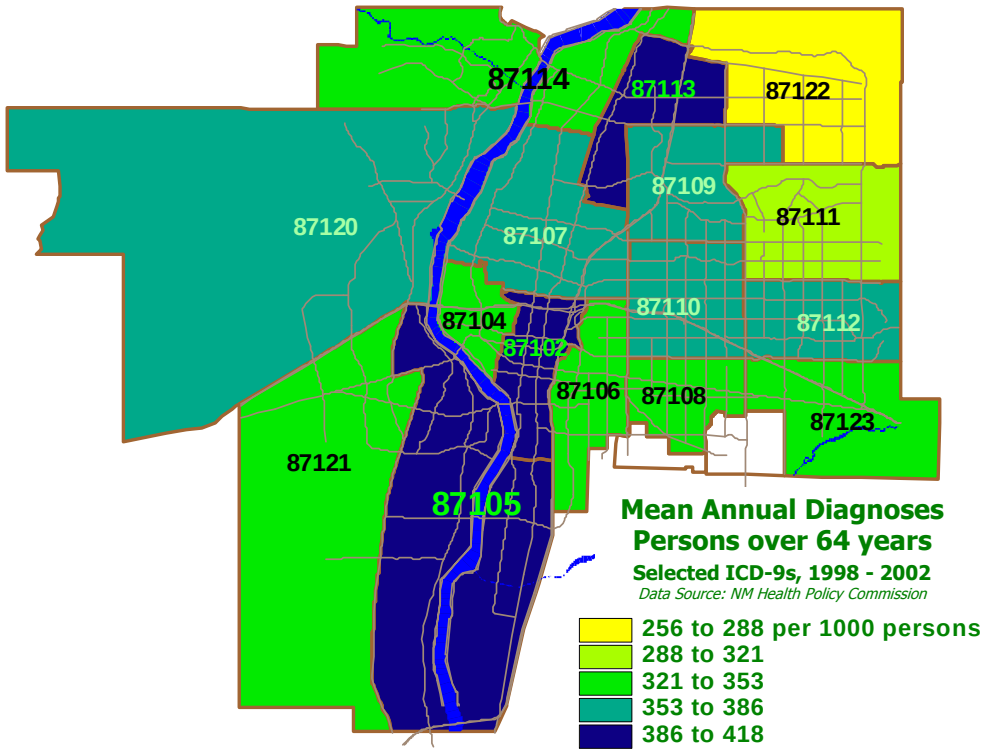
Mean Annual Hospitalization Rates - Persons over 64 years
Selected ICD-9s, 1998 - 2002
Data Source: NM Health Policy Commission
152 to 166 per 1000 persons
166 to 180
180 to 194
194 to 207
207 to 221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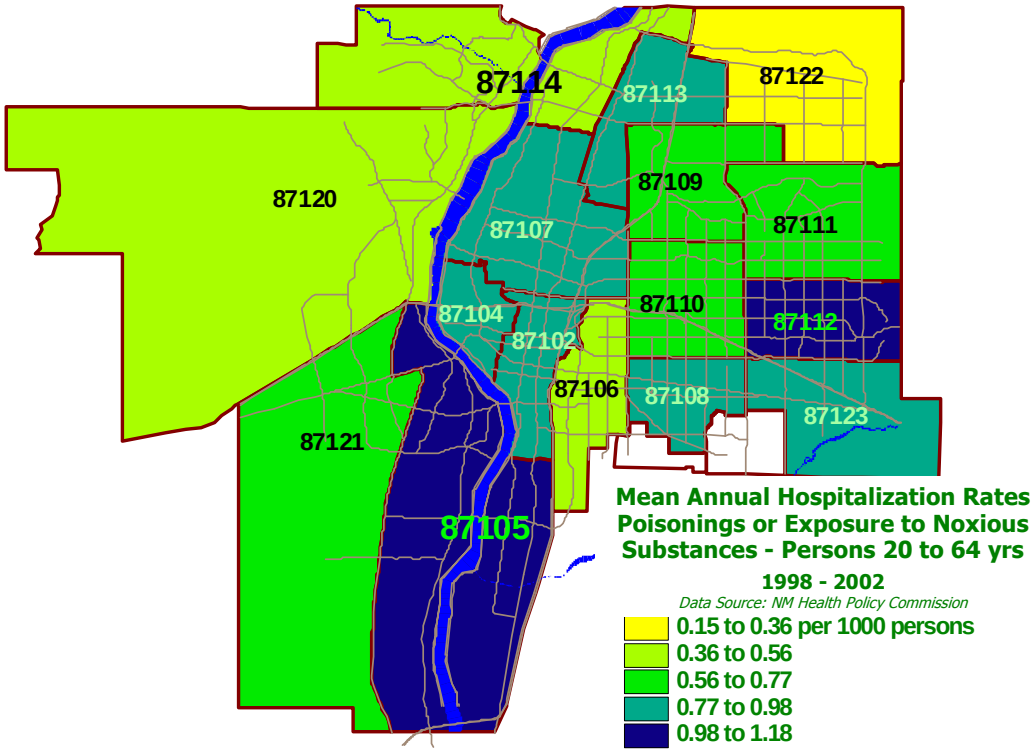
Mean Annual Diagnoses Persons over 64 years
Selected ICD-9s, 1998 - 2002
Data Source: NM Health Policy Commission
256 to 288 per 1000 persons
288 to 321
321 to 353
353 to 386
386 to 418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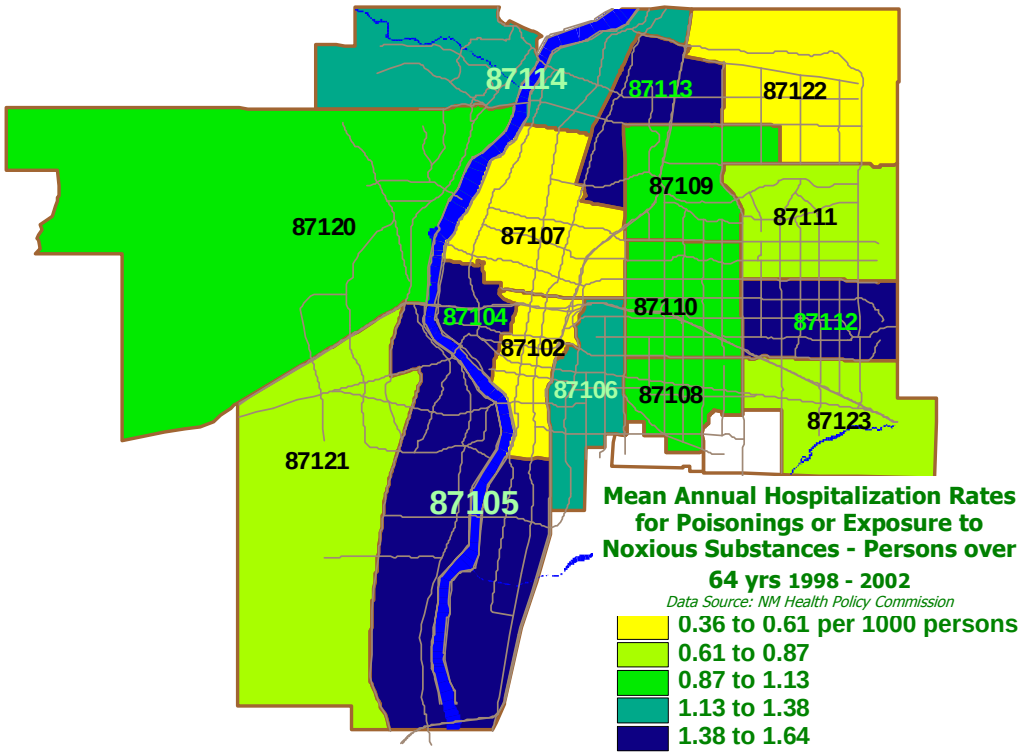
Mean Annual Hospitalization Rates
Poisonings or Exposure to Noxious
Substances - Persons 20 to 64 yrs
1998 - 2002
Data Source: NM Health Policy Commission
0.15 to 0.36 per 1000 persons
0.36 to 0.56
0.56 to 0.77
0.77 to 0.98
0.98 to 1.18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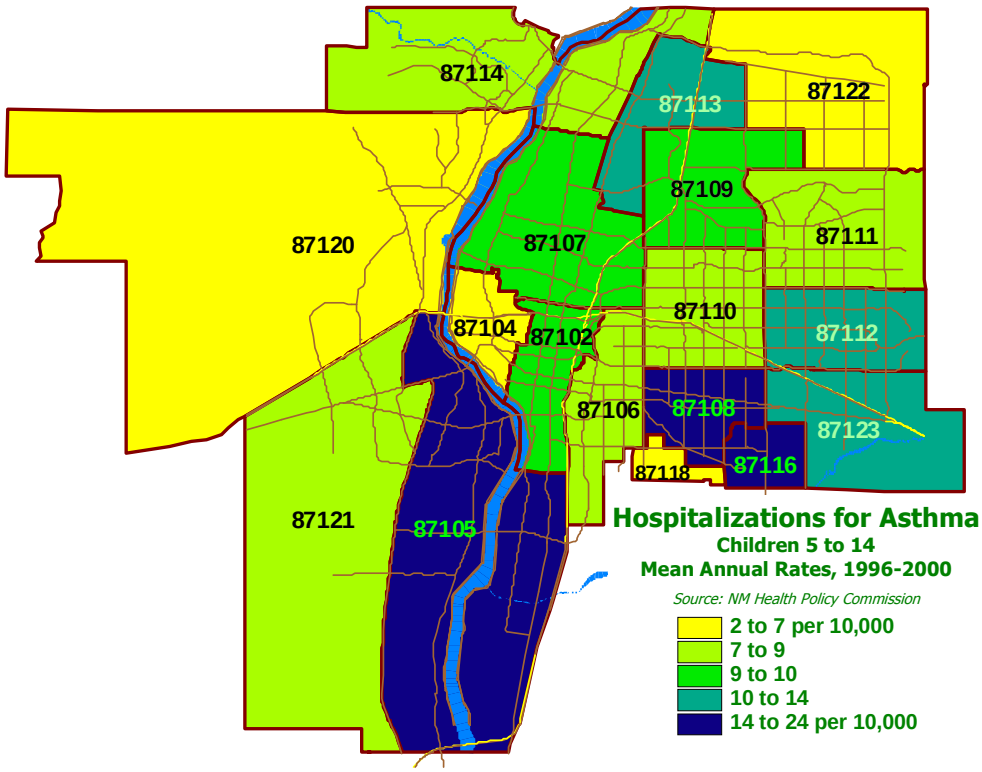
Mean Annual Hospitalization Rates
for Poisonings or Exposure to
Noxious Substances - Persons over
64 yrs 1998 - 2002
Data Source: NM Health Policy Commission
0.36 to 0.61 per 1000 persons
0.61 to 0.87
0.87 to 1.13
1.13 to 1.38
1.38 to 1.64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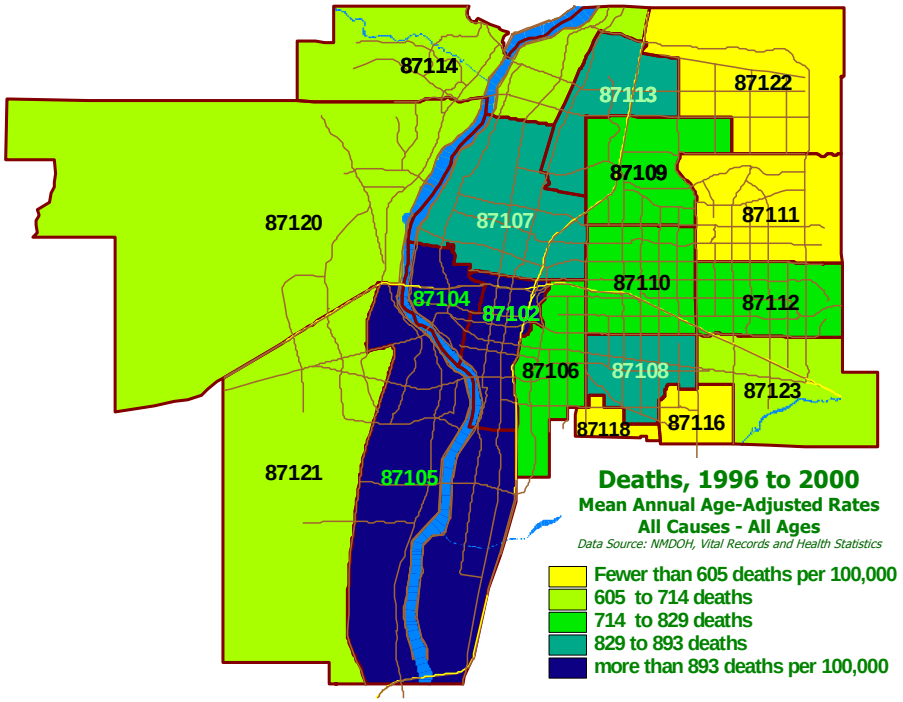
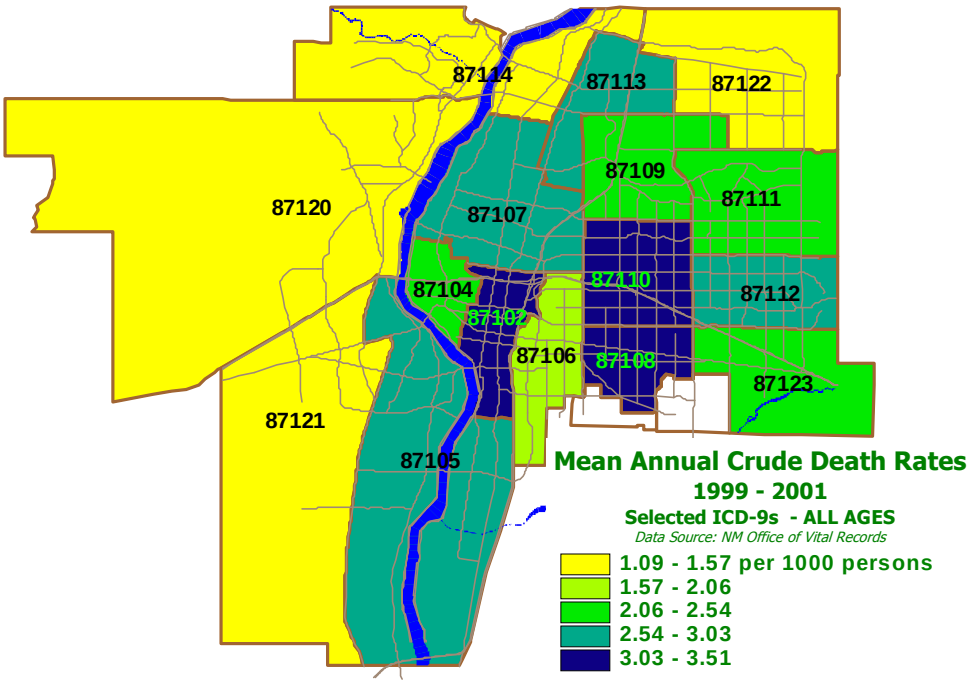
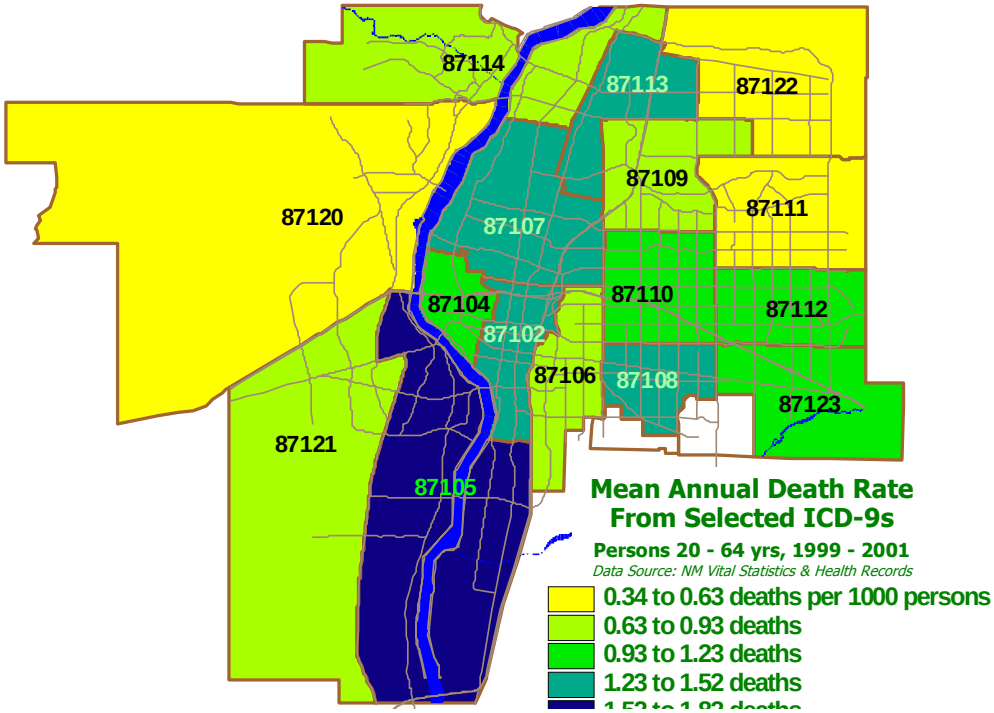
Hospitalizations for Asthma
Children 5 to 14
Mean Annual Rates, 1996-2000
Source: NM Health Policy Commission
2 to 7 per 10,000
7 to 9
9 to 10
10 to 14
14 to 24 per 10,000

In the following 4 maps, mortality rates for all causes - and for the selected causes - may be compared to the above hospitalization maps.






87114
87113
87122
87109
87120
87111
87107
87104
87110
87112
87102
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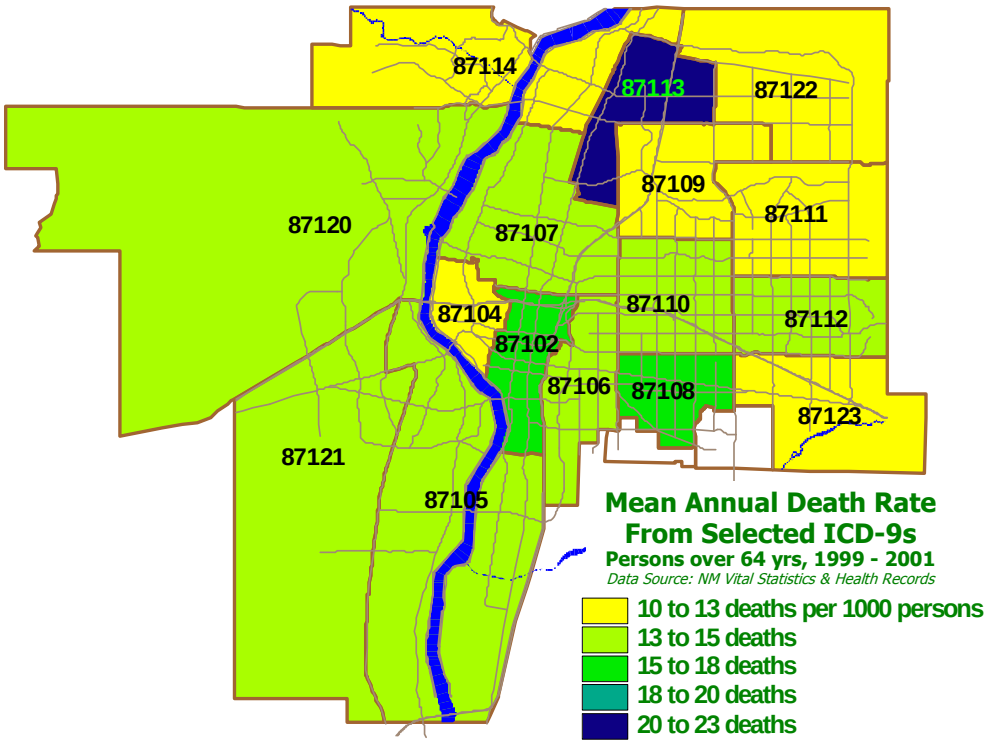
87108
87123
87121
87105
Mean Annual Death Rate
From Selected ICD-9s
Persons 20 - 64 yrs, 1999 - 2001
Data Source: NM Vital Statistics & Health Records
0.34 to 0.63 deaths per 1000 persons
0.63 to 0.93 deaths
0.93 to 1.23 deaths
1.23 to 1.52 deaths


87114
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Mean Annual Death Rate
From Selected ICD-9s
Persons over 64 yrs, 1999 - 2001
Data Source: NM Vital Statistics & Health Records
10 to 13 deaths per 1000 persons
13 to 15 deaths
15 to 18 deaths
18 to 20 deaths
20 to 23 deaths

RECOMMENDATIONS FOR FURTHER STUDY

Possible Next Steps for Analysis

Focus on single categories of cause of hospitalization, rather than all categories together.
Focus on a number (5 to 10) ICD-9 codes, rather than on categories; and inclusion of exposure histories.

With the Same Data Sets and More Time

- Conduct statistical analysis of the present HIDDS and Death Registry data sets
- Focus on a select number of 5 to 10 ICD-9 codes, rather than on categories or all selected causes.
- Use of patient as a unit of analysis (HIDDS)
- Analysis of length of stay and cost of hospitalization and care (HIDDS) by patient and population levels.

With the Same Data Sets and More Detail

- A version of the current HIDDS data set that, in addition, includes addresses
- A case-level version of the Death Registry data set that includes addresses

With Other Data Sets

- A case level, multi-year version of the NM Birth Defects Registry with addresses
- A case level, multi-year version of the NM Children's Chronic Conditions Registry with addresses
- A case level, multi-year version of the NM Tumor Registry with addresses and exposure measures

COMMENTS

The request poses a research question. But this report takes a Public Health Surveillance approach – exploratory analysis that casts a wide net and searches for anomalies – and does not attempt to resolve a pre-established hypothesis. The purpose of surveillance is to turn information into action – in this case the recommended actions are to conduct more surveillance, and (if resources permit) to eventually develop a research project, including case-control or cohort designs.

The public health surveillance approach often presents a problem to acquiring databases, as many institutions insist on a *research* description, i.e., a single or pre-set hypothesis or specific question to be answered, as a prerequisite to releasing the database. Yet PH surveillance by definition has a different methodology.

This descriptive study should be followed with more complex statistical analysis. For example, this study did not develop a dependent variable at the individual level.

Zip codes are an inadequate convenience. They do not correspond to actual communities, counties or US census geographies, but they do appear in almost all databases. They are a way of detouring around the road blocks to data placed by the institutions that collect and maintain it.

The databases have certain inherent biases. Hospitalization, for example, is strongly related to issues of access, health insurance coverage, preventive primary care and even immigrant status.

There is a great need to recognize the importance of data analysis and comprehensive assessment of sub-county level data in New Mexico. Since the state only has one county with a large MSA, the need is overlooked by those not specializing in comprehensive assessment of health conditions in Albuquerque and its multiple neighborhoods. Because the need is so often unappreciated, access to the data at the appropriate level is often impeded.

The chart, tables and maps in this report describe real conditions in real communities, yet the people in the communities described do not yet have this information in this format. I would like permission to utilize those charts, tables and maps in reports to those communities.

ATTACHMENT

Summary of Events in Mountain View

Prepared by K. Richards, Office of Env. Health, Bernalillo County
7/6/04

- 1980's, Southwest Organizing Project works to organize residents of Mountain View to address case of blue baby syndrome resulting from high nitrate levels in drinking water wells;
- 1980-1990, two Superfund sites are placed on the National Priority List; both sites are located on the northern boundary of Mountain View. The sites are the AT&SF (designated on 12/16/94) and the South Valley superfund sites (designated on 9/8/83);
- As a result of sites being listed on the NPL, a Technical Advisory Group is formed to address monitoring and remediation issues;
- October 2001, Bernalillo County Office of Environmental Health (OEH) receives NIEHS award to address EJ issues in the South Valley, including the Mtn. View area, and hires community organizers for the South Valley to address issues—form partnership named South Valley Partners for Environmental Justice (SVPEJ);
- October 2002, OEH prepares map illustrating EPA regulated facilities in the South Valley, the majority of which are located in Mtn. View (source: EPA Envirofacts database);
- 2003, Mtn. View community profile is developed including community liabilities (e.g., numerous industrial facilities) and assets (e.g., high home ownership);
- November 2003, Mtn. View Air Quality team meets monthly to address air quality issues in Mtn. View and potential health outcomes, team is comprised of community organizers, community residents, physicians, DOH personnel, NMED personnel, and Bernalillo County, OEH personnel;
- January 2004, Community Profile of Mtn. View is presented before the Albuquerque/Bernalillo County Air Quality Control Board resulting in a formal request of the board to improve monitoring of industrial emissions and to consider the cumulative effects from the numerous industries located in Mtn. View on the residents;
- March 2004, Southwest Network for Economic and Environmental Justice (SNEEJ) and SVPEJ conduct toxic tour of Mtn. View for area students from South Valley Academy;
- 2004, Patty Grice and Rep. Saavedra meet with R. Curry to discuss environmental quality issues in Mtn. View;
- 2004, Community Profile of Mtn. View is presented before NMED Sec. Ron Curry during a community meeting held at the Mtn. View Community Center;
- Spring 2004, Mtn. View NMED Task Force meets with residents to identify env. health priorities;
- June 2004, sweep of industries in Mtn. View by NMED inspectors.