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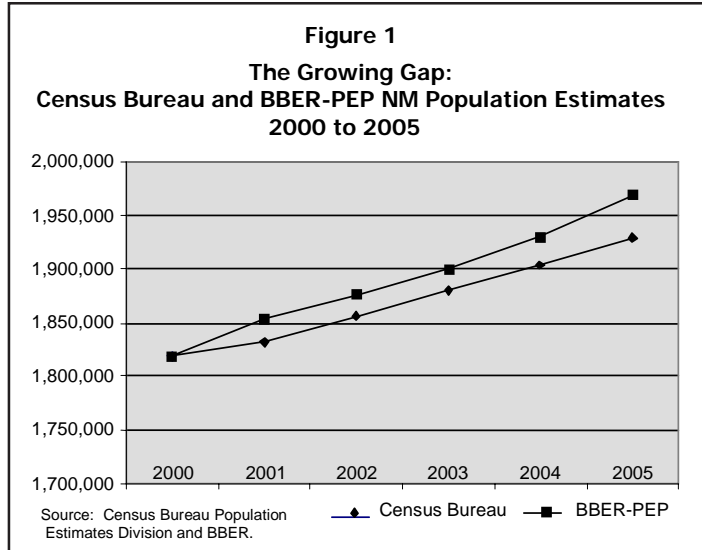
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Spatial Demography as a Method for Population Estimation: Addressing Census Bureau Under-Estimation of New Mexico's Populations Using GIS Technologies



Census Undercounts in New Mexico

In 2001, the PriceWaterhouseCoopers consulting firm produced a study of decennial census undercounts which suggested that inadequacies in Census 2000 enumeration in New Mexico would cost the state over \$100 million in Federal funding between 2002 and 2012¹. These funds would have been used for programs that include Medicaid, adoption assistance, grants for vocational education, and block grants for social services, child care, and substance abuse prevention and treatment programs. Unfortunately, this firm's estimate of the effect of the decennial undercount in New Mexico may have been smaller than it should have been. Since that time, data compiled by the Population Estimates Program at the University of New Mexico's Bureau of Business and Economic Research (BBER-PEP) suggest that the gap between official Census estimates and actual New Mexico population is widening even further. (See Figure 1 above and Table 1 on page 3). In 2005, the statewide gap between the estimates equaled 39,968 persons. These differences are notable not only at the State level, but also within counties where the difference between the Census Bureau and BBER-PEP estimates can vary up or down in significant ways (See Table 2 on page 8). In an attempt to address Census Bureau mis-estimation of the New Mexico population, State funding was provided to expand BBER's

Census Dissemination and Demographic Analysis Program² in FY 2005. Since that time, the BBER-PEP has actively pursued administrative data in geographic formats in order to address overall State-level undercount as well as county-by-county discrepancies. These data allow the BBER-PEP to produce population estimates within appropriate geographies and will potentially allow the BBER-PEP to predict Census mis-estimates before they occur.

Demographic Data and the Mechanics of Population Estimation

Demographic estimation techniques center upon the judicious use of available information on demographic "events" that track population change. These events may include traditional components of population change such as births, deaths and migration. They may also consist of economic indicators that track population change, such as the issuance of building permits. These events are typically used within a mathematical model designed to track changes in total population, or in the characteristics of a given population. These models are used to arrive at "working" population estimates that are then evaluated in terms of their reasonability within the context of New Mexico's overall economic and social environment. While many non-demographers consider the mathematical models to be simplistic and easily-replicated, quality population estimates are arrived at only through a thorough consideration of these estimates in light of a variety of social and economic factors, and only within the context of well-developed demographic theory. It is for this reason that demographic estimates should be produced by qualified scientists with appropriate training in applied demographic theory and methodologies.

The BBER-PEP utilizes a combination of two methods of demographic estimation: the housing unit method and the cohort-component method, coupled with an extensive set of diagnostics and sensitivity analyses. The housing unit method requires an adequate count of housing units, and estimates of the percentage of housing units actually occupied, and the expected number of persons living within each unit (the "persons per household"). These quantities are multiplied together to arrive at the number of persons living within housing units, then added to an estimate of the population living in group quarters facilities (such as nursing homes, boarding schools, college dormitories, or prisons) to arrive at the population estimate. The cohort component method is based on accounting principles and involves an annual "updating" of a base population (such as the decennial census) with counts of births, deaths, in-migrants, and out-migrants. (See Figure 2 on page 2.) These methods are used to arrive at a "working" population estimate. This working estimate is then considered in light of historical economic and population trends, land-use information, and a detailed consideration of trends in births and

(continued on page 2)

1 http://govinfo.library.unt.edu/cmb/cmbp/reports/080601.pricewaterhouse/state_nm.asp.htm.

2 The Census Dissemination and Demographic Analysis Program was originally funded through the legislative process in 1991 as a Research and Public Service Project of the University of New Mexico. The purpose of the Program is to improve the usefulness of U.S. Census Bureau data, making the data valuable and meaningful for New Mexico's residents. This includes conducting research that uses Census Bureau information and related data to analyze and describe the characteristics of New Mexico's population and industries; providing access to this research and broadly disseminating New Mexico socioeconomic and demographic data; educating the public regarding the meaning and use of the data; and expanding and enhancing BBER's population estimates and projections initiatives. The FY 2005 expansion directly impacts the last of these goals, truly enhancing BBER's capabilities to estimate and project population.

See the box on page 3 for important information about changes in data and table formats.

Population Estimates... (cont. from page 1)

deaths that requires more sophisticated demographic modeling of historic patterns. These semi-final estimates are then typically sub-categorized by age, sex, race, and ethnicity (at the county and state levels) based on life-table models and calibration to data on driver's license registration, school enrollment, and other diagnostic information. In the end, through a combination of empirical data and sophisticated modeling, population estimates are produced for the state, as well as for smaller geographies such as counties and cities.

Reducing Undercount Through the Use of Geographic Information Systems Technology: Spatially-Explicit Demographic Estimation Methods

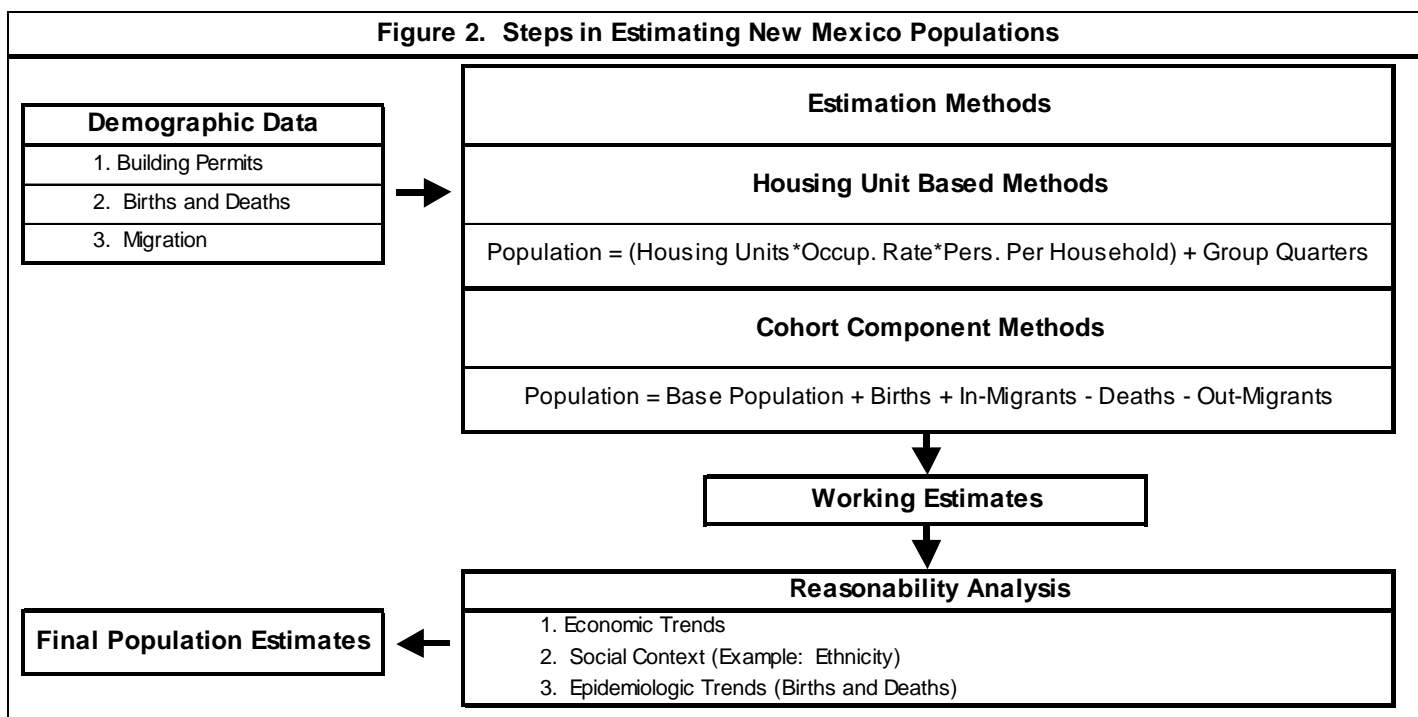
Demography has always been spatial. Demographic estimates are always produced within geographic boundaries that reflect the needs of government planners, businesses, or other consumers. The BBER-PEP has more recently sought to improve methodologies relevant to such "spatially explicit" demographic estimation through the use of Geographic Information Systems (GIS) technologies. GIS allows the BBER-PEP to do two important things: 1) to allocate demographic events such as births, deaths, or housing unit construction to specific locations in space, and 2) add an additional layer of reasonability assessment to the estimation process through the consideration of land-use data, aerial photography, and other forms of geographic data. Together, these powerful new tools and approaches allow the BBER-PEP to more accurately assess Census underestimation at small levels of geography and, in the near future, may permit the forecasting of demographic trends across both time and space.

Successful use of GIS for demographic modeling involves both correct allocation of demographic data to geographic locations and proper applications of statistical models to these data. The first challenge is addressed using GIS through the process of address matching—or "geocoding"—of occurrences of births, deaths, and building permits. This is accomplished by matching

addresses where these events have occurred to digitized road networks that provide their locations in space. For the BBER-PEP's population estimates within New Mexico, this requires an intensive amount of data processing. For example, in processing building permit data to arrive at counts of housing units within each county, the BBER-PEP must collect data from as many as 26 jurisdictions that issue their own building permits as well as from the State of New Mexico's Construction Industries Division (NM-CID). These data arrive in a variety of formats, including hand-written summaries as well as electronic spreadsheets. These data must be compiled into a standardized format, cleaned for quality of address entries, and then matched to the previously-described digitized road networks to arrive at specific geographic location of demographic events. (See Figure 3 on page 3.) These efforts are rewarded, however, by permitting the BBER-PEP to produce their working population estimates within any desired geography and to begin statistical description of these data within a spatial context—the first step towards geospatial modeling of demographic trends in New Mexico.

Spatial statistical modeling allows the BBER-PEP to add a spatial layer of reasonability analysis to our estimation process. The famous geographer Tober, in describing spatial effects, noted that: "everything is related to everything else, but near places are more related than far places". This observation rings true in demography as well as in any other discipline. Geospatial modeling allows the BBER-PEP to begin to assess the effect of spatial proximity on demographic trends such as, for example, the issuance of building permits. Once these data have been matched to specific geographic locations, the BBER-PEP is able to define spatial "autocorrelation" models that describe the effects of nearness in detail. (See Figure 4 on page 7.) These relationships may be displayed graphically in maps, describing how rates of development in one county affect those in another. For example, Figure 4 displays one set of spatial autocorrelations that may be detected from 1990 to 2000 Census counts for New Mexico counties. Here, the highlighted counties have been

(continued on page 8)



Editor's Note—Changes in the Data

There are a number of changes in this issue of **New Mexico Business** that the reader should note. These include deletions and additions of data items, inconsistencies in the employment time series for several industries, and new table formats. Here are the details.

The New Mexico Department of Labor (NMDOL) recently completed the annual revision of Current Employment Statistics (CES), the monthly survey of nonagricultural employers that provides much of the employment data appearing in **New Mexico Business**. With this round of CES revisions, the NMDOL dropped a number of individual sectors from the tabulations. The "New Mexico Economic Indicators" tables on pages 4 and 5, along with the "Estimated Civilian Labor Force and Employment" table for the state and metro areas on page 6, were adjusted accordingly. Sectors were deleted from the tabulations and some aggregates, such as employment in private goods producing and services providing sectors, were added.

The average hourly earnings line items, updated monthly in the "New Mexico Economic Indicators" tables (also a part of the CES survey), were replaced with average weekly earnings. Although average weekly earnings are only updated quarterly, the data are of a higher quality than average hourly earnings and cover more individual sectors. Average weekly earnings are produced by the NMDOL via their Quarterly Census of Employment and Wages (QCEW), a database that relies on administrative records from employers (a so-called 100% database) rather than a sample of employers, which is used for average hourly earnings data. The reader should note that the QCEW data sometimes refers to a smaller employment universe than the CES. For example, real estate and insurance agents working solely on commission are excluded from the QCEW.

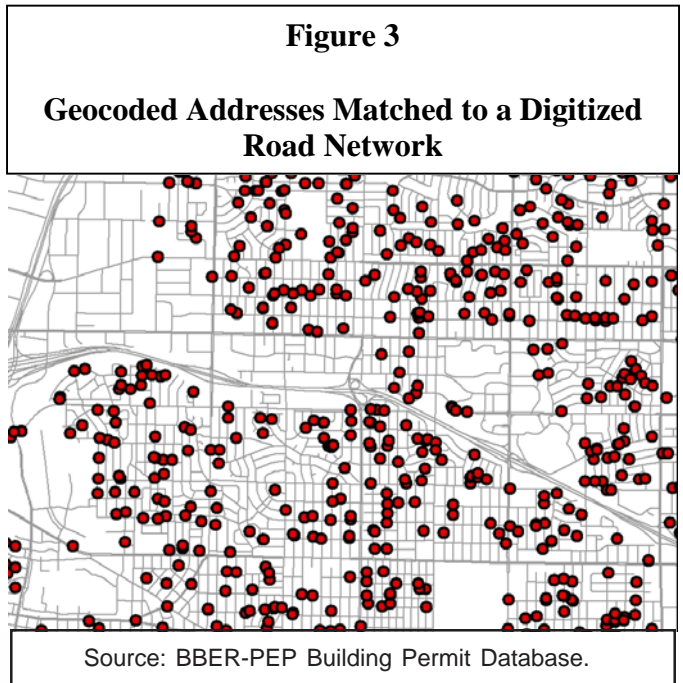
Employment growth rates and 12-month average employment for total government and private classifications, along with the state government and professional & business services sectors, are not calculated. The growth rates were omitted because the time series data for these various industries are not consistent. As part of the CES revisions, Los Alamos National Laboratory (LANL) employment is now recorded in the professional & business services sector (part of the private sector) rather than in state government. This shifted about 10,000 jobs from state government to professional & business services beginning in June 2006. This new way of recording LANL employment is in accordance with the change in LANL management. LANL management changed from the University of California (a state government agency) to a private-public consortium.

Several new data items were added to "New Mexico Economic Indicators", such as median home prices in Albuquerque and Santa Fe, the volume of oil and natural gas production, state general fund recurring and nonrecurring revenues, taxable gross receipts for retail trade and eating & drinking places, and more milk production indicators.

There were also some formatting changes. A column displaying the previous period's data was deleted from the "New Mexico Economic Indicators" table and a column showing the current 12-month or 4-quarter average was added. This average column contains typical short-term values of the various indicators. For example, the data column shows average quarterly personal income over the last four quarters, average monthly mining employment over the last 12 months, average quarterly taxable gross receipts from retail trade over the last four quarters, average weekly wages for the wholesale trade sector over the last four quarters, etc. Associated percent changes between the current 12-month/4-quarter average and the previous 12-month/4-quarter average are calculated as before.

Year*	Census	BBER
2000	1,819,046	1,819,046
2001	1,832,608	1,852,740
2002	1,855,400	1,876,287
2003	1,879,252	1,899,846
2004	1,903,006	1,929,713
2005	1,928,384	1,968,352

* July 1 of each year except for 2000, which is the April 1, 2000 Census.
Source: UNM, BBER-PEP and U.S. Census Bureau, 2005 round of population estimates.



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NEW MEXICO ECONOMIC INDICATORS

	Current Mo./Qtr.	Current Data	%Chg. From a Year Ago	12-Mo./4-Qtr. Averages	
				Current	%Chg. From Previous ¹
1. GENERAL					
Civilian labor force ² (000s)	Dec 06	949.1	0.2	952.9	1.8
Employment (000s)	Dec 06	917.5	1.2	912.1	2.9
Unemployment (000s)	Dec 06	31.6	-23.4	40.8	-17.0
Unemployment rate (%)	Dec 06	3.3	-	4.3	-
Weekly new unemployment insurance claims	Dec 06	1,210	-0.8	928	-14.5
Nonagricultural wage & salary employment ³ (000s)	Dec 06	845.5	2.5	833.3	3.0
All industries average weekly wages (\$)*) ⁴	3Q 06	\$654	-	-	-
Personal income ⁵ (\$ mil.)	3Q 06	\$58,538	8.0	\$56,837	6.9
2. AGRICULTURE					
Receipts for all agricultural commodities (\$ mil.)	Nov 06	\$262.6	-2.2	\$216.6	-0.7
Livestock (\$ mil.)	Nov 06	\$139.0	-8.3	\$161.7	-3.1
Crops (\$ mil.)	Nov 06	\$123.7	5.8	\$54.9	7.4
Milk production (mil. lbs.)	Dec 06	608	0.8	637	9.9
Milk cows (000s head)	Dec 06	360	6.2	355	8.3
Milk per cow (lbs. per head)	Dec 06	1,690	-5.1	1,792	1.4
3. NATURAL RESOURCES & MINING					
Total employment ³ (000s)	Dec 06	19.4	9.6	18.7	10.9
Mining average weekly wages (\$)*) ⁴	3Q 06	\$1,126	7.4	\$1,144	10.9
Coal production (000 short tons)	Dec 06	1,866	-23.6	2,113	-11.1
Oil sales (\$ mil.)	Nov 06	\$262.4	-2.9	\$305.0	16.2
Oil volume of production (mil. bbls.)	Nov 06	4.8	-1.7	5.0	-2.8
Gas sales (\$ mil.)	Nov 06	\$795.6	-34.9	\$815.0	-8.2
Gas volume of production (bil. cf.)	Nov 06	119.8	-3.7	124.8	-2.0
4. CONSTRUCTION					
Total employment ³ (000s)	Dec 06	58.5	3.0	59.3	8.9
Average weekly wages (\$)*) ⁴	3Q 06	\$654	1.1	\$662	6.3
Residential units permitted	Dec 06	957	-18.4	1,190	-12.1
Residential building permit value (\$ mil.)	Dec 06	\$147.8	-31.5	\$207.1	-9.3
Nonresidential const. contract value (\$ mil.)	Dec 06	\$118.5	3.6	\$232.7	171.4
Nonbuilding const. contract value (\$ mil.)	Dec 06	\$51.8	-29.4	\$72.2	0.6
5. MANUFACTURING					
Total employment ³ (000s)	Dec 06	37.9	2.7	37.7	4.3
Average weekly wages (\$)*) ⁴	3Q 06	\$816	0.7	\$835	4.6
6. WHOLESALE TRADE					
Total employment ³ (000s)	Dec 06	23.8	3.5	23.5	3.2
Average weekly wages (\$)*) ⁴	3Q 06	\$832	3.5	\$828	4.7
7. RETAIL TRADE					
Total employment ³ (000s)	Dec 06	98.7	1.4	94.4	0.8
Average weekly wages (\$)*) ⁴	3Q 06	\$455	0.0	\$454	2.5
Taxable gross receipts (\$ mil.)	4Q 06	\$3,832.2	2.6	\$3,499.6	5.4
8. TRANSPORTATION, WAREHOUSING & UTILITIES					
Total employment ³ (000s)	Dec 06	24.6	1.7	24.0	3.2
Transp. & warehousing average weekly wages (\$)*) ⁴	3Q 06	\$722	2.6	\$713	4.2
Utilities average weekly wages (\$)*) ⁴	3Q 06	\$1,152	-1.2	\$1,164	0.5

Note: Selected data items subject to revision. **na** Not available. **1** For example, in the report that contains Dec. 2006 figures this would be the percent change from the average of Jan. 2005 to Dec. 2005 to the average of Jan. 2006 to Dec. 2006. For quarterly data, the average column represents and average of four quarters. **2** Number of employed and unemployed persons by place of residence. **3** Number of jobs by place of work. **4** Wages represent gross pay, including commissions, bonuses and over time. **5** Quarterly data seasonally adjusted at annual rates. **6** Does not include insurance and real estate agents working on commission. **7** Includes Albuquerque, Rio Rancho, Placitas, Corrales, the East Mountains and Valencia County. **8** Includes all of Santa Fe and Los Alamos counties and part of Rio Arriba County. **9** Based on information from Santa Fe Assoc. of REALTORS® MLS for the period Oct. 2006 to Dec. 2006. This representation is based in whole or in part on data supplied by SFAR MLS who does not guarantee nor is in any way responsible for its accuracy. Data maintained by SFAR MLS may not reflect all real estate activity in the market. **10** Commercial passenger traffic includes enplanements and deplanements. **11** Includes recurring and non-recurring revenues. * Los Alamos National Security, LLC, (a consortium of private and public organizations) replaced the Univ. of Cal. as the management and operating contractor at Los Alamos National Laboratory (LANL). Because of this change in Lab management, LANL employment, beginning in June 2006, is recorded in the professional and business services sector rather than state government. Employment data prior to June 2006 are not comparable with current data for the government, professional and business services, private services providing, and total private sectors. Inconsistent data are not shown and percent changes are not calculated. State government wages were not affected because LANL was previously not in the wage data base.

NEW MEXICO ECONOMIC INDICATORS (continued)

	Current Mo./Qtr.	Current Data	%Chg. From a Year Ago	12-Mo./4-Qtr. Averages	
				Current	%Chg. From Previous ¹
9. INFORMATION					
Total employment ³ (000s)	Dec 06	16.0	3.9	15.9	7.8
Average weekly wages (\$) ⁴	3Q 06	\$723	2.1	\$720	2.1
10. FINANCIAL ACTIVITIES					
Total employment ³ (000s)	Dec 06	35.6	0.0	35.2	0.8
Finance & insurance average weekly wages (\$) ^{4, 6}	3Q 06	\$809	2.8	\$836	4.9
Real estate & rental & leasing avg. wkly. wages (\$) ^{4, 6}	3Q 06	\$572	4.4	\$578	7.5
Albuquerque Area ⁷ Median Sales Price:					
Existing Single-Family Detached (\$000s)	4Q 06	\$195.0	9.6	-	-
Existing Condo/Townhome Attached (\$000s)	4Q 06	\$139.3	10.5	-	-
Santa Fe City/County ⁸ Median Sales Price ⁹ :					
Existing Single-Family Detached (\$000s)	4Q 06	\$415.0	-2.4	-	-
Existing Condo/Townhome Attached (\$000s)	4Q 06	\$285.0	17.8	-	-
11. PROFESSIONAL & BUSINESS SERVICES					
Total employment* ^{3, 3} (000s)	Dec 06	108.5	-	-	-
Professional & technical serv. avg. wkly. wages (\$) ^{4, 4}	3Q 06	\$1,162	-	-	-
Mgt. of cos. & enterprises avg. weekly wages (\$) ⁴	3Q 06	\$918	-3.6	\$923	-3.5
Admin. & waste & remed. serv. avg. wkly. wages (\$) ⁴	3Q 06	\$527	0.8	\$526	3.2
12. EDUCATIONAL & HEALTH SERVICES					
Total employment ³ (000s)	Dec 06	110.6	2.8	107.9	2.7
Educational serv. emp. ³ (000s)	Dec 06	14.0	2.2	13.0	1.6
Health care & social assist. emp. ³ (000s)	Dec 06	96.6	2.9	94.9	2.9
Educational services average weekly wages (\$) ⁴	3Q 06	\$544	-1.4	\$532	4.6
Health care & social assist. avg. weekly wages (\$) ⁴	3Q 06	\$651	2.5	\$645	4.3
13. LEISURE AND HOSPITALITY					
Total employment ³ (000s)	Dec 06	85.6	3.5	86.5	3.2
Arts, entertainment & recreation emp. ³ (000s)	Dec 06	7.9	2.6	8.2	1.1
Accommodation & food services emp. ³ (000s)	Dec 06	77.7	3.6	78.4	3.4
Arts, entertainment & recreation avg. wkly. wages (\$) ⁴	3Q 06	\$328	-3.5	\$337	1.3
Accommodation & food serv. avg. weekly wages (\$) ⁴	3Q 06	\$256	1.6	\$250	3.4
Eating & drinking place taxable gross receipts (\$ mil.)	4Q 06	\$554.7	3.1	\$565.8	7.5
Visits to state parks (000s)	Dec 06	92.3	-5.5	328.3	-9.6
Visits to national parks/monuments (000s)	Dec 06	72.7	-14.5	135.0	-1.8
Passenger traffic at Albuquerque airport ¹⁰ (000s)	Dec 06	493.2	-5.8	540.6	0.3
Lodgers tax receipts (\$000s)	2Q 06	\$8,781.0	4.7	\$8,323.2	6.9
Lodging occupancy rates (%)	Dec 06	51.4	-	63.8	-
14. OTHER SERVICES					
Total employment ³ (000s)	Dec 06	28.9	1.0	29.4	1.1
Average weekly wages (\$) ⁴	3Q 06	\$463	1.8	\$467	5.0
15. GOVERNMENT					
Total employment* ^{3, 9} (000s)	Dec 06	197.4	-	-	-
Federal employment ³ (000s)	Dec 06	30.2	0.7	30.5	1.5
State employment* ³ (000s)	Dec 06	60.3	-	-	-
State education employment ³ (000s)	Dec 06	28.9	-0.3	27.0	-0.3
Local employment ³ (000s)	Dec 06	106.9	3.2	104.6	1.8
Local education employment ³ (000s)	Dec 06	59.0	2.1	57.2	1.3
Federal gov. average weekly wages (\$) ⁴	3Q 06	\$1,152	2.3	\$1,124	4.6
State gov. average weekly wages (\$) ⁴	3Q 06	\$782	2.5	\$755	2.9
Local gov. average weekly wages (\$) ⁴	3Q 06	\$557	2.0	\$601	2.6
Total general fund revenues ¹¹ (\$ mil.)	Jun 06	\$530.9	5.1	\$459.8	11.0
Recurring (\$ mil.)	Jun 06	\$523.4	7.9	\$465.0	13.7
Nonrecurring (\$ mil.)	Jun 06	\$7.5	-62.5	-\$5.2	-199.5

Sources: NM Dept. of Labor, Economic Research and Analysis, Sections 1, 3 through 15; U.S. Dept. of Commerce, Bureau of Economic Analysis, Section 1; U.S. Dept. of Agriculture, Section 2; NM Taxation and Revenue Dept., Section 3, 7, 13; U.S. Dept. of Energy, Energy Information Admin., Section 3; U.S. Dept. of Commerce, Bureau of the Census and individual building permit-issuing agencies, Section 4; F. W. Dodge (a division of McGraw Hill, Inc.), Section 4; Albuquerque Metropolitan Board of Realtors, Section 10; Santa Fe Association of Realtors, Section 10; NM Energy Minerals and Natural Resources Dept., Park and Recreation Div., Section 13; U.S. National Park Service, Section 13; City of Albuquerque, Albuquerque International Sunport, Section 13; NM Dept. of Finance and Admin., Local Government Div., Section 13; Rocky Mountain Lodging Report, Section 13; NM Dept. of Finance and Admin., Section 15.

ECONOMIC INDICATORS FOR CITIES AND METRO AREAS**Taxable Gross Receipts^{r,1,2} from Retail Trade, Selected Cities (\$000)**

City	Current	% Chg.	Previous	City	Current	% Chg.	Previous
	3 Month	Average	3 Month		3 Month	Average	3 Month
	Average ³	Year	Average ³		Average ³	Year	Average ³
	Oct-Dec ⁴	Ago	Jul-Sep ⁴		Oct-Dec ⁴	Ago	Jul-Sep ⁴
Alamogordo	\$22,847	3.7	\$20,730	Las Cruces	\$82,593	2.1	\$70,160
Albuquerque	442,018	0.3	391,855	Las Vegas	9,676	1.3	9,062
Artesia	11,221	1.8	9,821	Los Alamos	7,164	6.9	5,751
Carlsbad	20,111	3.4	17,645	Portales	7,623	1.3	7,584
Clovis	24,031	-6.0	21,565	Rio Rancho	34,481	49.5	31,746
Deming	9,553	0.6	8,175	Roswell	33,935	11.7	26,889
Espanola	14,678	4.3	14,416	Ruidoso	7,313	1.1	7,998
Farmington	76,292	3.7	66,008	Santa Fe	104,169	-6.6	100,457
Gallup	29,411	-1.3	27,781	Silver City	12,541	-6.8	11,457
Hobbs	35,380	5.2	32,256	Taos	15,389	0.9	15,725
				State total	1,276,594	2.7	1,138,781

r Revised. **1** Taxable gross receipts are total retail sales less all applicable exemptions and deductions. Deductions are designed to make the gross receipts tax reach only receipts from sales to final users. **2** Food and various medical deductions were implemented in 2005. These data have been adjusted to maintain comparability. Thus, food and medical deductions were added back to taxable gross receipts. **3** Averages are used to smooth out fluctuations in the data which are not caused by changes in economic conditions. **4** Receipts based on month of activity.

Note: Original RP-80 gross receipts reports from the New Mexico Taxation and Revenue Dept. for Jul-Sep 2006 and Jul-Sep 2005 have been adjusted to correct a reporting anomaly.

Source: New Mexico Taxation and Revenue Dept.

Estimated Civilian Labor Force and Employment

	New Mexico		Albuquerque MSA ¹		Farmington MSA ²		Las Cruces MSA ³		Santa Fe MSA ⁴	
	% Chg.		% Chg.		% Chg.		% Chg.		% Chg.	
	Dec. 2006	Year Ago	Dec. 2006	Year Ago	Dec. 2006	Year Ago	Dec. 2006	Year Ago	Dec. 2006	Year Ago
Total Civilian Labor Force⁵	949,126	0.2	407,809	0.4	56,733	0.9	89,184	-0.2	78,083	-0.2
Employment	917,522	1.2	394,927	1.3	54,887	2.1	85,932	0.9	76,042	0.7
Unemployment	31,604	-23.4	12,882	-21.2	1,846	-26.2	3,252	-22.2	2,041	-24.8
Unemployment rate (%)	3.3	-	3.2	-	3.3	-	3.6	-	2.6	-
Total Nonagricultural Wage & Salary Employment⁵	845,500	2.5	397,000	2.6	51,600	4.2	68,600	1.9	63,300	1.3
Private Sector ⁶	648,100	-	316,400	2.6	40,200	5.0	47,000	2.4	47,000	1.5
<i>Goods Producing</i>	115,800	3.9	54,500	1.7	11,700	7.3	8,500	4.9	6,100	5.2
<i>Services Providing⁶</i>	532,300	-	261,900	2.7	28,500	4.0	38,500	1.9	40,900	1.0
Natural Resources, Mining & Const.	77,900	4.6	30,300	0.3	*	-	5,000	6.4	5,000	6.4
Natural Resource & Mining	19,400	9.6	#	-	*	-	#	-	#	-
Construction	58,500	3.0	#	-	*	-	#	-	#	-
Manufacturing	37,900	2.7	24,200	3.4	*	-	3,500	2.9	1,100	0.0
Wholesale Trade	23,800	3.5	13,500	3.1	*	-	1,200	9.1	1,100	0.0
Retail Trade	98,700	1.4	46,200	0.7	*	-	7,400	1.4	9,200	1.1
Transp., Warehousing & Utilities	24,600	1.7	10,700	0.0	*	-	1,900	11.8	700	0.0
Information	16,000	3.9	9,300	3.3	*	-	1,300	0.0	1,100	0.0
Financial Activities	35,600	0.0	19,200	-2.0	*	-	2,400	0.0	3,100	0.0
Professional & Business Services ⁶	108,500	-	63,900	4.1	*	-	5,600	-1.8	5,200	0.0
Educational & Health Services	110,600	2.8	48,600	3.2	*	-	10,300	1.0	8,800	3.5
Leisure & Hospitality	85,600	3.5	38,300	5.5	*	-	6,900	4.5	8,900	0.0
Other Services	28,900	1.0	12,200	3.4	*	-	1,500	0.0	2,800	0.0
Government ⁶	197,400	-	80,600	2.7	11,400	1.8	21,600	0.9	16,300	0.6
Federal	30,200	0.7	14,500	1.4	1,500	-6.3	3,600	0.0	1,100	0.0
State ⁶	60,300	-	26,400	2.3	500	0.0	9,200	0.0	8,200	1.2
Local	106,900	3.2	39,700	3.4	9,400	3.3	8,800	2.3	7,000	0.0

Data are suppressed. Included in "Natural Resources, Mining & Construction" super sector. * Data are suppressed. Included in total. **1** Bernalillo, Sandoval, Torrance and Valencia counties. **2** San Juan County. **3** Dona Ana County. **4** Santa Fe County. **5** Civilian labor force data are by place of residence and include self-employed persons and agricultural workers. Nonagricultural wage and salary employment data are by place of work. **6** Los Alamos National Security, LLC, (a consortium of private and public organizations) replaced the Univ. of Cal. as the management and operating contractor at Los Alamos National Laboratory (LANL). Because of this change in Lab management, LANL employment, beginning in June 2006, is recorded in the professional and business services sector rather than state government. Employment data prior to June 2006 are not comparable with current data for the government, professional and business services, private services providing, and total private sectors. Inconsistent data are not shown and percent changes are not calculated.

Note: Data have been revised by NMDOL and are subject to future revisions.

Source: New Mexico Dept. of Labor, Economic Research and Analysis.

ECONOMIC INDICATORS FOR CITIES AND METRO AREAS (continued)

New Mexico Construction^{1, P} Selected Cities

	Number of Building Units or Permits ²					Value of Building Permits (\$000)				
	Dec 2006	Dec 2005	Cumulative Total			Dec 2006	Dec 2005	Cumulative Total		
			Dec 2006	Dec 2005	% Chg.			Dec 2006	Dec 2005	% Chg.
New Residential³										
Alamogordo	13	22	218	233	-6.4	\$2,832	\$3,921	\$51,058	\$45,398	12.5
Albuquerque	397	411	4,229	5,141	-17.7	48,050	67,393	670,089	765,314	-12.4
Single Family	153	411	3,336	4,676	-28.7	27,633	67,393	586,658	740,484	-20.8
Multi Family	244	0	893	465	92.0	20,416	0	83,431	24,831	236.0
Carlsbad	2	3	53	33	60.6	245	435	7,681	4,719	62.8
Clovis	20	3	251	161	55.9	2,782	468	42,793	24,518	74.5
Farmington	16	17	244	270	-9.6	2,708	2,579	38,158	46,552	-18.0
Hobbs	7	4	70	42	66.7	703	628	11,484	7,218	59.1
Las Cruces	101	107	1,854	1,829	1.4	13,854	15,540	238,791	243,430	-1.9
Los Alamos	1	5	43	59	-27.1	306	1,294	14,601	15,208	-4.0
Rio Rancho	152	240	2,056	3,247	-36.7	29,484	52,018	440,872	601,077	-26.7
Roswell	6	7	133	100	33.0	1,100	1,195	29,552	17,396	69.9
Ruidoso	1	14	143	203	-29.6	236	3,367	26,650	38,846	-31.4
Santa Fe	30	35	607	721	-15.8	5,679	6,106	110,190	104,554	5.4
New Nonresidential										
Alamogordo	4	8	62	55	12.7	\$625	\$99	\$13,465	\$8,558	57.3
Albuquerque	7	8	119	145	-17.9	20,924	5,100	156,947	179,150	-12.4
Carlsbad	0	0	9	5	80.0	0	0	5,052	2,405	110.0
Clovis	2	0	26	22	18.2	91	0	17,992	19,957	-9.8
Farmington	0	17	25	49	-49.0	0	2,456	16,070	24,461	-34.3
Hobbs	1	0	29	19	52.6	100	0	11,290	11,678	-3.3
Las Cruces	4	4	45	41	9.8	900	2,725	46,835	28,032	67.1
Los Alamos	0	0	0	0	-	0	0	0	0	-
Rio Rancho	4	7	49	34	44.1	2,626	3,565	58,320	24,913	134.1
Roswell	4	1	49	70	-30.0	21	43	358	30,910	-98.8
Ruidoso	1	1	9	22	-59.1	475	635	1,370	5,863	-76.6
Santa Fe	1	0	49	13	276.9	631	0	43,564	7,864	454.0

N Not available. **1** Data refer only to permits authorized for private construction projects. Public buildings are excluded.
2 Residential data shows the number of permitted units while nonresidential data show the number of permits. **3** Residential data includes both single and multi-family units. In the case of Albuquerque single and multi-family units are also shown separately.
Sources: U.S. Dept. of Commerce Bureau of the Census and local permit-issuing agencies.

Figure 4. Spatial Autocorrelation in County-Level Population Growth: 1990 to 2000

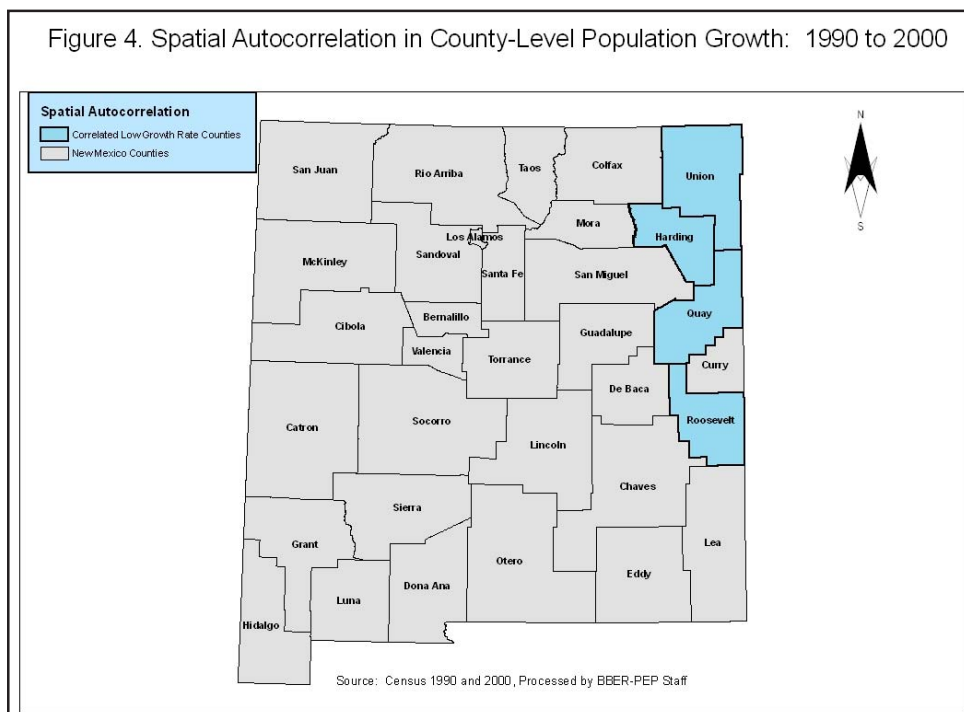


Table 2
Census Under-Estimation in New Mexico: July 1, 2005

County	2005 Census Estimate	2005 BBER-PEP Estimate	Difference ¹
New Mexico	1,928,384	1,968,352	39,968
Bernalillo	603,562	614,508	10,946
Catron	3,409	3,712	303
Chaves	61,860	62,203	343
Cibola	27,620	28,506	886
Colfax	13,755	14,375	620
Curry	45,846	46,289	443
De Baca	2,016	2,256	240
Dona Ana	189,444	192,474	3,030
Eddy	51,437	52,167	730
Grant	29,747	31,511	1,764
Guadalupe	4,369	4,743	374
Harding	740	778	38
Hidalgo	5,139	5,966	827
Lea	56,719	57,006	287
Lincoln	21,007	21,898	891
Los Alamos	18,822	19,864	1,042
Luna	26,498	26,394	-104
McKinley	71,918	78,013	6,095
Mora	5,107	5,440	333
Otero	63,538	63,994	456
Quay	9,259	10,106	847
Rio Arriba	40,828	43,024	2,196
Roosevelt	18,238	18,771	533
Sandoval	107,460	106,165	-1,295
San Juan	126,208	126,008	-200
San Miguel	29,530	30,719	1,189
Santa Fe	140,855	143,306	2,451
Sierra	12,815	13,657	842
Socorro	18,148	18,513	365
Taos	31,722	31,931	209
Torrance	17,501	18,282	781
Union	3,850	4,315	465
Valencia	69,417	71,459	2,042

Source: UNM, BBER-PEP and U.S. Census Bureau, 2005 round of population estimates.

¹ A positive number indicates that the BBER-PEP estimate is larger than the Census Bureau estimate.

Population Estimates... (cont. from page 2)

identified as having a spatially-significant relationship in displaying low population growth rates during this time period. Each of these counties had low population growth rates, and these low growth rates are at least partially due to their nearness in space (this, of course, would be due to underlying similarities in influencing factors that could be economic, political, or social). An understanding of these patterns at smaller scales of geography, such as Census tracts, allows the BBER-PEP to assess whether population estimates are reasonable in light of historical spatio-temporal trends. The identification of these trends may highlight the need for further investigation, and methods of potential additional calibration based on data related to land-use or through the review of aerial photographic imagery.

Identifying Under-estimation Before It Happens: Directions in Spatial Demographic Forecasting by the BBER-PEP

The production of spatially-explicit population estimation made possible through geocoding, and descriptions of spatial relationships in demographic trends estimated through spatial auto-correlation modeling will ultimately allow the BBER-PEP to forecast population across both space and time through extensions of econometric models of time-dependent, dynamic processes (Space-Time Autoregressive Moving Average—STARMA—models provide one possibility). In doing so, this process opens up the exciting possibility of someday being able to forecast undercounts before they happen, allowing the State to address these problems before they occur. Currently, the BBER-PEP is exploring this possibility in their ongoing attempts to address Census undercounts in New Mexico.

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