

## Population and Housing - Moving in Different Directions

### Case Study - Understanding the Data

is a publication developed by the North Dakota State Data Center at North Dakota State University to provide assistance in understanding and interpreting various data and statistics.

The publication offers examples and illustrations that are useful in explaining methodological approaches or seemingly contradictory information.

For this and previous Case Studies, visit our web site at [www.ndsu.edu/sdc/toolbox.htm](http://www.ndsu.edu/sdc/toolbox.htm)

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### Statement of Problem or Challenge

Residents and decision makers are exposed to seemingly contradictory data released from state and federal statistical agencies regarding changes in population and housing estimates. These contradictions develop through a paradox between what people actually see (i.e., lots of new residential construction) and what is reported (i.e., stagnant or declining population base). In the absence of context to explain an apparent contradiction, people typically use their visual reference point to decide what is true. As a result, there is growing skepticism and mistrust about the validity of population estimates.

### Assessment of the Situation

North Dakota's population has changed by less than 1 percent per year over the past 15 years, suggesting relative stability. Conversely, data for housing and construction in the state have shown constant and steady growth since 1990. The number of housing units grew 4.8 percent during the 1990s and another 5.1 percent since 2000. Permits issued for new housing construction have more than doubled since 1990. Another indicator of change, resident births, is also showing growth. After significant losses during the 1990s, resident births have increased slowly and steadily over the past five years (Table 1). Due to growth in housing, construction, and births, specifically since 2000, some officials question the accuracy of current population estimates that indicate overall population loss between 2000 and 2006.

**Table 1. Population, Births, Birth Rate, Housing Units, and New Housing Unit Construction Authorized in North Dakota: 1990, 2000, and 2001 to 2006**

	1990	2000	Percent Change: 1990 to 2000	2001	2002	2003	2004	2005	2006	Percent Change: 2000 to 2006
Population	638,800	642,200	0.5%	636,349	633,649	632,620	635,848	634,605	635,867	-1.0%
Resident Births	9,253	7,676	-17.0%	7,664	7,755	7,976	8,179	8,381	8,617	12.3%
Birth Rate (Resident births per 1,000 persons)	14.48	11.95	-17.5%	12.04	12.24	12.61	12.86	13.21	13.55	13.4%
Housing Units	276,340	289,677	4.8%	292,241	294,570	297,523	300,816	304,458	NA	5.1%*
New Housing Unit Construction Authorized by Building Permit	1,512	2,130	40.9%	2,691	3,272	3,721	4,033	4,038	3,529	65.7%
for Single Family Homes	858	1,259	46.7%	1,486	1,800	2,344	2,521	2,367	2,297	82.4%
for Multi-Unit Homes	654	871	33.2%	1,205	1,472	1,377	1,512	1,671	1,232	41.4%

Sources: POPULATION - U.S. Census Bureau: 1990 Census, Summary Tape File 1, Table P1; Census 2000, Summary File 1, Table P1, <http://factfinder.census.gov>; Population Division, *NST-EST2006-compchg2000\_2005: Annual Estimates of the Components of Population Change for the United States and States: April 1, 2000 to July 1, 2006*, <http://www.census.gov/popest/estimates.php>. BIRTHS AND BIRTH RATES - Calendar year data from the North Dakota Department of Health, Vital Records, *North Dakota Resident Vital Event Summary Data, 1989-2005*, <http://ndhealth.gov/vital/> and unpublished data. HOUSING UNITS - U.S. Census Bureau: 1990 Census, Summary Tape File 1, Table H1; Census 2000, Summary File 1, Table H1, <http://factfinder.census.gov>; Population Division, *HU-EST2005: State Housing Unit Estimates: April 1, 2000 to July 1, 2005*, <http://www.census.gov/popest/estimates.php>. CONSTRUCTION PERMITS - Calendar year data from the U.S. Census Bureau, Residential Construction Branch, Housing Units Authorized by Building Permits, <http://www.census.gov/const/www/permitsindex.html>.

Notes: \*This number reflects the percent change between 2000 and 2005. NA indicates that data are not available.

### Data Solution

In order to assess the validity of the trends displayed in Table 1, it is important to remember that population change is affected by characteristics other than housing and births. Population shifts result from the combination of three indicators: births, deaths, and migration. Changes in housing and new construction, however, result from real or perceived supply and demand dynamics. Adjustments in real demand are generated by shifts in population as well as changing population characteristics. The following discussion briefly examines the components of population change affecting North Dakota's slight population decline during the past few years along with household characteristics affecting the state's growth in housing.

### Population Change

As stated previously, change in a population is comprised of three components: births, deaths, and migration. The difference between births and deaths is referred to as natural change. Migration refers to the net movement of domestic and international movers to and from an area. Natural change plus net migration equals total population change.

During the 1980s and 1990s, the number of resident births in North Dakota declined steadily. By 2000, resident births totaled 7,676 or 11.95 births per 1,000 persons. Beginning in 2002, the number and rate of births increased annually, reaching 8,617 births in 2006 (13.55 births per 1,000) (Table 1). This recent growth in births is a generational effect of the baby boom (the large cohort born between 1946 and 1964). Essentially, these babies are the grandchildren of baby boomers. By examining birth data by age of mother, one can see that this recent increase in births is the result of more women entering their 20s (prime child-bearing years) and an increased fertility rate among women in their 30s. While the number of North Dakota women in their 30s declined 18.0 percent between 2000 and 2006, their fertility rate (the rate at which these women are opting to have children) grew 28.8 percent. The fertility rate among women in their 20s grew at a much slower pace; 9.1 percent. However, the number of women in their 20s grew 9.6 percent during this time (Table 2).

**Table 2. Resident Births and Fertility by Age of Mother in North Dakota: 2000 to 2006**

Year	Total Resident Births	Women Ages 20 to 29			Women Ages 30 to 39		
		Total	Births to Mothers Ages 20 to 29		Total	Births to Mothers Ages 30 to 39	
			Number	Rate/1,000 Women Ages 20 to 29		Number	Rate/1,000 Women Ages 30 to 39
2000	7,676	42,196	4,383	103.87	41,884	2,429	57.99
2001	7,664	41,809	4,447	106.36	39,878	2,358	59.13
2002	7,755	42,210	4,506	106.75	38,359	2,440	63.61
2003	7,976	43,097	4,657	108.06	36,797	2,528	68.70
2004	8,179	44,503	4,817	108.24	35,861	2,568	71.61
2005	8,381	45,160	5,032	111.43	35,046	2,557	72.96
2006	8,617	46,240	5,241	113.34	34,348	2,566	74.71

Sources: WOMEN AGES 20 TO 39 - U.S. Census Bureau, Population Division, *SC-EST2006-AGESEX\_RES: Annual Estimates of the Resident Population by Single-Year of Age and Sex for the United States and States: April 1, 2000 to July 1, 2006*, <http://www.census.gov/popest/estimates.php>. BIRTH BY AGE OF MOTHER - Calendar year data from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System, <http://www.cdc.gov/nchs/VitalStats.htm> and the North Dakota Department of Health, Vital Records, unpublished data.

While the number of North Dakota births increased during the past few years, the number of deaths decreased, resulting in an increase of 13,133 people due to natural change alone since 2000. Thus, if there had been no migration of people to and from North Dakota since 2000, the state's population would have grown by more than 13,000 people. However, during that time, 17,485 more people moved away from North Dakota than moved into the state. Thus, when net migration is added to natural change, and a small residual is taken into account, the result is a population loss of 6,333 people between 2000 and 2006 (1.0 percent of the total population) (Table 3).

**Table 3. Components of Population Change in North Dakota: 2000 to 2006**

Components of Population Change	April 1, 2000 (Census) to July 1, 2000	July 1 Estimates						April 1, 2000 (Census) to July 1, 2006
		2000 to 2001	2001 to 2002	2002 to 2003	2003 to 2004	2004 to 2005	2005 to 2006	
Natural Change (Births minus Deaths)	507	1,732	1,685	1,866	2,230	2,619	2,494	13,133
Total Births	1,886	7,691	7,681	7,862	8,081	8,300	8,380	49,881
Total Deaths	1,379	5,959	5,996	5,996	5,851	5,681	5,886	36,748
Net Migration (In-migration minus Out-migration)	-1,498	-6,196	-4,078	-2,366	1,428	-3,498	-1,277	-17,485
Net International Migration	266	759	440	-287	1,048	602	836	3,664
Net Domestic Migration	-1,764	-6,955	-4,518	-2,079	380	-4,100	-2,113	-21,149
Residual*	-16	-380	-307	-529	-430	-364	45	-1,981
<b>Population Change (Natural Change plus Net Migration)</b>	<b>-1,007</b>	<b>-4,844</b>	<b>-2,700</b>	<b>-1,029</b>	<b>3,228</b>	<b>-1,243</b>	<b>1,262</b>	<b>-6,333</b>

Source: U.S. Census Bureau, Population Division, *NST-EST2006-compchg2000\_2005: Annual Estimates of the Components of Population Change for the United States and States: April 1, 2000 to July 1, 2006*, <http://www.census.gov/popest/estimates.php>.

Note: \*The residual results from the application of a national population control to state and county population estimates. The residual is the difference in state and county population before and after the application of the control. The residual is not a demographic component of population change.

Out-migration from North Dakota not only impacts the current population, but has the potential to affect future population growth in the state. As part of Census 2000, the U.S. Census Bureau compiled demographic characteristics of those persons who indicated they had moved between 1995 and 2000. These data indicate that during those five years nearly three-fourths of North Dakota's net out-migration affected the 25 to 44 age group, those of child-bearing years. In fact, nearly half the state's net out-migration during this time was living in married-couple families with young children. Further analysis of the characteristics of movers to and from North Dakota between 1995 and 2000 shows that persons moving into the state were less likely to be married (56.5 percent) than those persons leaving the state (63.3 percent). In addition, persons moving to North Dakota were more likely to be in a non-family household (28.3 percent) than those leaving the state (24.2 percent) (U.S. Census Bureau, Census 2000 Migration Data on DVD, [http://www.census.gov/population/www/cen2000/mig\\_dvd.html](http://www.census.gov/population/www/cen2000/mig_dvd.html)).

#### Household Composition

The number of North Dakota households (occupied housing units) has been increasing over the past several decades. Households grew 5.8 percent in number between 1980 and 1990, 6.8 percent between 1990 and 2000, and 5.2 percent between 2000 and 2005. The data in Table 4 help demonstrate how this increase in households occurred despite little change in population. Over the past 25 years, the average household size in North Dakota changed from 2.75 persons per household in 1980 to 2.25 in 2005. Although this may seem like a small change, if the state still had 2.75 persons living in each household, North Dakota's household population would be nearly 744,000. In addition, 22.9 percent of all households consisted of one person in 1980. By 2005, this proportion increased to 32.3 percent.

**Table 4. Household Density and Householders Living Alone in North Dakota: 1980, 1990, 2000, and 2001 to 2005**

	1980	1990	2000	Percent Change: 1990 to 2000	2001	2002	2003	2004	2005	Percent Change: 2000 to 2005
Population in Households	625,685	614,566	618,569	0.7%	610,793	610,245	609,236	609,691	609,645	-1.4%
Total Households	227,664	240,878	257,152	6.8%	249,124	254,689	254,464	262,585	270,437	5.2%
Persons Per Household	2.75	2.55	2.41	-5.5%	2.45	2.40	2.39	2.32	2.25	-6.6%
Percent of Householders Living Alone	22.9%	26.5%	29.3%	10.6%	31.1%	30.5%	31.3%	30.4%	32.3%	10.2%

Sources: U.S. Census Bureau, <http://factfinder.census.gov>: 1980 Census, Summary Tape File 1, Tables 15 and 16; 1990 Census, Summary Tape File 1, Table DP-1; Census 2000, Summary File 1, Table DP-1; 2001 Supplementary Survey, Tables P1, P7, and P11; 2002-2005 American Community Survey, Table DP-1.

Note: The Census Bureau adopted the American Community Survey (ACS) in 2001 which provides data on an annual basis rather than every 10 years. The methodology for collecting the annual data is different from that involved with traditional decennial Census data. The changes between 2000 and 2001, which may seem larger than expected, are impacted by this change in methodology. For a complete explanation of the ACS, visit <http://www.census.gov/acs/www/>.

#### New Construction

According to the U.S. Census Bureau's Residential Construction Branch, the number of new housing units authorized for construction by building permits in North Dakota increased 89.6 percent between 2000 and 2005 (Table 1). While this growth is substantial, it is important to keep in mind that new construction is not always filled. As an example, consider North Dakota's largest metro area; Cass County. Half of North Dakota's new housing permits are consistently issued in Cass County, part of the Fargo-Moorhead metropolitan statistical area. A survey of apartment owners and managers in the Fargo-Moorhead area conducted by Appraisal Services, Inc., found that multi-family building permits in the area grew an average of 936 per year between 2001 and 2005. Along with increased permits, the apartment vacancy rate increased from an annual average of 4.5 percent in 2001 to 8.5 percent in 2005. The elevated vacancy rate, compounded by continued apartment construction, has created a situation of oversupply of multi-family housing in the Fargo-Moorhead area. According to Appraisal Services, "It will take several years of reduced apartment growth or a significant increase in population to bring the rental market back into a balanced supply and demand condition" (Appraisal Services, Inc., *Quarterly Report on Apartment Vacancies for the Fargo-Moorhead Metropolitan Area*). Building permit data for 2006 indicate that the market may already be adjusting. The number of new homes authorized for construction by building permits in North Dakota decreased for the first time since 2000, dropping 12.6 percent between 2005 and 2006. This decline is largely a result of a decrease in permits for multiple-unit housing, 26.3 percent between 2005 and 2006 (Table 1).

#### Explanation

Through a brief analysis of specific indicators, the perceived contradiction between changes in population and housing units can be explained. Despite the recent increase in North Dakota's birth rate, this increase is not enough to offset the magnitude of out-migration affecting the state's population. It is also evident that household composition is changing in North Dakota. Fewer people, on average, live in each North Dakota home, and a larger proportion of residents are choosing to live by themselves. Thus, an increase in housing units does not always equate to more people as is generally assumed; rather, the increase can result from the shifting style in which North Dakotans are living and instances of supply outpacing demand.