POPULATION PROJECTIONS WITHOUT TRYING

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Some Basic Terminology

Cohort. A cohort consists of a group of individuals who experienced the same significant demographic event during a particular period of time and who may be identified as a group at successive later dates on the basis of this common demographic experience. [Shryock, H. and Siegel, J. (1973). *The methods and materials of demography*. Washington, D.C.: US Government Printing Office, p.712). For example, all babies born in the 1990s comprise the birth cohort for that decade.

Projection. The numerical outcome of a particular set of assumptions regarding future values of a variable (e.g., population).

Forecast. The projection selected as the one most likely to provide an accurate prediction of the future value of a variable (e.g., population).

Estimate. A calculation of a current or past value of a variable (e.g., population) typically based on symptomatic indicators of change in that variable.

Base year. The year of the earliest data used to make a projection.

Launch year. The year of the most recent data used to make a projection.

Target year. The year for which a variable is projected.

Projection horizon. The interval between the launch year and target year of a projection.

Projection interval. The increments in which projections are made.

STATISTICAL MEASURES

STATISTICAL MEASURES

- ♦ Absolute measures focus on single numbers such as population size, births, deaths, natural increase, or net migration.

- ♦ Relative measures focus on the relationship between two numbers. They are typically expressed as follows:

    - **Ratio** is simply one number divided by another. These could be any two numbers. They do not have to be related to each other. For example, one could calculate the ratio of desserts to casseroles at a potluck. But they have to provide some type of meaningful information.

      A commonly used ratio in demography is **SEX RATIO,** which is the number of males per 100 females. In New Mexico in 2000, there were 894,317 males and 924,729 females, yielding a sex ratio of

      (894,317/924,729)*100=96.7.

      This translates to 96.7 males for every 100 females in New Mexico.

- **Proportion** is a special type of ratio in which the numerator is a subset of the denominator.

  For example, in New Mexico in 2000, there were 50,751 people aged 80 years and older and a total population of 1,819,046. The proportion of 80+ can thus be calculated as

  50,751/1,819,046 = .028.

  A proportion multiplied by 100 is called **percentage**. Thus, people aged 80 years and older accounted for 2.8% of the New Mexico population in 2000.

- **Rate** is also a special type of ratio. A rate is the number of events that occur during a given period of time divided by the population at risk of the occurrence of those events. For example, the death rate is the number of deaths divided by the population exposed to dying. Rates are usually expressed on a period of one year. In New Mexico in 2000, the **Crude Death Rate** (CDR) was 7.3 per thousand people.

  CDR = (13.301/1,819,046) * 1000.

Population at risk. This is difficult to measure exactly because the population is constantly in a state of flux. Some die. Some move away, some move in during the year. How can the population exposed to the risk of dying be measured?

This is solved by using the **midyear population** as an approximation of the population at risk. This solution is based on the assumption that births, deaths, and migration occur evenly throughout the year, so that the midyear is a measure of the average population during the year.

PROJECTION METHODOLOGIES

TREND EXTRAPOLATION METHODS

Trend extrapolation methods

The defining characteristic of trend extrapolation methods is that future values of any variable are determined solely by its historical values.

For very short term projection horizons (five to 10 years) and for places where little or no migration occurs, these methods can produce reasonably accurate forecasts.

The advantage to using these methods is their relatively low costs and small data requirement.

Simple Methods

- *Small data requirements*
- *Simple mathematical structure*
- *Very easy to apply*

LINEAR EXTRAPOLATION METHOD (LINE) assumes that the population will increase (decrease) by the same number in each future year as the average annual increase (decrease) observed over the base period.

Average annual absolute change can be computed as

$$AAAC = (P_l - P_b)/n$$

where P_l is the population in the launch year,

P_b is the population in the base year.

Example:
The AAAC for Catron County from 1990 to 2000 can be calculated as

$$AAAC = (3{,}543 - 2{,}563)/10 = 98 \text{ per year}$$

Population projections based on LINE method can be expressed as

$$P_t = P_l + z * (AAAC)$$

where P_t is the population in the target year, and

z is the number of years in the projection horizon.

LINE Example

The LINE projection for Catron County for 2005 and 2010 can be calculated as

Catron 2005 = 3,543 + (5 * 98) = 4,033

Catron 2010 = 3,543 + (10 * 98) = 4,533

GEOMETRIC EXTRAPOLATION METHOD (GEO)

This method assumes that a population will increase (decrease) at the same annual percentage rate during the projection horizon as during the base period. Growth rates estimated using GEO assumes compounding at discrete time intervals, e.g. one year. To calculate the average annual geometric rate use the following formula:

$$r = (P_l / P_b)^{1/y} - 1$$

Given this formula a population projection using the GEO method can be expressed as

$$P_t = P_l * (1 + r)^z$$

GEO Example

Catron 1990 = 2,563
Catron 2000 = 3,543

r = ((3,543/2,563)^(1/10)) – 1 = .032909

The GEO projection for Catron County for 2005 and 2010 can be calculated as

Catron 2005 = (3,543 (1 + .032909)^5 = 4,165

Catron 2010 = (3,543 (1 + .032909)^10 = 4,896

EXPONENTIAL EXTRAPOLATION METHOD (EXPO)

Like the GEO method, EXPO assumes that a population will increase (decrease) at the same annual percentage rate during the projection horizon as during the base period. The difference is that population growth is assumed to occur continuously rather than at discrete intervals.

To calculate the average annual exponential rate use the following formula:

$$r = \ln (P_l / P_b)/y$$

where ln is the natural logarithm .

Given this formula a population projection using the GEO method can be expressed as

$$P_t = P_l * e^{rz}$$

EXPO Example

Catron 1990 = 2,563
Catron 2000 = 3,543

r = (ln(3,543/2,563)) /10= .03238

The GEO projection for Catron County for 2005 and 2010 can be calculated as

Catron 2005 = 3,543 * exp (5* .03238) = 4,167

Catron 2005 = 3,543 * exp(10* .03238) = 4,898

COMPLEX Methods

- *Incorporate data from a number of points in time*
- *Complex mathematical structure*
- *Require an algorithm to estimate method's parameters*
- *Provide a more complete picture of the historical pattern of population change than simple extrapolation methods*
- *More difficult to implement than simple extrapolation methods*

REQUIREMENTS:

- Historical data at equal time intervals between launch and base year
- Consistent geographic boundaries for each point in time

LINEAR TREND

Simplest and most familiar of the complex trend extrapolation methods.

Assumptions

- population will increase (decrease) by a constant numerical amount, as determined by historical population.
- same assumption as LINE but operationalized differently
- equation is that for a straight line

The formula is as follows: $Y = a + bX$

Where Y is the dependent variable (e.g., total population

X is the independent variable (e.g., time)

a is the constant term

b is the slope of the line.

X and Y are the model's variables. They represent the data used in estimated the model and take on values that vary with each observation.

LINEAR TREND

The terms **a** and **b**

- are the model's parameters or coefficients.
- represent the relationships between the model's independent and dependent variables.
- take on values that remain constant for any particular application of the model but vary from one application to another.

EXAMPLE

New Mexico

Year	Time	Population
1950	1	981,187
1960	2	951,023
1970	3	1,017,055
1980	4	1,303,303
1990	5	1,515,069
2000	6	1,819,046

LINEAR TREND EXAMPLE

The linear regression results are as follows:

a = 666,755.7 $\quad$ R = .990

b = 219,076.6 $\quad$ R^2 = .981 $\quad$ adjusted R^2 = .976

The model shows that NM population increases by 219,076.6 a year.

We construct population projections by plugging the estimated parameters into the linear trend model as follows:

$$P_t = a + b(\text{time}) + \text{CALIB}$$

CALIB is an error term calculated by subtracting the estimated population from the actual population in the launch year. In the New Mexico, the launch year is 2000.

NM 2000 = 666,755.7 + (219,076.6 * 6) = 1,981,215

CALIB = 1,819,046 – 1,981,215 = 162,169

NM 2010 = (666,755.7 + (219,076.6 * 7)) – 162,169

=2,038,123

OTHER COMPLEX TREND EXTRAPOLATION METHODS

POLYNOMIAL CURVE FITTING

Like the EXPO and GEO methods, a polynomial curve can be useful for basing projections on nonlinear patterns, i.e., when annual population change is not a constant numerical value.

The general formula for a polynomial curve is

$$Y = a + b_1X + b_2X^2 + b_3X^3 + \ldots b_nX^n$$

Where Y is the dependent variable, e.g., total population

a is the intercept or constant

b is the slope that indicates the amount of change in the population

X is the independent variable, e.g. time

POLYNOMIAL CURVE FITTING

The coefficients of the polynomial curve include both a linear (b_1) and nonlinear measures (b_2, $b_3 \ldots b_n$).

For use in population projections a second-degree polynomial or quadratic equation is used.

$$Y = a + b_1X + b_2X^2$$

OTHER TREND EXTRAPOLATION METHODS

RATIO METHODS

- **In these methods, the population (or population change) of a smaller area is expressed as a proportion of the population (or population change) of a larger area in which the smaller area is located.**
- **Small data requirements**
- **Easy to apply**

TYPES OF RATIO METHODS

- ***Constant Share***, the smaller area's share in the larger area's population is held constant at some historical level, such as the level observed in the launch year.
- ***Shift Share*** accounts for changes in the population shares over time.
- ***Share of Growth*** or apportionment method focuses on shares of population growth rather than population size. This method assumes that the smaller area's share of population growth will be the same over the projection horizon as during the base period.

STRUCTURAL METHODS

- Land use models
- REMI model (input-output)
- Econometric models

COMPONENTS OF POPULATION CHANGE and COHORT COMPONENT METHOD

THE POPULATION BALANCING EQUATION

The overall growth or decline of a population is determined by its ***mortality, fertility*** and ***migration***. This is formalized in what is commonly known as the Population Balancing Equation:

$$P_t - P_{(t-n)} = (B - D) + (IM - OM)$$

Where P_t is the population at the end of the time period;

$P_{(t-n)}$ is the population at the beginning of the time period;

B, is the number of births during the time period;

D, is the number of deaths during the time period;

IM, is the number of in-migrants during the time period;

OM, is the number of in-migrants during the time period.

POPULATION BALANCING EQUATION, CONT'D.

(B - D), the difference between the number of births and the number of deaths is called ***natural increase***. If the result is negative, it is called ***natural decrease***.

(IM – OM), the difference between the number of in-migrants and the number of out-migrants is called ***net migration***. This represents the population growth coming from the movement of people into and out of the area. It may be either positive or negative.

USES OF POPULATION BALANCING EQUATION

Population Estimation:

$$P_t = P_{(t-n)} + (B – D) + (IM – OM)$$

If we have a good population count in a census year ($P_{(t-n)}$) and (good quality) data on births, deaths, and in- and out-migration, we can use the above formula to estimate the population in a later year P_t.

Migration Estimation:

$$(IM – OM) = (P_t - P_{(t-n)}) – (B – D).$$

The above equation can be used to estimate migration as a residual from the total population change ((P_t - $P_{(t-n)}$). This can be used when there are good data from two consecutive censuses and good data on births and deaths, but no migration data.

EXAMPLES:

July 1, 2001 Population Estimation for Santa Fe County

July 1, 2001 population = 129,936 + (1688 – 812) + 1204

132,206 = 129,936 + (1688 - 812) + 1204

132, 206 = 129,936 + 876 + 1204

If we use the data from IRS data for 2000-01 wherein the estimated net migration for Santa Fe County is (-124), the population of Santa Fe County for July 2001 would be: 130,684.

Net Migration calculation:

Net migration = (132,206 – 129,936) – (1688 – 812)

1204 = 2080 – 876

MORTALITY is the occurrence of death in a population.

MEASURES OF MORTALITY:

Crude Death Rate: the number of deaths during the year divided by the mid-year population multiplied by 1000

Age-Specific Death Rate (ASDR): the proportion of persons in each age group (x to x+n) that dies during the year:

$_nASDR_x = {}_nD_X/{}_nP_x$

Where x is the youngest age in the age interval,

n is the number of years in the age interval,

$\mathbf{_nD_X}$ is the number of deaths between the ages of x to x+ n

$\mathbf{_nP_x}$ is the midyear population between the ages of x and x+n

For example: the notation $\mathbf{_5D_{15}}$ translates to *deaths between the ages of 15 to 19.*

ASDR is typically calculated for one, five, and ten-year age groups.

CALCULATION OF AGE-SPECIFIC DEATH RATE (ASDR)			
New Mexico Males, 1990			
Age Group (1)	Number of Deaths ($_nD_x$) (2)	Mid-Year Population ($_nP_x$) (3)	$_nASDR_x$ (4) = (2)/(3)
0	137	10,839	0.012640
1 - 4	27	53,330	0.000506
5 - 9	20	66,612	0.000300
10 - 14	27	62,064	0.000435
15 - 19	113	58,207	0.001941
20 - 24	123	53,482	0.002300
25 - 29	156	63,103	0.002472
30 - 34	197	64,626	0.003048
35 - 39	164	60,113	0.002728
40 - 44	178	52,641	0.003381
45 - 49	174	39,676	0.004386
50 - 54	204	32,162	0.006343
55 - 59	329	29,842	0.011025
60 - 64	440	28,002	0.015713
65 - 69	596	25,744	0.023151
70 - 74	722	19,231	0.037544
75 - 79	752	13,429	0.055998
80 - 84	672	7,571	0.088760
85 +	730	4,579	0.159423
Total	5,761	745,253	

CALCULATION OF CRUDE DEATH RATE (CDR)
CDR = (5,761/745,253)*1000

Female Life Table: New Mexico, 1990									
	Deaths	Pop	ASDR	nqx	nlx	ndx	nLx	Tx	ex
0	106	10597	0.010003	0.009953	100000	995	99279	7966047	79.66
1 - 4	20	51112	0.000391	0.001564	99005	155	395622	7866768	79.46
5 - 9	19	64447	0.000295	0.001473	98850	146	493885	7471146	75.58
10 - 14	11	59568	0.000185	0.000923	98704	91	493294	6977261	70.69
15 - 19	47	55731	0.000843	0.004208	98613	415	492028	6483967	65.75
20 - 24	37	52576	0.000704	0.003513	98198	345	490129	5991939	61.02
25 - 29	47	62980	0.000746	0.003724	97853	364	488355	5501810	56.23
30 - 34	57	66040	0.000863	0.004306	97489	420	486395	5013455	51.43
35 - 39	59	61850	0.000954	0.004758	97069	462	484190	4527060	46.64
40 - 44	73	53113	0.001374	0.006849	96607	662	481382	4042869	41.85
45 - 49	99	41114	0.002408	0.011968	95946	1148	476857	3561488	37.12
50 - 54	145	34496	0.004203	0.020798	94797	1972	469057	3084631	32.54
55 - 59	184	32196	0.005715	0.028172	92826	2615	457590	2615573	28.18
60 - 64	291	31488	0.009242	0.045165	90211	4074	440867	2157983	23.92
65 - 69	451	29734	0.015168	0.073068	86136	6294	414946	1717116	19.93
70 - 74	509	22898	0.022229	0.105294	79842	8407	378195	1302170	16.31
75 - 79	622	18294	0.034000	0.156683	71435	11193	329196	923975	12.93
80 - 84	696	11929	0.058345	0.254591	60243	15337	262871	594779	9.87
85 +	1306	9653	0.135295	1.000000	44906	44906	331909	331909	7.39

Male Life Table: New Mexico, 1990									
Male	Deaths	Pop	ASDR	nqx	nlx	ndx	nLx	Tx	ex
0	137	10839	0.012640	0.012560	100000	1256	99091	7257820	72.58
1 - 4	27	53330	0.000506	0.002023	98744	200	394463	7158729	72.50
5 - 9	20	66612	0.000300	0.001500	98544	148	492352	6764267	68.64
10 - 14	27	62064	0.000435	0.002173	98396	214	491447	6271915	63.74
15 - 19	113	58207	0.001941	0.009660	98183	948	488542	5780468	58.87
20 - 24	123	53482	0.002300	0.011433	97234	1112	483392	5291926	54.42
25 - 29	156	63103	0.002472	0.012285	96122	1181	477660	4808534	50.03
30 - 34	197	64626	0.003048	0.015126	94942	1436	471118	4330874	45.62
35 - 39	164	60113	0.002728	0.013549	93505	1267	464360	3859756	41.28
40 - 44	178	52641	0.003381	0.016765	92239	1546	457327	3395396	36.81
45 - 49	174	39676	0.004386	0.021690	90692	1967	448543	2938069	32.40
50 - 54	204	32162	0.006343	0.031219	88725	2770	436701	2489526	28.06
55 - 59	329	29842	0.011025	0.053645	85955	4611	418248	2052825	23.88
60 - 64	440	28002	0.015713	0.075596	81344	6149	391347	1634577	20.09
65 - 69	596	25744	0.023151	0.109422	75195	8228	355404	1243230	16.53
70 - 74	722	19231	0.037544	0.171611	66967	11492	306104	887826	13.26
75 - 79	752	13429	0.055998	0.245607	55475	13625	243311	581722	10.49
80 - 84	672	7571	0.088760	0.363204	41850	15200	171248	338411	8.09
85 +	730	4579	0.159423	1.000000	26650	26650	167163	167163	6.27

FERTILITY is the occurrence of a live birth to an individual, a group, or an entire population

MEASURES OF FERTILITY

Crude Birth Rate (CBR) = number of births during a year divided by the midyear population multiplied by 1,000. For example, in New Mexico in 2000 the CBR is equal to 14.3 per 1,000 people.

CBR = (25,950/1,819,046) * 1,000

Age Specific Fertility Rate (ASFR) is the number of births to females in a given age group divided by the number of females in that age group.

$_{n}ASFR_{x} = {}_{n}B_{X}/{}_{n}P_{x}$

Where x is the youngest age in the age interval,

n is the number of years in the age interval,

$_{n}F_{X}$ is the number of births between the ages of x to x+n

$_{n}P_{x}$ is the midyear population between the ages of x and x+n

Total Fertility Rate (TFR) is the sum of the individual ASFRs. When computed for one year, the TFR is calculated as

TFR = sum($ASFR_x$)

When age groups are defined in five-year intervals, the TFR is calculated by multiplying the sum of the ASFRs by five, to account for the fact that females spend five years in each age group.

TFR = 5 * (sum (${}_5ASFR_x$)

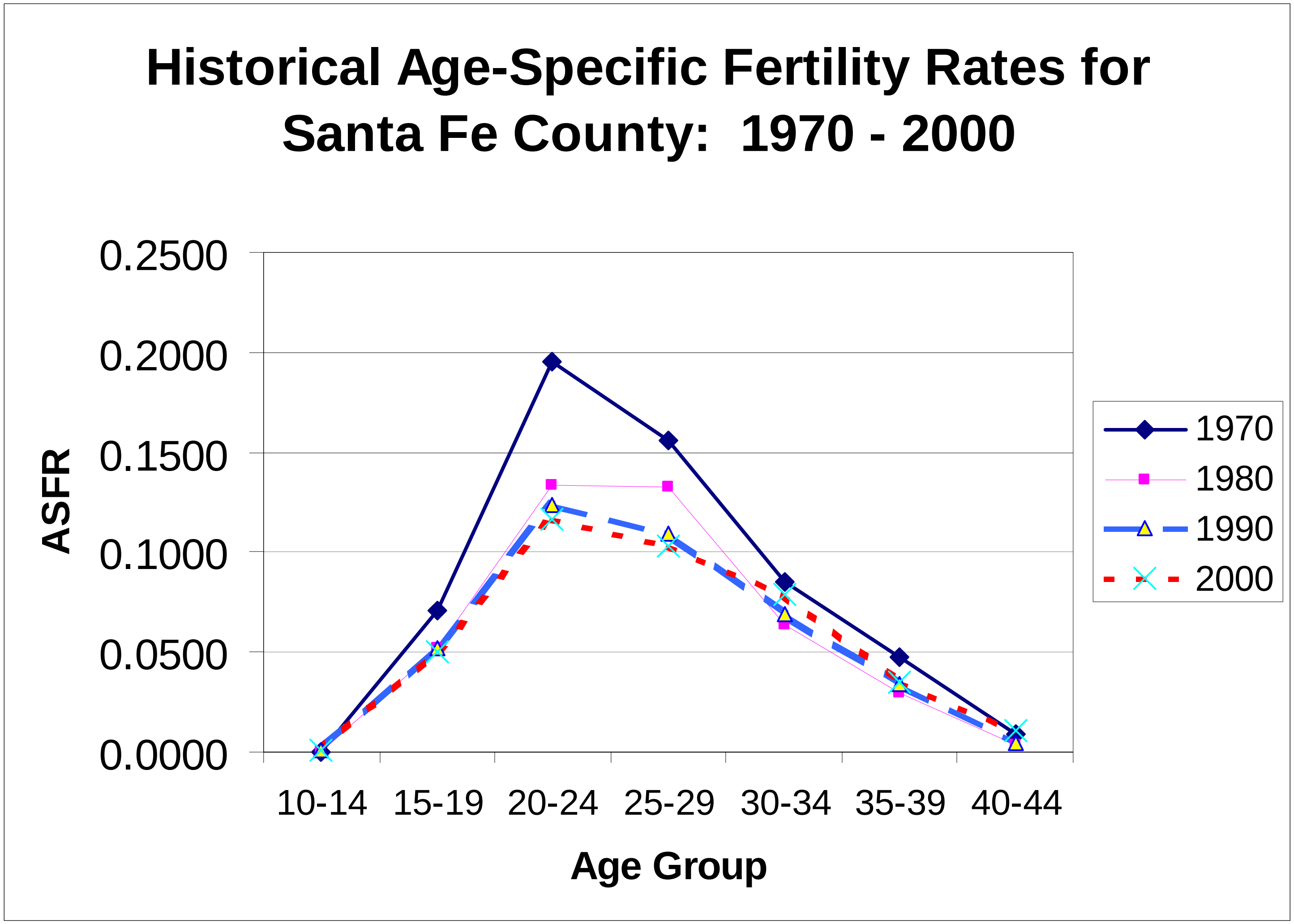
The TFR is often expressed as the average number of births per woman.

General Fertility Rate (GFR) relates the number of births to the number of females in their childbearing years. It is calculated by dividing the number of births to the number of females aged 15-44. It is typically expressed as births per 1000 women. This measure is a refinement to the CBR because it relates the births to the population most likely to have children.

Calculation of Fertility Rates, New Mexico 2000			
Age Group	Number of Females	Number of Births	Age Specific Fertility Rate (ASFR)
10 - 14	72,055	73	0.001013
15 - 19	71,004	4,431	0.062405
20 - 24	59,945	7,763	0.129502
25 - 29	57,734	6,458	0.111858
30 - 34	59,564	4,402	0.073904
35 - 39	70,974	2,274	0.032040
40 - 44	72,143	524	0.007263
45 - 49	67,311	25	0.000371
Total	530,730	25,950	0.418356

Total Fertility Rate (TFR) = sum of ASFR across
all age groups multiplied by 5
where, 5 is the number of ages in each age group

TFR = .418356*5	
TFR =	2.09


Historical Age-Specific Fertility Rates for
Santa Fe County: 1970 - 2000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
ASFR
10-14
15-19
20-24
25-29
30-34
35-39
40-44
Age Group
1970
1980
1990
2000

MIGRATION refers to moves across some type of political or administrative boundary. This distinction is made to differentiate between local moves within a community from moves from one community to another.

MEASURES OF MIGRATION

Gross migration is the movement of people into or out of an area.

Net migration is the difference between in and out migration.

Migration rates:

Inmigration rate: number of migrants into a community divided by the population of that community multiplied by 1,000.

Outmigration rate: number of people leaving a community divided by the population of that community multiplied by 1,000.

Net migration rate: the difference between the inmigration rate and the outmigration rate.

IRS-Based Migration Estimates Between 1999-2000

	Inmigration		*Outmigration*	*Net Migration*
New Mexico	102,604	New Mexico	108,637	-6,033
Bernalillo	26,681	Bernalillo	29,008	-2,327
Catron	301	Catron	222	79
Chaves	2,603	Chaves	3,132	-529
Cibola	1,323	Cibola	1,297	26
Colfax	794	Colfax	672	122
Curry	3,422	Curry	4,186	-764
De Baca	93	De Baca	153	-60
Dona Ana	8,607	Dona Ana	9,771	-1,164
Eddy	1,840	Eddy	2,684	-844
Grant	1,305	Grant	1,678	-373
Guadalupe	227	Guadalupe	209	18
Harding	27	Harding	43	-16
Hidalgo	245	Hidalgo	853	-608
Lea	1,991	Lea	3,517	-1,526
Lincoln	1,585	Lincoln	1,271	314
Los Alamos	1,077	Los Alamos	1,406	-329
Luna	1,313	Luna	1,674	-361
McKinley	8,000	McKinley	7,003	997
Mora	275	Mora	207	68
Otero	4,321	Otero	4,962	-641
Quay	478	Quay	765	-287
Rio Arriba	1,646	Rio Arriba	1,823	-177
Roosevelt	1,122	Roosevelt	1,305	-183
Sandoval	7,730	Sandoval	6,173	1,557
San Juan	9,275	San Juan	9,114	161
San Miguel	1,102	San Miguel	1,301	-199
Santa Fe	6,980	Santa Fe	6,652	328
Sierra	692	Sierra	627	65
Socorro	845	Socorro	948	-103
Taos	1,447	Taos	1,287	160
Torrance	1,121	Torrance	1,007	114
Union	229	Union	234	-5
Valencia	3,907	Valencia	3,453	454

Estimated Migration Using Forward Survival Method Derived from 1990 New Mexico Male Life Table															
			Expected Population in the Absence of Migration												
$_nAge_x$	Age_x	Survival Rates ($_nS_x$)	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Census 2000 Actual Count	Difference Between Actual and Expected
0 - 1	0	0.9902	13530	13866	14070	14118	14077	13921	13623	13723	13656	13809	13678	13,367	-311
1 - 2	1	0.9991	12955	13398	13730	13932	13980	13939	13785	13490	13589	13522	13674	13,404	-270
2 - 3	2	0.9994	12962	12944	13386	13718	13920	13968	13927	13773	13478	13577	13511	12,987	-524
3 - 4	3	0.9995	12929	12954	12935	13377	13710	13911	13959	13918	13764	13469	13568	12,991	-577
4 - 5	4	0.9996	13535	12922	12947	12929	13370	13703	13904	13952	13911	13757	13462	13,442	-20
5 - 6	5	0.9997	13233	13529	12917	12942	12923	13365	13697	13898	13946	13905	13751	13,665	-86
15 - 16	15	0.9988	11659	11558	12054	12135	12602	13270	13659	12668	13421	13283	13187	15,266	2,079
16 - 17	16	0.9984	11547	11645	11544	12040	12120	12586	13254	13642	12653	13405	13267	15,344	2,077
17 - 18	17	0.9981	11778	11529	11626	11526	12021	12101	12567	13233	13620	12633	13384	15,418	2,034
18 - 19	18	0.9979	11233	11756	11507	11604	11504	11998	12078	12543	13208	13595	12609	14,513	1,904
19 - 20	19	0.9978	12080	11210	11731	11483	11580	11480	11973	12053	12517	13181	13566	14,206	640
25 - 26	25	0.9975	11687	10940	10523	10310	10519	11101	11903	11046	11560	11315	11411	11,328	-83
26 - 27	26	0.9976	12348	11658	10913	10497	10285	10493	11073	11874	11018	11531	11287	11,168	-119
27 - 28	27	0.9976	12769	12318	11629	10886	10471	10259	10467	11046	11844	10991	11503	11,342	-161
28 - 29	28	0.9975	12515	12738	12288	11601	10859	10445	10234	10442	11019	11815	10964	11,634	670
29 - 30	29	0.9974	13684	12484	12706	12257	11572	10832	10419	10209	10415	10991	11786	12,181	395
30 - 31	30	0.9973	13468	13648	12451	12673	12225	11541	10804	10392	10182	10388	10963	12,465	1,502
31 - 32	31	0.9972	12804	13431	13611	12417	12638	12191	11510	10774	10363	10154	10360	11,654	1,294
32 - 33	32	0.9971	12971	12768	13393	13573	12382	12602	12157	11478	10744	10334	10126	11,416	1,290
33 - 34	33	0.9971	12791	12934	12731	13355	13534	12346	12566	12122	11444	10713	10304	11,593	1,289
34 - 35	34	0.9971	12649	12754	12896	12694	13316	13494	12310	12529	12086	11411	10682	12,012	1,330
35 - 36	35	0.9970	12644	12612	12716	12858	12656	13276	13454	12274	12492	12051	11377	13,372	1,995
36 - 37	36	0.9970	12148	12607	12574	12678	12820	12619	13237	13414	12238	12455	12015	13,472	1,457
37 - 38	37	0.9970	12067	12112	12569	12537	12640	12781	12581	13197	13374	12201	12418	14,048	1,630
38 - 39	38	0.9969	11074	12030	12075	12531	12499	12602	12742	12543	13157	13334	12164	14,244	2,080
39 - 40	39	0.9968	11941	11039	11993	12037	12492	12460	12563	12703	12504	13116	13292	14,268	976
65 - 66	65	0.9799	5375	5354	5139	5263	5356	5524	5522	5032	5299	5169	5371	6,494	1,123
66 - 67	66	0.9785	5275	5267	5246	5036	5157	5248	5413	5411	4931	5192	5065	5,997	932
67 - 68	67	0.9768	5123	5161	5154	5133	4927	5046	5135	5296	5294	4825	5080	5,998	918
68 - 69	68	0.9746	4970	5004	5042	5034	5014	4813	4929	5016	5173	5171	4713	5,923	1,210
69 - 70	69	0.9721	4796	4844	4877	4914	4906	4887	4691	4804	4889	5042	5040	5,714	674
80 - 81	80	0.9245	1919	1998	2154	2223	2226	2391	2457	2420	2468	2601	2599	2,922	323
81 - 82	81	0.9162	1727	1774	1847	1992	2055	2058	2210	2271	2237	2282	2404	2,453	49
82 - 83	82	0.9076	1492	1582	1625	1692	1825	1883	1885	2025	2081	2049	2090	2,212	122
83 - 84	83	0.8994	1285	1354	1436	1475	1536	1656	1709	1711	1838	1889	1860	1,964	104
84 - 85	84	0.8916	1100	1156	1218	1292	1327	1381	1490	1537	1539	1653	1699	1,779	80
85 - 86	85	0.8820	912	981	1030	1086	1152	1183	1232	1328	1371	1372	1474	1,516	42
All ages			745242	753306	761425	769437	777261	784786	791867	798908	805738	812582	819157	894317	28068

COHORT COMPONENT METHOD

Cohort is defined as a group of people who experience the same demographic event during a particular period of time and who may be identified at later dates on the basis of this common experience (Shryock & Siegel, 1973, p. 712)

The population is divided into age cohorts that are moved forward in time using the probability of survival as estimated in the life tables.

The components of population change, mortality, fertility, and migration are projected separately and then combined together using the population balancing equation.

Fertility is estimated using the Age-Specific Fertility Rates that are projected into the future based on some assumption that is generally an extrapolation from historical trends.

Migration is projected using migration rates (in- and out-migration) to the appropriate population at risk.