March 1, 2004

New Approaches to Measuring Emergent U. S. Demographic Trends

John F. Long

U. S. Census Bureau

Paper to be presented at the annual meeting of the Population Association of America, Boston, MA. April 1-2, 2004.

This paper reports the results of research and analysis undertaken by the U.S. Census Bureau staff. It has undergone a Census Bureau review more limited in scope than that given to official Census Bureau publications. This report is released to inform interested parties of ongoing research and to encourage discussion of work in progress.

New Approaches to Measuring Emergent U.S. Demographic Trends

John F. Long, *U.S. Census Bureau*

In recent years, a number of emergent demographic trends have challenged the traditional methods of taking censuses, asking surveys, and estimating demographic change in the United States. As these trends have emerged and grown in importance, the U. S. statistical system has developed new methods and approaches to measure the new phenomena. Growing mobility and family instability have led to increasing ambiguity in residency and a re-examination of the definition and measurement of place of residence. Increasing international migration (both documented and undocumented) has led to new approaches to measuring or estimating international migration. Increased racial and ethnic diversity and intermarriage has led to new methods of measuring the variety of single and multiple racial and ethnic identifications of the population. The paper outlines these and other trends and points out the importance of a flexible statistical system that can react to rapid social and demographic changes.

The first impression that one might get from comparing the decennial census questionnaires over the last several decades would be one of continuity. The basic topics covered have remained fairly constant and even the questions have shown only moderate changes over those years. A similar observation could be made about the long-standing annual social and economic supplements to the Current Population Survey.

Given the role that these mainstays of demographic data collection play as benchmarks to measure the basic changes in demographic, social, and economic phenomena, such continuity is important. Only by continuing to measure the same underlying phenomena with relatively similar questions can these instruments chronicle the changes over time in the nation's basic social and demographic composition.

Yet, a closer look at these censuses and surveys reveals changes – some subtle and some rather major – in recent years. As new social and demographic trends emerge, the statistical system must respond not only to measure new phenomena but also to be sure that the questions provide reliable measures of changing phenomena. While demographic measures need to be revised less rapidly than economic or social measures, even they require occasional changes in measurement in recognition of emergent trends. Under such circumstances, census and survey questions as well as demographic methods must evolve to capture the changing phenomena even if it increases the potential lack of continuity.

Several such trends have become evident during the last few decades and must be reckoned with in any adjustment of the statistical system. Among those trends are the increasing complexity of racial and ethnic heritage, the rapid growth of international migration, the increasing mobility of the population, and the increasing rate of change in social and demographic conditions. Increased racial and ethnic diversity and intermarriage has led to new methods of measuring the variety of single and multiple racial and ethnic identifications of the population. Increasing international migration (both documented and undocumented) has led to new approaches to measuring or estimating international migration. Growing mobility and family instability have led to increasing ambiguity in residency and a re-examination of the definition and measurement of place of residence.

Growing Complexity of Racial and Ethnic Heritage –

Perhaps the major area of concern leading up to the 2000 census was the issue of racial and ethnic reporting – especially how to account for individuals with mixed racial heritage. With the increase in the diversity of the U.S. population, the increasing rates of marriage between individuals with different racial identities, and the increasing consciousness of the variety of racial heritages that a given individual might claim, the need to permit individuals to choose more than one race for their racial identity became apparent.

Census 2000 following the guidance of the Office of Management and Budget adopted a question on race that permitted respondents to identify in one or more race categories. This recognition of these changes in society around the issue of race permitted the statistical system to capture the more complex world of racial identity and provided many respondents a place to identify themselves that they had not previously had. Since it also was a major change to the system of historical demographic accounting that had relied upon a mutually exclusive and exhaustive set of race categories, many challenges of tabulation and historical comparisons had to be addressed. A look at the tabulations from Census 2000 gives numerous examples of the complexity of the results and the creativity with which the new data series are being addressed (table 1).

Another consequence of increasing racial and ethnic diversity was the growing number of people who did not identify with any of the race groups or their combinations and marked the "some other race" box. From 1990 to 2000 the percentage of the population marking this category increased from 3.9 percent to 5.5 percent. The majority of these individuals also identified as Hispanic on the Hispanic origin question. Research for the 2010 census will focus on asking the questions in such a way as to increase the number of individuals who will give a specific race response. In addition to changes in question wording, one option is to eliminate the "some other race" category.

Increasing Levels of International Migration –

Even though the population estimates of immigration during the 1990s had allowed for a large number of documented and undocumented immigrants, the results of Census 2000 revealed an even larger increase in the foreign-born population than the population estimates had predicted. The foreign-born population grew from 19.8 million to 31.1 million during the decade.[1] Not since the 1920's had immigration played such a major part in U.S. demographic change. It was clear that the rapid economic and social changes driving this large-scale immigration required new methods for measuring and estimating immigration in the 21st century.

The Census Bureau has begun a major new initiative to measure the size, characteristics, and impact of higher immigration flows. Given the large size of the American Community Survey (750,000 households now rising to 3 million households by 2005), it is possible to make reliable annual estimates of the foreign-born population rather than waiting 10 years for the next census. Measurement of the change in size and characteristics of this population will enable us to determine the changing immigration patterns of the United States.

[1] See Malone, Nolan, Kaari F. Baluja, Joseph M. Costanzo, and Cynthia M. Davis, U.S. Census Bureau, Census 2000 Brief, C2KBR-34, *The Foreign-Born Population: 2000*, U.S. Government Printing Office, Washington, DC, 2003.

In addition, the Census Bureau will be testing modifications of its current questions on immigration to improve their utility in measuring year of immigration, place of birth, and citizenship status. Of particular interest is a better determination of the year of entry of the foreign-born population. At present, respondents answers to this question might represent any of a number of events ranging from the first time they came to this country to the time that they obtained their most recent legal status to the last time they entered the country. Such ambiguity makes the questions extremely difficult to use in measuring or estimating immigration flows.

The Census Bureau has several other immigration initiatives underway including joint research with Statistics Canada and the Mexican National Institute for Statistics and Geography and an examination of administrative data from federal and state sources.

Increasing Short-term Residential Mobility –

Although the long-term residential mobility of the population (measured by census or survey questions that record residence one or five years earlier) appears to have stabilized or even decreased in recent years, short-term residential mobility may have increased substantially. Factors such as joint custody, seasonal changes in residence, weekday residence vs. weekend residence, and other residential instability may lead to frequent changes in a person's *de facto* residence over the course of a week, month, or year. As such, the Census Bureau's concept of usual residence has become harder to measure. In

fact, the entire concept of residency becomes more complex when an increasing portion of the population moves on a weekly or monthly cycle.

This increased instability affects the very heart of census taking – the effort to assign every individual to a unique geographic place of residence. If there is ambiguity in determining that place, people are more likely to be counted in the wrong place, counted more than once, or missed completely.

In demographic theory, we learn that a census may be either *de facto* (counting people where they were located -- or spent the night – as of the enumeration or reference date) or *de jure* (counting people at their place of legal residence). In practice, the situation is far more complicated, with the Census Bureau using the concept of "usual residence" (where a person lives or sleeps most of the time). With the large amount of short-term residential mobility in today's society, that concept has become increasingly ambiguous.

A chart might help in conceptualizing the issues. For a moment, put the measuring issues aside and assume perfect knowledge of where each individual slept each of the 365 nights of the year (equivalent to a *de facto* measurement every night). Table 2 shows an illustration of events consisting of changes in the *de facto* residence over the course of 365 days. The illustrations include a short two night trip away from home (A) to place B on days 3 and 4 (events 1 and 2), a two week vacation in place C on days 14 through 30 (events 3 and 4), a three month seasonal change of residence to place D on days 91

through 181 (events 5 and 6), and a permanent move to a new residence beginning on day 241 (event 7).

Columns 3 and 4 of table 2 show the effect of alternative residence concepts on the theoretical measures of residence. While a *de facto* process would capture all daily changes in residence, a 2-month residence rule (like the one currently used in the American Community Survey) only captures seasonal and permanent residence changes. The usual residence concept (as used in Census 2000) only captures permanent residence changes.

Note also that these concepts include a notion of intent as well. The seasonal residence change in event 5 and the permanent residence change in event 7 could not be distinguished from a temporary move (at least not on a contemporary basis) using changes in the *de facto* residence alone. There is the presumption of intent for this move to last an extended period of time beyond the measurement period.

The effects of these differences are shown in table 3, where the population of each place (in terms of person-days) would differ depending on which of the three concepts are used. In this example the residence in places A and B that a *de facto* system would have given do not show up in the actual measures from a 2-month rule or from a usual residence rule. Moreover, the seasonal residence captured by the 2-month rule is not captured by a usual residence rule.

The ambiguity that arises from the concepts is only magnified by issues in measuring the concepts. As seen above, the concepts are complicated in themselves but the operationalization of these concepts results in measurement issues that may be even more important. As with any question in the census, the respondent's own self reporting provides the basis for these results. If a respondent believes that a person really should be counted in a given place (a college student at home, an overseas resident at his family's stateside address, a joint custody child at the home of the parent who does not have residential custody on that day), the person may well be counted in a place that is not correct and may also be counted in another location as well.

In Census 2000 this residential ambiguity appears to have had a substantial effect on the accuracy of the census and of the coverage evaluation survey which was designed to measure net overcounts and undercounts. Only through a system of exact matching by name and date of birth were a number of responses in the census shown to be duplicate responses for the same individual albeit at different addresses, often far apart.

How can these issues be addressed? In preparation for the 2010 census, the Census Bureau is performing a series of cognitive tests to see how individuals respond to varying ways of asking the residence question or to a battery of questions that try to get at the complexity of the residence rules. This research is still in the initial stages but it is necessary to begin to get a handle on the fact of increased short-term mobility and its effects on residence reporting.

Increasing Rate of Change of Social and Demographic Factors –

The rapid changes in society that we have been detailing in race, immigration, and residential mobility are happening to many of the other variables that we measure in the census. While national surveys can provide a big picture of these annual changes, the local area data has only been available in the decennial census. The Census Bureau's new American Community Survey will provide frequent measures for social, demographic, and economic characteristics at small levels of geography that had previously only been available once a decade in the census long form. These data will now be available on an annual basis for states and for counties and places over 65,000 population and in multi-year averages (updated annually) for smaller areas.

Of all the major methodological improvements currently under way, the full-scale implementation of the American Community Survey in July 2004 will undoubtedly be the most revolutionary. No longer will communities have to live with out-of-date data to plan their services but instead will have annually updated information on the full range of topics previously available only from the decennial census.

Table 1. **Difference in Population by Race and Hispanic or Latino Origin, for the United States: 1990 to 2000**

Subject	1990 Census		Census 2000		Difference between 1990 and 2000			
					Using race alone for Census 2000		Using race alone or in combination for Census 2000	
	Number	Percent of total population	Race alone[1]	Race alone or in combination[2]	Numerical difference (2000 minus 1990)	Percent difference (based on 1990)	Numerical difference (2000 minus 1990)	Percent difference (based on 1990)
Total population[3]	**248 709 873**	**100.0**	**281 421 906**	**281 421 906**	**32 712 033**	**13.2**	**32 712 033**	**13.2**
White	199 686 070	80.3	211 460 626	216 930 975	11 774 556	5.9	17 244 905	8.6
Black or African American	29 986 060	12.1	34 658 190	36 419 434	4 672 130	15.6	6 433 374	21.5
American Indian and Alaska Native	1 959 234	0.8	2 475 956	4 119 301	516 722	26.4	2 160 067	110.3
Asian	6 908 638	2.8	10 242 998	11 898 828	3 334 360	48.3	4 990 190	72.2
Native Hawaiian and Other Pacific Islander	365 024	0.1	398 835	874 414	33 811	9.3	509 390	139.5
Some other race	9 804 847	3.9	15 359 073	18 521 486	5 554 226	56.6	8 716 639	88.9
Hispanic or Latino (of any race)[3]	22 354 059	9.0	35 305 818	35 305 818	12 951 759	57.9	12 951 759	57.9
White	11 557 774	4.6	16 907 852	18 753 075	5 350 078	46.3	7 195 301	62.3
Black or African American	769 767	0.3	710 353	1 035 683	- 59 414	-7.7	265 916	34.5
American Indian and Alaska Native	165 461	0.1	407 073	674 601	241 612	146.0	509 140	307.7
Asian	266 157	0.1	119 829	319 334	- 146 328	-55.0	53 177	20.0
Native Hawaiian and Other Pacific Islander	39 146	-	45 326	126 265	6 180	15.8	87 119	222.5
Some other race	9 555 754	3.8	14 891 303	16 750 841	5 335 549	55.8	7 195 087	75.3
Not Hispanic or Latino[3]	226 355 814	91.0	246 116 088	246 116 088	19 760 274	8.7	19 760 274	8.7
White	188 128 296	75.6	194 552 774	198 177 900	6 424 478	3.4	10 049 604	5.3
Black or African American	29 216 293	11.7	33 947 837	35 383 751	4 731 544	16.2	6 167 458	21.1
American Indian and Alaska Native	1 793 773	0.7	2 068 883	3 444 700	275 110	15.3	1 650 927	92.0
Asian	6 642 481	2.7	10 123 169	11 579 494	3 480 688	52.4	4 937 013	74.3
Native Hawaiian and Other Pacific Islander	325 878	0.1	353 509	748 149	27 631	8.5	422 271	129.6
Some other race	249 093	0.1	467 770	1 770 645	218 677	87.8	1 521 552	610.8

- Rounds to 0.0.

[1] One of the following six races: (1) White, (2) Black or African American, (3) American Indian and Alaska Native, (4) Asian, (5) Native Hawaiian and Other Pacific Islander, (6) Some other race. The population of Two or More races is not shown separately.

[2] Alone or in combination with one or more of the other five races listed. Numbers for the six race groups add to more than the total population and the six percentages add to more than 100 percent because some individuals indicated more than one race. For example, a person indicating "American Indian and Alaska Native ***and*** Asian ***and*** Native Hawaiian and Other Pacific Islander" is included with American Indian and Alaska Native, with Asian, and with Native Hawaiian and Other Pacific Islander.

[3] The differences between 1990 and 2000 for the total population, the Hispanic or Latino Population, and the Not Hispanic or Latino population are not affected by whether data on race are for race alone or for race alone or in combination.

Source: U.S. Census Bureau, Census 2000, Special Tabulation PHC-T1.

Table 2: Illustrative Place of Residence by Residence Concept					
		Days	Residence Concept		
Event #	Day #	Elapsed	De Facto	2 Month Rule	Usual Residence
-	1	2	A	A	A
	…				
1	3	2	B	A	A
	…				
2	5	9	A	A	A
	…				
3	14	17	C	A	A
	…				
4	31	60	A	A	A
	…				
5	91	90	D	D	A
	…				
6	181	60	A	A	A
	…				
7	241	125	E	E	E
	…				
-	365	-	E	E	E

Table 3: Illustrative Place Populations by Residence Measurement Concept (in person-days)			
	Residence Measure		
Place	De Facto	2 Month Rule	Usual Residence
A	131	150	240
B	2	0	0
C	17	0	0
D	90	90	0
E	125	125	125
F	0	0	0
Total	365	365	365