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Undercount in China's 2000 Census in Comparative Perspective

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Abstract

• There has been great concern about undercount in the 1995 Mid-Censal Survey of China and the 2000 Census of China, especially involving young men. The extent of undercount increased between 1990 and 1995; it decreased between 1995 and 2000. This paper focuses on patterns of undercount by age and sex in the 2000 Census of China.

• Estimation of the undercount by age and sex involves comparison of the enumerated population with some estimate of the “true” number of people of a given age and sex. Any estimated difference between the the population in two sources shows the error or difference in one source relative to that in the other source.

• Undercount is a problem in all countries, especially among children and young men. This is evident in data from numerous countries, including Australia, New Zealand, Canada, the United States, South Africa and the Soviet Union. Geographic mobility, living in non-standard dwellings that may not be recognized as residences and living with non-relatives or distant relatives all contribute to the chance that people are missed in a census.

• The pattern of undercount in China is not surprising in light of experience in other countries, and China-specific explanations are probably not the main reasons for the undercount.

• Policies implemented for the 2000 Census improved the coverage by age and sex in the 2000 Census beyond what would have happened without such changes.

• The United States has undertaken anthropological and qualitative research to understand better the reasons why some groups are undercounted. Even though the general reasons for undercount are common across countries, how to improve coverage of frequently-missed groups in a particular country requires specific cultural knowledge. Further research into how to improve census coverage in China would be worthwhile, including pursuing ethnographic studies.

• Issues of undercount, estimation of undercount, and whether to adjust official population figures are fraught with practical and political considerations throughout the world. What procedures to implement to assure the most complete possible count, how to estimate the undercount and whether to use adjusted population figures are all difficult decisions. Hopefully international experience will be helpful to China in deciding how to proceed.
There was concern after the 1995 Mid-Censal Survey of China about an undercount, especially of young men. This concern also was raised about the 2000 Census of China. With a history of high-quality demographic data and a reputation for accurate age reporting some have wondered what happened since 1990 to data quality in China.¹

Census undercount and increases in this undercount, especially among young children and young adults, have occurred in many countries. Although a variety of remedies have been tried, none have proven completely satisfactory.

In this paper, the patterns by age and sex that suggest undercount in the 2000 Census of China are discussed in light of data from the 1990 Census of China and the 1995 Mid-Censal Survey of China. Undercount patterns in other countries are described, and the main types and sources of census undercount are examined. The main ways other countries have addressed this problem are presented, and their possible appropriateness for China are discussed.

**Concern with Undercount in China**

The post-enumeration survey after the 2000 Census of China yielded a net undercount of 1.81% (China, State Statistical Bureau, Department of Population Statistics, 2001; Walfish, 2001). Also, early feedback from some provinces of China reported large undercounts (Lavely, 2001: 14-15).

Analysts from the China State Statistical Bureau pointed out problems with underenumeration in the 1995 Mid-Censal Survey of China (Zhang, Yu & Cui, 1997). They focused on omission of young children and of young adults. Many of the omitted adults were temporary migrants.

**Types of Evidence of Undercount**

Undercount of the total population or of an age or sex group in a census occurs when the number of people counted is less than the actual number of people. To estimate this undercount requires a comparison of the recorded count with the “actual” number of people in the group—something that can never be known with certainty. Thus a comparison of the count of the population in two sources only indicates the extent to which the two sources differ.

A comparison of the "true" population and the enumerated population enables calculation of the size of population undercount and the proportion of the population that was not counted. There are two basic approaches to estimate the size of the "true" population as a whole and of population subgroups, such as by age, sex or ethnic group. The first method uses estimated survival from a previous census along with records or estimates of births, deaths and migrants to estimate the actual population at the second census date. This set of methods is called demographic analysis (Hogan & Robinson, 1993). The second method uses an independent survey conducted after the census, usually called a post-enumeration survey (PES).

Demographic analysis as a tool for census evaluation is well developed. Several studies have examined sex ratios by age to assess plausibility of reported data (Carrier & Farrag, 1959; Phillips, Anderson & Tsebe, 2003; Potter & Ordonez, 1976), and age reporting and completeness of coverage in censuses have been assessed by comparing the age distributions between successive censuses (Diamond, 1994; Himes & Clogg, 1992; United States Bureau of Census, 1974; 1988; South Africa, Office of Population Censuses &

¹ China and Chinese background populations have long been revered for accurate age reporting. However, there is substantial evidence that members of ethnic groups in China who do not use the twelve-year animal cycle to mark the year of birth often have problems of age misreporting and age exaggeration that typify populations in much of the developing world (Anderson & Silver, 1994; Coale & Li, 1991; Huang, 1994).
Independent standards, such as vital registration data, have also been used to access the completeness and quality of the census count (Jones & Grupp, 1983; Luther et al., 1987). When the quality of the census data and the vital registration data are both questionable, or when the vital registration data are not available or not fully reported, other standards are used. School enrollment has been used to evaluate the accuracy of the census by age (Anderson & Silver, 1985; Muller & Espenshade, 1985: 40-42; Smith & Nogle, 1997). When the likely values for fertility and mortality in the intercensal period are not known, or if there is a high level of international migration which is not well recorded, demographic analysis sometimes does not yield accurate results. In the United States, there have been problems with the use of demographic analysis in estimation of undercount due to uncertainty about the actual number of undocumented aliens in the United States, although it is certain that the actual number of undocumented aliens is large (Passel, 1993: 1075).

Many countries rely wholly or mainly on a PES in their estimates of undercount overall and by age and sex. One problem is that if omission in the original census is not random, then characteristics that led to a person’s omission in the census will also increase the likelihood that people with those characteristics will be missed in the PES. This problem is called “correlation error.” In this situation the estimate of the undercount will be too low. If these characteristics are related to age and sex, then estimates of undercount by age and sex based on the PES will underestimate the extent of underenumeration of some groups (Choldin, 1994: 216-218). China has done post-enumeration surveys, but the data by age and sex from these surveys were not available for this paper.

**Sex Ratios**

The sex ratio of the population as a whole or of a particular age group is normally expressed as the number of males per 100 females. Often censuses undercount men to a greater extent than women. This occurs if men are more likely to be temporary migrants than women and if unmarried adult men have weaker ties with their families than unmarried adult women. If women were completely enumerated and men were not, excessively female sex ratios would be evidence of the undercount of men.

Zhang, Yu and Cui (1997) examined sex ratios of the same birth cohorts in the 1990 Census of China and the 1995 Mid-Censal Survey of China and concluded that the lower sex ratio of those age 25-49 in 1995 than in the same cohort in 1990 was evidence of a greater undercount of men in that cohort in 1995 than in 1990. A decline in the sex ratio for the entire population over time is similarly taken as evidence of an increasing population undercount. The sex ratio of the entire population of China was 106.58 in 1990, 104.16 in 1995 and 106.30 in 2000.

Figure 1 shows the sex ratios by age group in China in 1990, 1995 and 2000. If the assumption of complete enumeration of females were true, then Figure 1 suggests that underenumeration was a more severe problem in 1995 than in 2000, since the sex ratios for 2000 tend to fall between those for 1990 and those for 1995. However, if underenumeration of young adult women also increased between 1995 and 2000, the sex ratios of the population overall and by age do not indicate the extent of underenumeration.
Cohort Survival

Another approach to detection of underenumeration is to look at the proportion of a cohort of a given sex reported in one census who are counted in a later census or large survey. Figure 2 shows the proportion surviving from the 1990 Census of China to the 1995 Mid-Censal Survey of China, Figure 3 shows the proportion surviving from the 1995 Mid-Censal Survey of China to the 2000 Census of China and Figure 4 shows the proportion surviving from the 1990 Census of China to the 2000 Census of China.

An estimated proportion surviving of more than 1.0 indicates some problem with the data either at the first or the second date.

Figure 2 shows a typical pattern of undercount: those age 10-14 are enumerated more completely than those age 0-4, those age 10-14 are enumerated more completely than those in their early twenties, and those in their thirties are enumerated more completely than those in their twenties. Figure 3 shows a different picture. As indicated in Figure 3, those age 15-19 in 1995 were enumerated less completely than those age 10-14 in 1990.

The patterns in Figures 2-4 are generally similar for both males and females, although they are somewhat more extreme for males than for females, especially in Figure 2. These patterns are consistent with a substantial deterioration in the completeness of enumeration of both males and females in the younger working ages between 1990 and 1995 and with some improvement in enumeration between 1995 and 2000.
Figure 2. Census/Survey Survival Proportions 1990-1995, China

Figure 3. Census/Survey Survival Proportions 1995-2000, China
The Chinese State Statistical Bureau/National Bureau of Statistics instituted changes before the 2000 Census of China in order to try to reduce the undercount observed in 1995. How well did these measures work in the 2000 Census of China? Figure 5 for males and Figure 6 for females show the census survival proportions 1990-2000 and what the reported survival proportions would have been if the patterns 1990-1995 had continued between 1995 and 2000. The census survival proportions for both males and females between the 1990 and 2000 censuses are much more plausible than the survival proportions that would have occurred if the pattern of survival between 1990 and 1995 had continued between 1995 and 2000.

The increase in undercount of young males from the 1990 Census of China to the 1995 Mid-Censal Survey of China was likely the result of the increased geographic mobility of China’s population and growth in non-standard housing in the early 1990’s, which was related to economic growth, the weakening of the household registration system and increase in the number of temporary migrants. Economic growth continued and geographic mobility in China increased in the late 1990’s. Thus, without the changes implemented in the conduct of the 2000 Census of China, the severity of the undercount, especially of mobile young adults probably would have increased.²

Yet another approach to estimation of the extent of undercount by age and sex is to compare the enumerated population at one date to the projected population from an earlier date. If the population count by age at the first date and the age-specific mortality rates used to project the population are accurate, then a comparison of the projected population and the enumerated population at the second date will reveal any underenumeration of those who were alive at the first date.³

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² Since the enumerations in 1990 and in 2000 were censuses, and the 1995 enumeration was a large survey, it is possible that the difference in the data collection led to some of the problems with the 1995 data.

³ This approach does not produce an estimate of the undercount of those born between the first and the second date.
Figure 5. Male Census Survival Proportions 1990-2000 and what Male Survival Proportions would have been if Patterns 1990-95 had Continued through the Decade

Figure 6. Female Census Survival Proportions 1990-2000 and what Female Census Survival Proportions would have been if Patterns 1990-95 had Continued through the Decade
Figure 7 shows the enumerated and the life table survival proportions for males and females from the 1990 to the 2000 Census of China.\textsuperscript{4} Figure 8 shows the percentage by which the enumerated population in 2000 exceeded or fell short of the projected population from 1990. The more complete count of those in their

teens compared to young children and the undercount of those in their twenties compared to those in their teens is clear. Similarly, those in their thirties are enumerated more completely than those in their twenties. The source of the shortfall of the enumerated population in comparison to the life table projected population among those over age 65 in 2000 is unclear. However, since this approach is based on the difference between the enumerated and the projected population, and since age-specific mortality rates at the older ages are relatively high, even a small error in the age-specific mortality rates used can result in a substantial estimated undercount or overcount at the second date.

**Overall Patterns in Other Countries**

The general picture of undercount by age and sex seen in China in 1995 and 2000 is found in many other countries. Figures 9 and 10 show the estimated percent undercount by age and sex for Australia in the 1976 (Doyle, 1980), 1996 (Australia, Australian Bureau of Statistics, 1997: 15) and 2001 (Australia, Australian Bureau of Statistics, 2003: 20) censuses. In these figures a higher value indicates a greater degree of undercount. In Australia, as in China, the undercount of young children and of young adults of both sexes is clear, with a greater undercount of young adult males than of young adult females. Generally, the magnitude of the undercount of young adults decreased over time, probably due to improved census procedures.

![Figure 9. Male Net Percent Undercount, Australia, 1976, 1996 and 2001](image)

Figure 11 shows the estimated net percent undercount in four age groups for the New Zealand 1996 and 2001 censuses, based on the post-enumeration surveys (New Zealand, Statistics New Zealand, 2002: 18). The high undercount for the young adult ages is clear. Also, the extent of undercount increased between 1996 and 2001. The results for New Zealand show that even in well-developed national statistical systems, the magnitude of undercount can increase over time.
Figure 10. Female Net Percent Undercount, Australia, 1976, 1996 and 2001

<table>
<thead>
<tr>
<th>Age Group</th>
<th>1976</th>
<th>1996</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>3.1</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td>5-9</td>
<td>1.7</td>
<td>1.3</td>
<td>1.4</td>
</tr>
<tr>
<td>10-14</td>
<td>1.5</td>
<td>0.9</td>
<td>1.3</td>
</tr>
<tr>
<td>15-19</td>
<td>3.2</td>
<td>2.0</td>
<td>1.9</td>
</tr>
<tr>
<td>20-24</td>
<td>3.9</td>
<td>2.6</td>
<td>2.5</td>
</tr>
<tr>
<td>25-29</td>
<td>2.6</td>
<td>1.6</td>
<td>2.5</td>
</tr>
<tr>
<td>30-34</td>
<td>1.4</td>
<td>1.0</td>
<td>1.2</td>
</tr>
<tr>
<td>35-39</td>
<td>1.7</td>
<td>0.6</td>
<td>1.5</td>
</tr>
<tr>
<td>40-44</td>
<td>1.8</td>
<td>0.8</td>
<td>0.7</td>
</tr>
<tr>
<td>45-49</td>
<td>2.0</td>
<td>0.6</td>
<td>0.9</td>
</tr>
<tr>
<td>50-54</td>
<td>2.7</td>
<td>0.9</td>
<td>1.5</td>
</tr>
<tr>
<td>55-59</td>
<td>2.4</td>
<td>0.6</td>
<td>0.8</td>
</tr>
<tr>
<td>60-64</td>
<td>2.2</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>65-69</td>
<td>2.5</td>
<td>0.7</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Figure 11. Net Percent Undercount by Age, New Zealand, 1996 and 2001

<table>
<thead>
<tr>
<th>Age Group</th>
<th>1996</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-14</td>
<td>1.7</td>
<td>2.7</td>
</tr>
<tr>
<td>15-29</td>
<td>2.5</td>
<td>3.1</td>
</tr>
<tr>
<td>30-44</td>
<td>1.5</td>
<td>2.3</td>
</tr>
<tr>
<td>45+</td>
<td>1.0</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Figure 12 shows the cohort survival proportions from 1985 to 1991 for persons living and born in South Africa (Phillips, Anderson & Tsebe, 2003). The undercount of young children and the less complete enumeration of those in their twenties than of those five years older or five years younger is clear. A special feature of the data from South Africa is the overcount of those age 61-65 compared to those age 55-59. This probably occurred because a person in South Africa had to be at least age 65 to qualify for a pension; this motivated some people who were younger than 65 to claim that they were age 65.
Causes of Undercount

There is widespread agreement about the situations and characteristics of people that result in them being missed in a census. Based on examination of censuses from Australia, Britain, Canada and the United States, Simpson and Middleton (1997) conclude that:

“High non-response rates are found for single and divorced males, recent migrants, unemployed, minority ethnic groups, private renters, and those who share a dwelling with other households or with a business.”

They further noted that for age and sex groups:

“The following features are apparent. Young children are less reliably captured than children in their early teens, for both sexes. Young adult men are the hardest to enumerate. Among adults, older adults are more easily enumerated than younger adults.”

In the 1980’s, the United States Bureau of the Censuses commissioned 29 ethnographic reports about members of ethnic minorities and members of other groups that were often undercounted, such as migrant laborers (Brownrigg & Martin, 1989).5 These studies were done in order to gain insight about how to minimize the undercount in the 1990 United States Census. In a multivariate analysis of the results across the studies, de la Puente (1993) found that persons were likely to be missed if they had never been married, were less than 45 years of age, were a male aged 19-44, if they were a relative but not a member of the nuclear family of the head of household or if they were unrelated to the head of household.

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5 This series of studies continued after the 1990 United States Census.
In summary, people who are marginal to society, are geographically mobile, have an unclear place of residence or have non-standard living arrangements tend to be undercounted.

In China, the weakening of the household registration system and increased geographical mobility in the 1990’s (China Daily, Hong Kong Edition, 2002; Liang, 2001; Solinger, 1999; Wu & Treiman, 2002) greatly increased the portion of the population of China that fell in the categories that are prone to undercount. Thus, it should not be surprising that in the 1990’s the undercount increased and that Chinese census and large-scale survey data acquired the patterns of undercount by age and sex consistent with what is found in other societies.

In South Africa, concern with an increase in census undercount coincided with social and political change. In the first post-apartheid census in South Africa in 1996, unusually low sex ratios were found, especially for those age 20-34 (Dorrington, 1999; Shell, 1999). The sex ratio in the South Africa Census for the population as a whole was 92.2, and for the 30-34 age group it was 89.5.

Some thought these low sex ratios were an indication of poor quality of the work by Statistics South Africa in carrying out the 1996 Census. Some thought that political changes in the new South Africa had resulted in a less-qualified staff than earlier (Sadie, 1998). The low sex ratios, however, were mainly due to the increased geographic mobility of Africans in South Africa that accompanied the ending of apartheid. Mobile young adult African males were missed by the census more than were members of other groups. Thus, like China, South Africa in the mid-1990s began to demonstrate the patterns of undercount by age and sex typical of many other countries (Phillips, Anderson & Tsebe, 2003).

**Young Children**

Young families tend to be mobile. For the 1950 United States Census, comparison of census enumeration and registered births for the first three months of 1950 revealed that 3.6% of infants were not counted (United States Bureau of the Census, 1953: 1). For 82% of the missed infants, the entire young family was missed (United States Bureau of the Census, 1953: 2). In the 1990 United States Census, over half of the total net undercount was comprised of children (West & Robinson, 1999). Similarly, for the 1976 Census of New Zealand, Yurjevich (1982) estimated that 3% of those under one year of age were missed.

Underenumeration of young children also was found in the Soviet Union (Anderson & Silver, 1985; Baldwin, 1973). Figure 13 shows the percentage of children and young people who were estimated to have been missed in the 1970 Soviet Census (Anderson & Silver, 1985: 297). It is clear that in the Soviet Union, children younger than school-age were often missed. Once children were in school, they were almost completely enumerated. Compulsory schooling ended at age 16. After age 16, an increased proportion of young people was missed in the census, with the exception of the more complete enumeration of 18-year-olds. Soviet males typically began military service for two to three years at age 18 – the census was about to locate those men who were in the military. Omission rates of those in their twenties increased, since young people became increasingly geographically mobile after their teenage years.

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6 The ages in Figure 13 refer to overlapping three or four year age groups because the results are based on projection from when the particular cohort was in the primary school ages. In some periods primary school lasted three years, while in other periods primary school lasted four years.

7 Zitter and McArthur (1980: 176) report that Soviet authorities in 1980 thought the 1979 Soviet Census was a complete enumeration. This is quite unlikely.
Figure 13 shows the estimated percent undercount of children and for the total population in United States censuses 1950-1970 (United States Bureau of the Census, 1974: 29, 31). The values for all children are shown as well as for non-White females and non-White males. The sharp decline in the undercount as children age is clear. For most groups, children under age five are more likely to be undercounted than the group as a whole. Undercount of young children in United States censuses continues to be a problem (West & Robinson, 1999). The overall high undercount of non-Whites is also clear – over 11% for males in 1950 and almost 5% for females in 1970. The greater undercount of non-Whites is probably because non-White children were more likely to live in non-standard residence and in other conditions related to a high chance of being missed in the census than were White children.

In China, there has been a special concern that households that have had births beyond those allowed under the family planning system could be reluctant to report those children to census enumerators (Cui, 2000). This argument has been made partially based on the logic that people will not want to admit having
violated a policy directive and partially to explain a shortage of girls at younger ages in census enumerations. Some analysts have concluded that the young girls are actually missing, mainly due to sex-selective abortion (Zeng et al., 1993), while other analysts have concluded that in some cases the girls are missing while in other cases they are alive but not reported to census enumerators (Anderson & Silver, 1995). Goodkind (2004) has argued that in the 2000 Census of China the omission of young children is greater than in earlier Chinese censuses. Although fertility limitation policies in China could contribute to the undercount of young children, it is important to realize that there would probably be a substantial undercount of young children in China even in the absence of fertility limitation policies.

**Mobile Individuals and Those with Non-standard Living Arrangements**

The sources of underenumeration in most countries relate to household size and composition, because these people often do not easily fit into the normal categories considered by census enumerators. According to Ewbank (1981: 62), most young adults who are not enumerated in the census are probably resident in one-person households that are often difficult to identify or are marginal members of households such as non-relatives.

In research on the United States, Martin (1998) found evidence that those who were absent from a household for a week or more in the previous two months, and those who were not related to the person who responded for the household were likely to be omitted from a household listing. The work by Tourangeau et al. (1997) suggested that concealment of household members was another important source of omission from household rosters in the United States. There have been experiments with wording of questions about household members in order to obtain a more complete listing of those who were not close relatives or who had other non-standard relations to the rest of the household (Gerber, Wellens & Keeley, 1996; Kearney et al., 1993). Nonetheless, there is evidence that those who are suspicious of the government, whether in general or related to fear of discovery of undocumented status or illegal activity, are likely to be undercounted (Bourgois, 1990; Durant & Jack, 1993; Wingerd, 1992). Sometimes, landlords are reluctant to disclose the presence of residential units if the renting of this space is illegal (Garcia & Gonzales, 1995). Both fear about the possible uses of census data (Goodkind, 2004) and possible concealing of non-standard residential rentals could be problems in recent enumerations in China.

Marginal living arrangements often characterize labor migrants in China, as well as in other countries. They frequently live in irregular situations with unrelated individuals or with distant relatives. This kind of situation, with associated high levels of omission in the census, was found for Mexican migrants to the United States, who also frequently have irregular living arrangements and are often missed in the census (Montoya, 1992; Velasco, 1992). Hamid (1991) found a high rate of omission of one-person households for African-Americans in New York City. Salvadoran workers on Long Island sometimes live in households where they do not know anything about others with whom they live, a situation which also leads to omissions in the census (Mahler, 1993). Even people who live in a conventional household, but whose residence is not well established (Spiegelman, 1968) or have recently moved (Hauser, 1968), are difficult to enumerate. A study on New York’s Chinatown suggested that for those who are difficult to locate and who work very long hours, enumeration at places of work could be a partial solution (Sung, 1991).

**Decreasing Undercount in China and Decisions about Census Adjustment**

Changes in the social and economic situation in China in the near future are likely to further increase the proportion of the population in danger of being missed in the census. The China National Bureau of Statistics has been using demographic analysis (Zhang & Cui, 1995; Zhang, Yu & Cui, 1997) and the PES to assess undercount and take steps to reduce it.
This paper has examined the experience with undercount of several countries. In light of United States experience with ethnographic and small-group studies (Brownrigg & Martin, 1989; de la Puente, 1993, 1995; Salo, 1996), the China National Bureau of Statistics should consider undertaking studies to better understand the dynamics of undercount in China and to help develop improved methods to reach people who are likely to be missed, especially remote minority ethnic group members and temporary migrants in urban places. Although census undercount is a general problem with similar sources across countries, minimizing this undercount through improvement in the coverage of often-missed groups requires strategies that are culturally specific.

The issue of accuracy of census counts of the total population, as well as by age, sex, ethnic group, and geographic location is often a highly politically-charged issue (Prewitt, 2000). The ethnic composition of Nigeria was a major issue with the 1963 Nigerian census (Aluko, 1965), and in the United States the role of the census counts in allocating government monies and congressional representatives is a strong motivation for states and cities to do everything possible to encourage a complete enumeration.

Since no enumeration is 100% complete, there is always the question of what to do after the census enumeration has finished. Should the official numbers be adjusted for estimates of undercount? In the United States, since 1970 complaints about undercounts by the mayors of large cities have been common (Alltucker, 2001; Choldin, 1994). New York City brought a suit before the 1980 census contending that an undercount of the city’s population was inevitable. This suit resulted in some modifications in the United States Census Bureau’s conduct of the 1980 Census in New York City (Choldin, 1994: 100-118). Several American states and cities filed a lawsuit with the federal government in favor of adjusting the 1990 census count using the results of the 1990 PES (Hogan, 1993). The Secretary of Commerce decided not to adjust the census results, and his decision was not overturned by the courts (Choldin, 1994: 225-226).

Even if the census enumeration has been done as well as possible, and even if the estimates of undercount are well-founded, these estimates typically refer to large population groupings in the country as a whole, with difficulty and controversy in deciding how they apply to small geographic areas as well as problems in deciding the situations in which any adjusted numbers should be used (Erickson & Kadane, 1985; Schirm & Preston, 1987; Undercount Research Staff, Statistical Research Division, U. S. Bureau of the Census, 1984).

China, like every other country, needs to determine what procedures to implement to assure the most complete possible census enumeration, what set of methods will be applied to estimate the inevitable undercount, and what the uses will be of adjusted census numbers. Will they be available for scientific and policy research, and will they be used to adjust the official population figures at any level? Hopefully international experience will help China in these endeavors.

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8 U. S. Bureau of the Census ethnographic studies are available at http://www.census.gov/srd/papers/pdf/
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