Estimating the stability of census-based racial/ethnic classifications: the case of Brazil

Short Title: The stability of racial classifications

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This study estimates the degree to which people change their racial/ethnic identity from one census enumeration to another. We analyze the classification of skin colour in Brazil (white, black, brown, yellow) in the last four decades. For the period 1950/80, the findings show a deficit of 38 per cent in the black category, and a gain of 34 per cent in the brown category, suggesting that a large proportion of individuals who declared themselves black in 1950 reclassified themselves as brown in 1980. Estimates for 1980/1990, adjusted for the effects of international migration, reveal a similar pattern, although the magnitude of colour reclassification may have declined somewhat during the 1980s.

Recent years have witnessed an emerging consensus among international assistance organizations on the significance of racial and ethnic discrimination. Earlier perspectives in development studies paid scant attention to a country's stratification system, assuming, for the most part, that modernization would minimize, if not eliminate, racial and ethnic differentiation. The new perspective, in contrast, views the discrimination of minority groups as a threat to social development and as a drag on economic growth. The increased interest in measuring the degree of 'social exclusion,' and associated attempts to develop policies to overcome it, necessarily heighten the priority given to the collection of accurate racial and ethnic data. At a minimum, the new demand for information requires that census bureaus develop meaningful indicators of minority identity (to profile the material consequences of a country's stratification system) and generate a classification system that is stable over time (to assess the effectiveness of intervention policies).

This study quantifies the degree to which individuals enumerated in one census may change their racial classification in the next. There are two main advantages of using Brazilian censuses. First, the Brazilian Census Bureau has used virtually the same technique for classifying the skin colour in the last decades. Second, Brazil is a country with a highly multiracial population in which racial borders are relatively flexible. We first discuss the controversies concerning the collection of race and ethnic data in demographic censuses, and summarizing the factors that have promoted interest in race and ethnic data in developing countries. We present the methods used to estimate the racial reclassification in the Appendix.

Perspectives on census classifications of race and ethnicity

In the 1950s demographers in the United States Bureau of the Census expected that the race question would soon be dropped, as it had been in Canada in 1951. The shocking Nazi example of converting a religious category into a racial group that was then targeted for

elimination had prompted a re-examination of the concept of race, and pointed to the potential

dangers of officially classifying people in racial and religious terms. These concerns were

overshadowed by the requirements of the Civil Rights Act of 1964, the Voting Act of 1965,

and the assortment of legislative initiatives that comprised the emerging architecture of civil-

rights law. The anticipated demise of the 'race question' in the census surrendered to the

realization that data on race and ethnicity were fundamental to enforcing desegregation and

affirmative action, and to monitoring the progress of minority groups (Glazer 2002, p.30;

Nobles 2000, pp.75-79; Wright 1994, p.50).

     Today the critique of census-based classifications in the United States is driven by a

number of factors, including the changing ethnic profile of the nation's population, the

political attack on the foundations of affirmative action programmes, and pressure by people

of mixed heritage for the recognition of multiracial identities. The issue is embedded in the

broader debate between analysts who detect the 'declining significance of race' (e.g., Wilson

1980) in United States society, and those who counter that race continues to 'signify and

structure social life,' both nationally and globally (Winant 200, p.1).

     For developing countries, it is the *growing* significance of race and ethnicity that

distinguishes the current policy focus of international assistance institutions that promote

development across the world. Two major United Nations Conferences—the United Nations

Social Summit (1996) and the United Nations Conference Against Racism (2001)—helped

crystallize awareness of 'social inclusion' as a policy priority in Latin America and the

Caribbean (Buvinic 2003, p.1). Similarly, the Santiago Consensus of the 1998 Summit of the

Americas II in Chile emphasized equity and social justice as priority issues of the twenty-first

century. Later, in preparation for the United Nations World Conference Against Racism held

in May 2001, the Inter-American Development Bank (IDB) adopted an 'Action Plan'

designed to advance the social inclusion of racial and ethnic populations within the Bank's

policies, projects, and practices (IDB 2002). In a similar vein, the United Nations Research Institute for Social Development (UNRISD) held a conference in September 2001 on Racism and Public Policy to address the construction of race and citizenship, the dynamics of racism and inequality, and the impact of public policies on race relations (Bangura 2002). Within the World Bank, the concern for social exclusion reflects a shift from a focus on low consumption and low achievement in human capital in 1990, to a broader approach dealing with opportunity, security, and empowerment in 2000 (World Bank 2001; Clert, Gacitúa-Marió and Wodon 2001). To address these new concepts, the World Bank has 'enriched its traditional quantitative analysis of poverty with qualitative and participatory research' (Clert et al. 2001, p.1). The new development paradigm recognizes 'culture' as a pivotal factor in economic growth, and emphasizes the high cost of discrimination based on racial and ethnic differentiation (Deutsch and Reichmann 2001; Flórez, Medina and Urrea 2001; Zoninsein 2001). The heightened concern for racial and ethnic exclusion has prompted at least one Latin American country (Brazil) to take the unprecedented step of advocating a United States-style racial quota system for government jobs, public contracts, and university admissions (Rohter 2003).

While the concept of social exclusion is relatively new to the field of Latin American studies, it has a longer usage in continental Europe (Aggleton and Parker 2003, p.2). In France the notion of *exclusion sociale* has been used to refer to a sub-set of individuals excluded from the provision of the country's social insurance programmes. Similarly, the notion of exclusion has entered into mainstream policy discourse in the United Kingdom, identified by the Economic and Social Research Council as one of the key 'thematic priorities' which will guide its funding decisions (Byrne 1999, p.3).

Any policy or programme that targets a population subgroup necessarily implies some system for classifying people. Just as the civil rights legislation compelled the United States

Bureau of the Census to maintain the race question in the 1960s, the current emphasis on social inclusion requires the collection of racial and ethnic data in developing countries. To address this need, the Inter-American Development Bank's $250 million budget earmarked for social inclusion programmes will support continued 'efforts to incorporate questions of race and ethnicity in censuses and household surveys to collect the most basic information on these populations' (IDB 2002. p.7). The difficult task of devising a valid and reliable typology of majority/minority status is doubly challenged in places such as Brazil, where the colour-based differentiations that produce significant material consequences in daily life are culturally blurred and covertly practiced.

Skin colour and the mutability of racial identity in Brazil

People in Brazil commonly use many terms to identify shades of 'darkness', but the methods of data collection used in the country's decennial censuses greatly simplify the skin-colour classification of the population (Silva 1981; Wood and Carvalho 1988; Schwartzman 1999; Lovell 2000; Telles 2002). In 1950, census enumerators asked people to identify their own skin colour. Responses were grouped under three categories: black (*preto*), white (*branco*) or yellow (*amarelo*). Individuals who declared themselves to be somewhere in between (e.g., *mulato, caboclo, moreno, indio*) were classified as *pardo* (brown). The method was modified in 1960 when enumerators asked respondents to choose among three pre-coded possibilities (white, black and yellow), and added two pre-coded intermediate categories (*pardo* and *indio*). Although the 1960 census was never fully published, the tables that exist collapsed the two intermediate categories into a single grouping, *pardos*. The race item was not included in the 1970 census but was reintroduced in 1980. The 1991 and 2000 censuses used the self-identification method, and a five-category scheme: *branco, pardo, preto, amarelo* and *indígena* (white, black, brown, yellow, and indigenous). Although the reliability of the

census classification is open to question (as we shall see), the figures presented in Table 1 provide a general idea of the relative size of the colour groups that comprised Brazil's population from 1950 to 1980.

TABLE 1

Analysts have pointed to a number of shortcomings associated with the procedures used by the census bureau to classify people's skin colour. Concerns include: the large number of terms commonly used to depict gradations of skin colour in Brazil, and the implications of this phenomenon for the simplified classification used by the Brazilian Census Bureau (Silva 1981); discrepancies between pre-coded and open-ended questions about skin colour (Silva 1981); the potential ambiguities associated with the use of the term *pardo* in the census-based classification (Harris, Consorte, and Byrne 1993; Nobles 2000, p.172); and the notion that self responses to the skin-colour question produce a proportionately 'whiter' population than when interviewer classifications are used (Harris et al. 1993; Telles and Lim 1998). This study focuses primarily on the stability of racial identity over time.

In contrast to what occurs in the United States, in Brazil a dark-skinned person who is also poor is likely to be thought of, and to classify himself or herself as, black (*preto*). On the other hand, a high-status person of the same dark skin tone is more likely to be thought of, and to classify himself or herself as, brown (*pardo* or *moreno*), or to use some other colour closer to the white end of the colour continuum. Subjective identity in Brazil is therefore based on physical appearance in combination with other factors, such as income, education, and related insignias of social rank. The multidimensional basis of racial identity, in turn, suggests the possibility that an upwardly mobile individual who identifies himself or herself as black at one point in time may, after rising in socio-economic status, reclassify him or herself as brown later on.

Given the increase in income and education that has taken place in Brazil since the Second World War (Merrick and Graham 1979; Wood and Carvalho 1988), as well as the substantial upward mobility (Pastore 1982), the mobility hypothesis predicts that a large number of individuals will have reclassified themselves, moving from darker to lighter categories along the colour spectrum. The challenge is to develop a method of estimating the magnitude of colour reclassification that may have taken place in recent decades (Wood and Carvalho 1994).

The magnitude of colour reclassification: 1950-1980

The results of the thirty-year projection, shown in the third column of Table 2, reflect the number of men and women 30 years of age and older we would expect to find in each racial group in 1980 *if no reclassification occurred during the period.* The number of men and women actually enumerated in the 1980 census is given in column 4. When we subtract the enumerated from the projected populations in 1980, as shown in column 5, we find a striking deficit of blacks among both men and women (-797,787 and -815,379, respectively). These figures indicate that between 1950 and 1980 approximately 38 per cent of men and 39 per cent of women reclassified themselves from black to some other colour category. It is reasonable to assume that black individuals would be most likely to reclassify themselves as brown (rather than white).

<div align="center">TABLE 2</div>

Contrary to the expected net brown-to-white redefinition during the period, the values given in column 5 show that the number of whites aged 30 years of age and older in 1980 was actually lower than the projected number. Although the differences are relatively small—around 9 per cent for men, and 6 per cent for women—the results suggest a net movement of people out of the white and into the brown (*pardo*) category.

<div align="center">8</div>

We can only speculate about the possible reasons for these findings. If a decline occurred in the social stigma attached to being brown after 1950, this would have made it easier for people to classify themselves as brown in 1980 compared with thirty years earlier, when people were presumably more compelled to classify themselves as white. Similarly, there might have been a net downward mobility of formerly self-declared whites who, because of their lower status in 1980, might have reclassified themselves as brown. Without supporting information on a possible weakening in the intensity of the colour stigma, and in the absence of race-specific measures of net rates of social mobility during the reference period, these explanations remain no more than conjectures.

Turning to the intermediate brown category, the values shown in column 5 indicate that the enumerated population in 1980 far exceeds the projected number. Because of the net movement of both blacks and whites into that category, there are 1,836,564 more men and 1,590,273 more women in the brown category than projected. The percentage of net reclassification was +36 among men and +31 per cent among women.

Colour reclassification and net migration: 1980/1990

The first column in Table 3 shows the population by sex and colour that would have been observed in Brazil if the country had been a closed population. Column 2 presents the 'observed' population had the demographic census been carried out in 1990. In previous years, the demographic censuses had always been conducted at the beginning of every decade. However, owing to budgetary constraints, the 1990 enumeration was postponed to 1991.

The figures given in column 3 represent the difference between the observed and the expected (closed) population, by sex and age. As such, the estimated 'net transfer' for each sex/colour group (given in column 3) is due to the effects of colour reclassification or net international migration or both in combination. Finally, the 'net reclassification rate' (column

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4) refers to the percentage gained or lost from the effects of colour reclassification or net international migration or a combination of the two.

TABLE 3

If we ignore the sex/colour breakdown and focus attention only on the country's total population, the 'net transfer' value refers, in effect, to net international migration. The values presented in column 3 indicate that, during the 1980s, Brazil experienced a net loss of around 1,527,000 men and 827,000 women (who were 10 years of age or older in 1990). The findings indicate a net loss among white, black, and yellow men and women, and a net gain among brown men and women.

Because column 3 refers to the difference between the number of people enumerated in 1990 and the number who survived to 1990, we can say that around 2.3 million white men and around 1.2 million white women either reclassified themselves in another colour category or migrated out of the country or both reclassified themselves and migrated. Among blacks, the male and female populations were also reduced by 267,000 and 362,000, respectively. Similarly, the number of yellow males and females showed a deficit in 1990 of 58,000 and 45,000. The brown population was the only group that experienced a net gain due to reclassification or international migration or both (males + 1,100,000; females +737,000).

To determine the approximate magnitude of the reclassification that is solely due to the movement of people from one colour group to another, we can construct several hypothetical scenarios. For example, suppose that Brazil sent but did not receive international migrants between 1980 and 1990. If this had been the case, the negative values noted in column 3 would indicate an absolute loss of 1,527,000 men and 827,000 women as a result of migration out of the country. Now suppose that the entire amount of emigration took place solely within a particular sex/colour group, as shown in Table 4.

TABLE 4

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For the purposes of explication, three examples can be used to help interpret the figures presented in Table 4. First, consider the white/male category, which experienced a net loss of 2,319,000 individuals during the decade (see Table 3, column 3). Let us further suppose that the white/male group was responsible for all of the emigration (i.e., 1,527,000 people) that took place during the decade. If that had been the case, the net loss of population observed in the white/male category can be decomposed into the effects of two processes: international emigration would account for a deficit of 1,527,000 individuals; and the remaining deficit of 792,000 individuals would necessarily be the result of colour reclassification. In this scenario, 792,000 males who declared themselves to be white in 1980 identified themselves as being of some other colour in 1990, most probably opting for the brown category.

The brown/female category is also illustrative. In 1990, the brown/female category experienced a net gain of some 737,000 individuals owing to the combined effects of emigration and colour reclassification (Table 4, column 1). In keeping with the previous example, assume that all female emigrants—a total of 827,000—had been drawn exclusively from this colour/sex category. According to this scenario, colour reclassification during the decade would be +1,564,000 for the brown/female group (Table 4 column 3).

The third example focuses on black males. Comparing the number enumerated in 1980 with the number of individuals ten years old and older in 1990 showed a net loss of 267,000 individuals. In the (unlikely) event that all 1,527,000 male emigrants were black, the black/male category would have gained 1,260,000 individuals as a result of colour reclassification.

While the various scenarios illuminate the logical relationship between the various estimates, the analysis can be rendered more realistic by incorporating historical observations about the nature of international migration in Brazil. For example, numerous studies have

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concluded that Brazilian emigrants during the 1980s consisted mostly of middle class individuals who travelled mainly to the United States, Japan, and Paraguay (Padovani 1980; Margolis 1994; Patarra 1995, 1996; Sales 1998; Sales and Reis 1999). It is therefore reasonable to conclude that blacks made only a small contribution to the total outflow of migrants from the country. It is also recognized that, during the 1980s, Brazil was the country of destination of blacks from Mozambique and Angola, although no precise numbers are available. As a consequence of the influx of Africans, it is likely that Brazil's black population experienced net in-migration in the 1980s.

Observations about the class basis of international emigration and the influx of people from Mozambique and Angola lend support to the assumption that the net loss observed among blacks between 1980 and 1990 was a result of the process of colour reclassification. If we accept the notion that the increase in the black population due to immigration exceeded the number of blacks who emigrated, we can conclude that the net loss of 267,000 men and 362,000 women (Table 4, column 1) are minimum estimates of the magnitude of colour reclassification among blacks.

In contrast to blacks, the net loss observed in the yellow category (58,000 men; 45,000 women) was most probably due to international emigration. This interpretation is consistent with two observations. The first refers to the strong sense of ethnic identity among the population of Asian descent (see Yukio and Smith 1958; Smith 1979), a factor that makes it unrealistic to expect that a sizeable number of individuals who declared themselves yellow in 1980 would opt for a different colour category in 1990. The second observation points to the significant migration to Japan in the 1980s by Brazilians of Japanese descent, known as the *dekasseguis*. Oliveira et al. (1996) estimate that as many as 100,000 may have left Brazil to live in Japan between 1980 and 1990.

The historical observations suggest two plausible assumptions: first, that no significant emigration occurred among blacks in 1980/1990, and the deficit was therefore due to reclassification; and, second, that no significant reclassification occurred among yellows in 1980/1990 and the deficit was therefore due to emigration. If our first assumption is correct, international migration is not a factor among blacks, and the estimate of net colour reclassification is simply –267,000 men and –362,000 women, as shown in Table 5, column 3. If our second assumption is correct, reclassification is not a factor among the yellow group, and the estimated amount of colour reclassification derived in Table 4, column 3 [i.e., 1,469 thousand men (1,527 - 58) and 782 thousand women (827 - 45)] could be attributed to the white or brown colour groups. It follows that the corresponding estimate of net colour reclassification would be –850,000 for white men and –375,000 for white women (Table 5, column 3). The comparable estimate for brown men and women would be +2,587,000 and +1,519,000, respectively.

TABLE 5

If we accept the two assumptions posited above, we are also in a position to estimate the minimum quantity of net colour reclassification for the white and brown populations. Because white men and women showed a net loss of population, we can obtain a minimal estimate of colour reclassification by excluding yellow men and women from total emigration, and attributing the entire remainder of emigration to white men and women (Table 6, column 2). The resulting minimum estimates of net colour reclassification for the white category are therefore –850,000 among men and –375,000 among women (column 3). Brown men and women, however, showed a net gain of population. We therefore obtain a minimum estimate of colour reclassification by attributing 0 emigration to that group. The resulting minimum estimates of net colour reclassification for the brown category are +1,118,000 among men and +737,000 among women.

TABLE 6

How do the estimates of net colour reclassification for 1980/1990 (a ten-year period) compare with the earlier findings for 1950/1980 (a 30 year period)? Has the rate of reclassification increased or declined? To answer these questions, it is useful to calculate comparable rates that are based on the same durations.

Comparing colour reclassification: 1950/1980 and 1980/1990

The findings are presented in Table 7. As noted earlier, the absolute quantities of net colour reclassification, given in column 2, assume that white and yellow individuals were responsible for the total amount of emigration from Brazil in the 1980s. Hence, the deficits shown for the white category, and the gains shown for the brown category, are minimum estimates of the amount of colour reclassification. The figures shown in the third column of Table 7 refer to the percentage of colour reclassification during the 1980s (under the stated assumptions).

TABLE 7

The final issue to which we turn is whether the rates of colour reclassification in 1980/1990 significantly differ from those observed between 1950 and 1980. In order to compare earlier and later time periods it is necessary to convert the 1950/1980 estimates (shown in Table 2) to an average reclassification rate for the decades between 1950 and 1980. Table 8 presents the average reclassification rate for the period 1950 to 1980, along with the estimated net reclassification for the 1980/1990 period.

TABLE 8

The findings shown in Table 8 offer important insights into the mutability of racial identity in Brazil. Although the calculations of colour reclassification over time provide only

coarse estimates, and despite the fact that the estimates for white and brown populations refer to the minimum possible values for 1980/1990, the magnitude of the estimates nonetheless permits some general if tentative conclusions.

The most salient observation is the unstable nature of the distinction between the black and the brown census categories. The decades between 1950 and 1980 witnessed an average deficit of 14 to 15 per cent of individuals who classified themselves as black at an earlier point in time (10 years earlier) but chose another skin colour category later on (presumably moving into the brown group). The white category, in contrast, remained more stable over time, showing an average net deficit of 2 to 3 per cent per decade. Since both black and white individuals who reclassified themselves probably chose the brown category, it is not surprising to find a 'surplus' of brown individuals at the end of each decade (i.e., the number of people enumerated consistently exceeded the number of people expected in that colour class).

The same general pattern is evident when we compare the average reclassification rates for 1950/1980 with the estimates for 1980/1990. However, the comparison also suggests that the magnitude of colour reclassification may have declined somewhat in recent years. With the exception of white males, all of the reclassification rates in 1980/1990— whether positive (in the case of the brown category) or negative (in the case of the black category)—are lower than the average reclassification rates estimated for decades between 1950 and 1980. If correct, the findings suggest that colour self-identification may be becoming more stable over time in Brazil.

The porous distinction between black and brown in Brazil has prompted researchers to merge the two into a single Afro-Brazilian category (e.g., Lovell 1994; Wood and Carvalho 1988; Wood and Lovell 1992), or, alternatively, to use both the aggregated and separated versions in the same study (e.g., Lovell 2000 and 2000a). The strategy of using a white/Afro-

Brazilian dichotomy has been criticized for imposing a bipolar racial scheme that is deemed by some to be inappropriate to Brazilian culture, history, and racial attitudes (Harris, Consorte, and Byrne 1993). Others have argued that—regardless of the gradations of skin colour that Brazilians routinely apply— in the practice of daily interactions, the great divide is nonetheless between white and non-white populations (Andrews 1991; Sheriff 2001).

Conclusion

If colour reclassification is prevalent, and if the 'migration' from darker to lighter skin colour categories is selective of upwardly mobile individuals (as anthropologists claim), the instability of skin-colour identity over time has critical implications for the method of any study that uses census data (or their equivalent) to investigate changes in the status of Brazil's black and brown populations. Among other things, the selective exodus of upwardly mobile individuals from the black category introduces a downward bias in analyses that seek to track the progress of blacks over time (to the extent that non-mobile individuals continue to classify themselves as black). Similarly, the black-to-brown reclassification among successful black individuals would introduce an upward bias in analyses that track the progress of the brown population.

The issues and controversies associated with the classification of skin colour in Brazil are indicative of the challenges that confront analyses of social exclusion in other countries in Latin America and the Caribbean. Indeed, the mutability of social identity is an issue that potentially applies to declarations of racial and ethnic affiliations around the world, especially when group identity is associated with material advantages or disadvantages. In the United States the entitlements associated with affirmative-action programmes prompted a variety of groups to lobby for ethnic reclassification in an attempt to increase their proportion of federal dollars, or avail themselves of other advantages. One example was the proposal to move

Hawaiians from the 'Asian and Pacific Islander' category to the 'American Indian' category, a reclassification that could make native Hawaiians eligible for the privileges and gambling concessions available to certain American Indian tribes (Wright 1994, p.47).

The potential mutability of racial and ethnic classifications highlights the importance of developing methods that can be used to estimate the degree to which census-based typologies may be modified over time by changing subjective identities and by international migration. In addition to presenting crucial insights into the reliability of the Brazilian census-based skin-colour typology, this paper reports the development of a set of techniques that can be used to assess the stability of racial and ethnic designations in demographic censuses in other parts of the world.

Appendix

A. Method to estimate racial reclassification in a closed population – the 1950/1980 period

The method used to estimate the magnitude of colour reclassification follows the same logic used to estimate net migration in a geographic area. The technique is based on a projection of the area's closed population from time 1 to time 2. To perform the projection, one uses survival ratios to project age cohorts of men and women. The results of the projection to time 2 are then compared to the number of people in the same cohort living in the area enumerated by the census at time 2. If there is no migration, and if the assumptions of the projection are correct, the projected and the enumerated size of the population will be identical. On the other hand, if the projected value is greater than the actual population, we can infer that net out-migration occurred. Similarly, if the projected population size is less than the enumerated population, we can infer that net in-migration took place during the period.

The same logic can be applied to the study of racial reclassification. From the published demographic census we know the number of men and women in each age group who classified themselves as white, black, or brown in 1950. Using sample data from the 1960 and 1980 enumerations, we used the Brass method of indirect mortality estimation (Brass et al. 1968) to obtain life tables for each colour group for the 1950s and 1970s. These race-specific life tables were used to forward-survive each group aged x in 1950 to age x+30 in 1980. The projected values (by race, age, and sex) were then compared with the number enumerated in the 1980 demographic census. For racial group j, the difference between the projected population and the number of people enumerated in 1980 provides an estimate of the magnitude of net colour reclassification in or out of the j category, in the absence of international migration. In the case of Brazil, this approach is enhanced by the fact that the colour categories employed by the census, and the method of obtaining information on people's colour, did not significantly change over the period.

This technique has important assumptions: 1) coverage is perfect and 2) there are no errors in the reporting of age in 1950 or 1980. Both assumptions are open to question. The objective, therefore, was to devise a method of projecting the population of each racial subgroup from 1950 to 1980 using a technique that does not rely on absolute census counts. With this purpose, we first estimated the intercensal survival ratio for the country as a whole between 1950 and 1980 ($_n\text{ISR}_{x,50/80}$). The census survival ratio is the ratio of the population aged x+30 to x+30+n at the second census to that aged x to x+n in the first census. The

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advantage of the census survival ratio is that it is affected not only by the mortality level but also by the relative coverage and errors in age reporting in the two censuses. The confounding of the two effects may actually be an advantage. As Zachariah (1962) first demonstrated, and as Carvalho (1982) further noted, for the same cohort, the ratios between the degree of completeness in the enumerated populations for the two censuses in question tend to be similar, both at the regional and national levels. In this case, relative errors in the estimated rate of net migration and the estimated size of the closed population would be of the same order of magnitude. Consequently, the estimated net migration rate (in this case, the net rate of colour reclassification), defined as the ratio of net migrants to the estimated closed population at the end of the period, tend to be correct.

The next step was to adjust $_n\text{ISR}_{x,50/80}$ up or down in proportion to the higher or lower survival level of racial group j. The adjustment is determined by the extent to which the survival ratio for group j exceeds or falls short of the survival ratio for the total population. In the present case the adjustment is calculated as the result of dividing the life-table survival ratio for group j by the life table survival ratio for the country as a whole in the 1950s and in the 1970s (and then taking the average). Several studies have noted that mortality is higher among the population of African descent than among Brazil's white population (Cunha 1990; 1994; Wood and Carvalho 1988; Wood and Lovell 1992; Lovell and Wood 1998).

The result is a race-specific intercensal survival rate ($_n\overline{\text{ISR}}_{x,j,50/80}$) that can be used to project subgroup j from 1950 to 1980, as follows:

$$_n\overline{\text{ISR}}_{x,j,50/80} = {}_n\text{ISR}_{x,50/80} \bullet \frac{1}{2}\left[\frac{\dfrac{_nL_{x+30,j,50/60}}{_nL_{x,j,50/60}}}{\dfrac{_nL_{x+30,BR,50/60}}{_nL_{x,BR,50/60}}} + \frac{\dfrac{_nL_{x+30,j,70/80}}{_nL_{x,j,70/80}}}{\dfrac{_nL_{x+30,BR,70/80}}{_nL_{x,BR,70/80}}}\right] \quad (1)$$

where for each sex: $_n\overline{\text{ISR}}_{x,j,50/80}$ is the survival ratio used to project age group x, x+n, colour group j from 1950 to 1980; $_n\text{ISR}_{x,50/80}$ is the intercensal survival ratio for the country as a whole between 1950 and 1980; $_nL_{x+30,j} : {}_nL_{x,j}$ is the ratio of the survival of colour group j based on the colour-specific life tables; and $_nL_{x+30,BR} : {}_nL_{x,BR}$ is the life-table survival ratio for the total population. The term in parenthesis refers to the average of the 1950s and 1970s

quotients of the colour specific life table survival ratio and the Brazilian life table survival ratio. The bar over the ISR (i.e., $_n\overline{\text{ISR}}_{x,j,50/80}$) indicates that the survival ratio is an estimate proposed by the authors.

Estimates of the survival rates for the decades of the 1950s and 1970s were derived from 1960 and 1980 data. The indirect technique of estimating infant and child mortality proposed by Brass (see Brass et al. 1968) was applied to each colour group. The values of l_2, l_3, and l_5 —based on women 20-34 years of age in 1960 and 1980—correspond, in effect, to the mortality experience of children born during the decades of the 1950s and the 1970s, respectively. The life table for each colour group was generated by logit transformation using the national life table as a pattern, and the colour-specific l_2, l_3, and l_5 values to estimate the level of mortality for each group, holding β equal to 1.

B. Method to estimate racial reclassification from 1980 to 1990: accounting for international migration

The method used to estimate the magnitude of colour reclassification between 1950 and 1980 (Equation 1) cannot be directly applied to the 1980/1990 period because of the effects of international migration. Whereas we could reasonably treat Brazil as a virtually closed population prior to 1980, that assumption no longer holds in the more recent period. Estimates indicate that, during the 1980s, Brazil may have experienced a net loss of 1 to 2.5 million people aged 10 and older (Carvalho 1996). As a consequence, we must obtain the intercensal survival ratio (ISR) using a procedure that takes into account the net international movement of people.

Carvalho and Rigotti (1999) suggested that age-specific $\overline{\text{ISR}}s$ for 1980/1990 could be derived from the ISR for Brazil between 1970 and 1980, a period during which net international migration was negligible. The proposed correction adjusts the mortality level implicit in the ISR observed in the 1970s by taking into account the variation in the survival ratio for Brazil between the 1970s and the 1980s, as well as the differential survival levels during the 1980s between population subgroup 'j' and Brazil as a whole. The procedure, applied by sex, is as follows:

$$_n\overline{\text{ISR}}_{x,j,80/90} = {}_n\text{ISR}_{x,BR,70/80} \bullet \frac{\dfrac{_nL_{x+10,BR,80/90}}{_nL_{x,BR,80/90}}}{\dfrac{_nL_{x+10,BR,70/80}}{_nL_{x,BR,70/80}}} \bullet \frac{\dfrac{_nL_{x+10,j,80/90}}{_nL_{x,j,80/90}}}{\dfrac{_nL_{x+10,BR,80/90}}{_nL_{x,BR,80/90}}} \quad (2)$$

where: $_n\overline{\text{ISR}}_{x,j}$ is the estimated intercensal survival ratio used to project age group x, x+n, colour group j, from 1980 to 1990; $_n\text{ISR}_{x,BR}$ is the intercensal survival ratio observed for Brazil between 1970 and 1980; $_nL_{x+10,j} : _nL_{x,j}$ is the survival ratio for colour group j based on colour-specific life tables; and $_nL_{x+10,BR} : _nL_{x,BR}$ is the survival ratio based on the life tables for Brazil's total population. Simplifying:

$$_n\overline{\text{ISR}}_{x,j,80/90} = {_n}\text{ISR}_{x,BR,70/80} \bullet \dfrac{\dfrac{_nL_{x+10,j,80/90}}{_nL_{x,j,80/90}}}{\dfrac{_nL_{x+10,BR,70/80}}{_nL_{x,BR,70/80}}} \qquad (3)$$

The life table for Brazil as a whole for 1970/1980 was based on Carvalho and Pinheiro (1986), using Brazilian Model Life Tables (IBGE 1981) to establish the age pattern of mortality. The levels of mortality were then adjusted using the estimates of l_2, l_3 and l_5 generated using the indirect estimation techniques proposed by Brass (Brass et al. 1968). For the period 1980/1990, we used life tables generated at CEDEPLAR (UFMG/CEDEPLAR 1999), based on vital statistics and estimates of child mortality using the Brass method. Life tables for each colour group in 1980/1990 were obtained by logit transformation. The national life table provided the age pattern of mortality and the levels of mortality were based on child mortality differences obtained using Brass methods and 1991 census data. As Rigotti (1999) noted, the correction of the ISR (shown in formula 3) assumes that the pattern of errors associated with enumeration coverage and age misclassification between the 1980 and 1990 censuses were the same as those between 1970 and 1980.

C. Method to compare the colour reclassification

In contrast to earlier periods, when international migration was minimal and a closed population could be assumed (e.g., the 1950/1980 findings in Table 2), an adjustment for international migration (by colour category) is necessary in order to calculate rates of net colour reclassification for the 1980/1990 period. With this objective in mind, the Net Reclassification Rate (NRR) for colour category 'j' is given by Equation 4:

$$\text{NRR}_j^{80/90} = \dfrac{\text{NT}_j^{80/90}}{\overline{\text{P}}_j^{90} + \text{IMF}_j^{80/90}} \qquad (4),$$

where: $\overline{\text{P}}_j^{90}$ is the expected (closed) population, in 1990, of racial category j (assuming no international migration flow and no racial reclassification); $\text{NT}_j^{80/90}$ is the net racial

reclassification, for racial category j, between 1980 and 1990; and $IMF_j^{80/90}$ is the net international migration during 1980/90, for racial category j. The denominator ($\overline{P}_j^{90} + IMF_j^{80/90}$) of Equation 4 corresponds to the expected population in 1990 in the absence of racial reclassification but accounting for international migration.

C.1. Estimating the average reclassification rate between 1950 and 1980:

The average reclassification rate between 1950 and 1980 is given by:

$$NRR_t = 3 \bullet \overline{NRR}_d + 3 \bullet \overline{NRR}_d^2 + \overline{NRR}_d^3 \quad (5),$$

where: NRR_t is the net reclassification rate of the 30-year period; $\overline{NRR}_d$ is the estimate of the net average decennial reclassification rate (the bar over the NRR indicates that the measure is proposed by the authors). The average of decennial rates generated by Equation 5 includes the absolute value of net reclassification in the numerator, and the expected population at the end of each period in the denominator. Equation 5 has three possible solutions for each racial category, two imaginary and one real. Equation 5 is derived from the following relationships the field of internal migration:

$$NM_t = NM_1 \bullet SR_2 \bullet SR_3 + NM_2 \bullet SR_3 + NM_3 \quad (5.a)$$

$$\overline{P}_t \bullet NMR_t = \overline{P}_1 \bullet NMR_1 \bullet SR_2 \bullet SR_3 + \overline{P}_2 \bullet NMR_2 \bullet SR_3 + \overline{P}_3 \bullet NMR_3 \quad (5.b)$$

$$\overline{P}_t \bullet NMR_t = P_{0.ob} \bullet SR_1 \bullet SR_2 \bullet SR_3 \bullet NMR_1 + P_{0.ob} \bullet SR_1(1 + NMR_1) \bullet SR_2 \bullet SR_3 \bullet NMR_2 + $$
$$+ P_{0.ob} \bullet SR_1(1 + NMR_1) \bullet SR_2(1 + NMR_2) \bullet SR_3 \bullet NMR_3 \quad (5.c)$$

$$\overline{P}_t \bullet NMR_t = P_{0.ob} \bullet SR_1 \bullet SR_2 \bullet SR_3 \bullet [NMR_1 + (1 + NMR_1) \bullet NMR_2 + $$
$$+ (1 + NMR_1) \bullet (1 + NMR_2) \bullet NMR_3] \quad (5.d)$$

Since $\overline{P}_t = P_{0.ob} \bullet SR_1 \bullet SR_2 \bullet SR_3$, then (4) can be simplified to:

$$NMR_t = NMR_1 + NMR_2 + NMR_3 + NMR_1 \bullet NMR_2 + NMR_1 \bullet NMR_3 + NMR_2 \bullet NMR_3 + $$
$$+ NMR_1 \bullet NMR_2 \bullet NMR_3 \quad (5.e)$$

Assuming that the NMR is the same for each of the three sub periods,

$NMR_1 = NMR_2 = NMR_3 = \overline{NMR}_d$ (decennial average rate), then:

$$NMR_t = 3 \bullet \overline{NMR}_d + 3 \bullet \overline{NMR}_d^2 + \overline{NMR}_d^3 \quad (5.f), \text{ where:}$$

$\overline{P}_t$ is the expected (closed) population at the end of the 30-year period; TLM_t is the net migration rate at the end of the 30-year period (calculated as the quotient of net migration and the closed population at the end of the period); NMR_1, NMR_2, NMR_3 are the net rates at the end of the 1st, 2nd and 3rd decades, respectively; $\overline{P}_1$, $\overline{P}_2$, $\overline{P}_3$ are the expected (closed) populations at the end of each decade (assuming that the 'observed' population at the beginning of each period remains closed until the end of each period); SR_1, SR_2, SR_3 are the survival ratios for the 1st, 2nd and 3rd decenniums, respectively; and $P_{0.ob}$ is the observed population in the initial period (1950).

Equation 5.a describes the relation between the net migration that corresponds to a period and the net migration that corresponds to the three sub-periods that comprise it. Equation 5.f estimates the average NMR for each decade when the total period is divided into three sub-periods of equal duration. $\overline{P}_t$ is not equal to $\overline{P}_3$ because $\overline{P}_t$ corresponds to the closed population at the end of the 30-year period (calculated from the 'observed' population at the beginning of the 30-year period), while $\overline{P}_3$ is the closed population at the end of the third decade that is estimated from the 'observed' population at the beginning of the decade.

Note

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TABLE 1

Distribution of the population by skin colour
Brazil, 1950–91

Colour	1950 (%)	1960 (%)	1980 (%)	1991(%)
White	61.7	61.0	54.2	51,6
Brown	26.5	29.5	38.8	42,6
Black	11	8.7	5.9	5,0
Yellow	0.6	0.7	0.7	0,4
Missing	0.2	0.1	0.4	0,4
Total	100.0	100.0	100.0	100
N (000's)	51,944	70,191	119,011	146,815

Source: Demographic censuses, various years.

TABLE 2

Skin-colour reclassification from 1950 to 1980, by sex

Sex (1)	Colour (2)	Expected population in 1980[1] (3)	Enumerated population in 1980 (4)	Enumerated minus expected (5)	Percentage reclassified (5) / (3) (6)
Male	Black	2,022,606	1,254,819	-767,787	- 38
	Brown	5,042,499	6,879,063	1,836,564	+ 36
	White	12,383,959	11,315,191	-1,068,768	- 9
Female	Black	2,091,361	1,275,982	-815,379	- 39
	Brown	5,160,740	6,751,013	1,590,273	+ 31
	White	12,757,882	11,982,990	-774,892	- 6

Source: Wood and Carvalho (1994)
[1] Population 30 years old and older.

TABLE 3

Net transfer due to colour reclassification and/or international migration,
by sex and colour, 1980/1990
(in thousands)

Colour/Sex	Population aged 10 and older in 1990			
	Estimated (closed) population in 1990 (1)	'Observed' population in 1990 (2)	Net transfer 1980/1990 (2)-(1) (3)[1]	Net transfer rate (%) 1980/1990 (3)/(1) (4)
Male				
White	30062	27743	-2319	-7,7
Black	3254	2987	-267	-8,2
Brown[2]	21693	22810	1118	5,2
Yellow	330	272	-58	-17,7
Total Male Population	55339	53813	-1527	-2,8
Female				
White	31460	30303	-1157	-3,7
Black	3264	2902	-362	-11,1
Brown[2]	21805	22542	737	3,4
Yellow	315	270	-45	-14,2
Total female population	56844	56017	-827	-1,5

Source: IBGE, 1980 and 1991 Brazilian censuses.
[1] Combined effects of racial reclassification and/or international migration.
[2] Includes the indigenous population.

TABLE 4

Estimates of net colour reclassification[1] between 1980 and 1990,
associated with the maximum values of emigration, by colour and sex
(in thousands)[2]

Race/Sex	Scenario 1		
	Net Gain/Loss[3] (1)	Maximum possible number of international emigrants[4] (2)	Implied colour reclassification (3) = (1) + (2)
White			
Male	-2319	1527	-792
Female	-1157	827	-330
Black			
Male	-267	1527	1260
Female	-362	827	465
Brown			
Male	1118	1527	2645
Female	737	827	1564
Yellow			
Male	-58	1527	1469
Female	-45	827	782

Source: IBGE, 1980 and 1991 Brazilian censuses.

[1]People aged 10 or more in 1990.

[2]Assuming no international immigration (all migration due to emigration), the number of emigrants would be 1,527,000 men and 827,000 women.

[3]Values estimated in Table 3, corresponding to gains via colour reclassification and international migration.

[4]Assuming that all emigrants are entirely white, or black, or brown, or yellow.

TABLE 5
Net racial reclassification[1] between 1980 and 1990, by sex, associated with maximum values of emigration, assuming the deficit in the yellow category is due to emigration and the deficit in the black category is due to reclassification
(in thousands)[2]

Race/Sex	Scenario 2		
	Net Gain/Loss[3] (1)	Maximum possible number of international emigrants (2)	Implied colour reclassification (3) = (1) + (2)
White			
Male	-2319	1469[4]	-850
Female	-1157	782[4]	-375
Black			
Male	-267	-	-267[5]
Female	-362	-	-362[5]
Brown			
Male	1118	1469[4]	2587
Female	737	782[4]	1519
Yellow			
Male	-58	58[5]	0
Female	-45	45[5]	0

Source: IBGE, 1980 and 1991 Brazilian censuses.
[1]People aged 10 or more in 1990.
[2]Assuming emigration only (no immigration), the number of emigrants would be 1,527 thousand men and 827 thousand women.
[3]Values estimated in Table 3, corresponding to gains via colour reclassification and international migration.
[4]Assumes that all non-yellow emigrants were white or brown.
[5]Assumes that the deficit in the yellow category was due to international migration and the deficit in black category was due to reclassification.

TABLE 6

Minimum net colour reclassification among white and brown categories, assuming the deficit
in the yellow category is due to emigration and the deficit in the
black category is due to colour reclassification
(in thousands)[1]

| Race/Sex | Scenario 3 | | | |
| | Net Gain/Loss[2] (1) | Emigrants (2) | | Minimum colour reclassification |
		Maximum	Minimum	(3) = (1) + (2)
White				
Male	-2319	1469	-	-850
Female	-1157	782	-	-375
Brown				
Male	1118	-	0	1118
Female	737	-	0	737

Source: IBGE, 1980 and 1991 Brazilian censuses.
[1]People aged 10 or more in 1990. Assumes no immigration.
[2]Values estimated in Table 3.

TABLE 7

Net colour reclassification between 1980 and 1990, by sex
(in thousands)[1]

Race/Sex	Expected population[2] 1990 (2)	Net colour reclassification (1)	Net colour reclassification rate (%) (3)=(1)/(2)
White			
Male	28593	-850[3]	-3.0[3]
Female	30678	-375[3]	-1.2[3]
Black			
Male	3254	-267	-8.2
Female	3264	-362	-11.1
Brown			
Male	21693	1118[3]	5.2[3]
Female	21805	737[3]	3.4[3]

Source: IBGE, 1980 and 1991 Brazilian censuses.
[1]People aged 10 and older in 1990.
[2]Expected population assuming the absence of racial reclassification and assuming emigration of whites only between 1980 and 1990.
[3]Minimum loss (white) and minimum gain (brown).

TABLE 8
Average decadal net colour reclassification rates between 1950 and 1980,
and between 1980 and 1990, by sex

Race/Sex	Net colour reclassification rate 1950/80	Average net colour reclassification rate for decades between 1950 and 1980	Net colour reclassification rate for 1980/90
White			
Male	-8.6	-3.0	-3.0
Female	-6.1	-2.1	-1.2
Black			
Male	-38.0	-14.7	-8.2
Female	-39.0	-15.2	-11.1
Brown			
Male	36.4	10.9	5.2
Female	30.8	9.4	3.4

Source for 1950/1980, Wood and Carvalho (1994)