Racial differences in infant mortality in Brazil: how long will they last?[1]

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Introduction

Brazil has the largest population of Afro-descendants outside Africa. Although slavery ended 121 years ago, there is a huge socioeconomic gap between whites and Afro-descendants – those who classify themselves as blacks or *pardos* (brown) in surveys. If compared to whites, Brazilian blacks and browns have less education and lower income – between 1995 and 2003, 50% of the Afro-descendant population was below the poverty line (Miranda-Ribeiro and Oliveira, 2006).

Infant mortality is one of the indicators that better reflect differences in the quality of life among different groups within the same population and is one of the United Nations Millennium Development Goals (MDG). The year 2015 is the deadline for the reduction of the infant mortality rate by two thirds. Will Brazil reach an infant mortality rate of 13.8 by 2015 and therefore beat this deadline? What happens if, instead of considering the population as a whole, we separate whites from Afro-descendants? Will whites and brown+blacks achive that level of infant mortality?

The objective of this paper is twofold. First, it aims at presenting infant mortality rates (IMR) for Brazilian children born to white and to Afro-descendant (black + brown) mothers in 1991 and 2000. Second, it speculates when those rates tend to converge. Data come from the 1991 and 2000 Brazilian Censuses.

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Results indicate that, if the pace of decline experienced in the 1990s is maintained, Brazilian IMR will be under 13.8 by 2015. However, infants born to brown and black mothers will be disadvantaged during their first year of life if compared to infants born to white mothers until 2027, when IMRs will converge.

Infant Mortality by Race/Skin Color in Brazil

The literature about infant mortality in Brazil has explored geographical inequalities, as well as access to health services and socioeconomic and demographic factors (Ferreira, 1989; Szwarcwald et al, 1997; Simões, 2003; França et al, 2001; Costa et al, 2003; Jobim and Aerts, 2008; among many others). However, the racial factor is seldom considered.

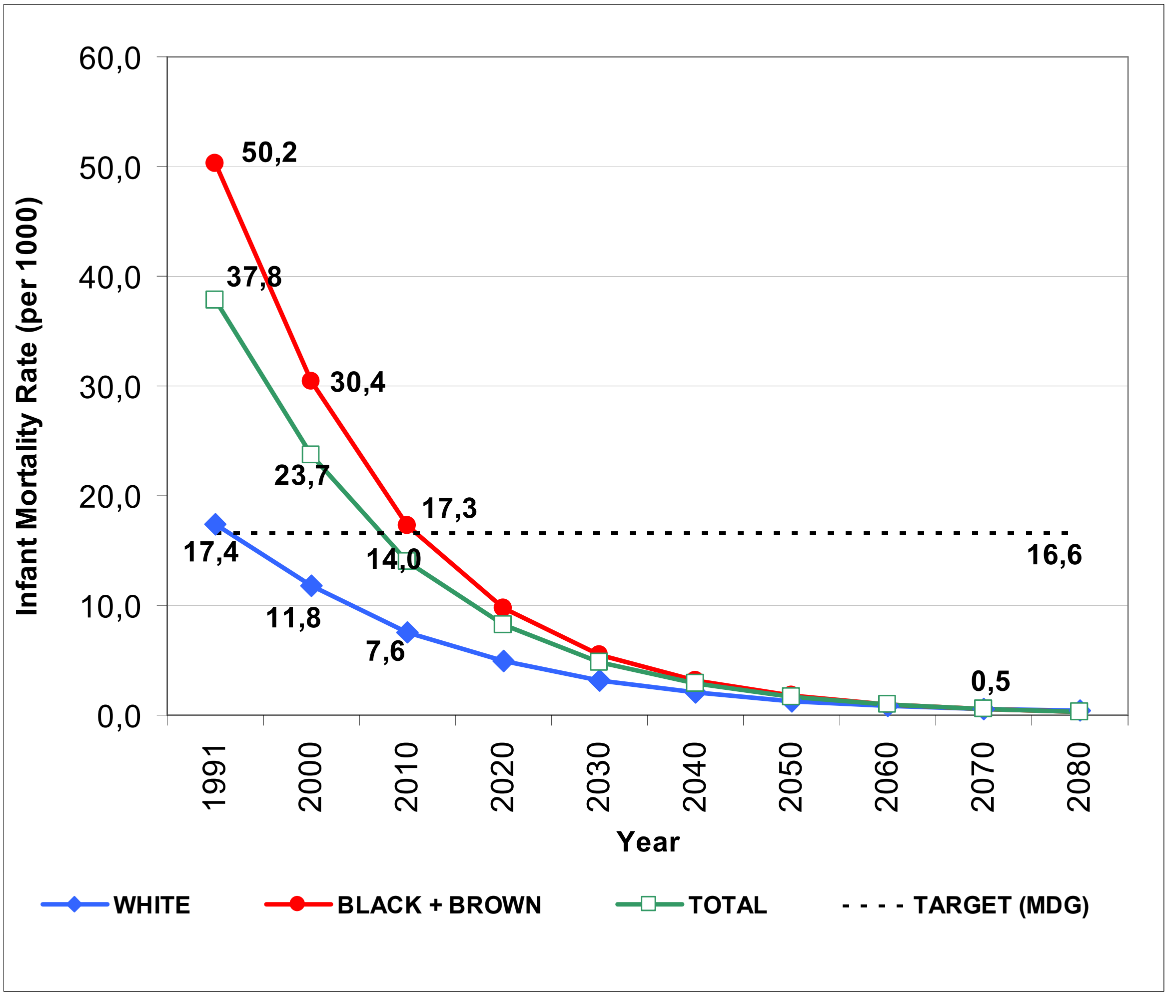
Research about the association between IMR and race in Brazil indicates inequality between white and black+brown children who die before age 1. Using vital registration data, Cunha (2003) suggests that the IMR among black infants is higher than for white ones, even after controlling for biological, health and socioeconomic factors. Based on 1996 DHS data[2], Santos and Moura (2001) show that the risk of death of children born of brown women in the Northeast of Brazil is 1.34 times higher if compared to white, black of yellow women. Thus, children born to brown and black mothers seem disadvantaged if compared to those born to white mothers.

Previous work with data for Belo Horizonte, the state capital of Minas Gerais, indicate that IMR was 32 per one thousand among children born to black and brown mothers and 12.1 per one thousand children born to white mothers in 2000 (Figure 1). Convergence would not take place until 2071, when the rates would be very close to zero, a level that has never been reached (and most likely never will) by any human population. If the goal is more realistic – 6.7 deaths per one thousand live births – and keeping the pace of IMR reduction observed between 1991 and 2000, children born to white

[2] The 1996 Brazilian DHS is called Pesquisa Nacional sobre Demografia e Saúde (PNDS).

mothers would achieve it before 2015, but Afro-descendant children would not reach that level until 2029 (Carvalho et al, 2008).

Figure 1: Infant Mortality Rate According to Race/Skin Color, 1991-2080 – Belo Horizonte



Source: IBGE, 1991 and 2000

For the country as a whole, infant mortality dropped considerably among children born to white, brown, and black women between 1980 and 2000. In 1980, 85.8 out of 1000 children born to white women died before their first birthday. Among children born to brown and black women, this figure was 100.6. Two decades later, IMR dropped to 22.9 per one thousand children born to white mothers and 38 per 1000 children born to brown and black women. Despite this important decline, at the turn of the century the IMR for children born to brown and black women was still 66% above the IMR for those born to white mothers (Miranda-Ribeiro and Oliveira, 2006). Will those rates ever converge? If so, when?

Data and Methods

We used 1991 and 2000 Census microdata from IBGE (the Brazilian Census Bureau) and followed three steps. First, we utilized Brass´s (1974) infant and child mortality technique to estimate the probabilities of death of children born to white and Afro-descendant mothers. Estimates were based on the proportion of dead children, according to the mother´s age. In order to transform the proportion of dead children into probabilities of dying between birth and exact ages, we used the multipliers developed by Trussel (1975). Originally, Brass alocates the estimates of mortality over time. For the purpose of this exercise, however, we assume that the levels of mortality refer to 1991 and 2000.

The second step was the application of a relational model to estimate the variation in the levels of mortality in 1991 and 2000. We estimated the probabilities of surviving to exact age *x*. From those, we calculated the observed logits. Based on observed and standard logits, we estimated α (alfa), which reflects the level of mortality relative to the standard[3]. The difference between the values of average alfa for white women in 1991 and 2000 will reflect the variation in mortality for children born to white mothers. The annual variation is obtained through the division of the total variation by the number of years in the interval (in this case, 9 years). The same is true for Afro-descendants and their children.

The standard mortality chosen for both racial groups was Brazil Table in 1995, obtained by the interpolation of the logits from the life tables of 1991 and 2000, which corresponds to approximately 1995.5. Thus, the calculated alfas can be compared in and within the categories.

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[3] We assume that the level of mortality is given by an average between α_3 and α_4, which correspond to the values of l_3 and l_5.

Finally, we calculated the convergence of the IMRs. We assumed that the IMR would continue to decline at the same rate that was observed between 1991 and 2000. In this case all that is needed is one reference year and the yearly variation of the mortality level for the year, given by α (alfa) for each of the two racial categories. By adding the survival probability logarithms for the referenced year for each category with the product of the annual variation for the respective α (alfa) by n, we were able to obtain the survival probability logarithm n years after the referenced year. By leveling the equation for white and black mothers, we calculate the number of years needed until the rates converge, meaning that racial differences in infant mortality disappear.

Results and discussion

Brazil had an IMR of 38.9 deaths per 1000 live births in 1991. This figure masks huge racial inequality – infants born to white mothers experienced 28.9 deaths per 1000 births, whereas those born to brown and black mothers experienced 47.3 deaths.

In 2000, IMRs were considerably lower if compared to 1991 but still high – 28.5 for the country as a whole, 33.1 for the children of brown and black women and 23.1 for those born to white mothers. Decline was faster among those born to browns and blacks. Yet they did not reach the level observed for whites 9 years earlier.

Table 1 indicates that, if the pace of decline remains constant, projected IMRs for infants born to brown and black mothers will be 16.8 per one thousand live births in 2010. Children born to white mothers will reach this level 4 years earlier (% of infant deaths, multipliers and alfas can be found in Table 2, annex).

The MDG target (13.8) will be reached in 2010 for children born to white mothers and three years later for those born to brown and black women. Therefore, both groups will have reached the target by 2015. However, if the pace of decline is maintained, racial inequality will not have disappeared by then – IMRs will converge only in 2027 at 5.2 deaths per 1000 live births. A summary of the results can be found in Figure 2.

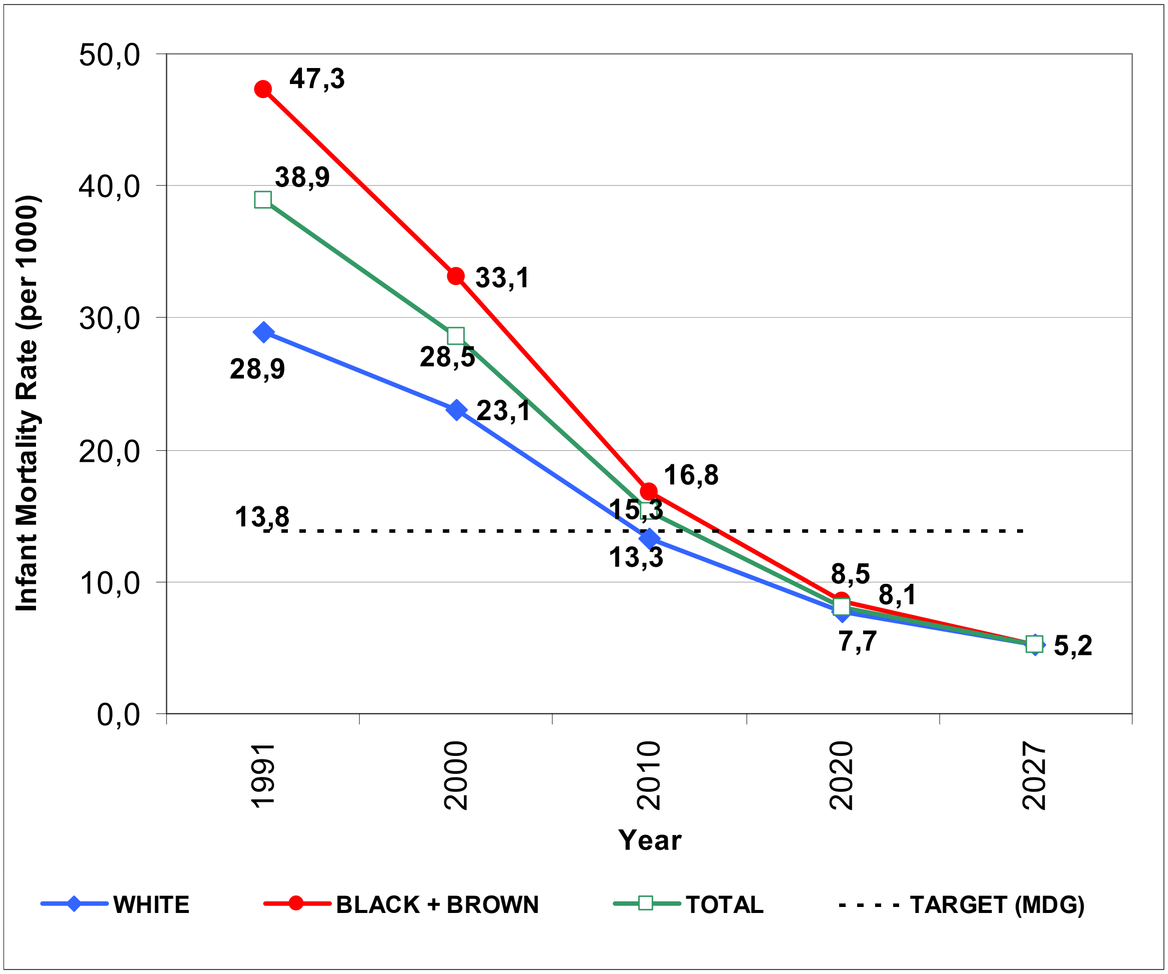
Table 1 – Infant Mortality Rates According to Race/Skin Color, Brazil, selected years*

YEAR	***WHITE***	***BLACK+BROWN***	***TOTAL***
1991	37,5	60,2	49,7
2000	23,1	33,1	28,5
2001	21,8	31,0	26,8
2002	20,7	28,9	25,2
2003	19,6	27,0	23,7
2004	18,5	25,3	22,2
2005	17,5	23,6	20,9
2006	16,6	22,1	19,6
2007	15,7	20,6	18,4
2008	14,9	19,3	17,3
2009	14,1	18,0	16,2
2010	13,3	16,8	15,3
2011	12,6	15,7	14,3
2012	11,9	14,6	13,4
2013	11,3	13,7	12,6
2014	10,7	12,8	11,8
2015	10,1	11,9	11,1
2016	9,6	11,1	10,4
2017	9,0	10,4	9,8
2018	8,6	9,7	9,2
2019	8,1	9,1	8,6
2020	7,7	8,5	8,1
2021	7,2	7,9	7,6
2022	6,9	7,4	7,1
2023	6,5	6,9	6,7
2024	6,1	6,4	6,3
2025	5,8	6,0	5,9
2026	5,5	5,6	5,5
2027	5,2	5,2	5,2
2028	4,9	4,9	4,9

Source: IBGE, 1991 and 2000

* 1991 and 2000: observed; 2001-2028: projected

Figure 2: Infant Mortality Rate According to Race/Skin Color, 1991-2080 – Brazil



Source: IBGE, 1991 and 2000

If there is no policy intervention aiming at reducing the racial differences in infant mortality in Brazil, it will take almost another two decades until the rates for both children born to Afro-descendant mothers and white mothers converge. Although feasible, this rate seems unlikely to be achieved without poverty reduction and educational increase. Until this day comes, Brazil will have to bear the heavy burden of unequal infant death.

References

BRASS, W. *Métodos para estimar la fecundidad y la mortalidad en poblaciones com datos limitados*. CELADE: Santiago, Chile, Serie E n. 14, 1974.

CARDOSO, A.M., SANTOS, R.V., COIMBRA JR.,C. E. A. Mortalidade infantil segundo raça/cor no Brasil: o que dizem os sistemas nacionais de informação? *Cadernos de Saúde Pública*, 21(5):1602-1608, set-out, 2005

CARVALHO, J. A .M, MIRANDA-RIBEIRO, P., MIRANDA-RIBEIRO, A. A mortalidade infantil por raça/cor em Belo Horizonte e os Objetivos do Milênio. Revista do Observatório do Milênio de Belo Horizonte, v. 1, p. 83-90, 2008.

COSTA, M. C. N. ; MOTA, E. L. A. ; PAIM, J. S.; TEIXEIRA, M. G. L. C.; MENDES, C. M. C. . A mortalidade infantil no Brasil em períodos recentes de crise econômica. *Revista de Saúde Pública*, v. 37, n. 6, 2003.

CUNHA, E. M. G. P. Crianças paulistas: diferenciais raciais ao nascer e ao morrer. *Anais XII Encontro da Associação Brasileira de Estudos Populacionais*. Ouro Preto, Minas Gerais. 2002.

DUARTE,C. M. R. Reflexos das políticas de saúde sobre as tendências da mortalidade infantil no Brasil: revisão da literatura sobre a última década. *Cadernos de Saúde Pública*, v. 23, p. 1511-1528, 2007.

FERREIRA, C. E. C. Mortalidade infantil: a manifestação mais cruel das desigualdades sociais. *São Paulo em Perspectiva*;3(3):24-29, jul.-set. 1989.

FRANÇA, E.; SOUZA, J. M.; GUIMARÃES, M. D. C; GOULART, E. M. A. ; COLOSIMO, E.; ANTUNES, C. M. F. Associação entre fatores sócio-econômicos e mortalidade infantil por diarréia, pneumonia e desnutrição em região metropolitana do sudeste do Brasil: um estudo caso-controle. *Cadernos de Saúde Pública*, v. 17, n. 6, p. 1437-1447, 2001.

IBGE. *Evolução e perspectivas da mortalidade infantil no Brasil*. Departamento da População e Indicadores Sociais. Rio de Janeiro: IBGE, 1999. 45 p. - (Estudos e pesquisas. Informação demográfica e socioeconômica, ISSN 1516-3296; n. 2).

IBGE 1991. Tábuas de Mortalidade. http://www.ibge.com.br/servidor_arquivos_est/. Acesso em 28 de junho de 2008.

IBGE 2000. Tábuas de Mortalidade. http://www.ibge.com.br/servidor_arquivos_est/. Acesso em 28 de junho de 2008.

JOBIM, R. D.; AERTS, D. R. G. C. . Mortalidade infantil evitável e fatores associados em Porto Alegre, Rio Grande do Sul, Brasil, 2000-2003. *Cadernos de Saúde Pública*, v. 24, p. 179-187, 2008.

MIRANDA-RIBEIRO, P.; OLIVEIRA, A. M. H. C. 2006. Atlas Racial Brasileiro: conteúdo, usos e limitações. In: Maria Stela Grossi Porto; Thomas Patrick Dwyer. (Org.). Sociologia e Realidade : Pesquisa Social no século XXI. Brasília: Editora UnB, p. 305-317.

PNUD 2008. http://www.pnud.org.br/odm/objetivo_4/. Acesso em 06 de julho de 2008.

SIMÕES, C.C.S. *A Mortalidade Infantil na Década de 90 e Alguns Condicionantes Sócio-econômicos*. Rio de Janeiro: IBGE; 2003. mimeo.

SZWARCWALD, C. L.; LEAL, M C; CASTILHO, E. A.; ANDRADE, C L T. Mortalidade Infantil no Brasil: Belíndia ou Bulgária?. *Cadernos de Saúde Pública* (FIOCRUZ), RIO DE JANEIRO, v. 13, n. 2, p. 503-516, 1997.

TRUSSEL, J. A re-estimation of the multiplying factors for the Brass Technique for determining childhood survivorship rates. *Population Sudies*, v. 29(1): 97-107, London, 1975.

UNITED NATIONS. *Manual X: Indirect Techniques for Demographic Estimation*. New York, 1983.

UNITED NATIONS. United Nations Statistical Division. 2008. Disponível em http://unstats.un.org/unsd/cdb/cdb_dict_xrxx.asp?def_code=279. Acesso em 24 de julho de 2008.

ANNEX

Table 2 - Brazil 1991 and 2000 - white, black + brown and total mothers: calculation of qx and alfa using Brass' infant and child mortality technique

	Mother's age	i	Children's age	% Infant Deaths (di)	ki	qx = ki*di	lx = 1-qx	Y(x)	$Y_{standard}(x)$	alfa
1991										
TOTAL	15-19	1	1	0,0412	0,945	0,0389	0,961	-1,603	-1,604	0,001
TOTAL	20-24	2	2	0,0530	1,019	0,0540	0,946	-1,432	-1,571	0,140
TOTAL	25-29	3	3	0,0609	1,006	0,0612	0,939	-1,365	-1,555	0,190
TOTAL	30-34	4	5	0,0728	1,019	0,0742	0,926	-1,262	-1,533	0,271
TOTAL	35-39	5	10	0,0883	1,039	0,0917	0,908	-1,146	-1,507	0,360
TOTAL	40-44	6	15	0,1098	1,018	0,1118	0,888	-1,036	-1,482	0,445
TOTAL	45-49	7	20	0,1321	1,005	0,1328	0,867	-0,938	-1,424	0,486
WHITE	15-19	1	1	0,0311	0,927	0,0289	0,971	-1,758	-1,604	-0,154
WHITE	20-24	2	2	0,0396	1,016	0,0402	0,960	-1,586	-1,571	-0,015
WHITE	25-29	3	3	0,0432	1,007	0,0435	0,956	-1,545	-1,555	0,010
WHITE	30-34	4	5	0,0519	1,021	0,0529	0,947	-1,442	-1,533	0,091
WHITE	35-39	5	10	0,0639	1,041	0,0666	0,933	-1,320	-1,507	0,186
WHITE	40-44	6	15	0,0824	1,020	0,0840	0,916	-1,194	-1,482	0,287
WHITE	45-49	7	20	0,1008	1,007	0,1015	0,898	-1,090	-1,424	0,334
BLACK + BROWN	15-19	1	1	0,0490	0,965	0,0473	0,953	-1,501	-1,604	0,103
BLACK + BROWN	20-24	2	2	0,0643	1,026	0,0659	0,934	-1,325	-1,571	0,246
BLACK + BROWN	25-29	3	3	0,0771	1,008	0,0778	0,922	-1,237	-1,555	0,318
BLACK + BROWN	30-34	4	5	0,0927	1,019	0,0945	0,906	-1,130	-1,533	0,403
BLACK + BROWN	35-39	5	10	0,1114	1,039	0,1157	0,884	-1,017	-1,507	0,490
BLACK + BROWN	40-44	6	15	0,1358	1,018	0,1382	0,862	-0,915	-1,482	0,567
BLACK + BROWN	45-49	7	20	0,1619	1,005	0,1628	0,837	-0,819	-1,424	0,605
2000										
TOTAL	15-19	1	1	0,0335	0,851	0,0285	0,971	-1,764	-1,604	-0,160
TOTAL	20-24	2	2	0,0340	0,974	0,0331	0,967	-1,687	-1,571	-0,116
TOTAL	25-29	3	3	0,0360	0,985	0,0355	0,965	-1,651	-1,555	-0,097
TOTAL	30-34	4	5	0,0427	1,007	0,0430	0,957	-1,552	-1,533	-0,019
TOTAL	35-39	5	10	0,0521	1,031	0,0536	0,946	-1,435	-1,507	0,072
TOTAL	40-44	6	15	0,0675	1,011	0,0682	0,932	-1,307	-1,482	0,174
TOTAL	45-49	7	20	0,0847	0,998	0,0845	0,915	-1,191	-1,424	0,233
WHITE	15-19	1	1	0,0277	0,834	0,0231	0,977	-1,873	-1,604	-0,269
WHITE	20-24	2	2	0,0274	0,981	0,0268	0,973	-1,795	-1,571	-0,224
WHITE	25-29	3	3	0,0276	0,996	0,0275	0,972	-1,782	-1,555	-0,228
WHITE	30-34	4	5	0,0313	1,017	0,0318	0,968	-1,707	-1,533	-0,174
WHITE	35-39	5	10	0,0369	1,040	0,0383	0,962	-1,611	-1,507	-0,104
WHITE	40-44	6	15	0,0481	1,020	0,0490	0,951	-1,482	-1,482	-0,001
WHITE	45-49	7	20	0,0626	1,006	0,0630	0,937	-1,350	-1,424	0,074
BLACK + BROWN	15-19	1	1	0,0378	0,875	0,0331	0,967	-1,687	-1,604	-0,083
BLACK + BROWN	20-24	2	2	0,0393	0,971	0,0382	0,962	-1,613	-1,571	-0,042
BLACK + BROWN	25-29	3	3	0,0435	0,977	0,0425	0,957	-1,557	-1,555	-0,003
BLACK + BROWN	30-34	4	5	0,0537	0,999	0,0536	0,946	-1,435	-1,533	0,098
BLACK + BROWN	35-39	5	10	0,0676	1,023	0,0691	0,931	-1,300	-1,507	0,206
BLACK + BROWN	40-44	6	15	0,0875	1,004	0,0878	0,912	-1,170	-1,482	0,311
BLACK + BROWN	45-49	7	20	0,1078	0,992	0,1069	0,893	-1,061	-1,424	0,363