

Luciana de Souza Braga

**DESIGUALDADES NOS DETERMINANTES DO ENVELHECIMENTO  
ATIVO (BELO HORIZONTE, 2003-2010) E NOS DETERMINANTES  
SOCIAIS DA SAÚDE (BELO HORIZONTE E *NEW YORK*, 2010), ENTRE  
ADULTOS MAIS VELHOS**

Universidade Federal de Minas Gerais  
Programa de Pós-Graduação em Saúde Pública  
Belo Horizonte – MG  
2015

Luciana de Souza Braga

DESIGUALDADES NOS DETERMINANTES DO ENVELHECIMENTO ATIVO (BELO  
HORIZONTE, 2003-2010) E NOS DETERMINANTES SOCIAIS DA SAÚDE (BELO  
HORIZONTE E *NEW YORK*, 2010), ENTRE ADULTOS MAIS VELHOS

Tese apresentada ao Programa de Pós-Graduação  
em Saúde Pública da Universidade Federal de  
Minas Gerais, como requisito parcial para a  
obtenção do título de Doutora em Saúde Pública.

Orientadora: Prof<sup>ª</sup> Maria Fernanda Furtado Lima-Costa

Co-orientador: Prof. James Macinko

Belo Horizonte

2015

B813d Braga, Luciana de Souza.  
Desigualdades nos determinantes do envelhecimento ativo (Belo Horizonte, 2003-2010 ) e nos determinantes sociais da saúde (Belo Horizonte e New York, 2010), entre adultos mais velhos [manuscrito]. / Luciana de Souza Braga. -- Belo Horizonte: 2015.  
80f.  
Orientador: Maria Fernanda Furtado Lima-Costa.  
Coorientador: James Macinko.  
Área de concentração: Saúde Pública.  
Tese (doutorado): Universidade Federal de Minas Gerais, Faculdade de Medicina.  
1. Envelhecimento. 2. Determinantes Sociais da Saúde. 3. Fatores Socioeconômicos. 4. Saúde da População Urbana. 5. Dissertações Acadêmicas. I. Lima-Costa, Maria Fernanda Furtado. II. Macinko, James. III. Universidade Federal de Minas Gerais, Faculdade de Medicina. IV. Título.

NLM: WA 300

## **UNIVERSIDADE FEDERAL DE MINAS GERAIS**

### **Reitor**

Prof. Jaime Arturo Ramírez

### **Vice-Reitor**

Prof<sup>a</sup>. Sandra Regina Goulart Almeida

### **Pró-Reitor de Pesquisa**

Prof<sup>a</sup>. Adelina Martha dos Reis

### **Pró-Reitor de Pós-Graduação**

Prof. Rodrigo Antônio de Paiva Duarte

## **FACULDADE DE MEDICINA**

### **Diretor**

Prof. Tarcizo Afonso Nunes

### **Chefe do Departamento de Medicina Preventiva e Social**

Prof. Antônio Thomáz G. da Matta Machado

## **PROGRAMA DE PÓS-GRADUAÇÃO EM SAÚDE PÚBLICA**

### **Coordenadora**

Prof<sup>a</sup>. Sandhi Maria Barreto

### **Sub-Coordenadora**

Prof<sup>a</sup>. Ada Ávila Assunção

### **Colegiado**

Prof<sup>a</sup>. Sandhi Maria Barreto

Prof<sup>a</sup>. Ada Ávila Assunção

Prof<sup>a</sup>. Eli Iola Gurgel Andrade

Prof<sup>a</sup> Mariângela Leal Cherchiglia

Prof. Mark Drew Crossland Guimarães

Flávia Soares Peres

## AGRADECIMENTOS

À Professora Maria Fernanda Lima-Costa;

Ao Professor James Macinko;

À Professora Cibele Comini;

Aos Professores, colegas e amigos da Pós-graduação em Saúde Pública;

Aos colegas e amigos com quem convivi e convivo na Secretaria de Saúde de Contagem;

Aos meus pais, Ana Maria de Souza Braga e Nelson Rocha Braga;

Ao meu querido irmão, Leonardo de Souza Braga;

Aos meus queridos familiares, amigos e amigas.

## RESUMO

**Objetivos:** Este trabalho avalia as tendências em sete anos (2003-2010) das desigualdades sociais entre adultos mais velhos residentes em Belo Horizonte (BH), considerando-se indicadores do envelhecimento ativo e da condição de saúde. Também investiga as desigualdades sociais nos determinantes intermediários da saúde e indicadores da condição de saúde, comparando-se adultos mais velhos residentes em Belo Horizonte e *New York, United States*, no ano de 2010.

**Métodos:** As fontes de dados utilizadas neste trabalho foram o 1º e o 2º Inquéritos de Saúde da Região Metropolitana de BH, conduzidos respectivamente em 2003 e 2010, e o *Community Health Survey*, conduzido em *New York* em 2010. A desigualdade social foi avaliada a partir dos índices absoluto e relativo de desigualdade (respectivamente, *Slope Index of Inequality and Relative Index of Inequality*), utilizando a escolaridade como definidora da posição socioeconômica.

**Resultados:** Entre 2003 e 2010, Belo Horizonte apresentou melhora significativa na prevalência de 7 indicadores do envelhecimento ativo e condição de saúde, entre os 12 avaliados. Entretanto, as desigualdades sociais persistiram para 10 desses indicadores, exceto medo de cair por defeitos nos passeios/dificuldades para atravessar a rua e medo de assalto. Em comparação à *New York*, BH apresentou melhor performance global nos indicadores de cuidado preventivo e condição de saúde. *New York*, por sua vez, apresentou melhor desempenho nos indicadores de circunstâncias materiais e fatores comportamentais. As cidades também apresentaram padrões distintos de desigualdade absoluta e relativa e, via de regra, foi a cidade com melhor desempenho global dos indicadores que apresentou maior desigualdade social.

**Conclusão:** Com poucas exceções, as desigualdades absolutas e relativas se concentraram entre aqueles com escolaridade mais baixa. É possível que a implementação de políticas públicas tenha melhorado o desempenho global dos indicadores analisados. Entretanto, a persistência das desigualdades sociais em saúde evidencia que a distribuição de recursos entre os grupos com diferentes níveis de escolaridade permanece desigual.

**Palavras-chave:** envelhecimento ativo, desigualdades sociais, determinantes da saúde, saúde urbana e epidemiologia

## ABSTRACT

**Objective:** To evaluate trends of social inequalities in seven years (2003-2010) among older adults living in Belo Horizonte (BH), considering indicators of active aging and health status. It also investigates social inequalities in intermediary determinants of health and health status indicators, comparing older adults living in Belo Horizonte and New York City (NYC), United States, in 2010.

**Methods:** Data came from the Belo Horizonte Metropolitan Region Health Survey, conducted in 2003 and 2010 and the NYC Community Health Survey, conducted in 2010. Social inequality was measured using the slope and the relative index of inequality. Educational attainment was used to define socioeconomic status.

**Results:** From 2003 to 2010, Belo Horizonte presented significant improvements in the prevalence rates of 7 out of 12 indicators. However, the social inequalities persisted through 10 out of 12 selected active aging and health status indicators, except for fear of falling on the sidewalks/crossing the streets and fear of assault. In comparison with NYC, BH presented better performance for preventive care and health status indicators. In turn, New York presented better performance in total prevalence for material circumstances and behavioral factors. The cities also presented distinctive patterns of absolute and relative inequalities. In general, the city with the best prevalence rates also showed higher absolute and/or relative inequalities.

**Discussion:** With few exceptions, absolute and relative inequalities in both cities were concentrated among the less educated. Although many public policies likely have improved the global performance of the indicators over time, it seems that the unequal distribution of resources is still persistent.

**Keywords:** active aging, social inequalities, determinants of health, urban health, and epidemiology

## SUMÁRIO

1 CONSIDERAÇÕES INICIAIS .....	07
2 OBJETIVOS .....	14
3 MÉTODOS .....	15
3.1 VARIÁVEIS DO ESTUDO .....	16
3.2 ANÁLISE ESTATÍSTICA .....	17
4 ARTIGO 1 .....	20
<b>4.1 INTRODUÇÃO .....</b>	<b>23</b>
<b>4.2 MÉTODOS .....</b>	<b>24</b>
4.2.1 VARIÁVEIS DO ESTUDO .....	25
4.2.2 ANÁLISE ESTATÍSTICA .....	27
<b>4.3 RESULTADOS .....</b>	<b>29</b>
<b>4.4 DISCUSSÃO .....</b>	<b>30</b>
<b>REFERÊNCIAS BIBLIOGRÁFICAS .....</b>	<b>35</b>
5 ARTIGO 2 .....	46
<b>5.1 INTRODUÇÃO .....</b>	<b>49</b>
<b>5.2 MÉTODOS .....</b>	<b>50</b>
5.2.1 MARCO CONCEITUAL .....	51
5.2.2 ANÁLISE ESTATÍSTICA .....	53
<b>5.3 RESULTADOS .....</b>	<b>54</b>
<b>5.4 DISCUSSÃO .....</b>	<b>55</b>
<b>REFERÊNCIAS BIBLIOGRÁFICAS .....</b>	<b>59</b>
6 CONSIDERAÇÕES FINAIS .....	75
ANEXOS .....	78
ANEXO A – CARTA DE ACEITE.....	79
ANEXO B – ATA DA DEFESA DE TESE .....	80
ANEXO C – FOLHA DE APROVAÇÃO.....	81



## 1 CONSIDERAÇÕES INICIAIS

Nas últimas décadas, o Brasil passou por grandes transformações políticas, sociais e econômicas, com evidente crescimento econômico e expansão das políticas sociais.<sup>1</sup> Entre 1990 e 2012, a pobreza extrema diminuiu de 25,5% para 3,5% e a proporção de jovens entre 15 e 24 anos com pelo menos seis anos de estudo passou de 60% para 84%.<sup>2</sup> Um dos aspectos mais notáveis das mudanças sociais no Brasil diz respeito à diminuição das desigualdades entre grupos, com forte crescimento da renda e maior acesso à educação entre as camadas historicamente menos privilegiadas.<sup>2,3</sup> Entretanto, apesar desses avanços, o país permanece como um dos mais desiguais do mundo, com coeficiente de Gini = 0,53 em 2012.<sup>2</sup>

Considerando os indicadores de saúde, entre 1990 e 2012 a expectativa de vida dos brasileiros aumentou de 67 para 74 anos<sup>4</sup> e a mortalidade materna diminuiu 55%, atingindo 64 óbitos por 100 mil nascidos vivos.<sup>2</sup> Houve aumento do acesso da população adulta a consultas médicas, redução nas hospitalizações<sup>5</sup> e as desigualdades para obter consultas diminuíram aproximadamente 80%.<sup>6</sup> Entre os idosos também houve aumento no acesso aos serviços de saúde e redução nas desigualdades para obter consultas. Entretanto, as desigualdades sociais relacionadas ao estado de saúde não se modificaram durante a última década.<sup>5,6,7</sup>

---

<sup>1</sup> Paim J, Travassos C, Almeida C, Bahia L, Macinko J. The Brazilian health system: history, advances, and challenges. *Lancet* 2011, 377(9779): 1778-1797.

<sup>2</sup> Brasil, Instituto de Pesquisa Econômica Aplicada. Objetivos de Desenvolvimento do Milênio: Relatório Nacional de Acompanhamento. Brasília; 2014.

<sup>3</sup> Brasil, Instituto de Pesquisa Econômica Aplicada. Duas décadas de desigualdade e pobreza no Brasil medidas pela Pnad/IBGE. Comunicados IPEA 2013, 159: 46p.

<sup>4</sup> The World Bank. World Development Indicators. <http://data.worldbank.org/country/brazil#> (acessado em 03/Maio/15).

<sup>5</sup> Lima-Costa MF, Matos DL, Camargos VP, Macinko J. 10-year trends in the health of Brazilian elderly: evidence from the National Household Sample Survey (PNAD 1998, 2003, 2008). *Ciência & Saúde Coletiva* 2011, 16(9): 3689-3696.

<sup>6</sup> Macinko J, Lima-Costa MF. Horizontal equity in health care utilization in Brazil, 1998-2008. *International Journal for Health in Equity* 2012, 11:33. 7.

<sup>7</sup> Lima Costa MFF, Facchini LA, Matos DL, Macinko J. Changes in ten years of social inequalities in health among elderly Brazilians (1998-2008). *Rev Saúde Pública* 2012, 46: 100-107.

As desigualdades sociais em saúde ocorrem quando há diferenças na situação de saúde entre grupos populacionais, categorizados a partir de atributos definidores de sua condição socioeconômica como renda, escolaridade, pertencimento geopolítico, idade ou outros<sup>8,9</sup>. Assim, o uso dos termos disparidade ou desigualdade define a existência de diferenças na saúde entre os indivíduos ou grupos sociais. Quando as desigualdades são sistemáticas, evitáveis e injustas, sob a perspectiva do conceito de justiça social, elas passam a ser denominadas iniquidades<sup>8,9</sup>. As iniquidades em saúde são causadas pelas condições sociais em que as pessoas nascem, crescem, vivem, trabalham e envelhecem, as quais recebem a denominação de determinantes sociais da saúde<sup>9,10</sup>.

Diversos modelos e teorias buscam explicar a ocorrência e magnitude das desigualdades sociais em saúde. Entre eles, destacam-se:

- **Teoria das causas fundamentais:** as forças sociais subjacentes à estratificação social são as responsáveis pelas desigualdades em saúde. A posição socioeconômica fornece recursos flexíveis aos indivíduos - como conhecimento, dinheiro, poder, prestígio e relações sociais benéficas - que os auxiliam a evitar doenças ou minimizar o impacto causado por elas.<sup>11</sup>
- **Perspectiva do curso de vida:** a saúde na idade adulta e as desigualdades sociais em saúde são parcialmente determinadas por fatores biológicos e pela condição socioeconômica vivenciada na infância e durante os estágios iniciais da vida.<sup>12</sup>

---

<sup>8</sup> Harper S, Lynch J. Methods for measuring cancer disparities: using data relevant to Healthy People 2010 cancer-related objectives. NCI Cancer Surveillance Monograph Series, Number 6. Bethesda, MD: National Cancer Institute, 2005. NIH Publication No. 05-5777.

<sup>9</sup> Solar O, Irwin A. A conceptual framework for action on the social determinants of health. Social Determinants of Health Discussion Paper 2 (Policy and Practice). Genebra: OMS; 2010.

<sup>10</sup> Organização Mundial da Saúde. Diminuindo diferenças: a prática das políticas sobre determinantes sociais da saúde (documento de discussão). Conferência Mundial sobre Determinantes Sociais. Rio de Janeiro, Brasil: OMS; 2011.

<sup>11</sup> Phelan JC, Link BG, Tehranifar P. Social conditions as fundamental causes of health inequalities: theory, evidence, and policy implications. *Journal of Health and Social Behavior* 2010, 51 (S), S28-S40.

<sup>12</sup> Wadsworth, MEJ. Health inequalities in the lifecourse perspective. *Social Science & Medicine* 1997, 44, 859-69

- **Teoria da seleção social:** a mobilidade social dos indivíduos é determinada pela sua condição de saúde. Assim, indivíduos com problemas de saúde tendem a mover-se para estratos mais baixos (seleção direta) e indivíduos saudáveis tendem a mover-se para estratos mais altos (seleção indireta).<sup>13</sup>

- **Modelo das características pessoais:** elementos como habilidade cognitiva, personalidade e outras características pessoais podem aumentar as oportunidades para seleção e mobilidade social. Essas características também explicam parcialmente as desigualdades em saúde entre grupos populacionais categorizados a partir da condição socioeconômica.<sup>14,15</sup>

- **Teoria neomaterialista:** as desigualdades no acesso aos recursos materiais foram atenuadas ao longo do tempo, mas elas ainda são persistentes, expressivas e responsáveis pelas desigualdades em saúde.<sup>16,17</sup>

- **Teoria psicossocial:** elementos como stress psicossocial, falta de suporte e senso de controle explicam parcialmente as desigualdades na situação de saúde entre grupos populacionais categorizados a partir da condição socioeconômica. Vale ressaltar que a própria percepção de privação material pode desencadear mecanismos de stress, com impacto direto na saúde do indivíduo.<sup>18,19</sup>

---

<sup>13</sup> West P. Rethinking the selection explanation for health inequalities. *Social Science & Medicine* 1991, 32, 373-84.

<sup>14</sup> Batty GD, Der G, Macintyre S, Deary IJ. Does IQ explain socioeconomic inequalities in health? Evidence from a population based cohort study in the west of Scotland. *British Medical Journal* 2006, 332, 580-84.

<sup>15</sup> Mackenbach JP. New trends in health inequalities research: now it's personal. *Lancet* 2010, 376(9744), 854-55.

<sup>16</sup> Lynch JW, Davey Smith G, Kaplan GA, House JS. Income inequality and mortality: importance to health of individual income, psychosocial environment, or material conditions. *British Medical Journal* 2000, 320(7243), 1200-1204.

<sup>17</sup> Davey Smith G, Bartley M, Blane D. Explanations for socioeconomic differentials in mortality: evidence from Britain and elsewhere. *European Journal of Public Health* 1994, 4, 131-44.

<sup>18</sup> Marmot M. Status syndrome. How your social standing directly affects your health and life expectancy. London: Bloomsbury; 2004.

<sup>19</sup> Wilkinson RG. The impact of inequality. How to make sick societies healthier. London: Routledge; 2005.

- **Difusão de inovações:** indivíduos em posições socioeconômicas mais favoráveis tendem a adotar novos comportamentos precocemente, antes dos indivíduos em posições socioeconômicas mais baixas. Como resultado, as desigualdades relacionadas aos comportamentos em saúde aumentam e também se ampliam as desigualdades nas taxas de mortalidade.<sup>20,21</sup>

- **Teoria do capital cultural:** elementos como atitude, conhecimento e competência explicam parcialmente as desigualdades no comportamento de grupos populacionais categorizados a partir da condição socioeconômica. Essas diferenças se originam da necessidade de distinção entre os grupos, uma vez que os indivíduos em posição socioeconômica mais alta desejam evidenciar sua condição favorável.<sup>22,23</sup>

De maneira geral, esses modelos não são excludentes e atuam em conjunto, reforçando um ao outro. Há modelos gerais (Teoria das Causas Fundamentais e Perspectiva do Curso de Vida) e teorias com enfoque na mobilidade social, que atribuem as diferenças entre os estratos às características pessoais dos membros de cada grupo (Teoria da Seleção Social e Modelo das Características Pessoais). Há ainda as teorias com enfoque na distribuição de recursos materiais e imateriais (Teoria Neomaterialista e Teoria Psicossocial) e aquelas que se baseiam no valor atribuído aos recursos para promover ganhos em saúde e evitar problemas prevalentes (Difusão de inovações e Capital Cultural).<sup>24</sup>

---

<sup>20</sup> Rogers EM. Diffusion of innovations. New York etc.: Free Press; 1962.

<sup>21</sup> Victora CG. Explaining trends in inequities: evidence from Brazilian child health studies. *Lancet* 2000, 356, 1093-98.

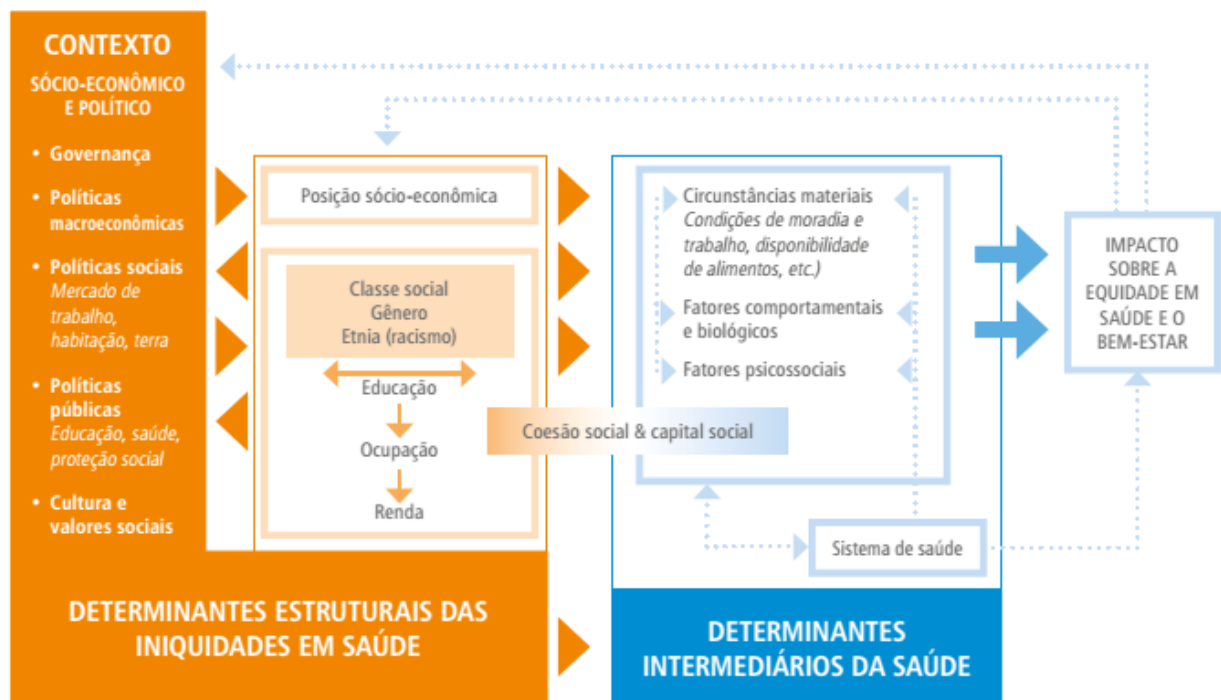
<sup>22</sup> Bourdieu P. Distinction. A social critique of the judgment of taste. Cambridge (Mass.): Harvard University Press; 1984.

<sup>23</sup> Abel T. Cultural capital and social inequality in health. *Journal of Epidemiology and Community Health* 2008, 62, e13.

<sup>24</sup> Mackenbach JP. The persistence of health inequalities in modern welfare states: the explanation of a paradox. *Social Science & Medicine* 2012, 75, 761-69.

Em 2010, após uma extensa revisão sobre as teorias de produção social da saúde e das desigualdades em saúde, a Organização Mundial da Saúde (OMS) elaborou o documento intitulado: *A Conceptual Framework for Action on the Social Determinants of Health*.<sup>25</sup> A Figura 1 apresenta o marco conceitual proposto no documento para os determinantes sociais da saúde:

**Figura 1.** Marco Conceitual dos determinantes sociais da saúde.



Fonte: Organização Mundial da Saúde, 2011<sup>26</sup>.

A Organização Mundial da Saúde divide os determinantes sociais da saúde em 2 grupos: os determinantes estruturais (contexto socioeconômico-político e mecanismos estruturais) e os determinantes intermediários<sup>25</sup>. O contexto socioeconômico-político inclui fatores que não podem ser medidos diretamente no nível individual e é formado por aspectos como: governança; políticas macroeconômicas; políticas sociais relacionadas ao mercado de trabalho, uso da terra, e habitação; políticas públicas de educação, saúde, proteção social e saneamento; e os valores culturais e sociais relacionados à saúde. Os mecanismos estruturais são aqueles que geram ou reforçam a

<sup>25</sup> Solar O, Irwin A. A conceptual framework for action on the social determinants of health. Social Determinants of Health Discussion Paper 2 (Policy and Practice). Genebra: World Health Organization; 2010.

<sup>26</sup> Organização Mundial da Saúde. Diminuindo diferenças: a prática das políticas sobre determinantes sociais da saúde (documento de discussão). Conferência Mundial sobre determinantes Sociais. Rio de Janeiro, Brasil: OMS; 2011.

estratificação social na sociedade e definem a posição socioeconômica do indivíduo a partir de hierarquias de poder, prestígio e acesso a recursos. Os mecanismos estruturais mais importantes são renda, ocupação, educação, etnia, gênero e classe social. Em conjunto, os determinantes estruturais influenciam os desfechos em saúde através dos determinantes intermediários (circunstâncias materiais relacionadas às condições de moradia, trabalho e domicílio; fatores comportamentais e biológicos; aspectos psicossociais; e sistema de saúde). É a distribuição desigual dos determinantes intermediários que constitui o mecanismo primário pelo qual a posição socioeconômica afeta a saúde e o bem-estar dos grupos populacionais. Coesão social e capital social são componentes transversais do modelo.

A necessidade de aferir regularmente as desigualdades e iniquidades em saúde constitui um dos pilares da saúde urbana.<sup>27</sup> Neste, trabalho serão investigadas as desigualdades sociais em saúde entre adultos mais velhos residentes em Belo Horizonte (BH), Minas Gerais. O município é uma das maiores cidades brasileiras, com cerca de 2,4 milhões de habitantes, dos quais 12,6% são idosos (60 anos ou mais).<sup>28</sup> Embora apresente alto Índice de Desenvolvimento Humano (0,882)<sup>29</sup>, a distribuição da riqueza, da escolaridade e das condições de saúde entre seus habitantes apresenta grandes disparidades. Resultados de um inquérito de saúde conduzido em 2003 evidenciaram associações graduadas entre o nível socioeconômico da área de residência e diferentes dimensões do envelhecimento ativo, com pior performance entre os idosos residentes nas áreas mais vulneráveis.<sup>30</sup>

---

<sup>27</sup> Caiaffa WT, Ferreira FR, Ferreira AD, Oliveira CDL, Camargos VP, Proietti FA. Saúde urbana: “a cidade é uma estranha senhora, que hoje sorri e amanhã te devora”. *Ciência & Saúde Coletiva* 2008, 13(6):1785-1796.

<sup>28</sup> Instituto Brasileiro de Geografia e Estatística. Censo 2010. <http://www.ibge.gov.br/home/estatistica/populacao/censo2010/default.shtm> (acessado em 10/Fev/2014).

<sup>29</sup> Programa das Nações Unidas para o Desenvolvimento Brasil. Ranking IDHM Municípios 2010. Atlas do Desenvolvimento Humano do Brasil 2013. [http://www.pnud.org.br/IDH/Atlas2013.aspx?indiceAccordion=1&li=li\\_Atlas2013](http://www.pnud.org.br/IDH/Atlas2013.aspx?indiceAccordion=1&li=li_Atlas2013) (acessado em 10/Fev/2014).

<sup>30</sup> Braga LS, Macinko J, Proietti FA, César CC, Lima-Costa MF. Intra-urban differences in vulnerability among the elderly population. *Cad.Saúde Pública* 2010, 26(12), 2307-2315.

Resultados do mesmo inquérito mostraram que o uso de serviços de saúde pela população adulta foi menos afetado pelas desigualdades socioeconômicas, possivelmente em consequência de intervenções do sistema de saúde público local para reduzi-las<sup>31</sup>.

---

<sup>31</sup> Turci MA, Lima-Costa MF, Proietti FA, César CC, Macinko J. Intra-urban differences in the use of ambulatory health services in a large brazilian city. *J Urban Health* 2010, 87 (6): 994-1006.

## 2 OBJETIVOS

O presente trabalho tem por objetivo avaliar as desigualdades sociais em saúde entre adultos mais velhos residentes em Belo Horizonte, a partir dos índices absoluto e relativo de desigualdade (respectivamente, *Slope Index of Inequality* e *Relative Index of Inequality*), utilizando a escolaridade como definidora da posição socioeconômica.

São objetivos específicos deste trabalho:

- Examinar as tendências em sete anos (2003-2010) das desigualdades sociais entre idosos residentes em BH, considerando-se três domínios do modelo do Envelhecimento Ativo da OMS (ambiente físico, determinantes sociais e uso de serviços de saúde) e indicadores da condição de saúde;
- Investigar as desigualdades sociais nos determinantes intermediários da saúde e indicadores da condição de saúde, comparando-se adultos acima de 50 anos residentes em Belo Horizonte e *New York, United States*, no ano de 2010.



### 3 MÉTODOS

As fontes de dados utilizadas neste trabalho foram o 1º e o 2º Inquéritos de Saúde da Região Metropolitana de Belo Horizonte (RMBH), conduzidos respectivamente em 2003 e 2010, e o *Community Health Survey*, conduzido na cidade de *New York* em 2010. Os participantes dos três inquéritos foram selecionados por meio de amostra probabilística, para representar a população adulta não institucionalizada. Todos os dados foram coletados através de autorrelato.

Para os inquéritos da RMBH, todos os residentes nos 7.500 domicílios amostrados com idade igual ou superior a 20 anos foram elegíveis para entrevista face a face. Em 2003, 5.922 domicílios participaram da pesquisa; em 2010, 5.798 domicílios. As respectivas taxas de resposta foram 79% e 77%. O *Community Health Survey*, por sua vez, incluiu 8.665 indivíduos com idade igual ou superior a 18 anos. As entrevistas foram realizadas pelo telefone, com taxa de resposta equivalente a 86%. Maiores detalhes podem ser encontrados em outras publicações e na seção de métodos dos **Artigos 1 e 2**.<sup>32,33,34</sup>

Para o **Artigo 1** foram selecionados todos os participantes dos inquéritos da RMBH residentes em Belo Horizonte, com idade igual ou superior a 60 anos (n= 1.149 em 2003 e n=1.475 em 2010). Para o **Artigo 2** foram selecionados todos os participantes do 2º Inquérito da RMBH residentes em Belo Horizonte, com idade igual ou superior a 50 anos e todos os participantes do *Community Health Survey*, na mesma faixa etária (n=2.740 em BH e n=4.669 em *New York*).

---

32 Lima-Costa MF. A saúde dos adultos na Região Metropolitana de Belo Horizonte: um estudo epidemiológico de base populacional. Belo Horizonte: Núcleo de Estudos em Saúde Pública e Envelhecimento; 2004.

33 Lima Costa MF, Turci M, Macinko J. Saúde dos adultos em Belo Horizonte. Núcleo de Estudos em Saúde Pública e Envelhecimento da Fundação Oswaldo Cruz e Universidade Federal de Minas Gerais. Belo Horizonte; 2012.

34 The New York City Department of Health and Mental Hygiene. Data and Statistics, Surveys, Community Health Survey. <http://www.nyc.gov/html/doh/html/data/survey.shtml> (acessado em 25/Jul/2014).

### **3.1 Variáveis do estudo**

No presente trabalho, a condição socioeconômica foi medida através dos anos de estudo e categorizada como alta, média ou baixa escolaridade. A definição dos pontos de corte para cada categoria está detalhada na seção de métodos dos **Artigos 1 e 2**.

A seleção de variáveis para o **Artigo 1** se baseou no modelo do Envelhecimento Ativo da Organização Mundial da Saúde, com algumas adaptações<sup>33</sup>. Foram incluídas variáveis pertencentes a três domínios do modelo: ambiente físico (satisfação com a vizinhança, barreiras físicas e atitudinais que dificultam o sair de casa); determinantes sociais (suporte social, confiança nas pessoas e medo de assalto); e uso dos serviços de saúde (consultas médicas e hospitalizações no ano anterior, dificuldades para obter consultas ou medicamentos). Indicadores da condição de saúde (autoavaliação da saúde e desempenho funcional) também foram selecionados, embora não integrem o modelo do Envelhecimento Ativo originalmente. Por sua vez, a seleção de variáveis para o **Artigo 2** se baseou no modelo de Determinantes Sociais da Saúde, proposto pela Organização Mundial da Saúde.<sup>34</sup> Foram incluídos determinantes intermediários da saúde e indicadores da condição de saúde, considerando-se os seguintes domínios: circunstâncias psicossociais (estado civil e número de residentes no domicílio); circunstâncias materiais (emprego e condições da vizinhança); fatores comportamentais (tabagismo atual, consumo de álcool, atividade física e consumo de frutas, hortaliças e legumes); sistema de saúde (indicadores de cuidado preventivo); e condição de saúde (autoavaliação de saúde e diagnóstico médico para doenças crônicas prevalentes). Todas as variáveis selecionadas para o presente trabalho foram codificadas como dicotômicas. Maiores detalhes sobre a descrição de cada variável estão disponíveis na seção de métodos dos **Artigos 1 e 2**.

---

<sup>35</sup>World Health Organization. Active ageing: a policy framework. [http://www.who.int/ageing/publications/active\\_ageing/en/index.html](http://www.who.int/ageing/publications/active_ageing/en/index.html) (acessado em 03/Mai/13).

<sup>36</sup> Solar O, Irwin A. A conceptual framework for action on the social determinants of health. Social Determinants of Health Discussion Paper 2 (Policy and Practice). Genebra: OMS; 2010.

### **3.2 Análise estatística**

A análise inicial dos dados baseou-se em estimativas de prevalência e intervalos de confiança de 95% (IC 95%), ajustadas por idade e sexo, por meio da regressão de Poisson. No **Artigo 2**, as estimativas de prevalência dos domínios fatores comportamentais, sistema de saúde e condição de saúde também foram ajustadas por cobertura por plano de saúde. Foram estimadas as prevalências para o conjunto dos participantes e para os três níveis de escolaridade. As análises foram estratificadas por ano (**Artigo 1**) ou cidade (**Artigo 2**).

As desigualdades sociais foram medidas por dois indicadores: o índice absoluto de desigualdade (*Slope Index of Inequality*) e o índice relativo de desigualdade (*Relative Index of Inequality*)<sup>37,38</sup>. Ambas são medidas sintéticas, de uso recomendado quando se pretende avaliar a população ao longo do tempo ou comparar diferentes populações ou subgrupos entre si. Distinguem-se de outros métodos que avaliam disparidades por serem sensíveis às alterações no tamanho dos subgrupos populacionais envolvidos na análise e às modificações na situação de saúde dentro de cada subgrupo, ao longo do tempo<sup>37</sup>. Políticas ou programas sociais podem, por exemplo, criar oportunidades educacionais, distribuir renda e/ou afetar os tipos de emprego disponíveis no mercado. Ao interferirem na natureza da estratificação na sociedade, essas ações podem reduzir a proporção de indivíduos com baixa escolaridade e, assim, diminuir o número de indivíduos expostos a alguma forma de desvantagem social<sup>38</sup>. Os índices absoluto e relativo de desigualdade são capazes de captar essas mudanças ao longo do tempo. Adicionalmente, eles também incorporam as informações de todos os indivíduos incluídos na análise, sem estabelecer comparações apenas entre os grupos extremos (por exemplo, alta escolaridade *versus* baixa escolaridade).

Para iniciar as análises, a amostra foi ordenada pelo nível de escolaridade, de maneira decrescente. Aos indivíduos pertencentes a cada categoria educacional foi atribuído um escore de posição relativa, baseado no ponto médio da distribuição cumulativa da variável escolaridade. Por exemplo, se o subgrupo com alta escolaridade representasse 30% da

---

<sup>37</sup> Mackenbach, J.P., & Kunst, A.E. (1997). Measuring the magnitude of socio-economic inequalities in health: an overview of available measures illustrated with two examples from Europe. *Soc. Sci. Med*, 44(6), 757-771.

<sup>38</sup> Schneider MC, Castillo-Salgado C, Bacallao J, Loyola E, Mujica OJ, Vidaurre M, Roca A. Métodos de medición de las desigualdades de salud. *Rev Panam Salud Publica* 2002, 12(6): 398-415.

população sob análise, o escore dos participantes desse subgrupo seria 0,15 ( $0 + 0,30/2$  ou frequência acumulada + frequência relativa/2). Adicionalmente, se os indivíduos com média escolaridade representassem 40% da amostra, o escore atribuído a eles seria 0,50 ( $0,30 + 0,40/2$ ); e assim por diante.

Finalizada essa etapa seguiu-se a estimativa dos índices, baseada em modelos lineares generalizados, considerando-se o escore da escolaridade como variável explicativa e ajustando-se os modelos por idade e sexo, ano (**Artigo 1**) ou cidade (**Artigo 2**), e cobertura por plano de saúde (apenas **Artigo 2**, quando aplicável). A tendência nos índices ao longo do tempo foi avaliada pela inclusão de um termo de interação entre escore e ano no **Artigo 1**:

$$Y = \beta_0 + \beta_1 \text{ score} + \beta_2 \text{ idade} + \beta_3 \text{ sexo} + \beta_4 \text{ ano} + \beta_5 \text{ ano(score)} + \text{erro}$$

No **Artigo 2**, foi incluído um termo de interação entre escore e cidade:

$$Y = \beta_0 + \beta_1 \text{ score} + \beta_2 \text{ idade} + \beta_3 \text{ sexo} + \beta_4 \text{ cidade} + \beta_5 \text{ cidade(score)} + \text{erro}$$

O coeficiente  $\beta_1$  dos modelos de regressão foram os coeficientes de interesse, estimando o índice absoluto de desigualdade a partir da distribuição binomial com função de ligação identidade e determinando o índice relativo de desigualdade, quando o modelo foi ajustado a partir da distribuição de Poisson. Para os dois índices também foram estimados os intervalos de confiança de 95% e o valor de p, a partir do termo de interação, para as diferenças entre as estimativas - 2003 *versus* 2010 (**Artigo 1**); Belo Horizonte *versus* New York (**Artigo 2**).

O índice absoluto pode ser interpretado como a diferença absoluta na variável dependente ao longo do espectro da condição socioeconômica<sup>39</sup>, do grupo com alta escolaridade ao grupo com baixa escolaridade. Na ausência de desigualdade absoluta, o índice apresenta o valor 0 e, quando a relação entre o indicador de saúde e a condição socioeconômica é inversa, ele é negativo<sup>40</sup>. Já o índice relativo pode ser interpretado como a razão entre aqueles com maior desvantagem em comparação aos que apresentam melhor condição socioeconômica<sup>39</sup>. Na

---

<sup>39</sup> Mackenbach, J.P., & Kunst, A.E. (1997). Measuring the magnitude of socio-economic inequalities in health: an overview of available measures illustrated with two examples from Europe. *Soc. Sci. Med*, 44(6), 757-771.

<sup>40</sup> Schneider MC, Castillo-Salgado C, Bacallao J, Loyola E, Mujica OJ, Vidaurre M, Roca A. Métodos de medición de las desigualdades de salud. *Rev Panam Salud Publica* 2002, 12(6): 398-415.

ausência de desigualdade relativa, o índice apresenta o valor 1.

Todas as análises foram realizadas utilizando-se os procedimentos para amostras complexas do pacote estatístico Stata, versão 12.0, considerando-se os efeitos do delineamento da amostra, do peso do indivíduo e do agregado por domicílio.<sup>41</sup>

---

<sup>41</sup> StataCorp: Stata user`s guide. Release 12. College Station, TX: Stata Corporation, 2011.



**Social Inequalities on Selected Determinants of Active Aging and Health Status Indicators  
in a Large Brazilian City (2003-2010)**

**Luciana de Souza Braga, MPH<sup>1</sup>, Maria Fernanda Lima-Costa, MD, PhD<sup>1,2</sup>, Cibele Comini  
César, PhD<sup>1,3</sup>, and James Macinko, PhD<sup>4</sup>**

<sup>1</sup> Programa de Pós-graduação em Saúde Pública, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil.

<sup>2</sup> Centro de Pesquisas René Rachou, Fundação Oswaldo Cruz, Belo Horizonte, Minas Gerais, Brazil.

<sup>3</sup> Departamento de Estatística, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil.

<sup>4</sup> Departments of Health Policy and Management and Community Health Sciences, University of California, Los Angeles, USA.

**Corresponding author:**

Luciana de Souza Braga, MPH, Programa de Pós-graduação em Saúde Pública, Universidade Federal de Minas Gerais.

Address: Núcleo de Estudos em Saúde Pública e Envelhecimento, Centro de Pesquisas René Rachou da Fundação Oswaldo Cruz, Avenida Augusto de Lima, 1715, CEP 30190-002, Belo Horizonte, Minas Gerais, Brazil.

Phone number: +55(31)3349-7733/7741

Email: lusouzabraga@yahoo.com.br

**Funding:**

The household health surveys (the 1st and 2nd Inquéritos de Saúde da Região Metropolitana de Belo Horizonte) were supported by the Ministry of Health, Brazil. LSB received a research grant from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES, Brazil).

## **Abstract**

**Objective:** To assess trends in social inequalities among 2,624 individuals aged 60 years or older, living in Belo Horizonte, Brazil, in three domains of the WHO Active Ageing Model (physical environment, social environment, use of health services) and health status indicators. **Methods:** Data came from two representative household surveys conducted in 2003 and 2010. Social inequality was measured using the slope and the relative index of inequality. Educational level was used to define socioeconomic status. **Results:** Significant improvements were observed in the prevalence rates of 7 out of 12 indicators. However, the social inequalities persisted through 10 out of 12 selected active aging and health status indicators, except for fear of falling on the sidewalks/crossing the streets and fear of assault. **Discussion:** The unequal distribution of resources such as knowledge, wealth, prestige and beneficial social networks among the different educational levels may have contributed to the persistence of inequalities.

**Keywords:** active aging, social inequalities, urban health, epidemiology



## 4.1 Introduction

Brazil has the world's fifth largest population, with around 200 million people (United Nations Department of Economic and Social Affairs, 2010), and approximately 84% of its population lives in urban areas (United Nations Department of Economic and Social Affairs, 2011). The country also has a rapid rate of aging, similar to China, Thailand and South Korea (National Institute on Aging, & World Health Organization, 2011). Overall, social inequalities in Brazil have been decreasing and there is evidence of improvements in the socioeconomic status and health of the population: from 1970 to 2011, illiteracy among individuals aged 15 years or more decreased from 33.6% to 8.6% (Paim, Travassos, Almeida, Bahia, & Macinko, 2011; Instituto Brasileiro de Geografia e Estatística [IBGE], 2012) and life expectancy at birth increased by about 40%, reaching 73.3 years (Paim et al., 2011; The World Bank, 2011). Despite these improvements, the country remains one of the most unequal in the world, with a Gini Coefficient of 0.508 in 2011 (Instituto Brasileiro de Geografia e Estatística [IBGE], 2012). Recent studies, based on a nationally representative sample, have also shown that social inequalities in health status among the elderly have not changed during the last decade, although the use of health services has increased (Macinko & Lima-Costa, 2012; Lima-Costa, Facchini, Matos & Macinko, 2012).

Belo Horizonte, capital of the state of Minas Gerais, is one of the largest Brazilian cities, with about 2.4 million inhabitants of which 12.6% are 60 years or older (Instituto Brasileiro de Geografia e Estatística, 2010). Although the city has a high Human Development Index (0.810) (Programa das Nações Unidas para o Desenvolvimento [PNUD] Brasil, 2013), wealth, schooling and health status are unequally distributed among its inhabitants. Results from a health survey conducted in 2003 showed graded associations between household socioeconomic level and different active aging determinants, with worse performance among those elderly living in the most vulnerable areas (Braga, Macinko, Proietti, César, & Lima-Costa, 2010).

Active Aging, as defined by the World Health Organization (World Health Organization [WHO], 2002), may be described through six domains: (1) economic determinants (income, work and social protection); (2) social determinants (education, social support and safety); (3) physical environment (household and neighborhood; absence of environmental barriers; and access to clean water, pure air and healthy food); (4) personal determinants (biological, genetics and psychological factors); (5) behavioral determinants (health behaviors and self care); (6) social and health service systems (health promotion and disease prevention, curative services and social services). Culture and gender influence all determinants and permeate the entire model.

In Belo Horizonte, diverse approaches have been used to measure social inequalities, such as the Gini Coefficient (Programa das Nações Unidas para o Desenvolvimento [PNUD] Brasil, 2013) or association measures based on the relationship between socioeconomic characteristics and health outcomes (Lima-Costa, 2004; Braga et al., 2010). However, these measures often rely on pairwise comparisons of extreme groups, and if the number of groups and/or time periods increases, there is no clear way to summarize and understand the social inequality trends (Harper & Lynch, 2005). To overcome these limitations, two summary measures were selected to assess social inequalities in Belo Horizonte: the slope index of inequality (SII) and the relative index of inequality (RII) (Mackenback & Kunst, 1997; Schneider et al., 2002). Thus, this study aims to evaluate trends (2003-2010) in social inequalities among the elderly living in Belo Horizonte, considering four selected domains of the Active Aging model and based on suitable absolute and relative measures of social-group inequalities.

## **4.2 Methods**

The data sources used in this study included two household health surveys conducted in Belo Horizonte in 2003 and 2010 (the 1<sup>st</sup> and 2<sup>nd</sup> *Inquéritos de Saúde da Região Metropolitana de Belo Horizonte*). Participants in each survey were randomly selected to represent the non-institutionalized adult population. All residents within the 7,500 households sampled, aged 20 years and older, were eligible for a face to face interview; 5,922 households in 2003 and 5,798 in 2010 participated in the survey. The response rates for both years were 79% and 77.3%, respectively. For this study, all the survey participants who lived in Belo Horizonte, aged 60 years and over

(n=1,149 in 2003 and n=1,475 in 2010, respectively), were selected. Greater detail on the survey methods may be found in other publications (Ferreira, César, Camargo, Lima-Costa, & Proietti, 2010; Lima-Costa, 2004; Lima-Costa, Turci, & Macinko, 2012). The first and second health surveys were approved by the Ethics Committee of *Instituto de Pesquisas René Rachou* of the *Fundação Oswaldo Cruz*, Belo Horizonte, Minas Gerais (Protocol numbers 14/2001 and 10/2009, respectively).

#### 4.2.1 Study variables

Socioeconomic status was measured by years of schooling. Formal schooling was categorized into three groups: <4 years, 4-7 years and 8+ years, reflecting the distribution of schooling among the population studied.

The selection of outcome variables was based on the Active Aging policy from the WHO (World Health Organization, 2002), with some **adaptations**, as described previously (Braga et al., 2010). These variables belong to three domains of Active Aging: physical environment (satisfaction with the neighborhood of residence and physical or attitudinal barriers that make it difficult to leave the house); social determinants (social support, trust in people and fear of assault); and use of health services (medical visits and hospitalization in previous 12 months and reporting complaint about the receipt of health care or obtaining prescribed medications). A fourth domain, which originally does not compound the WHO Active Aging policy, was also included in this study: health status (self-rated health and functional performance). Self-rated health is one of the most widely used measures in public health and social science research, because of its simplicity and strong predictive power for future mortality in different populations (Jylhä, 2009; Lima-Costa, Steptoe, et al., 2012). In turn, functional performance is a key measure of successful aging.

Satisfaction with the neighborhood of residence was based on 8 questions, with dichotomous responses, considering: sense of comfort in the neighborhood; satisfaction with how the neighborhood/block is cared for; esteem for the neighborhood and home; pride in the place of residence; availability of neighbors to help each other; respect for adults; quality of the neighborhood for raising children; and desire to move to another place. People who reported dissatisfaction on at least four questions were classified as unsatisfied). The attitudinal and physical barriers were based on binary questions and included: report of concern when leaving the house because of pedestrians' and/or drivers' impatience, fear of falling on sidewalks and/or difficulties in crossing the street. Social support was defined by reporting visits from adult children or relatives during the last month. Trust in people was measured by the question, "*Do you believe you can trust most people?*" and fear of assault was assessed by reporting concern with being robbed when leaving the house. Social support, trust in people, and fear of assault were coded as yes/no variables. Self-rated health was measured by the question, "*In general would you say your health is...*" with five response categories ranging from very good to very poor. In the current analysis it was categorized into two categories (very poor and poor versus fair, good and very good). Functional limitation was defined by reporting much difficulty or need of assistance to perform four or more of 15 activities of daily living (ADL) or instrumental activities of daily living (IADL), as previously described (Ferreira et al., 2010). The use of health services was defined as having three or more medical visits in the previous 12 months (the median number of visits in 2003) and by the occurrence of one or more hospitalizations in the same period. Those who reported any of the following difficulties (scheduling a medical visit due to long waiting lines, accessing the health center, inability to pay for needed care, problems finding a doctor when needed) were classified as having barriers to healthcare. Barriers to obtaining prescribed medications were defined as any of the following: financial problems, unavailability of the needed medications at the pharmacy/public health centers, and difficulty in getting to the pharmacy/public health center or finding someone to pick up needed medication.

#### *4.2.2 Statistical Analysis*

The initial data analysis was based on prevalence estimates and 95% confidence intervals (95% CI), adjusted for age and sex, using Poisson regression. Prevalence rates for all the participants as a whole and for each schooling level were estimated, and both analyses were stratified by year.

Social inequalities were measured by the slope index of inequality (SII) and the relative index of inequality (RII) (Mackenback & Kunst, 1997; Schneider et al., 2002). Both are summary measures, recommended when evaluating a population over time or making comparisons across different populations or subgroups. They are distinguished from other methods that evaluate social inequalities as they are sensitive to the changes in both the size of population subgroups involved in the analysis and the health conditions within each subgroup, over time (Mackenback & Kunst, 1997; Schneider et al., 2002). Social policies or programs might, for example, create educational opportunities, redistribute income, and/or affect the types of jobs that are available. These policies may affect the nature of social stratification by reducing the number of minimally educated individuals, and thus reduce the number of individuals exposed to that form of social disadvantage (Harper & Lynch, 2005). The absolute and relative indices of inequality are able to capture these changes. Furthermore, they take into account information from all individuals included in the analysis, without comparing only the two most extreme groups (for example, 8+ years of schooling versus <4 years) (Mackenback & Kunst, 1997; Schneider et al., 2002; Harper & Lynch, 2005).

To create the RII and SII, the sample was ordered by decreasing education, from 0 (highest level of education) to 1 (lowest level of education). A relative position score was assigned to individuals in each educational category, based on the midpoint of the cumulative distribution of the schooling variable. For example, the subgroup with 8+ years of schooling represented 41% of the population under analysis. Therefore, the score of the participants from this subgroup was 0.20 ( $0 + 0.41/2$  or  $\text{cumulative frequency} + \text{relative frequency}/2$ ). Furthermore, individuals whose schooling ranged from 4-7 years represented 34% of the sample and the score assigned to them was 0.58 ( $0.41 + 0.34/2$ ), and so on. Thus, individuals included in each educational category represent an extension of the populational cumulative distribution and the scores become weighted indices in which the weights are based on the size of each subgroup. A noteworthy aspect is that the use of year specific scores did not change the results.

Then the indices were estimated based on generalized linear models, including the relative position score as a covariate, replacing *schooling*. The models were adjusted by age, sex and year. The trends of the indices over time were assessed by including an interaction term between score and year:

$$Y = \beta_0 + \beta_1 \text{score} + \beta_2 \text{age} + \beta_3 \text{sex} + \beta_4 \text{year} + \beta_5 \text{year}(\text{score}) + \text{error} \quad (1)$$

The  $\beta_1$  coefficient of the regression models were the coefficients of interest, estimating the SII from the binomial distribution with identity link function and determining the RII when the model was adjusted from Poisson distribution. As the relative position score is a proportion and it ranges from 0 to 1, modifying it in one unit is equivalent to moving from the highest educational level group toward the lowest educational level group (Schneider et al., 2002). The 2003 coefficients were estimated from the above mentioned equation when the indicator variable year was 0. A post estimation command, combining score and the interaction term was used to estimate 2010 SII and RII. The 95% CIs were also estimated for both indices and the p-values for the differences of the estimates between 2003 and 2010 were obtained from the interaction term. P-values  $\leq 0.05$  were considered to be significant.

The absolute index (SII) can be interpreted as the absolute difference in the outcome over the whole range of the socioeconomic status (Mackenbach & Kunst, 1997), from the highest educational level group toward the lowest educational level group. In the absence of inequality, the index equals 0. When health outcomes and socioeconomic status are inversely related, the SII is negative (Schneider et al., 2002). The relative index (RII) can be interpreted as the ratio of those more disadvantaged compared to those with higher socioeconomic status (Mackenbach & Kunst, 1997). The index equals one when there is no inequality among groups. When its magnitude increases over time, there is evidence of increased relative inequalities across the socioeconomic gradient. All analyses took into account the effects of sample design, individual weights and aggregation by household using the routines for complex samples in the Stata statistical package, version 12 (StataCorp, 2011).

### 4.3 Results

Among the 1,159 and 1,479 eligible participants from the 2003 and 2010 surveys, 99.2% and 99.7%, respectively, provided complete information for all study variables and were included in the analysis. Among participants, most were female (59.1% in 2003 and 61.6% in 2010) and the average age was 70.1 (Standard error = 0.30) and 70.2 years (Standard error = 0.27), respectively. In 2003, 32.8% had less than 4 years of schooling, 31.9% between 4-7 years and 35.3% had 8 or more years. In 2010, the corresponding proportions were 20.0%, 35.2% and 44.7%, respectively.

Table 1 presents indicators of the physical environment, social determinants, health status, and use of health services in 2003 and 2010. For all participants, statistically significant decreases ( $p < 0.05$ ) were observed in dissatisfaction with the neighborhood of residence (-7%), concern with leaving the house because of pedestrians' and/or drivers' impatience (-7.1%), mistrust in most people (-17.5%) and fear of being robbed when leaving the house (-21.4%). Between 2003 and 2010, no statistically significant differences were observed in self-rated health, functional limitation and reporting complaint about the receipt of health care. During this period, the rate of having three or more medical visits in the previous 12 months increased (10.2%) and there were reductions in both the occurrence of one or more hospitalizations (-4.7%) and barriers to obtaining prescribed medications (-20.6%).

Table 2 presents the results for physical environment and social determinants indicators, in 2003 and 2010, by level of schooling. In 2003, all indicators of physical environment showed statistically significant associations with schooling levels, with the worst performance among those elderly with the least schooling. In 2010, these differences persisted for the variables: concern with leaving the house because of pedestrians' and/or drivers' impatience, fear of falling on sidewalks and/or difficulties in crossing the street, and fear of being robbed when leaving the house.

The prevalence rates for health status and use of health services, by schooling in 2003 and 2010 are shown in Table 3. In 2003, statistically significant differences associated with schooling level were observed in self-rated health, number of medical visits and reporting complaint about the receipt of health care or barriers to obtaining prescribed medications. In 2010, these differences

were observed again, except for having three or more medical visits in the previous 12 months. Functional limitation presented significant variation according to schooling levels in 2010, but not in 2003.

Figure 1 presents the slope indices of inequality for physical environment, social determinants, health status and use of health services. With few exceptions, the magnitudes of the inequalities remained unchanged between 2003 and 2010. Reduction in absolute social inequality was found for fear of falling on sidewalks and/or difficulties in crossing the street when leaving the house (SII = 0.30 in 2003 and 0.11 in 2010). However, the absolute social inequality for fear of being robbed increased (SII = -0.02 in 2003 and -0.25 in 2010). The relative indices of inequality are shown in Figure 2. The magnitude of social inequalities persisted for most outcome variables, except for fear of being robbed (RII = 0.95 in 2003 and 0.66 in 2010). Whereas that RII equals 1 in the absence of inequality, values closer to 1 represent lower inequality in comparison with values closer to 0. Thus, from 2003 to 2010, the social inequality increased for fear of being robbed. In addition, the RII under 1 indicates that higher fear was observed among those with the highest educational level.

#### **4.4 Discussion**

Our results show significant improvements in the physical environment (reduction of both dissatisfaction with neighborhood of residence and concern when leaving the house because of pedestrians' and/or drivers' impatience), in the social determinants (increased trust in people and diminished fear of being robbed) and for some indicators of use of health services (increase in the number of medical visits and decrease in both the hospitalizations and report of barriers to obtaining prescribed medications). On the other hand, there was persistence of inequalities between 2003 and 2010, in most of the analyzed indicators (dissatisfaction with neighborhood, concern with pedestrians/drivers, no visit from children/relatives, mistrust in most people and all health status and use of health services variables). Reduction in social inequalities was observed only for fear of falling/crossing the street, and there was increase in social inequalities for fear of being robbed, with higher fear among those with the highest educational level.



With regard to physical environment, despite the improvements on dissatisfaction with the neighborhood of residence and concern with pedestrians' and/or drivers' impatience among community-dwelling elderly, social inequalities associated with these indicators showed no statistically significant changes between 2003 and 2010. However, there was a decrease in absolute social inequality associated with fear of falling on sidewalks and/or difficulties in crossing the street. This is an important finding given that a previous study showed that this indicator was the strongest factor associated with the number of functional limitations in the study area (Ferreira et al., 2010).

Whereas social determinants, the prevalence of mistrust in most people presented a significant reduction in the study population, but there was no significant association with educational level in both 2003 and 2010. An intriguing result was the change regarding fear of being robbed and schooling level over time. In 2003, there was no association between this indicator and schooling level. However, in 2010, a significant association was observed and social inequality increased in absolute and relative terms, with higher fear among those with the highest educational level. The literature shows that associations between fear of crime and official estimates of the incidence or objective risk of victimization are weak (Caminhas, 2010; Stafford, Chandola, & Marmot, 2007; Hayman, 2011). Thus, individual factors associated with changes in the fear of crime may be related to variations in subjective risk perception, in consumption of news related to violence or trust in both people and government institutions related to safety and justice (Caminhas, 2010; Hayman, 2011). In addition, contextual factors such as vandalism signs, garbage accumulation, abandoned houses, and the presence of drug users may also have contributed to the above mentioned changes (Caminhas, 2010; Stafford, Chandola, & Marmot, 2007).

This study included two important indicators of health: self-rated health and functional limitation. Previous studies have shown that both measures are associated with older Brazilians' socioeconomic status, with worse performance among those with lower educational and income levels (Lima-Costa, Oliveira, Macinko & Marmot et al., 2012). The magnitude of social inequalities associated with self-rated health and functional limitation in Brazilians did not change from 1998 to 2008 (Lima-Costa, Facchini, et al., 2012). Our results showed that between 2003 and

2010, social inequalities in Belo Horizonte associated with both indicators presented similar trends than those observed at the national level.

The Brazilian national health system (the *Sistema Único de Saúde* or SUS) was created in 1988 to provide comprehensive and universal care, through decentralized management and provision of health services free of charge at the point of delivery (Macinko & Lima-Costa, 2012; Paim et al., 2011). In addition, about 30% of Brazilian citizens have private health plans that allow them to access the private health sector (Macinko & Lima-Costa, 2012). A study based on representative sample of Brazilian adults showed that, between 1998 and 2008, the population access to medical visits increased and there was a reduction in hospitalizations (Lima-Costa, Matos, Camargos, & Macinko, 2011). In the same period, inequalities related to medical visits decreased by around 80%, although a slight pro-rich trend was still observed. Income, geographic region of residence and being a user of private health insurance system were the main contributing factors for this disparity persistence (Macinko & Lima-Costa, 2012). Among the Brazilian elderly, disparities by income decreased for obtaining medical care (Lima-Costa, Facchini, et al., 2012). Our results are partially in line with these observations. Between 2003 and 2010, the elderly living in Belo Horizonte had more medical visits and less hospitalizations, but social inequalities did not change.

A major finding of the current study (and to our knowledge not previously described in other Brazilian populations) was the striking reduction in the prevalence of barriers to obtain prescribed medications. It is likely that two pharmaceutical assistance policies launched by the Federal Government have contributed to this scenario. The *Política de Medicamentos Genéricos* (Generic Medications Policy) (Brasil, 1999) released in 1999, increased the availability of medications at lower prices. Five years later, the *Programa Farmácia Popular* (BPF - Brazilian Popular Pharmacy Program), expanded the access to medications for users of private health services with financial problems in purchasing them (Brasil, 2013). The BPF has its own public network of pharmacies and partnerships with private pharmacies and drugstores, which ensures its supply chain. In Belo Horizonte there are 4 public BPF pharmacies and over 550 private accredited units, comprising all city regions. The medications are offered free of charge or through copayment and are related to prevalent diseases in the population. Accredited pharmacies offer antihypertensive, antidiabetic and antiasthmatic medications at no cost; and, through copayment, users can purchase

drugs for the treatment of glaucoma, dyslipidemia and osteoporosis, among others (Brasil, 2013). Although the SUS is responsible for the provision of medications free of charge to the population, private pharmacies and drugstores accredited by the BPF have higher availability of medicines in comparison with the public sector (Santos-Pinto, Miranda, Emmerick, Costa, & Castro, 2010). Thus, even though the BPF has not changed the duties of the government regarding the provision of medications, it is likely that a large number of elderly who use the SUS as their only source of care, also access the Popular Pharmacy seeking greater availability of products and more affordable prices. However, despite the striking findings related to obtaining of prescribed medications, no change in social inequalities was observed during the study period.

Among the advantages of this study, we can highlight the methods employed to assess social inequalities, based on absolute and relative measures, analyzed in a complementary manner, each one reflecting different perspectives. Relative indicators of inequality analyze the progress of one group with respect to another, while absolute indicators are commonly used in public health to evaluate the charge of diseases and injuries in the population (Harper & Lynch, 2005). Moreover, the indices are also distinguished from other methods for incorporating information related to changes in both the size of the subgroups and in the health status within each subgroup, over time. They also take into account information from the entire sample rather than only comparing the two most extreme groups.

This study presents four main limitations. First, it has a cross-sectional design which prevents the building of temporal relationships among the analyzed variables. However, it does allow the analysis of trends by comparing two different years separated by a seven-year interval. Second, all variables are based on self-reports. Nevertheless, as the questions were developed in the same way for both surveys, the comparability is preserved. The third limitation is related to the choice of education as the unique source of information on the socioeconomic status. Other measures, such as income or wealth, could provide additional information. Fourth, only three domains of the Active Aging policy were included in this analysis. However, the WHO model is not an empirical approach, and there is no consensus on which domains truly represent it or which variables better represent each domain. According to our knowledge, only one study has tested the model empirically, and the authors did not confirm it (Paúl, Ribeiro, & Teixeira, 2012). Besides, many

authors have been publishing studies that include only specific domains of the model (Fernández-Ballesteros, Robine, Walker, & Kalache, 2013; Sidorenko, & Zaidi, 2013; The Australian Government Department of Health and Ageing, 2006).

The results of this study show the persistence of social inequalities among the elderly living in Belo Horizonte, through 10 out of 12 selected active aging and health status indicators. This persistence might be assigned to the continuity of unequal distribution of resources (knowledge, wealth, prestige, and social connections) among groups with different socioeconomic status. Our results demonstrate how difficult is reduction of social inequalities for elderly population living in a large city of a developing country.

## References

Braga, L.S., Macinko, J., Proietti, F.A., César, C.C., & Lima-Costa, M.F. (2010). Intra-urban differences in vulnerability among the elderly population. *Cad.Saúde Pública*, 26(12), 2307-2315.

Brasil. Lei nº 9.787. (1999). Altera a Lei nº 6.360, de 23 de setembro de 1976, que dispõe sobre a vigilância sanitária, estabelece o medicamento genérico, dispõe sobre a utilização de nomes genéricos em produtos farmacêuticos e dá outras providências. *Diário Oficial da União*, 10fev.

Brasil, Ministério da Saúde. (2013). *Programa Farmácia Popular do Brasil*. Retrieved from [http://portal.saude.gov.br/portal/saude/area.cfm?id\\_area=1095](http://portal.saude.gov.br/portal/saude/area.cfm?id_area=1095)

Caminhas DA.(2010). Medo do crime: uma análise exploratória sobre suas causas em Minas Gerais - 2009.104f. Dissertação (Mestrado em Sociologia). Faculdade de Filosofia e Ciências Humanas, Universidade Federal de Minas Gerais, Belo Horizonte.

Fernández-Ballesteros, R., Robine, J.M., Walker, A., & Kalache, A. (2013). Active Aging: a Global Goal. *Current Gerontology and Geriatrics Research*, 2013, 1-4.

Ferreira, F.R., César, C.C., Camargo, V.P., Lima-Costa, M.F.F., & Proietti, F.A. (2010). Aging and urbanization: the neighborhood perception and functional performance of elderly persons in Belo Horizonte Metropolitan Area - Brazil. *J Urban Health*, 87 (1), 54-66.

Harper S., & Lynch J. (2005). Methods for measuring cancer disparities: using data relevant to Healthy People 2010 cancer-related objectives. *NCI Cancer Surveillance Monograph Series*, 6. Bethesda, MD: National Cancer Institute.

Hayman, S. (2011). Older people in Canada: their victimization and fear of crime. *Canadian Journal on Aging*, 30(3), 423-436.

Instituto Brasileiro de Geografia e Estatística. (2010). *Censo 2010*. Retrieved from <http://www.ibge.gov.br/home/estatistica/populacao/censo2010/default.shtm>

Instituto Brasileiro de Geografia e Estatística. (2012). Síntese de indicadores sociais: uma análise das condições de vida da população brasileira. *Estudos e Pesquisas, Informação Demográfica e Socioeconômica*, 29.

Jylhä, M. (2009). What is self-rated health and why does it predict mortality? Towards a unified conceptual model. *Social Science & Medicine*, 69(3), 307-16.

Lima-Costa, M.F. (2004). A saúde dos adultos na Região Metropolitana de Belo Horizonte: um estudo epidemiológico de base populacional. Belo Horizonte: Núcleo de Estudos em Saúde Pública e Envelhecimento.

Lima-Costa, M.F.F., Facchini, L.A., Matos, D.L., & Macinko, J. (2012). Changes in ten years of social inequalities in health among elderly Brazilians (1998-2008). *Rev Saúde Pública*, 46, 100-107.

Lima-Costa, M.F., Matos, D.L., Camargos, V.P., & Macinko, J. (2011). 10-year trends in the health of Brazilian elderly: evidence from the National Household Sample Survey (PNAD 1998, 2003, 2008). *Ciência & Saúde Coletiva*, 16(9), 3689-3696.

Lima-Costa, M.F., Oliveira, C., Macinko, J., & Marmot, M. (2012). Socioeconomic Inequalities in Health in Older Adults in Brazil and England. *American Journal of Public Health*, 102 (8), 1535-41.

Lima-Costa, M.F., Steptoe, A., César, C.C., Oliveira, C., Proietti, F.A., & Marmot, M. (2012). The influence of socioeconomic status on the predictive power of self-rated health for 6-year mortality in English and Brazilian older adults: the ELSA and Bambui cohort studies. *Annals of Epidemiology*, 22, 644-48.

Lima-Costa, M.F., Turci, M., & Macinko, J. (2012). Saúde dos adultos em Belo Horizonte. Núcleo de Estudos em Saúde Pública e Envelhecimento da Fundação Oswaldo Cruz e Universidade Federal de Minas Gerais

Macinko, J., & Lima-Costa, M.F. (2012). Horizontal equity in health care utilization in Brazil, 1998-2008. *International Journal for Equity in Health*, 11 (33), 1-8.

Mackenbach, J.P., & Kunst, A.E. (1997). Measuring the magnitude of socio-economic inequalities in health: an overview of available measures illustrated with two examples from Europe. *Soc. Sci. Med*, 44(6), 757-771.

National Institute on Aging, & World Health Organization. (2011). *Global health and aging*. Washington DC: National Institutes of Health. NIH Publication no. 11-7737.

Paim, J., Travassos, C., Almeida, C., Bahia, L., & Macinko, J. (2011). The Brazilian health system: history, advances, and challenges. *Lancet*, 377(9779), 1778-1797.

Paúl, C., Ribeiro, O., & Teixeira, L. Active Aging: an empirical approach to the WHO Model. (2012). *Current Gerontology and Geriatrics Research*, 2012, 1-10.

Programa das Nações Unidas para o Desenvolvimento Brasil. (2013). Ranking IDHM Municípios 2010. *Atlas do Desenvolvimento Humano do Brasil 2013*. Retrieved from [http://www.pnud.org.br/IDH/Atlas2013.aspx?indiceAccordion=1&li=li\\_Atlas2013](http://www.pnud.org.br/IDH/Atlas2013.aspx?indiceAccordion=1&li=li_Atlas2013)

Santos-Pinto, C.D.B., Costa, N.R., & Castro, C.G.S.O. (2011). The “Farmácia Popular do Brasil” Program and aspects of public provision of medicines in Brazil. *Ciência & Saúde Coletiva*, 16 (6), 2963-2973.

Santos-Pinto, C.D.B., Miranda, E.S., Emmerick, I.C.M., Costa, N.R., & Castro, C.G.S.O. (2010). Medicine prices and availability in the Brazilian Popular Pharmacy Program. *Rev Saúde Pública*, 44 (4), 611-619.

Schneider, M.C., Castillo-Salgado, C., Bacallao, J., Loyola E., Mujica, O.J., Vidaurre, M., & Roca, A. (2002). Métodos de medición de las desigualdades de salud. *Rev Panam Salud Publica*, 12(6), 398-415.

Sidorenko, A., & Zaidi, A. (2013). Active Ageing in CIS Countries: Semantics, Challenges, and Responses. *Current Gerontology and Geriatrics Research*, 2013, 1-17.

Stafford, M., Chandola, T., & Marmot, M. (2007). Association between fear of crime and mental health and physical functioning. *American Journal of Public Health*, 97 (11), 2076-2081.

StataCorp: Stata user`s guide. Release 12. (2011). College Station, TX: Stata Corporation.  
The Australian Government Department of Health and Ageing, Healthpact Research Centre for Health Promotion and Wellbeing (2006). A Review of the Literature on Active Ageing. Canberra, Australia.

The World Bank. (2011). *World Development Indicators*. Retrieved from <http://data.worldbank.org/country/brazil#>

United Nations Department of Economic and Social Affairs. (2010). *World population prospects, the 2010 revision*. Retrieved from: <http://esa.un.org/unpd/wpp/index.htm>

United Nations Department of Economic and Social Affairs. (2011). *World urbanization prospects, the 2011 revision*. Retrieved from <http://esa.un.org/unpd/wup/index.htm>

World Health Organization. (2002). *Active ageing: a policy framework*. Retrieved from [http://www.who.int/ageing/publications/active\\_ageing/en/index.htm](http://www.who.int/ageing/publications/active_ageing/en/index.htm)



**Table 1.** Indicators of physical environment, social determinants, health status and use of health services among elderly (Belo Horizonte, 2003 and 2010). 39

	Year		Difference
	2003 % (95% CI)	2010 % (95% CI)	
<b>Physical environment</b>			
Dissatisfaction with the neighborhood of residence	11.2 (8.6-13.8)	4.2 (2.7-5.7)	-7.0 ***
Concern with leaving the house because of pedestrians' and/or drivers' impatience	32.8 (28.5-37.0)	25.7 (22.0-29.4)	-7.1*
Fear of falling on sidewalks and/or difficulties in crossing the street	47.5 (43.1-52.0)	43.0 (38.5-47.4)	-4.5
<b>Social environment</b>			
No visit from children or relatives in the last month	17.1 (14.1-20.2)	14.2 (11.6-16.8)	-2.9
Mistrust in most people	53.8 (48.9-58.7)	36.3 (31.9-40.8)	-17.5***
Fear of being robbed when leaving the house	80.6 (77.5-83.6)	59.2 (54.9-63.4)	-21.4***
<b>Health status</b>			
Poor/very poor self-rated health	11.2 (8.9-13.4)	8.6 (6.5-10.6)	-2.6
Functional limitation	12.0 (9.4-14.7)	9.1 (7.2-11.1)	-2.9
<b>Use of health services</b>			
≥ 3 medical visits in the previous 12 months <sup>1</sup>	55.8 (51.8-59.8)	66.0 (62.6-69.3)	10.2*
≥ 1 hospitalizations in the previous 12 months	13.7 (11.3-16.0)	9.0 (7.0-11.0)	-4.7*
Reporting complaint about the receipt of health care	43.9 (39.6-48.3)	47.6 (44.0-51.2)	3.7
Reporting barriers to obtaining prescribed medications	41.4 (36.4-46.4)	20.8 (17.4-24.3)	-20.6***
TOTAL (n) <sup>2</sup>	1,149	1,475	

Note. %(95% CI): prevalence rates adjusted for age and sex. \*p<0.05; \*\*\*p<0.001: p-values for the differences between 2003 and 2010. <sup>1</sup>It corresponds to the median number of medical visits in 2003. <sup>2</sup>Participants number does not take into account the individual weight and other sample parameters.

**Table 2.** Indicators of physical environment and social determinants among elderly, by years of schooling (Belo Horizonte, 2003 and 2010).

	Years of schooling			p-value
	8+	4-7	<4	
	% (95% CI)			
<b>Physical environment</b>				
Dissatisfaction with the neighborhood of residence				
2003	7.7 (4.6-10.9)	12.5 (8.1-16.9)	13.7 (9.7-17.7)	0.040
2010	4.3 (1.8-6.8)	2.9 (1.3-4.4)	6.6 (2.6-10.5)	0.103
Concern with leaving the house because of pedestrians' and/or drivers' impatience				
2003	24.5 (18.7-30.3)	31.5 (25.4-37.6)	42.5 (35.9-49.1)	< 0.001
2010	23.5 (17.9-29.1)	23.8 (18.5-29.1)	34.2 (27.0-41.3)	0.010
Fear of falling on sidewalks and/or difficulties in crossing the street				
2003	36.9 (30.0-43.7)	49.5 (43.5-55.5)	56.2 (49.8-62.7)	< 0.001
2010	41.4 (35.5-47.4)	40.5 (33.9-47.1)	51.0 (43.9-58.0)	0.025

*(continued)*

**Table 2. (continued)**

	Years of schooling			p-value
	8+	4-7	<4	
	% (95% CI)			
<b>Social determinants</b>				
No visit from children or relatives in the last month				
2003	14.2 (9.5-18.9)	16.7 (11.9-21.4)	20.5 (15.7-25.4)	0.122
2010	14.4 (11.1-17.6)	11.4 (6.8-16.0)	18.7 (12.6-24.8)	0.136
Mistrust in most people				
2003	51.6 (43.9-59.3)	52.5 (44.7-60.2)	57.4 (51.1-63.8)	0.350
2010	40.3 (34.7-46.0)	32.0 (25.7-38.2)	34.8 (27.3-42.3)	0.098
Fear of being robbed when leaving the house				
2003	81.6 (76.9-86.4)	79.3 (73.8-84.9)	80.6 (75.7-85.5)	0.824
2010	67.3 (61.4-73.1)	53.4 (47.0-59.9)	51.3 (44.7-57.9)	< 0.001
TOTAL <sup>1</sup>	1,011	897	716	

*Note.* %(95% CI): prevalence estimates adjusted for age and sex.<sup>1</sup>Participants number does not take into account the individual weight and other sample parameters.

**Table 3.** Indicators of health status and use of health services among elderly, by years of schooling (Belo Horizonte, 2003 and 2010).

	Years of schooling			p-value
	8+	4-7	<4	
	% (95% CI)			
<b>Health status</b>				
Poor/very poor self-rated health				
2003	6.0 (3.4-8.6)	11.9 (8.0-15.9)	15.9 (11.8-20.0)	< 0.001
2010	4.7 (2.7-6.7)	9.7 (6.2-13.1)	15.7 (11.0-20.4)	< 0.001
Functional limitation				
2003	9.7 (6.0-13.4)	12.2 (8.3-16.1)	14.4 (10.2-18.6)	0.216
2010	6.6 (4.5-8.7)	10.9 (8.0-13.8)	11.5 (7.7-15.3)	0.015
<b>Use of health services</b>				
≥ 3 medical visits in the previous 12 months <sup>1</sup>				
2003	48.4 (42.4-54.5)	59.1 (52.7-65.6)	59.9 (54.5-65.4)	0.014
2010	64.1 (59.3-68.9)	68.0 (62.9-73.1)	66.5 (59.9-73.1)	0.524
≥ 1 hospitalizations in the previous 12 months				
2003	10.5 (7.1-14.0)	16.3 (12.1-20.6)	14.5 (10.5-18.4)	0.079
2010	7.1 (4.8-9.4)	10.6 (7.5-13.7)	10.3 (6.1-14.4)	0.111

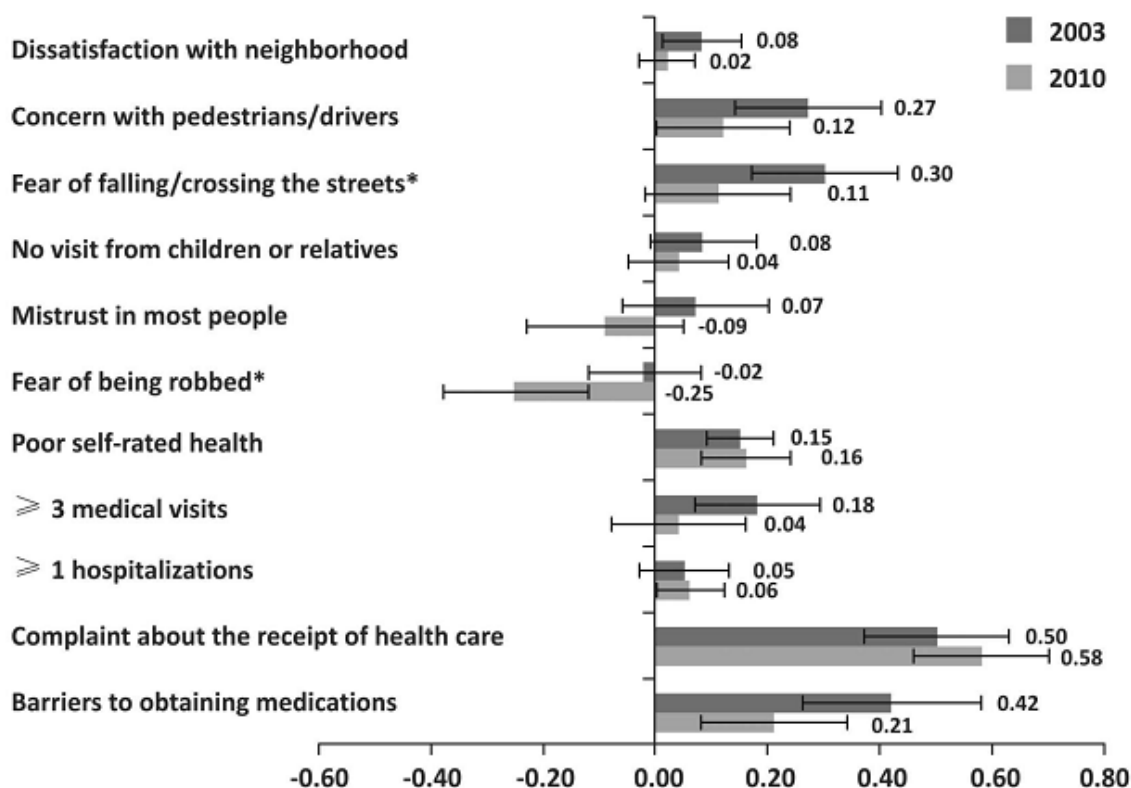
*(continued)*

**Table 3. (continued)**

	Years of schooling			p-value
	8+	4-7	<4	
	% (95% CI)			
Reporting complaint about the receipt of health care				
2003	25.3 (19.1-31.5)	49.0 (41.7-56.2)	58.1 (52.2-64.0)	< 0.001
2010	32.0 (27.3-36.8)	54.4 (48.4-60.3)	71.1 (63.8-78.5)	< 0.001
Reporting barriers to obtaining prescribed medications				
2003	24.2 (16.8-31.5)	46.2 (39.1-53.3)	51.9 (44.3-59.4)	< 0.001
2010	15.6 (10.4-20.9)	21.1 (16.4-25.8)	32.3 (24.3-40.4)	0.001
TOTAL <sup>2</sup>	1,011	897	716	

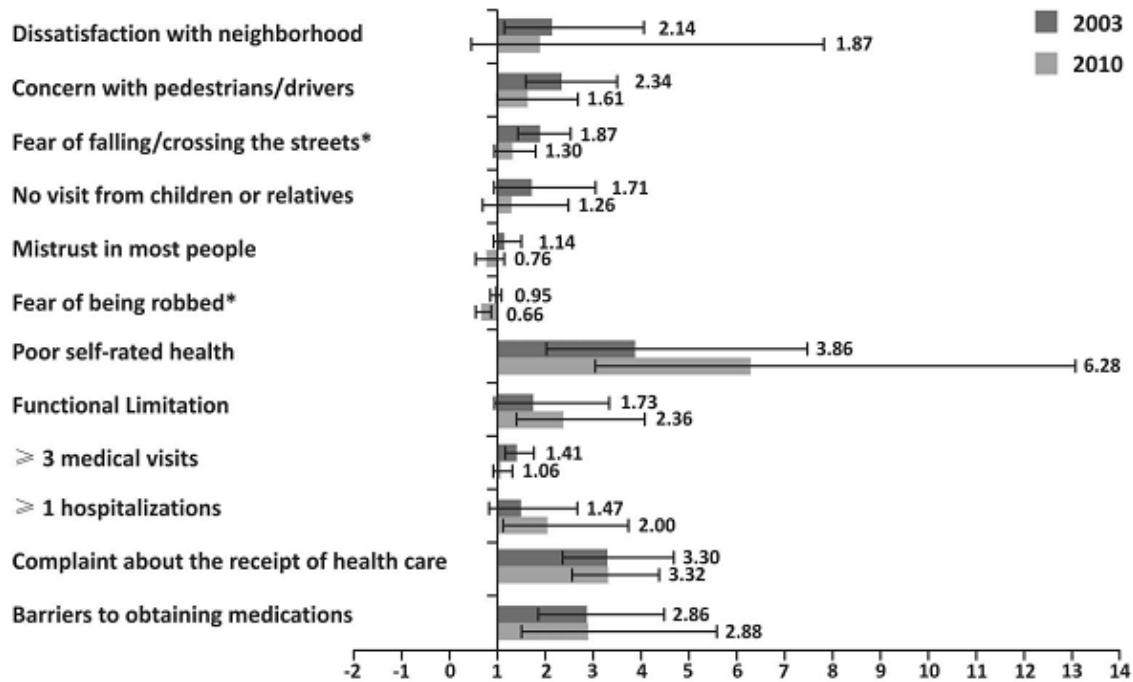
*Note.* % (95% CI): prevalence estimates adjusted for age and sex. <sup>1</sup>It corresponds to the median number of medical visits in 2003. <sup>2</sup>Participants number does not take into account the individual weight and other sample parameters.

**Figure 1.** Slope Index of Inequality (SII) among elderly (Belo Horizonte, 2003 and 2010).



*Note.* \* $p < 0.05$ : statistically significant difference between 2003 and 2010. Functional limitation was excluded because the analysis did not converge. The absolute index is the absolute difference in the outcome over the whole range of the socioeconomic status, from the highest educational level group toward the lowest educational level group. In the absence of absolute inequality, the index equals 0. When health outcome and socioeconomic status are inversely related, the SII is negative.

**Figure 2.** Relative Index of Inequality (RII) among elderly (Belo Horizonte, 2003 and 2010).



*Note.* \* $p < 0.05$ : statistically significant difference between 2003 and 2010. The relative index can be interpreted as the ratio of those more disadvantaged compared to those with higher socioeconomic status. In the absence of relative inequality the index equals 1. When its magnitude increases over time, there is evidence of increased relative inequalities across the socioeconomic gradient.





**Social Determinants of Health: Inequalities in Older Adults Living in Belo Horizonte,  
Brazil and New York City, U.S. (2010)**

**Luciana de Souza Braga, MPH<sup>1</sup>, Maria Fernanda Lima-Costa, MD, PhD<sup>1,2</sup>, and James  
Macinko, PhD<sup>3</sup>**

<sup>1</sup> Programa de Pós-graduação em Saúde Pública, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil.

<sup>2</sup> Centro de Pesquisas René Rachou, Fundação Oswaldo Cruz, Belo Horizonte, Minas Gerais, Brazil.

<sup>3</sup> Departments of Health Policy and Management and Community Health Sciences, University of California, Los Angeles, USA.

**Corresponding author:**

Luciana de Souza Braga, MPH, Programa de Pós-graduação em Saúde Pública, Universidade Federal de Minas Gerais.

Address: Núcleo de Estudos em Saúde Pública e Envelhecimento, Centro de Pesquisas René Rachou da Fundação Oswaldo Cruz, Avenida Augusto de Lima, 1715, CEP 30190-002, Belo Horizonte, Minas Gerais, Brazil.

Phone number: +55(31)3349-7733/7741

Email: lusouzabraga@yahoo.com.br

**Funding:**

The 2nd Inquérito de Saúde da Região Metropolitana de Belo Horizonte was supported by the Ministry of Health, Brazil. LSB received a research grant from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES, Brazil).

## **Abstract**

**Objective:** To evaluate social inequalities in intermediary determinants of health and health status indicators, among older adults living in Belo Horizonte, Brazil (n=2,740) and New York City, United States (n=4,669), under the perspective of public policies and services implemented in both cities. **Methods:** Data came from the Belo Horizonte Metropolitan Region Health Survey and the New York City Community Health Survey (CHS), both conducted in 2010. Social inequality was measured through the slope and the relative index of inequality. Educational level was used to define socioeconomic status. **Results:** New York presented better performance in total prevalence for material circumstances and behavioral factors, whereas Belo Horizonte presented better performance for health system and health status indicators. The cities also presented distinctive patterns of absolute and relative inequalities. For behavioral factors, health system and health status indicators, the city with the best prevalence rates also showed higher absolute and/or relative inequalities. **Discussion:** Although many public policies likely have improved the global performance of the indicators over time, it seems that the unequal distribution of resources is still persistent.

**Keywords:** social inequalities, determinants of health, urban health.

## 5.1 Introduction

The urban context plays an important role in citizens' health and in the persistence of inequalities, through a complex set of physical, social, and policy characteristics. Cities can shape and modify individual health outcomes and gaps among social groups, implementing programs and policies that define how their approach to dealing with the social determinants of health, especially among vulnerable populations like the elderly.

Brazil has experienced large and rapid changes in life expectancy over the past few decades. Despite relatively recent national measures designed to ease the economic burdens of the elderly, inequalities persist in many health outcomes, raising questions about how well Brazil's cities have adapted to meet the challenge of providing healthy environments for its growing elderly populations.

In the United States (U.S.), there have been national policies to protect the income and health of the elderly since the late 1960s. But in spite of having a longer period to adapt to the changing demographics of their populations, cities have developed very different approaches to provide for their elderly populations.

This paper examines health inequalities in the social determinants of health and health status indicators, among older adults living in Belo Horizonte (BH), Brazil and New York City (NYC), U.S. Although they exist in very different national contexts, both BH and NYC have presented persistent inequalities over the years, despite overall improvements in many health indicators<sup>1-5</sup>.

BH is one of the largest cities in Brazil, with about 2.4 million inhabitants. According to the 2010 Census, 12.6% of its population was 60 years and older<sup>6</sup>. From 2003 to 2010, BH presented significant improvements in many active aging indicators, such as measures of social and physical environment, and use of health services. However, social inequalities by educational attainment persisted for many conditions raising the question of how much a city should expect to be able to influence these complex conditions<sup>1</sup>.

NYC is one of the largest cities in the U.S. with over 8 million inhabitants. It is also one of the most unequal cities in the U.S.<sup>7</sup> and according to the 2010 Census, 17.2% of its population aged 60 years and older<sup>5</sup>. Recent reports show considerable health inequalities in life expectancy, death rates, and breast, colorectal and cervical cancers<sup>3,4</sup>. In particular, differences by race and ethnicity persist and are compounded by differences in other socioeconomic indicators. For example, blacks and whites in the poorest neighborhoods have died at higher rates (965 and 771 deaths/100,000 inhabitants, respectively) than their counterparts living in the wealthiest neighborhoods (644 and 552 deaths/100,000 inhabitants, respectively).

Based on these observations, this study aims to evaluate how the socioeconomic position of older adults living in BH and NYC affects inequalities in intermediary determinants of health and health status indicators, comparing the cities from the perspective of public policies and services implemented in both.

## **5.2 Methods**

The data sources for this study were two cross-sectional surveys conducted in 2010: the Belo Horizonte Metropolitan Region Health Survey (in Portuguese, *Inquérito de Saúde da Região Metropolitana de Belo Horizonte*) and the New York City Community Health Survey (CHS). For both surveys, participants were randomly selected to represent the non-institutionalized adult population. All data rely on self-report.

The Belo Horizonte Health Survey was conducted in 2010, by the *Fundação Oswaldo Cruz*, a public foundation. It included 7,778 participants from 5,798 households, surveyed through a two-stage cluster sampling method. All residents aged 20 years and older were eligible for a face to face interview. Cooperation rate was about 77% and additional details may be found in another publication<sup>8</sup>. For this study, all selected participants were 50 years of age or older, lived in Belo Horizonte, and had complete records of educational attainment (n=2,740).

The CHS is a telephone survey conducted annually by the NYC Department of Health and Mental Hygiene. In 2010, it included 8,665 individuals aged 18 years and older. Data was collected through

a computer-assisted telephone interviewing system in a variety of languages, for just one adult from each household. The cooperation rate was about 86% and detailed information on CHS methods is available elsewhere<sup>9</sup>. All selected participants were 50 years of age or older and had complete records of educational attainment (n=4,669).

### **5.2.1 Conceptual Framework**

Persistent health inequalities reveal unfair gaps among social groups, based on characteristics such as income level, educational attainment, sex, or race/ethnicity. When socially produced health differences are systematic and unfair, they create health inequities<sup>10</sup>.

Considering both health inequalities and inequities, the World Health Organization (WHO) developed a conceptual framework for action on the social determinants of health<sup>10</sup>. Based on this framework, structural determinants of health operate through a set of intermediary determinants to shape health outcomes. Structural determinants are factors that cannot be measured at the individual level, such as governance, macroeconomic policy, social and other public policies, and cultural and societal values placed on health. They also include factors that define individual socioeconomic position, such as income, education, occupation, social class, gender, and ethnicity. In turn, intermediary determinants comprise material and psychosocial circumstances, behavioral and biological factors, and the health system. The unequal distribution of these intermediary factors constitutes the primary mechanism through which socioeconomic position affects health and well-being.

Socioeconomic position was measured by educational attainment and categorized into three groups: high, intermediate, and low schooling level, based on each country's system of formal education and the different distributions of each category in each country. In BH, the respective cutoff points were 11+ years of schooling (high school completed or more), 8-10 years (middle school), and  $\leq 7$  years (middle school incompleting). In New York the categories were 16+ years (college completed), 13-15 years (some college), and  $\leq 12$  years of schooling (high school or less).

Outcome variables included intermediary determinants of the WHO's Social Determinants of Health framework<sup>10</sup> and health status indicators. Intermediary determinants were divided into 4

categories: (1) psychosocial circumstances (marital status and presence of household residents); (2) material circumstances (employment and neighborhood safety); (3) behavioral factors (smoking and drinking status, consumption of fruits and vegetables, and physical activity); and (4) health system (preventive care indicators). Health status was measured through self-rated health and medical diagnosis of hypertension, diabetes, and depression. Detailed analysis of response distributions and comparisons with the published literature were used to define variables so as to preserve conceptual clarity and ensure comparability between the surveys.

All intermediary determinants and health status indicators were coded as binary (yes/no) variables. Absence of partner included participants who reported being single, divorced, separated or widowed. Individuals whose total household resident number was one were classified as living alone. Unemployment/out of labor force included participants who described themselves as unemployed, homemaker, student, retired, unable to work or whose income did not come from job. Lack of perceived neighborhood safety in BH was assigned to those who reported fear of robbery when leaving the house and, in NY, to those who classified their neighborhoods as slightly safe or not at all safe, based on the question “*How safe from crime do you consider your neighborhood to be?*”. Current smoking was defined as having smoked at least 100 cigarettes during lifetime and still smoking. Binge drinking was assigned to people who reported intake of 5 or more drinks on one occasion during the past 30 days. Non-daily consumption of fruits and/or vegetables was assigned to those who reported not eating any servings of fruits and/or vegetables daily. Physical inactivity was defined as no leisure time exercise or any other physical activity during the last 30 days. Lack of mammogram screening group included women aged 50-69 in BH<sup>11</sup>, and 50-74 in NYC<sup>12</sup>, who reported no such exam in the past 2 years. Influenza vaccination was defined as no flu shot in the previous year. Self-rated health was measured by the question, “*In general would you say your health is...*” and the exposure category included individuals who reported poor or very poor health. Both surveys asked participants whether a doctor or health professional had ever told them they had any of a list of chronic diseases. For this study, data on hypertension, diabetes, and depression were selected.

Sex, age, and health insurance coverage were included as adjustment variables. Health insurance coverage included those covered by a private health plan in BH, and those covered by private or

prepaid insurance plans in NYC. In both cities, the reference group is public coverage (national health service for BH and Medicare/Medicaid and military health care programs for NYC).

### **5.2.2 Statistical Analysis**

The initial data analysis was based on Poisson regression to estimate total and by educational attainment prevalence, for each city. For total prevalence, differences between BH and NYC were obtained and p-values  $\leq 0.05$  were considered significant. Intracity differences were investigated by educational attainment prevalence and reported as significant if p-values  $\leq 0.05$  (included as supplementary material). All estimates were age and sex-adjusted and present robust 95% confidence intervals (95% CI). Behavioral factors, health system, and health status indicators were also health insurance-adjusted, whereas the cities have different health system models<sup>13,14</sup>.

The slope index of inequality (SII) and the relative index of inequality (RII) were used to evaluate health inequalities<sup>15,16</sup>. Both are summary measures recommended when making comparisons across different populations or subgroups. They can also be used to evaluate the same population over time, being able to detect changes in the size of population subgroups and variations of the health status within each subgroup as well<sup>15,16</sup>. Both indices also take into account information from all individuals included in the analysis, without comparing only the two most extreme groups (for example, the most educated versus the least educated)<sup>15,16</sup>.

To start the analysis, the sample was ordered from 0 (highest level of education) to 1 (lowest level of education), and individuals from each educational level were assigned to a relative position. This relative position or relative rank is a proportion based on the midpoint of the cumulative distribution of the educational attainment variable. It ranges from 0 to 1 and it was calculated separately for each city. Thus, the educational attainment became a weighted measure, whose weights were based on the size of each subgroup. Further details on this step can be found in other publication<sup>1</sup>. Then, the indices were estimated based on generalized linear models, including the relative position as a covariate named score, replacing educational attainment. The models were adjusted by age, sex, and city, including also an interaction term between score and city, as shown in Equation (1). Health insurance-adjustment was added when applicable.

$$Y = \beta_0 + \beta_1 \text{score} + \beta_2 \text{age} + \beta_3 \text{sex} + \beta_4 \text{city} + \beta_5 \text{city}(\text{score}) + \text{error} \quad (1)$$

The  $\beta_1$  coefficient of the regression models were the coefficients of interest, estimating SII through binomial distribution and identity link function, and RII from Poisson distribution. The SII can be interpreted as the absolute difference in the outcome over the whole range of the socioeconomic status<sup>15</sup>, in other words the difference from the highest educational level subgroup toward the lowest educational level subgroup. When there is equality, the index equals 0. SII will be negative whenever the socioeconomic status and health outcome are inversely related<sup>16</sup>. The RII, in turn, can be interpreted as the ratio comparing those less educated to those more educated<sup>15</sup>. The index equals 1 when there is equality among groups. The 95% CIs were also estimated for both indices and the p-values for the differences between BH and NYC were obtained from the interaction term. P-values  $\leq 0.05$  were considered significant.

All analyses took into account the effects of the sample design, individual weights and aggregation by household using the routines for complex samples in the Stata statistical package, version 12<sup>17</sup>.

### 5.3 Results

Among the 7,409 participants, most were female (58.8% in BH and 57.5% in NYC) and the average age was 70.1 in BH and 70.2 years in NYC, with respective standard errors of 0.30 and 0.27 (data not shown). Private health insurance coverage was quite similar between the cities. In Belo Horizonte, 42.8% had high schooling level, 11.6% had intermediate level, and 45.6% presented low educational attainment. The corresponding proportions in New York were 37.7%, 19.7%, and 42.6%, respectively.

Table 1 shows the total prevalences of intermediary determinants of health and health status indicators for Belo Horizonte and New York. Statistically significant differences ( $p < 0.05$ ) were found for all indicators, except lack of mammogram screening. NYC residents presented lower prevalences for unemployment/out of labor force (6.7% less) and neighborhood unsafety (34% less), and better performance for all behavioral factors. On the other hand, BH presented a lower



proportion of individuals with no partner (41.7% vs 49.3%) and living alone (11.7% vs 31.4%), better performance for influenza vaccine (23% more), and lower prevalences for all health status indicators.

Table 2 presents the slope index of inequality for the intermediary determinants of health inequalities and the health status indicators. In absolute terms, BH and NYC presented statistically significant differences for neighborhood unsafety (SII= -0.25 in BH and 0.29 in NY), current smoke (SII= 0.01 in BH and 0.12 in NY), binge drinking (SII= -0.35 in BH and 0.01 in NY), no mammogram in the past 2 years (SII=0.27 in BH and 0.00 in NY), and diabetes (SII=0.07 in BH and 0.17 in NY). Figure 1 highlights SII significant differences between BH and NY. Higher absolute social inequality was observed in NY for current smoke and diabetes, while absolute inequality for current smoke in BH has been close to 0. However, BH presented higher absolute social inequality for binge drinking and mammogram screening, while no absolute inequality has been observed in NY for both indicators. Besides, it is noteworthy that both neighborhood unsafety and binge drinking in BH were prevalent among those with higher educational attainment.

The relative indices of inequality are shown in Table 3. Significant differences between BH and NY were observed for all indicators of material circumstances and behavioral factors, except binge drinking. Differences were also found for no mammogram in the past 2 years (RII=6.1 in BH and 1.0 in NY). Higher relative inequalities were found among NY residents, except for mammogram screening. Figure 2 highlights the RII statistically significant differences between BH and NY.

#### **5.4 Discussion**

Our results show important differences between older adults living in Belo Horizonte and New York, regarding the prevalence of all intermediary determinants of health inequalities and health status indicators, except for lack of mammogram screening. The cities also presented distinctive patterns of absolute inequalities for neighborhood unsafety, current smoke, binge drinking, lack of mammogram screening, and no influenza vaccine. Significant differences in relative inequalities were observed for material circumstances, behavioral factors, and lack of mammogram screening. Considering our study findings and under the perspective of public policies and services, is relevant

to understand how the cities deal with the social determinants of health, how they tackle health inequalities in late adulthood and which lessons they can learn from one another.

On psychosocial circumstances, New Yorkers presented higher prevalence of individuals with no partner and singletons (people who live alone), respectively 7.6% and 19.7% more. No significant differences were found regarding both absolute and relative inequalities. Between 1970 and 2012, the proportion of one-person households increased from 17% to 27% in the U.S.<sup>18</sup>, and NYC is among the cities with the highest proportion of people living alone<sup>19</sup>. However, some European countries such as Sweden, Germany, and United Kingdom share a greater proportion of singletons than U.S., and countries like China, India, and Brazil are among the nations with the fastest growth in one-person households<sup>18</sup>. Aging alone may pose a sort of challenges for singletons and those who care for them. However, research evidence shows that old people who live alone may have higher life satisfaction, more contact with service providers, and no more cognitive or physical impairments than those who live with others<sup>19</sup>. In NYC, some public services and programs for supporting older adults who live alone include senior centers, home-delivered meals, home care assistance to perform activities of daily living and/or housekeeping, volunteer programs to connect retired healthy elderly with their less mobile counterparts, and the Carrier Alert program which trains mail carriers to recognize signs of senior distress, like the accumulation of mail in the person's mailbox<sup>20</sup>. Similar public policies do not exist in BH.

Regarding material circumstances, NYC presented lower prevalence of unemployment/out of labor force (-6.7%) and neighborhood unsafety (-34.7%), but higher relative inequality. Older men and women with higher educational attainment tend to remain in the labor force longer<sup>14</sup>, and older adults living in NYC are more educated than their counterparts in BH. In addition, the Social Security full retirement age is higher in NYC, reaching age 67 for Americans born in 1960 and later<sup>21</sup>, age 65 for male Brazilians, and age 60 for female Brazilians<sup>22</sup>. Stratified analysis by sex and age group (data not shown) revealed that significant difference occurred among women, with unemployment/out of labor force prevalence of 71.4% in BH and 60% in NYC. Considering that the participation of American women in the labor market increased from 1950 to 1980, and those more educated entered the workplace at a faster rate<sup>19</sup>, it is likely that educational and cultural factors delayed the participation of Brazilian women in the labor market. Then, it is possible that

while many older women were still working in NYC, their counterparts in BH have never left the uncompensated domestic work. Neighborhood unsafety was 34.7% higher in BH and inequality patterns revealed that the more educated reported higher levels of unsafety in BH and the less educated reported higher levels in NYC. It is likely that those with higher availability of goods and resources might feel more vulnerable to victimization and loss of their resources and, therefore, report unsafety feelings more often. On the other hand, less educated might not assess risk properly and report higher levels of unsafety<sup>23,24</sup>.

Regarding behavioral factors older New Yorkers smoke less cigarettes (-2.6%), drink less alcohol (-24.3%), consume more fruits and vegetables daily (22.6% more), and practice more physical activity (40% more). Meanwhile, inequalities were higher in NYC, in absolute terms for current smoke and in relative terms for all indicators. A noteworthy point is that absolute equality was observed for current smoke in BH and binge drinking in NYC, with SII close to zero. NYC has launched many successful initiatives to prevent and reduce the impact of non-communicable diseases. In 2002, an aggressive program was released to protect people from second-hand smoke, discourage smoking and make it easier for smokers to quit. Work places, restaurants, and bars have become smoke free since the 2003 Smoke-Free Air Act and increases in excise taxes made NYC cigarettes the most expensive in the U.S.<sup>25</sup>. Similar strategies have been implemented at both national and local level in Brazil, since the mid-1990s<sup>26</sup>, what might explain the small difference found between the cities. To promote healthier eating, NYC became the first jurisdiction in the U.S. to require restaurant chains to post calorie information on menus and menu boards, in 2006<sup>25</sup>. Two years later the city rose the number of street mobile vendors who might sell fresh fruits and vegetables in vulnerable neighborhoods and adopted food and nutrition standards for agencies that purchased or served food to the population, such as senior centers and public hospitals, limiting sugar-sweetened beverages, increasing fruits and vegetables intake, and decreasing the amount of sodium in meals<sup>25</sup>. To stimulate physical activity, the NYC Department of Transportation built 200 bike-lane miles (about 322 kilometers) and 4.9 miles (about 7.9 kilometers) of bike paths physically separated from car traffic lanes, from 2006 to 2009<sup>25</sup>. In 2010, a partnership among different public departments launched the *Active Design Guidelines*, an evidence-based manual of best strategies for increasing physical activity through the design and construction of the urban space<sup>27</sup>. The recommendations have been incorporated into the city's contracting processes for construction and

building codes and over 7,400 professionals have been trained already<sup>27</sup>. Another public initiative is the *BeFitNYC* website, which provides information on free and low-cost fitness opportunities throughout the city, including activities focused on seniors<sup>25</sup>. On binge drinking, NYC policies include: (1) the use of regulatory authority to limit alcohol outlet density (the concentration of retail alcohol establishments, including bars, restaurants and liquor stores in a given geographic area); (2) the dram shop liability (the owner or server of a retail alcohol establishment is held legally responsible for harms inflicted by intoxicated patrons), (3) the limitation of alcohol sale hours, and (4) the prohibition of alcohol consumption in public spaces<sup>28</sup>. Because none of these restrictions exist in BH, it is likely that these policies might partially explain the differences observed between the cities. Still, alcohol consumption in BH is strongly related to local culture.

Considering the health system and health status indicators, BH presented better performance for all analyzed variables, except mammogram screening. However, inequalities were higher in BH for lack of mammogram screening, in both absolute and relative terms. In the U.S., the population accesses the health system mostly through private health insurance. Government programs include Medicare (to those who are at age 65 and worked long enough to be eligible for Social Security or whose spouse qualified for it), Medicaid (which provides health care to poor people, seniors and individuals with disabilities), and military health care programs<sup>12</sup>. On the other hand, Brazil provides universal access to healthcare through the *Sistema Único de Saúde (SUS)*, and the private sector performs a complementary role. The SUS is the sole provider of healthcare for at least 75% of the population<sup>7</sup>. One might assume that differences regarding healthcare access would partially explain our findings. However, among older adults, public coverage was quite similar in both cities and consistent differences were observed even after health insurance adjustment.

With regard to behavioral factors, health system and health status indicators it was noteworthy that the city with the lowest and therefore the best prevalence rates, was also the city with higher absolute and/or relative inequalities. Even if the public policies implementation have improved the global performance of the indicators, it seems that the unequal distribution of resources was still persistent. However, this study design does not allow investigating the impact of public policies implementation on social determinants of health and health inequalities over time, in each city.

Key strengths of this study include the documented quality of the data collected and the fact that both surveys were conducted in the same year. In addition, the indicators selection was based on comparable questions from each instrument. The following limitations might be noticed: (1) the choice of education as the unique source of information on socioeconomic position, although no comparable listing of assets was available from both datasets; (2) all indicators were based on self-reports; (3) NYC survey excluded people not reachable through a landline or cell phone; (4) the Social Determinants model is a conceptual framework on health inequities and this study investigated health inequalities. However, because health inequalities related to educational attainment differences are systematic and unfair, the model was employed.

This study showed that, with few exceptions, absolute and relative inequalities in both cities were concentrated among the less educated. Although many public policies likely have improved the global performance of the indicators over time, it seems that the unequal distribution of resources was still persistent. The local and national initiatives presented to tackle social determinants of health involved investment on improving access to healthcare and other services, on promoting healthy life choices, and creating supportive social and physical environments. However, to tackle inequalities, initiatives must intervene on the structural determinants of health. Examples include policies that invest in poverty reduction and other social disadvantages, interventions to improve living conditions. It is necessary to address the mechanisms that systematically reproduce the unequal distribution of resources among population groups. Changes occur only when structural determinants are also the target of actions.

## References

1. Braga LS, Lima-Costa MF, Macinko J. Social inequalities on selected determinants of Active Aging and health status indicators in a large Brazilian city (2003-2010). *Journal of Aging and Health*. 2015 (in press).
2. NYC Department of Health and Mental Hygiene. Health Disparities in NYC. NYC Health; 2004. <http://www.nyc.gov/html/doh/downloads/pdf/epi/disparities-2004.pdf> Accessed November 12 2014.

3. NYC Department of Health and Mental Hygiene. Health Disparities in Life Expectancy and Death. *Health disparities in New York City*. 2010; 1: 1-8.

4. NYC Department of Health and Mental Hygiene. Disparities in breast, colorectal and cervical cancers in New York City. *Health disparities in New York City*. 2011; 2: 1-8.

5. NYC Department of Health and Mental Hygiene. EpiQuery: NYC Interactive Health Data, Census 2010. <https://a816-healthpsi.nyc.gov/epiquery/> Accessed February 10 2014.

6. Instituto Brasileiro de Geografia e Estatística. Censo 2010. <http://www.ibge.gov.br/home/estatistica/populacao/censo2010/default.shtm> Accessed February 10 2014.

7. Pan American Health Organization. Health in the Americas: regional outlook and country profiles. 2012 Edition. <http://www.paho.org/saludenlasamericas> Accessed Nov 12 2014.

8. Lima-Costa MF, Turci M, Macinko J. Saúde dos adultos em Belo Horizonte. Núcleo de Estudos em Saúde Pública e Envelhecimento da Fundação Oswaldo Cruz e Universidade Federal de Minas Gerais; 2012.

9. NYC Department of Health and Mental Hygiene. Community Health Survey. <http://www.nyc.gov/html/doh/html/data/chs-data.shtml> Accessed February 10 2014.

10. Solar O, Irwin A. A conceptual framework for action on the social determinants of health. Social Determinants of Health Discussion Paper 2 (Policy and Practice). Geneva: World Health Organization; 2010.

11. Brasil, Ministério da Saúde. Nota técnica conjunta: rastreamento do câncer de mama. Brasília: Secretaria de Atenção à Saúde; 2013. [http://www2.inca.gov.br/wps/wcm/connect/acoes\\_programas/site/home/nobrasil/programa\\_contr\\_ole\\_cancer\\_mama/notas\\_tecnicas](http://www2.inca.gov.br/wps/wcm/connect/acoes_programas/site/home/nobrasil/programa_contr_ole_cancer_mama/notas_tecnicas) Accessed August 18 2014.

12. U.S. Preventive Services Task Force. Final recommendation statement, Breast Cancer: screening, November 2009. <http://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/breast-cancer-screening> Accessed August 18 2014.

13. Paim J, Travassos C, Almeida C, Bahia L, Macinko J. The Brazilian health system: history, advances, and challenges. *Lancet*. 2011; 377(9779): 1778-1797.
14. West LA, Cole S, Goodkind D, He W. 65+ in the United States: 2010. Washington, DC: U.S. Census Bureau, Current Population Reports; 2014.
15. Mackenbach JP, Kunst AE. Measuring the magnitude of socio-economic inequalities in health: an overview of available measures illustrated with two examples from Europe. *Soc. Sci. Med.* 1997; 44(6): 757-771.
16. Schneider MC, Castillo-Salgado C, Bacallao J, Loyola E, Mujica OJ, Vidaurre M, Roca A. Métodos de medición de las desigualdades de salud. *Rev Panam Salud Publica*. 2002; 12(6): 398-415.
17. StataCorp: Stata user`s guide. Release 12. College Station, TX: Stata Corporation; 2011.
18. Vespa J, Lewis JM, Kreider RM. America`s Families and Living Arrangements: 2012. Washington, DC: U.S. Census Bureau; 2013.
19. Klinenberg E. Going solo: the extraordinary rise and surprising appeal of living alone. The Penguin Press: New York; 2012.
20. NYC Department of the Aging. Senior Services and Programs, Home-delivered meals and in home services <http://www.nyc.gov/html/dfta/html/services/meals.shtml> Accessed November 12 2014
21. U.S. Social Security Administration. Retirement Age Calculator. <http://www.ssa.gov/retirement/ageincrease.htm> Accessed November 12 2014.
22. Brasil, Ministério da Previdência Social. Aposentadoria por idade urbana. <http://agencia.previdencia.gov.br/e-aps/servico/341> Accessed November 12 2014.
23. Caminhas DA. Medo do crime: uma análise exploratória sobre suas causas em Minas Gerais - 2009. Dissertação (Mestrado em Sociologia). Faculdade de Filosofia e Ciências Humanas, Universidade Federal de Minas Gerais, Belo Horizonte; 2010.

24. Stafford M, Chandola T, Marmot M. Association between fear of crime and mental health and physical functioning. *American Journal of Public Health*. 2007; 97 (11): 2076-2081.

25. NYC Department of Health and Mental Hygiene. Preventing non-communicable diseases and injuries: innovative solutions from New York City. NYC Health; 2011.

26. Instituto Nacional de Câncer José Alencar Gomes da Silva. Programa Nacional de Controle do Tabagismo. <http://www.inca.gov.br/tabagismo/> Accessed November 12 2014.

27. Center for Active Design. Active Design Guidelines. <http://centerforactivedesign.org/guidelines/> Accessed January 5 2015.

28. New York State Liquor Authority. Division of Alcoholic Beverage Control. <http://www.sla.ny.gov/> Accessed January 5 2015.



**Table 1** Age, Sex, and Health Insurance-adjusted Prevalence of Intermediary Determinants of Health Inequalities and Health Status Indicators Among Older Adults: Belo Horizonte Household Health Survey and New York City Community Health Survey, 2010.

	Belo Horizonte	New York	Difference
	% (95% CI)		%
<b>Sample characteristics</b>			
Age ( $\geq 65$ years)	37.8 (35.5-40.0)	42.7 (40.6-44.7)	4.9**
Female	58.8 (57.2-60.3)	57.5 (55.4-59.6)	-1.3
Health insurance coverage	53.0 (50.5-55.5)	51.7 (49.4-53.9)	-1.3
<b>Psychosocial circumstances<sup>1</sup></b>			
Absence of partner	41.7 (39.2-44.2)	49.3 (47.2-51.4)	7.6***
Living alone	11.7 (10.3-13.1)	31.4 (29.6-33.2)	19.7***
<b>Material circumstances<sup>1</sup></b>			
Unemployment/Out of labor force	61.0 (58.8-63.3)	54.3 (52.2-56.5)	-6.7***
Neighborhood unsafety <sup>2,3</sup>	59.6 (56.3-62.9)	24.9 (22.6-27.3)	-34.7***
<b>Behavioral factors</b>			
Current smoke	14.4 (12.9-15.9)	11.4 (9.8-13.0)	-3.0***
Binge drinking	29.9 (27.8-32.1)	5.2 (4.3-6.2)	-24.7***
Non-daily consumption of fruits/vegetables	32.3 (30.0-34.7)	9.7 (8.2-11.1)	-22.6***
No physical activity in the previous month	72.3 (70.1-74.5)	32.2 (30.1-34.4)	-40.1***

(continued)

**Table 1 (continued)**

	Belo Horizonte	New York	Difference
	% (95% CI)		%
<b>Health system</b>			
No mammogram in the past 2 years <sup>4</sup>	16.2 (13.6-18.8)	17.0 (14.5-19.4)	0.8
No influenza vaccine in the previous year <sup>2</sup>	17.0 (14.6-19.4)	40.0 (37.4-42.5)	23.0***
<b>Health status</b>			
Poor self-rated health	7.0 (5.9-8.1)	10.7 (9.4-12.0)	3.7***
Hypertension	45.2 (43.0-47.4)	53.6 (51.4-55.8)	8.4***
Diabetes	12.3 (10.9-13.8)	19.8 (18.0-21.5)	7.5***
Depression	9.2 (7.9-10.4)	16.0 (14.3-17.6)	6.8***
TOTAL (n) <sup>5</sup>	2,740	4,669	

*Note.* CI = confidence interval. \*\*p<0.01; \*\*\*p<0.001: p-values for the differences between BH and NYC. <sup>1</sup>No health insurance-adjusted. <sup>2</sup>Only individuals aged 60 years and over. <sup>3</sup>It measures fear of being robbed in BH and fear of crime in NYC. <sup>4</sup>Only women aged 50-69 in BH, and 50-74 in NYC. <sup>5</sup>Participant number does not take into account the individual weight and other sample parameters.

**Table 2.** Slope Index of Inequality (SII) of Intermediary Determinants of Health and Health Status Indicators Among Older Adults: Belo Horizonte Household Health Survey and New York City Community Health Survey, 2010.

	Belo Horizonte	New York	p-value
	SII (95% CI)		
<b>Psychosocial circumstances<sup>1</sup></b>			
Absence of partner	0.08 (-0.01-0.17)	0.16 (0.08-0.24)	0.165
Living alone	-0.04 (-0.07-0.00)	-0.05 (-0.12-0.02)	0.692
<b>Material circumstances<sup>1</sup></b>			
Unemployment/Out of labor force	0.18 (0.10-0.25)	0.27 (0.20-0.35)	0.050
Neighborhood unsafety <sup>2,3</sup>	-0.25 (-0.37 - -0.13)	0.29 (0.21-0.36)	0.000***
<b>Behavioral factors</b>			
Current smoke <sup>1</sup>	0.01 (-0.04-0.07)	0.12 (0.06-0.17)	0.010*
Binge drinking <sup>1</sup>	-0.35 (-0.42 - -0.27)	0.01 (-0.01-0.02)	0.000***
No physical activity in the previous month	0.32 (0.23-0.41)	0.29 (0.20-0.37)	0.550
<b>Health system</b>			
No mammogram in the past 2 years <sup>4</sup>	0.27 (0.17-0.38)	0.00 (-0.10-0.09)	0.000***
No influenza vaccine in the previous year <sup>2</sup>	0.01 (-0.08-0.11)	0.06 (-0.03-0.16)	0.422
<b>Health status</b>			
Hypertension	0.12 (0.03-0.21)	0.20 (0.11-0.28)	0.198
Diabetes	0.07 (0.01-0.13)	0.17 (0.10-0.24)	0.014*
Depression <sup>1</sup>	0.02 (-0.02-0.06)	-0.02 (-0.08-0.03)	0.233

*(continued)*

**Table 2 (continued)**

*Note.* CI = confidence interval. \* $p < 0.05$ ; \*\*\* $p < 0.001$ : statistically significant difference between BH and NYC. The SII is the absolute difference in the outcome over the whole range of the socioeconomic position, from the highest educational level group toward the lowest educational level group. The index equals 0 in the absence of absolute inequality and it is negative when health outcome and socioeconomic position are inversely related. Non-daily consumption of fruits/vegetables and poor self-rated health were excluded because the analyses did not converge. <sup>1</sup>No health insurance adjusted. <sup>2</sup>Only individuals aged 60 years and over. <sup>3</sup>It measures fear of being robbed in BH and fear of crime in NY. <sup>4</sup>Only women aged 50-69 in BH, and 50-74 in NYC.

**Table 3.** Relative Index of Inequality (RII) of Intermediary Determinants of Health and Health Status Indicators Among Older Adults: Belo Horizonte Household Health Survey and New York City Community Health Survey, 2010.

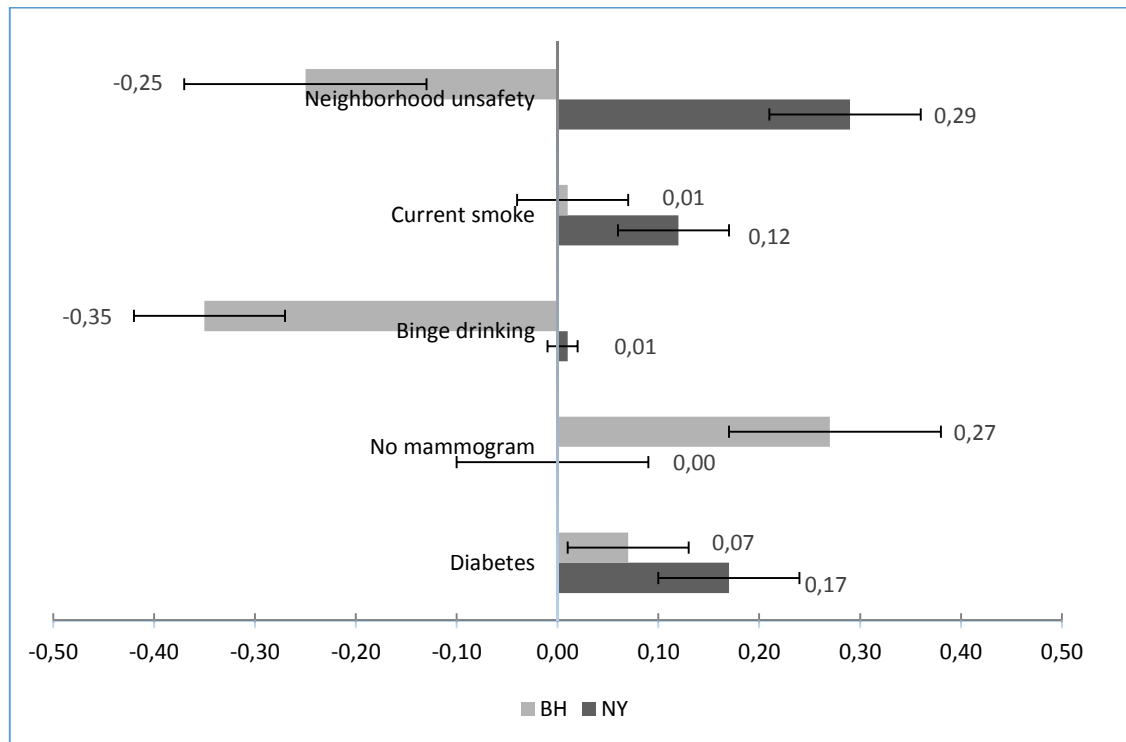
	Belo Horizonte	New York	p-value
	RII (95% CI)		
<b>Psychosocial circumstances<sup>1</sup></b>			
Absence of partner	1.2 (1.0-1.5)	1.4 (1.2-1.5)	0.400
Living alone	0.7 (0.5-1.1)	0.8 (0.7-1.1)	0.570
<b>Material circumstances<sup>1</sup></b>			
Unemployment/Out of labor force	1.3 (1.1-1.5)	1.7 (1.5-2.0)	0.006**
Neighborhood unsafety <sup>2,3</sup>	0.7 (0.6-0.9)	3.6 (2.5-5.2)	0.000***
<b>Behavioral factors</b>			
Current smoke	1.1 (0.7-1.7)	3.0 (1.9-4.8)	0.001 *
Binge drinking	0.8 (0.5-1.2)	1.6 (0.8-3.3)	0.06
Non-daily consumption of fruits/vegetables	0.9 (0.6-1.3)	6.0 (3.2-11.5)	0.000***
No physical activity in the previous month	1.4 (1.2-1.7)	2.5 (1.9-3.3)	0.000***
<b>Health system</b>			
No mammogram in the past 2 years <sup>4</sup>	6.1 (3.1-12.2)	1.0 (0.6-1.7)	0.000***
No influenza vaccine in the previous year <sup>2</sup>	1.0 (0.6-1.8)	1.2 (0.9-1.5)	0.647
<b>Health status</b>			
Poor self-rated health	5.1 (2.5-10.4)	2.3 (1.3-3.9)	0.06
Hypertension	1.3 (1.1-1.6)	1.4 (1.2-1.7)	0.529
Diabetes	2.0 (1.3-3.3)	2.5 (1.7-3.7)	0.480
Depression	0.93 (0.52-1.64)	0.69 (0.45-1.08)	0.389

(continued)

**Table 3 (continued)**

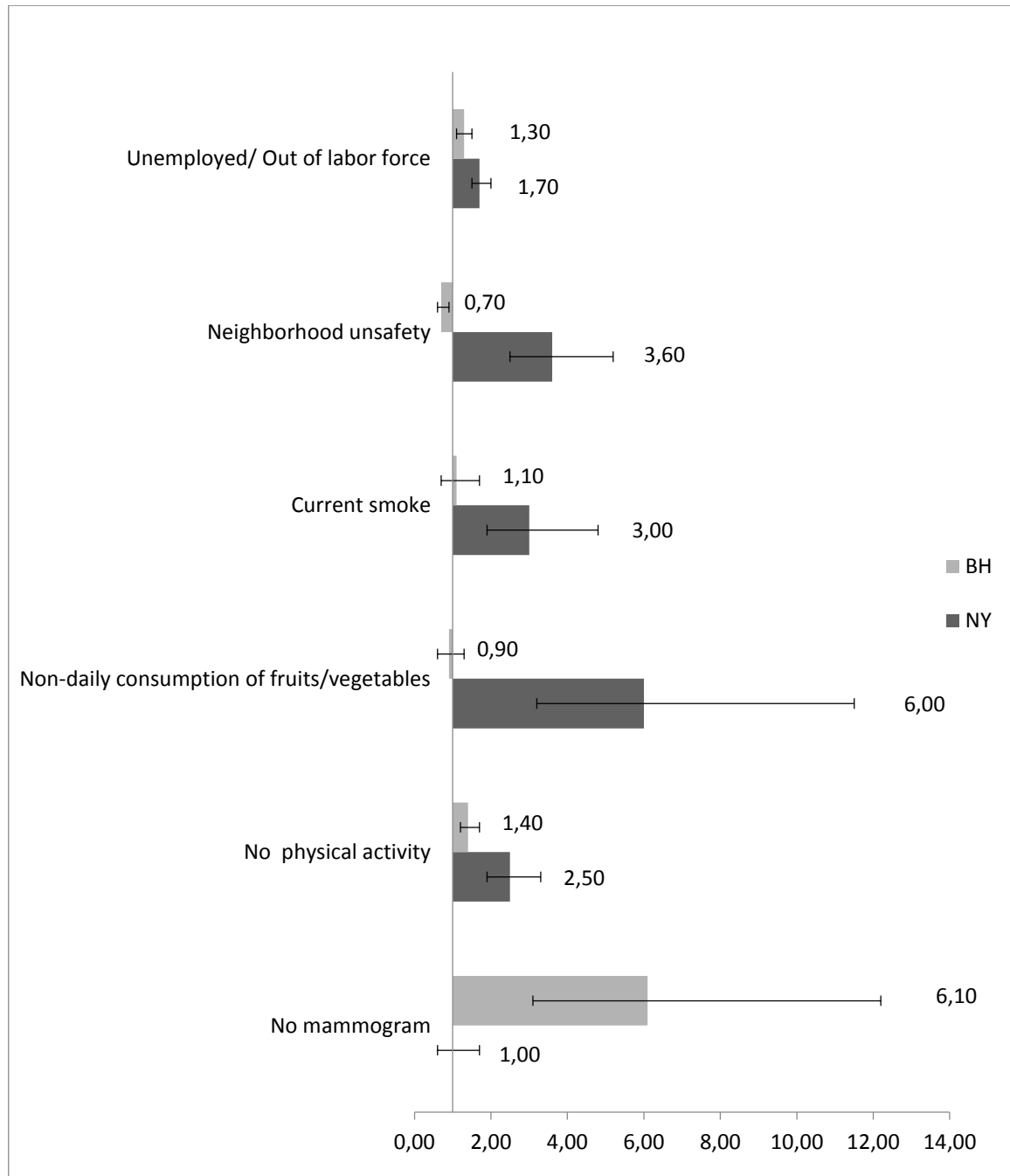
*Note.* \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ : statistically significant difference between BH and NYC. The RII can be interpreted as the ratio comparing those more educated to those less educated. The index equals 1 in the absence of relative inequality. <sup>1</sup>No health insurance adjusted. <sup>2</sup>Only individuals aged 60 years and over. <sup>3</sup>It measures fear of being robbed in BH and fear of crime in NYC. <sup>4</sup>Only women aged 50-69 in BH, and 50-74 in NYC.

**Figure 1.** Slope Index of Inequality (SII) of Intermediary Determinants of Health and Health Status Indicators Among Older Adults: Belo Horizonte Household Health Survey and New York City Community Health Survey, 2010.



*Note.* It shows only statistically significant differences between BH and NYC. The SII is the absolute difference in the outcome over the whole range of the socioeconomic position, from the highest educational level group toward the lowest educational level group. The index equals 0 in the absence of absolute inequality and it is negative when health outcome and socioeconomic position are inversely related.

**Figure 2.** Relative Index of Inequality (SII) of Intermediary Determinants of Health and Health Status Indicators Among Older Adults: Belo Horizonte Household Health Survey and New York City Community Health Survey, 2010.



*Note.* It shows only statistically significant differences between BH and NYC. The RII can be interpreted as the ratio comparing those more educated to those less educated. The index equals 1 in the absence of relative inequality.



**Supplementary material**

**Table 4.** Age and Sex-adjusted Prevalence of Psychosocial Circumstances, Material Circumstances, and Behavioral Factors Among Older Adults, by Educational Attainment: Belo Horizonte Household Health Survey and New York City Community Health Survey, 2010.

	Educational Attainment			p-value
	Highest	Intermediate % (95% CI)	Lowest	
<b>Psychosocial circumstances</b>				
Absence of partner				
Belo Horizonte	41.6 (37.8-45.3)	41.4 (34.8-48.0)	41.9 (38.6-45.1)	0.986
New York	42.4 (39.2-45.6)	55.3 (50.5-60.2)	52.4 (49.0-55.8)	0.000***
Living alone				
Belo Horizonte	13.1 (10.8-15.4)	11.8 (7.1-16.4)	10.7 (8.9-12.5)	0.252
New York	31.0 (28.0-34.0)	39.0 (34.4-43.7)	28.5 (25.9-31.1)	0.000***
<b>Material circumstances</b>				
Unemployment/Out of labor force				
Belo Horizonte	54.9 (51.2-58.5)	65.1 (59.2-71.1)	64.9 (62.1-67.7)	0.000***
New York	45.0 (41.8-48.2)	53.8 (49.0-58.6)	62.3 (59.0-65.5)	0.000***
Neighborhood unsafety <sup>1,2</sup>				
Belo Horizonte	70.7 (65.4-75.9)	58.1 (48.7-67.5)	53.2 (48.8-57.6)	0.000***
New York	15.7 (12.8-18.6)	21.4 (15.8-27.0)	33.6 (29.6-37.5)	0.000***

*(continued)*

**Table 4 (continued)**

	Educational Attainment			p-value
	Highest	Intermediate % (95% CI)	Lowest	
<b>Behavioral factors<sup>3</sup></b>				
Current Smoke				
Belo Horizonte	13.2 (10.9-15.6)	14.7 (10.4-19.0)	15.6 (13.1-18.1)	0.446
New York	6.5 (4.9-8.1)	15.3 (11.2-19.4)	13.9 (11.2-16.6)	0.000***
Binge drinking				
Belo Horizonte	33.7 (30.3-37.1)	34.1 (28.3-39.9)	23.7 (20.7-26.7)	0.000***
New York	4.5 (3.5-5.5)	5.5 (3.7-7.3)	5.9 (3.7-8.2)	0.383
Non-daily consumption of fruits/vegetables				
Belo Horizonte	35.4 (31.5-39.2)	28.2 (22.5-33.9)	30.6 (27.1-34.0)	0.081
New York	4.7 (3.2-6.3)	9.6 (6.4-13.0)	14.5 (11.5-17.5)	0.000***
No physical activity in the previous month				
Belo Horizonte	64.4 (60.6-68.2)	75.3 (70.0-80.7)	78.2 (75.2-81.2)	0.000***
New York	23.4 (20.1-26.6)	31.7 (26.7-36.7)	40.4 (36.7-44.2)	0.000***

*Note.* CI = confidence interval. \*\*\*p<0.001: p-values for prevalence differences by educational level, across each city. <sup>1</sup>Only individuals aged 60 years and over. <sup>2</sup>It measures fear of being robbed in BH and fear of crime in NYC. <sup>4</sup>Age, sex and health insurance-adjusted.

**Table 5.** Age, Gender and Health Insurance Coverage-Adjusted Prevalence of Health System and Health Status Indicators Among Older Adults, by Educational Attainment: Belo Horizonte Household Health Survey and New York City Community Health Survey, 2010.

	Educational Attainment			p-value
	Highest	Intermediate % (95% CI)	Lowest	
<b>Health System</b>				
No mammogram in the past 2 years <sup>1</sup>				
Belo Horizonte	9.4 (6.3-12.6)	13.5 (7.7-19.2)	23.0 (18.0-28.1)	0.000***
New York	15.5 (11.4-19.6)	22.2 (16.2-28.2)	15.7 (12.1-19.3)	0.101
No influenza vaccine in the previous year <sup>2</sup>				
Belo Horizonte	18.3 (13.8-22.8)	14.3 (7.1-21.6)	16.6 (13.3-19.9)	0.679
New York	37.6 (33.5-41.7)	41.0 (34.9-47.1)	41.6 (37.5-45.6)	0.390
<b>Health Status</b>				
Poor self-rated health				
Belo Horizonte	3.1 (1.9-4.2)	8.0 (4.5-11.4)	9.5 (7.6-11.5)	0.000***
New York	8.0 (5.8-10.1)	9.7 (7.2-12.2)	13.0 (10.7-15.3)	0.008**
Hypertension				
Belo Horizonte	42.7 (39.0-46.4)	41.6 (35.4-47.8)	48.0 (44.7-51.4)	0.073
New York	46.4 (43.0-49.9)	56.8 (51.6-62.1)	58.5 (54.9-62.0)	0.000***
Diabetes				
Belo Horizonte	9.3 (7.4-11.3)	10.1 (6.4-13.8)	15.6 (13.0-18.2)	0.001**
New York	14.6 (11.9-17.3)	17.9 (13.9-21.8)	25.0 (21.9-28.2)	0.000***

(continued)

**Table 5 (continued)**

	Educational Attainment			p-value
	Highest	Intermediate % (95% CI)	Lowest	
Depression				
Belo Horizonte	8.3 (6.3-10.3)	8.6 (5.1-12.1)	10.1 (8.1-12.2)	0.463
New York	17.8 (15.0-20.6)	16.5 (13.0-20.0)	14.3 (11.5-17.1)	0.268

*Note.* CI = confidence interval. \*\*p<0.01; \*\*\*p<0.001: p-values for prevalence differences by educational level, across each city <sup>1</sup>Only women aged 50-69 in BH and 50-74 in NYC. <sup>2</sup>Only individuals aged 60 years and over.

## 6 CONSIDERAÇÕES FINAIS

Os resultados deste trabalho revelaram melhora significativa no desempenho de indicadores do Envelhecimento Ativo em Belo Horizonte, entre 2003 e 2010, nos domínios ambiente físico (redução da insatisfação com a vizinhança e da preocupação ao sair de casa devido à impaciência de pedestres e/ou motoristas), determinantes sociais (aumento da confiança nas pessoas e diminuição do medo de assalto ao sair de casa) e uso dos serviços de saúde (aumento do número de consultas e redução das hospitalizações e das queixas para obter medicamentos). Entretanto, as desigualdades persistiram para a maior parte das indicadores, no período analisado (insatisfação com a vizinhança, preocupação ao sair de casa devido à impaciência de pedestres e/ou motoristas, ausência de visitas dos filhos e/ou parentes, desconfiança nas pessoas e todas as variáveis relacionadas a uso dos serviços de saúde e condição de saúde). Foi observada redução na desigualdade absoluta apenas para medo de cair devido aos defeitos nos passeios e/ou dificuldades para atravessar as ruas e aumento nas desigualdades absoluta e relativa para medo de assalto, com maior prevalência entre os indivíduos com escolaridade mais alta.

Os resultados também revelaram diferenças importantes entre adultos mais velhos residentes em Belo Horizonte e *New York*, considerando-se a prevalência dos determinantes intermediários da saúde e indicadores da condição de saúde. Em *New York*, uma maior proporção de indivíduos afirmou não possuir parceiro e morar só. A cidade também apresentou melhor desempenho nos indicadores de circunstâncias materiais (desemprego/fora da força de trabalho e insegurança na vizinhança) e para todos os fatores comportamentais. Belo Horizonte, por sua vez, apresentou melhor performance nos indicadores de cuidado preventivo (vacina contra gripe no ano anterior) e para todos as variáveis de condição de saúde. As cidades também apresentaram padrões distintos de desigualdade absoluta para insegurança na vizinhança, tabagismo atual, consumo excessivo de álcool, realização de mamografia nos últimos 2 anos e vacina contra gripe no ano anterior. Com relação às desigualdades relativas, diferenças significativas foram observadas para todos os indicadores de circunstância material e fatores comportamentais e também para realização de mamografia nos últimos 2 anos e autoavaliação da saúde. Com poucas exceções, as desigualdades absolutas e relativas se concentraram entre aqueles com escolaridade mais baixa, em ambas as cidades. Cabe ressaltar que nos domínios fatores comportamentais, sistema de saúde e condição de saúde, a cidade com melhor desempenho global dos indicadores também foi aquela que apresentou maior desigualdade social, em termos absoluto e/ou relativo.

Diferenças significativas nas desigualdades relativas foram observadas para todos os indicadores de circunstância material, fatores comportamentais, realização de mamografia nos últimos 2 anos e autoavaliação da saúde. Com poucas exceções, pior desempenho foi observado entre aqueles com escolaridade mais baixa, em ambas as cidades. Cabe ressaltar que nos domínios fatores comportamentais, sistema de saúde e condição de saúde, a cidade com melhor desempenho global dos indicadores também foi aquela que apresentou maior desigualdade social, em termos absoluto e/ou relativo.

As vida nas cidades oferece o que se denomina “vantagem urbana”, ou seja, oportunidades para participação social, cultural e política, acesso à informação, tecnologia e emprego, além da maior disponibilidade de serviços relacionados a saneamento básico, educação, cuidado em saúde e transporte.<sup>32,33</sup> Em contrapartida, a vida nas cidades também pode exacerbar as desigualdades sociais, expondo os indivíduos à escassez e dificuldades no acesso a serviços básicos, aumento de espaços não saudáveis e estímulo à hábitos prejudiciais. Assim, a vida nas cidades também se associa à “penalidade urbana”,<sup>33,34</sup> cujos aspectos tendem a se concentrar entre os indivíduos que vivem sob condições menos favoráveis.<sup>35</sup> A persistência das desigualdades sociais em saúde evidencia uma das fragilidades da Saúde Pública. Mesmo os países economicamente prósperos e com altos índices de desenvolvimento humano apresentam diferenças sistemáticas entre grupos com diferentes posições socioeconômicas, quer sejam medidas por educação, ocupação, renda ou riqueza.<sup>36</sup>

O desenho transversal empregado neste trabalho não permite investigar o impacto da implementação de políticas públicas nos determinantes do envelhecimento ativo, nos determinantes sociais da saúde ou nas condições de saúde, ao longo do tempo. Entretanto, é possível que a implementação de políticas tenha melhorado o desempenho global dos indicadores analisados, mesmo com a persistência das desigualdades sociais em saúde.

---

<sup>32</sup> Vlahov D, Galea S, Freudenberg N. Toward an urban health advantage. *J Public Health Manag Pract* 2005; 11(3): 256-258.

<sup>33</sup> Caiaffa WT, Ferreira FR, Ferreira AD, Oliveira CDL, Camargos VP, Proietti FA. Saúde urbana: “a cidade é uma estranha senhora, que hoje sorri e amanhã te devora”. *Ciência & Saúde Coletiva* 2008, 13(6):1785-1796.

<sup>34</sup> Rice J, Rice JS. The concentration of disadvantage and the rise of an urban penalty: urban Slum prevalence and the social production of health inequalities in the developing countries. *Int J Health Serv* 2009; 39(4):749–770.

<sup>35</sup> Solar O, Irwin A. A conceptual framework for action on the social determinants of health. *Social Determinants of Health Discussion Paper 2 (Policy and Practice)*. Genebra: OMS; 2010.

<sup>36</sup> Mackenbach JP. The persistence of health inequalities in modern welfare states: the explanation of a paradox. *Social Science & Medicine* 2012, 75, 761-69.

Para enfrentar as desigualdades, iniciativas locais e nacionais devem intervir nos determinantes intermediários e estruturais da saúde<sup>37</sup>. Exemplos incluem políticas que invistam na redução da pobreza e outras desvantagens sociais, intervenções que melhorem as condições de vida, práticas que ampliem o acesso aos cuidados em saúde e outros serviços, iniciativas que estimulem a criação de ambientes e escolhas saudáveis, entre vários outros aspectos. É necessário enfrentar os mecanismos que sistematicamente reproduzem a distribuição desigual de recursos entre os grupos populacionais. As mudanças ocorrem apenas quando os determinantes estruturais também são alvo de ações.

---

<sup>37</sup> Solar O, Irwin A. A conceptual framework for action on the social determinants of health. Social Determinants of Health Discussion Paper 2 (Policy and Practice). Genebra: OMS; 2010.





**ANEXO A – CARTA DE ACEITE**

**Assunto:** Journal of Aging and Health - Decision on Manuscript ID JAH-14-251.R2

**De:** editor.jah@gmail.com (editor.jah@gmail.com)

**Para:** lusouzabraga@yahoo.com.br; lima-costa@cpqrr.fiocruz.br; cibelesomini@yahoo.com.br; jmj5@nyu.edu;

**Data:** Segunda-feira, 20 de Abril de 2015 16:39

20-Apr-2015

Dear Mr. de Souza Braga:



It is a pleasure to accept your manuscript entitled "Social Inequalities on Selected Determinants of Active Aging and Health Status Indicators in a Large Brazilian City (2003-2010)" in its current form for publication in the Journal of Aging and Health. The comments of the reviewer(s) who reviewed your manuscript are included at the foot of this letter.

If you or your funder wish your article to be freely available online to non-subscribers immediately upon publication (gold open access), you can opt for it to be included in SAGE Choice, subject to payment of a publication fee. For further information, please visit SAGE Choice (<http://www.sagepub.com/sagechoice.sp>).

Thank you for your fine contribution. On behalf of the Editors of the Journal of Aging and Health, we look forward to your continued contributions to the Journal.

Sincerely,  
Dr. Kyriakos Markides  
Editor, Journal of Aging and Health  
[editor.jah@gmail.com](mailto:editor.jah@gmail.com), [kmarkide@utmb.edu](mailto:kmarkide@utmb.edu)

## ANEXO B – ATA DA DEFESA DE TESE

	<b>UNIVERSIDADE FEDERAL DE MINAS GERAIS</b> PROGRAMA DE PÓS-GRADUAÇÃO EM SAÚDE PÚBLICA	<b>UFMG</b> 
---	---	--

**ATA DA DEFESA DE TESE DA ALUNA  
LUCIANA DE SOUZA BRAGA**

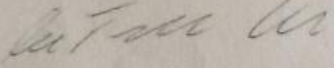
Realizou-se, no dia 03 de julho de 2015, às 09:00 horas, na sala 029 da Faculdade de Medicina da Universidade Federal de Minas Gerais, a defesa de tese, intitulada *DESIGUALDADES NOS DETERMINANTES DO ENVELHECIMENTO ATIVO (BELO HORIZONTE, 2003-2010) E NOS DETERMINANTES SOCIAIS DA SAÚDE (BELO HORIZONTE E NEW YORK, 2010), ENTRE ADULTOS MAIS VELHOS*, apresentada por LUCIANA DE SOUZA BRAGA, número de registro 2011656553, graduada no curso de TERAPIA OCUPACIONAL, como requisito parcial para a obtenção do grau de Doutor em SAÚDE PÚBLICA, à seguinte Comissão Examinadora: Prof(a). Maria Fernanda Furtado de Lima e Costa - Orientador (UFMG), Prof(a). James Macinko (UCLA), Prof(a). Waleska Teixeira Caiassa (UFMG), Prof(a). Jorge Alexandre Barbosa Neves (UFMG), Prof(a). Eduardo Faerstein (UERJ), Prof(a). Sérgio Willian Viana Peixoto (FIOCRUZ).

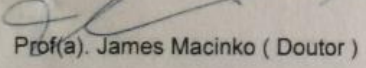
A Comissão considerou a tese:

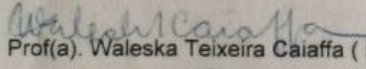
Aprovada

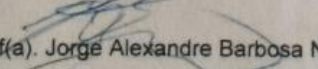
Reprovada

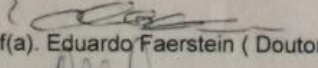
Finalizados os trabalhos, lavrei a presente ata que, lida e aprovada, vai assinada por mim e pelos membros da Comissão.  
Belo Horizonte, 03 de julho de 2015.

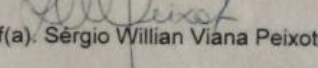
  
Prof(a). Maria Fernanda Furtado de Lima e Costa ( Doutora )


  
Prof(a). James Macinko ( Doutor )

  
Prof(a). Waleska Teixeira Caiassa ( Doutora )

  
Prof(a). Jorge Alexandre Barbosa Neves ( Doutor )

  
Prof(a). Eduardo Faerstein ( Doutor )

  
Prof(a). Sérgio Willian Viana Peixoto ( Doutor )

  
CONFERE COM ORIGINAL  
Centro de Pós-Graduação  
Faculdade de Medicina - UFMG

## ANEXO C - FOLHA DE APROVAÇÃO



UNIVERSIDADE FEDERAL DE MINAS GERAIS

PROGRAMA DE PÓS-GRADUAÇÃO EM SAÚDE PÚBLICA

UFMG

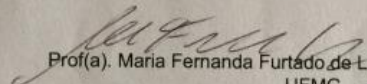
### FOLHA DE APROVAÇÃO

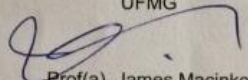
**DESIGUALDADES NOS DETERMINANTES DO ENVELHECIMENTO ATIVO (BELO HORIZONTE, 2003-2010) E NOS DETERMINANTES SOCIAIS DA SAÚDE (BELO HORIZONTE E NEW YORK, 2010), ENTRE ADULTOS MAIS VELHOS**

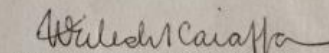
**LUCIANA DE SOUZA BRAGA**

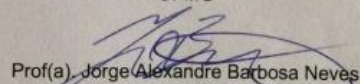
Tese submetida à Banca Examinadora designada pelo Colegiado do Programa de Pós-Graduação em SAÚDE PÚBLICA, como requisito para obtenção do grau de Doutor em SAÚDE PÚBLICA, área de concentração EPIDEMIOLOGIA.

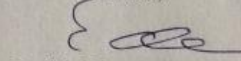
Aprovada em 03 de julho de 2015, pela banca constituída pelos membros:

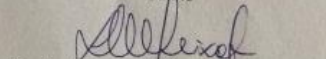
  
Prof(a). Maria Fernanda Furtado de Lima e Costa - Orientador  
UFMG

  
Prof(a). James Macinko  
UCLA

  
Prof(a). Waleska Teixeira Caiáffa  
UFMG

  
Prof(a). Jorge Alexandre Barbosa Neves  
UFMG

  
Prof(a). Eduardo Faerstein  
UERJ

  
Prof(a). Sérgio Willian Viana Peixoto  
FIOCRUZ

Belo Horizonte, 3 de julho de 2015.

