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## **ABSTRACT**

This paper estimates life expectancy at birth and mortality probabilities of Brazilian workers who were rescued in working conditions analogous to slavery. We address the following questions: do those workers have higher mortality levels than similar individuals who did not suffer from such working conditions? Do these conditions affect life expectancy at birth? In an approach on the subject as a public health problem, not only a legal matter, we refer to the effects of overexploitation and violence against enslaved workers in political, social and economic processes that harm life quality and health.

**Keywords:** Contemporary slavery, health, mortality, life expectancy

## INTRODUCTION

In contemporary Brazil, the existence of workers in a situation analogous to slavery became well-known in the 1970s with the first reports of slave labor, carried out by Brazilian civil society organized for the defense of human rights. Since 1995, with the creation of the Special Mobile Inspection Groups (GEFM), official numbers of the Brazilian government indicate that more than 55 thousand workers were rescued from this situation (Radar - Paineis de Informações e Estatísticas da Inspeção do Trabalho no Brasil, 2020<sup>1</sup>). Contemporary slavery is neither a recent nor an isolated problem in Brazil. It can be found in almost all countries of the world, being concentrated in Southeast Asia, North and West Africa and in parts of South America. Likewise, it occurs in developed countries in North America and Europe, among others<sup>2</sup>. It is, therefore, a global phenomenon expressed in different ways, according to the social, economic and cultural particularities of each region; however, its essential attributes are maintained:

*control over a person in such a way as to significantly deprive them of his or her individual liberty, supported by and obtained through force, threat, deception and/or coercion, with the intent of exploitation, through the use, management, profit, transfer or disposal of that person*<sup>3</sup>.

Today, the criterion for enslavement is not color, but the vulnerability of the enslaved<sup>4</sup>. Absence of income or livelihoods, difficulties in accessing services, benefits and public policies, in addition to the impossibility of participation in decision-making processes, are some economic, social and political factors that make men and women vulnerable to contemporary slavery, as they prevent the development of their capacity for self-determination.

In Brazil, contemporary slavery is described and criminalized based on Article 149 of the Brazilian Penal Code, being called "conditions similar to slavery." Its confrontation is the subject of intersectoral policies implemented in an articulated manner by public institutions, private entities and civil society organizations<sup>5</sup>. By law, the practice is limited to labor relations, marked by the exploitation and control of the worker, which implies actions that affect his or her freedom or dignity through the presence of forms of control that prevent him/her from leaving the

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<sup>1</sup>Radar - Panel of Information and Statistics of Labor Inspection in Brazil. Available in: <https://sit.trabalho.gov.br/radar/>, accessed on 09/28/2020.

<sup>2</sup> Kevin Bales, *Disposable People. New slavery in the global economy* (Berkeley: University of California Press, 2000).

<sup>3</sup> Kevin Bales, "Slavery and its Contemporary Manifestations". In Jean Allain (ed.) *The Legal Understanding of Slavery. From the Historical to the Contemporary* (Oxford: Oxford University Press, 2012), 287.

<sup>4</sup> Kevin Bales, *Disposable People. New slavery in the global economy* (Berkeley: University of California Press, 2000), 11

<sup>5</sup> Author, *Fighting Forced Labour: the example of Brazil* (Geneva: ILO, 2009), [http://www.oit.org/global/publications/ilo-bookstore/order-online/books/WCMS\\_116691/lang--en/index.htm](http://www.oit.org/global/publications/ilo-bookstore/order-online/books/WCMS_116691/lang--en/index.htm)

workplace at will, or by their submission to conditions considered degrading due to threats to their health, safety or physical integrity during work activity<sup>6</sup>.

In this context, workers are exposed to degrading working and living conditions, being subject to moral and physical control, in situations of coercion and violence in which vulnerable workers lose their social rights<sup>7</sup>.

Vulnerability and overexploitation associated with an exhaustive daily working routine, common to contemporary slaves, may have significant impacts on health levels, and differences on health levels might affect morbidity and mortality levels, and, therefore, life expectancies. This paper estimates life expectancy at birth and mortality probabilities of workers who were rescued in working conditions analogous to slavery. We address the following questions: do those workers have higher mortality levels than similar individuals who did not suffer from such working conditions? Do these conditions affect life expectancy at birth?

In the present study, we address the subject as a public health problem, rather than a legal matter, as it is done in most analyses concerning the topic. For that, we use an amplified concept of health encompassing threats to life, degrading working conditions, harmful impacts to interpersonal relationships and quality of life, all of those related to the public health realm<sup>8</sup>. Thus, we do not only refer to psychological and physical effects of contemporary slavery, but also to overexploitation and violence against workers in political, social and economic processes that harm life quality and health.

The hypotheses of this study are the following:

- 1) Workers who are submitted to extremely harsh conditions and who are overexploited, working in conditions similar to slavery, may present a deteriorated health;
- 2) In this context analogous to slavery, degrading conditions influence long-term health levels, impacting on life expectancy;
- 3) Workers who were rescued from these conditions possess similar characteristics to unqualified workers in Brazil, and should present similar life expectancies if working as a contemporary slave did not significantly affect health levels.

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<sup>6</sup>On the legal assets protected by Article 149, see: José Claudio Monteiro Brito Filho, "Trabalho em condições análogas às de escravo: os bens jurídicos protegidos pelo artigo 149 do Código Penal Brasileiro". In: Ricardo Figueira *et al.* *A Universidade Discute a Escravidão Contemporânea: práticas e reflexões* (Rio de Janeiro: Mauad X, 2015), 441-452; Renan Kalil and Paulo Gurjão (2018) "Os Descaminhos do Conceito de Trabalho em Condições Análogas às de Escravo no Congresso Nacional: Aonde o Poder Legislativo quer chegar? In Ricardo Figueira *et al.* *Estudos sobre Formas Contemporâneas de Trabalho Escravo* (Rio de Janeiro: Mauad X, 2018), 509-530 and Luís Antônio Camargo Melo, "Atuação do Ministério Público do Trabalho no Combate ao Trabalho escravo - crimes contra a organização do trabalho e demais crimes conexos", *Possibilidades Jurídicas de Combate à Escravidão Contemporânea* (Brasília: ILO, 2007), 64-103, [https://www.ilo.org/wcmsp5/groups/public/---americas/---ro-lima/---ilo-brasilia/documents/publication/wcms\\_227539.pdf](https://www.ilo.org/wcmsp5/groups/public/---americas/---ro-lima/---ilo-brasilia/documents/publication/wcms_227539.pdf)

<sup>7</sup> Livia Mendes Moreira Miraglia. *Trabalho escravo contemporâneo: conceituação à luz do princípio da dignidade da pessoa humana* (São Paulo: LTr, 2011).

<sup>8</sup> Maria Cecília de Souza Minayo and Edinilsa Ramos de Souza, "É possível prevenir a violência? Reflexões a partir do campo da saúde pública", *Ciência & Saúde Coletiva*, Volume 4, nº 1, (Rio de Janeiro, 1999), 7-23.

The text analyzes how high levels of mortality and low life expectancy are aspects resulting from enslavement, which reveal the health deterioration of rescued workers. This deterioration, added to other factors, makes them susceptible to recurrence in new situations of slavery, preventing the rupture with the cycle of contemporary slavery. This occurs when vulnerabilities to slavery remain unchanged after the rescue, making slave labor the only possibility for survival. Addressing worker health as a constituent part of this cycle is an important contribution to the studies of policies to confront contemporary slavery in Brazil, revealing an essential dimension of slave labor to be considered in the care and assistance actions for rescued people, as well as prevention of recurrence in slavery<sup>9</sup>.

In Brazil, the low Human Development Index (HDI) of states and municipalities reveals the vulnerability of its residents to contemporary slavery, indicating possible sources of slavery and enticement for slave labor. Finding that slavery worsens life expectancy, one of the aspects measured by the HDI, would make it possible to monitor, through this indicator, the points of vulnerability for incidence and recurrence of contemporary slavery in the country.

This paper is further divided into five subsections. The next discusses contemporary slavery in Brazil and the third presents some associations between contemporary slavery and health levels. Fourth section describes the methodology, the fifth presents the results and the last concludes the paper.

## **WORKERS IN SITUATIONS ANALOGOUS TO SLAVERY IN CONTEMPORARY BRAZIL**

In contemporary Brazil the existence of workers in a situation analogous to slavery became well-known in the 1970s when the first reports were made by human rights activists, in particular the catholic bishop dom Pedro Casaldáglia<sup>10</sup>. However, it was only in 1995 that the Brazilian Federal Government admitted the existence of contemporary slavery in the country<sup>11</sup>.

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<sup>9</sup> On public policies to confront contemporary slavery in Brazil, see: Renan Kalil and Thiago Ribeiro, “Trabalho Escravo Contemporâneo e Proteção Social”, *Revista Direitos, Trabalho e Política Social, Volume 1*, (Mato Grosso Federal University, 2015), 15-38, <http://periodicoscientificos.ufmt.br/ojs/index.php/rdtps/index>; Luiza Cristina Freitas and Valena Mesquita, “Combate ao trabalho escravo: a sistemática da lei estadual paulista 14.946 e seu processo de implementação nacional” In Ricardo Figueira *et. al. Estudos sobre Formas Contemporâneas de Trabalho Escravo* (Rio de Janeiro: Mauad X, 2018), 51-71; Fabiana Severo, “Trabalho Escravo Urbano Contemporâneo no Brasil: análise de mecanismos extrajudiciais de repressão e prevenção” In Ricardo Figueira *et. al. Estudos sobre Formas Contemporâneas de Trabalho Escravo* (Rio de Janeiro: Mauad X, 2018), 93-118; Krystima Chaves, “O trabalho escravo contemporâneo sob a perspectiva da teoria do desenvolvimento humano de Amartya Sen” In Ricardo Figueira, *et al, Estudos sobre Formas Contemporâneas de Escravidão* (Rio de Janeiro: Mauad X, 2018), 73-91.

<sup>10</sup> The document “*Uma Igreja da Amazônia em conflito com o latifúndio e a marginalização social*” is historically considered the first contemporary report on workers in a situation analogous to slavery in the Amazon region. Published in 1971, the document is recognized as an inflection point in the struggle against contemporary slavery. José de Souza Martins, “A escravidão nos dias de hoje e as ciladas da interpretação” In Comissão Pastoral da Terra, *Trabalho Escravo no Brasil Contemporâneo* (São Paulo: Ed. Loyola, 1999), 127-164.

<sup>11</sup> The former president Fernando Henrique Cardoso recognized the existence of contemporary slavery and announced the establishment of policies to prevent such working conditions.

Since then, official numbers of the Brazilian government indicate the hugeness of the problem: more than 55 thousand workers were rescued from a situation equivalent to slavery (Radar - Painel de Informações e Estatísticas da Inspeção do Trabalho no Brasil, 2020). Official statistics, however, do not show the number of enslaved workers who have not experienced fiscal action, nor do they demonstrate the re-enslavement situations. A study carried out by the International Labor Organization (ILO), which interviewed 121 workers rescued between October 2006 and July 2007, revealed that for each worker rescued in Brazil, it can be considered that 7 to 8 are not reached by the inspection. Among the rescued workers interviewed, 59.7% had already experienced situations of slave labor with deprivation of liberty, which makes recidivism part of the experience of these workers<sup>12</sup>.

The contemporary slaves in the Brazilian context are a phenomena that connect extreme violations of human and working rights with the slavery past of a society that is still in debt with the descendants of historical slaves. Nowadays, however, contemporary slavery is distinct from colonial slavery, abolished in 1888 by the enactment of Lei Áurea. Currently, slaves are not only Blacks and Pardos, although they are the majority of individuals in working conditions considered similar to slavery. Of the workers rescued between 2003 and 2018 in Brazil 42% declared themselves to be pardo, 12% black, 18% yellow and 23% white, showing the non-white profile of the workers rescued in Brazil. It is a phenomenon associated with social, economic and political vulnerabilities that affect non-qualified workers in agrarian and urban activities, although there is a prevalence of enslaving activities in Brazilian rural areas, since 73% of the workers rescued between 2003 and 2018 in the country were engaged in agricultural activities. 32% worked on beef cattle, 20% on rice, 8% on sugarcane and 11% on alcohol production. 3% worked as construction workers and 2% as bricklayers.<sup>13</sup>

The demand for unskilled labor combined with the supply of labor from socially and economically vulnerable workers produces the circumstances necessary for carrying out work in conditions similar to slavery. The absence of income or livelihoods, the lack of knowledge about labor rights and difficulties in accessing public health, education, work, employment and social assistance policies are vulnerabilities shared by workers currently enslaved in Brazil.

The exploitation of contemporary slaves in rural areas is directly linked to agribusinesses, a sector that produces a great part of the Brazilian commodities. Paradoxically, the agribusiness is a well-developed, modern and technological activity of the Brazilian economy, extremely capital-intensive. The use of capital-intensive technologies to produce agricultural commodities decreases the demand for unqualified workers. They are necessary for the performance of less specialized activities that precede the production of the commodities themselves, such as construction of fences or removal of native forest in an area that will receive agricultural or

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<sup>12</sup> International Labour Organization, *Perfil dos principais atores envolvidos no trabalho escravo rural no Brasil* (Brasília: ILO, 2011), 85-105.

<sup>13</sup> Data from the Digital Observatory for Slave Labor and Human Trafficking (<https://smartlabbr.org/trabalhoescravo>), accessed on: 05/07/2020.

livestock activities. Hence, still today, contemporary slavery is linked to the most precarious activities of the modernization process of capital expansion through agricultural activities<sup>14</sup>.

## CONTEMPORARY SLAVERY AND IMPACTS ON THE WORKERS HEALTH

Two main sets of factors can be used to analyze implications of contemporary slavery on health and security of workers: 1) the vulnerability of the exploited; and 2) the naturalization of overexploitation of workers.

Contemporary slavery is neither a recent nor an isolated and occasional problem in Brazil. It unfolds in many social and political contexts and in places plagued with extreme poverty and lack of opportunities in the labor market for unqualified workers, factors that decisively create situations of social vulnerability.

Therefore, although there are direct links between contemporary slavery and the colonial past, there is a clear convergence of this phenomenon with the modern degradation and overexploitation of unqualified workers<sup>15</sup>. Due to these features, the employers greatly reduce production costs, exposing their employees to degrading working conditions, in general, subjecting the individual to moral and physical control<sup>16</sup>.

As emphasized by Martins (1999), in societies with contemporary slavery, extremely harsh working conditions tend to be considered a natural fate of poor individuals who do not possess other living alternatives. A situation of absolute immediate financial deprivation is the factor that most motivates the worker to accept those working conditions. Hence, Moura<sup>17</sup> characterize the victims and survivors of modern slavery as "slaves of necessity", referring to vulnerable unqualified workers with working experience based on manual activities that require strength and physical endurance. Therefore, it is essential to understand contemporary slavery as a phenomenon naturally linked to a context of current labor force overexploitation in situations of coercion and violence in which vulnerable workers lose their social rights, being subjected to undignified living conditions.

Thus, contemporary slaves' living conditions, as well as impacts on their health, can be analyzed comparing contemporary slaves to groups of the population representing similar workers that, however, have not suffered from these degrading working conditions. Vulnerability and overexploitation associated with an exhaustive daily working routine may have significant

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<sup>14</sup> José de Souza Martins, "A escravidão nos dias de hoje e as ciladas da interpretação" In Comissão Pastoral da Terra, *Trabalho Escravo no Brasil Contemporâneo* (São Paulo: Ed. Loyola, 1999), 127-164.

<sup>15</sup> Rogério Garcia Schwarz, *Terra de trabalho, terra de negócio: o trabalho escravo contemporâneo na perspectiva (da violação) dos direitos sociais* (São Paulo: LTr, 2014).

<sup>16</sup> Lívia Mendes Moreira Miraglia, *Trabalho escravo contemporâneo: conceituação à luz do princípio da dignidade da pessoa humana* (São Paulo: LTr, 2011).

<sup>17</sup> Flávia de Almeida Moura, *Escravos Da Precisão: economia familiar e estratégias de sobrevivência de trabalhadores rurais em Codó (MA)* (Maranhão: Universidade Federal do Maranhão: Dissertação de Mestrado, 2006).

impacts on health levels. For instance, self-medication and the use of anti-inflammatories and painkillers have been reported among current slaves.

Differences in health levels might affect morbidity and mortality levels, and therefore, life expectancy. In this sense, this study estimates mortality levels of workers who were rescued from working conditions similar to slavery. More specifically, life expectancy at birth and survival probabilities are estimated for this group of individuals and comparisons with other groups in the population are made. The next section details the methodology.

## **METHODOLOGY**

### **Database**

The database used in this study contains administrative registers of individuals who were rescued from working conditions similar to slavery. The Labor Ministry, through the individual data on Unemployment Insurance, made the database available for Rescued Workers. This database is linked to data concerning death registers originated from the Civil Register's Computer-based System of Death Control (SISOBI), which is complemented by the Mortality Information System (SIM), created by DATASUS in the Health Ministry. These databases are harmonized and used in the empirical analysis of this paper.

Initially, the database had 35677 observations. 24 individuals were rescued twice, may present some particular idiosyncrasies, and were not included in the analysis. Only 5% of the individuals were women, and we selected only men to make the analysis more insightful, as mortality levels and life expectancies vary between sexes. A few individuals show problems in their year of birth and these were also excluded from the analysis. Moreover, data for those rescued in 2018 is incomplete and it was also excluded. The database has two forms of death registration, SISOBI and SIM. Most deaths were registered in both forms, 802 for the first and 756 for the second, however, the death record in one of the types of registration does not include deaths in 2017. Thus, data for this year was also excluded from the study.

The final sample size is 32971 observations of rescued men from 2003 and 2016 with ages ranging from 14 to 81 years old. 1019 of those had their death registered in at least one of the forms of registration.

### **Life expectancy at birth**

Life expectancy at birth of rescued men was estimated by standard procedures present in the literature <sup>18</sup>(Preston et al, 2001; Wachter, 2014). First, the number of living rescued individuals by age per year was directly obtained from the database for each year between 2003 and 2016. Then, the individuals were grouped in five age groups: 10 to 19 years old; 20 to 29 years old; 30 to 39 years old; 40 to 49 years old; and 50 to 59 years old. We use these age ranges in order to minimize statistical fluctuations due to small samples. After this, the number of

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<sup>18</sup>Kenneth W. Wachter, *Essential demographic methods* (Harvard: Harvard University Press, 2014).



individuals-year for each age group was estimated for all the period between 2003 and 2016. These numbers represent the risk of death for each individual in each age group.

Using data for deaths in the same age groups mentioned above, we estimated the ratio between deaths and individuals-year by age group in the period. Based on the standard methodology described in the literature<sup>19</sup> (Preston et al, 2001; Wachter, 2014), including the Brass<sup>20</sup> relational model described in the next subsection, the surviving probability in each age group was estimated for the period between 2003 and 2016. That is, we estimated the probability that an individual aged  $x$  would still be alive at age  $x + n$ .

However, there are three limitations in the estimates that must be emphasized. There are very few rescued individuals aged between 10 to 19 years old. All the estimates were made with and without this age group. The results are very similar and the results with this group are shown. Moreover, very few individuals aged 60 and over were rescued, so they were not used in the estimates. The use of mortality tables partially overcomes the problems associated with this feature of the data. Finally, the greatest limitation of the data is that there were no individuals aged under 10 among the rescued. Thus, it was impossible to estimate survival rates for this group. In order to overcome this limitation, three mortality tables for Brazil were used, with life expectancy at birth between 58.9 and 66.7 years old<sup>21</sup>, values below and above our estimates. The assumption is that rescued men have a similar survival rate to these mortality tables from birth until the age of ten. Using this assumption, we obtained a robust range of values for overall life expectancy at birth.

### **Brass relational model**

Relational models estimate standard mortality rates by age using a mathematical approach applied to mortality tables. More specifically, the relational model is a comparative mathematical relation between mortality tables chosen as a standard for comparison and mortality estimates of a particular population. The chosen standard mortality table captures the complexity of function representing mortality by age, and mathematical parameters determine deviations from this standard in order to reliably represent the empirical values described. An advantage of this approach is that it provides a high degree of flexibility. The first relational system was developed by Brass<sup>22</sup> and is based on the assumption that two mortality tables can be associated by a linear relation of the logits of survival probabilities from birth until the age  $x$  in each table. More formally, two sets of survival probabilities from two mortality tables, 1 and 2, have the following relationship:

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<sup>19</sup> *ibid.*

<sup>20</sup>William Brass, *Mortality models and their uses in demography*. *Transactions of the Faculty of Actuaries* (... v. 33, 1971), 123-142.

<sup>21</sup>CEPAL, *Tablas de vida* (CEPAL - América Latina y el Caribe - Observatorio Demográfico, 2017).

<sup>22</sup> *ibid.*

$$\log it(l_{2x}) = \alpha + \beta \log it(l_{1x}), \quad (1)$$

where  $l_x$  is the survival probability from birth to age  $x$  in each mortality table, and  $\alpha$  and  $\beta$  are parameters.

Variations of  $\alpha$  with a constant  $\beta$  vary mortality levels. If  $\alpha > 0$ , survival rates of mortality in table 2 are higher than in table 1. On the other hand, the contrary occurs if  $\alpha < 0$ . Changes in  $\beta$  with constant  $\alpha$  modifies the age profile of mortality levels. For instance,  $\beta > 1$ , mortality in table 2 concentrates at older ages.

### Log-quad model

Another relational model is the log-quad model. Wilmoth *et al.*<sup>23</sup> developed this model, a flexible bi-dimensional model of mortality tables. This technique indirectly generates estimates of complete mortality tables using partial data for a region or a population group, for instance, child mortality (from birth to 5 years) and adult mortality (from 15 to 60 years old), as used in this study. Other pairs of data, such as infant mortality (from birth to 1 year) and adult mortality in other age ranges can also be used. The model presents some interesting features as it has a great flexibility, demands very little information to obtain complete mortality curves and life expectancy at different ages, and results are robust. We use the same methodology proposed by these authors and the estimates are based on the results obtained by the Brass relational model.

The bi-dimensional log-quadratic model used to estimate mortality rates by age,  $m_x$ , is defined as:

$$\log(m_x) = \alpha_x + \beta_x \log(m_{child}) + \delta_x \log^2(m_{child}) + \gamma_x \kappa \quad (2)$$

where  $m_{child}$  is child death probability,  $\kappa$  is a parameter of mortality level that varies between -2 and 2, and  $\alpha_x$ ,  $\beta_x$  and  $\delta_x$  are parameters that differ by age and sex.

$\kappa$  is interactively estimated by using the mortality probability between the ages of 15 and 60. The value is obtained when the value estimated by the model for this probability is equal to the empirical value. The model estimates mortality probabilities for specific ages using the value of  $\kappa$  and of  $\log(m_{child})$ .

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<sup>23</sup> John Wilmoth *et al.*, "A flexible two-dimensional mortality model for use in indirect estimation" In *Population studies*, v. 66, n. 1 (...), 2012), 1-28.

## RESULTS

Life expectancy at birth and survival probabilities were estimated for rescued men in Brazil for the period between 2003 and 2016. The results were compared to other groups in the population in order to verify whether there are differences between individuals who suffered from contemporary slavery and similar individuals in the Brazilian population who did not suffer from this phenomenon.

Table 1 shows the estimates for life expectancy at birth for workers who were rescued from modern slavery conditions. As mentioned, we use three mortality tables for Brazil with life expectancy at birth below and above our estimates, and obtain a robust range of values for overall life expectancy at birth for the period between 2003 and 2016. First, notice that the estimates are not very sensitive to the assumption that rescued men had a similar survival rate than these mortality tables from birth until the age of ten. The values for life expectancy vary from 60.7 to 61.6, a quite narrow range.

**Table 1 – Life expectancy at birth of rescued men, Brazil, 2003-2016**

Life expectancy at birth in the mortality tables	Life expectancy at birth of rescued men
58.9	60.7
61.9	61.6
66.7	61.4

Source: SISOBI, SIM and authors estimates

These results are compared to similar socio demographic groups of the Brazilian population. For instance, life expectancy at birth for unskilled men who live in the North or Northeast regions ranged between 65 and 67 years (Silva, Pereira and Freire, 2016). That is, a value quite higher than the observed for rescued workers between 2003 and 2016, although this first population group may also face poverty and harsh working conditions.

The results presented in table 1 seem quite robust. However, the use of the Brass relational model in databases such as the one used in this paper may present some limitations, as already mentioned, in particular the use of mortality tables to exogenously estimate survival rates of the first and last age groups. The use of three different mortality tables could overcome some of the limitations. Nonetheless, in order to test the robustness of our estimates by using a different approach, we choose to compare mortality rates for rescued workers with Brazilian adults in different population groups.

We estimated the death probabilities for those aged between 15 and 60 years. This estimate has several advantages: it captures mortality levels in a large age interval; it does not suffer the effects of mortality levels for children, a limitation of our data; and it does not use data for older individuals, another limitation of our data.

Table 2 shows the results for rescued workers and for different groups in the Brazilian population. Workers rescued from conditions similar to slavery have a probability of 28.8% of dying between the ages of 15 and 60. This number is compared to other groups in the Brazilian population. First, it is much higher than for Brazilian men, a group with a value of 21.3%. However, these differences may be caused by the higher SES level of Brazilian men when compared to rescued individuals. Indeed, qualified men in Brazil show a much lower death probability between the ages of 15 and 60, 9.3%. However, even the non-qualified men in Brazil show lower probabilities than rescued workers, 23.2% against 28.8%. This might be caused by regional differences in mortality rates of unqualified men. Truly, mortality levels for this group in the Northeast region, the poorest in Brazil, are higher than in other regions, but the value for death probability is still smaller than the observed for rescued men, 25.3% against 28.8%. Last comparison is between rescued men and indigenous men, and the first also present higher death probabilities.

The results indicate that the death probability of rescued men is considerably superior to all the other analyzed groups in the Brazilian population. The value is similar to the observed in very violent regions of Latin America, with large prevalences of external cause deaths, such as Guatemala and El Salvador, with values ranging between 22% and 30% for the probability of dying between the ages of 15 and 60 in 2015. Although high, the death probability between these ages for rescued workers is much lower than in regions plagued by HIV/AIDS epidemics, such as South Africa and Mozambique, with values between 44.4% and 63.0% for this probability in 2007.

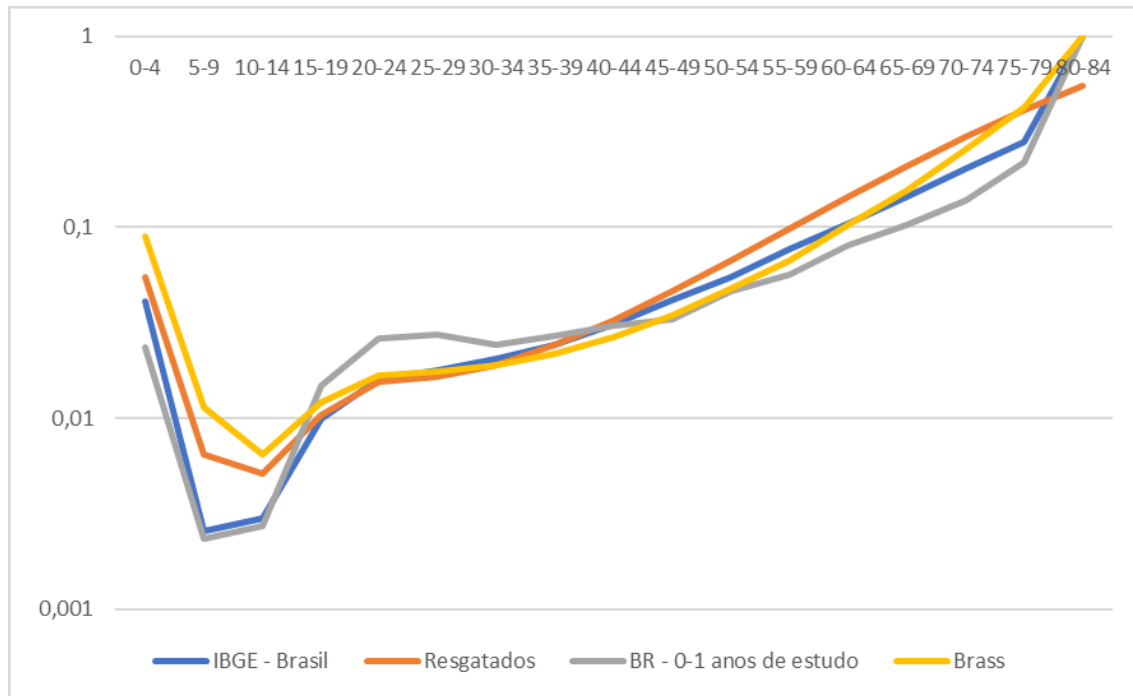
Table 2 – Death probabilities for Brazilian men in different population groups

<b>Population group</b>	<b>Death Probability (%)</b>
Rescued workers	28.8
Brazilian men	21.3
Qualified Brazilian men	9.3
Unqualified Brazilian men	23.2
Unqualified Brazilian men – South	21.9
Unqualified Brazilian men – Southeast	22.5
Unqualified Brazilian men – Central-West	21.1
Unqualified Brazilian men – North	20.9
Unqualified Brazilian men – Northeast	25.3
Non-indigenous Brazilian men	21.5
Indigenous Brazilian men	25.5

Source: SISOBI, SIM and authors estimates; IBGE (Censo 2010); Silva, Freire and Pereira (2016), Campos *et al.* (2017), Queiroz and Sawyer (2012) .

Additionally, based on infant and adult mortality estimates generated by the Brass relational model, we obtained the complete mortality curve using the log-quad model. Figure 1 compares this curve for different groups of Brazilian men. The mortality estimates for children and young adolescents are lower for rescued individuals than the observed for other groups of the population. However, due to the limitations of the data, we believe that it is better to focus the attention on adult mortality. The results for adult mortality indicate that mortality levels are similar to the poorest and least qualified in Brazil (Silva, Pereira and Freire, 2016; Campos, *et al.*, 2017). Nonetheless, mortality levels for young adults are higher.

Figure 1 – Comparisons of mortality curves for different groups of males in the Brazilian population



## CONCLUSION

This study estimates mortality levels and life expectancy at birth for workers rescued from working conditions similar to slavery, the contemporary slaves. The main question addressed is: are mortality levels of contemporary slaves higher than the ones of similar individuals who did not suffer from these extremely harsh working conditions? This topic is approached based on a public health perspective, which uses an amplified concept of health encompassing threats to life, degrading working conditions, harmful impacts to interpersonal relationships and quality of life.

Life expectancy at birth for those rescued from working conditions similar to slavery ranged from 60.7 to 61.6 between 2003 and 2016, while this estimate for Brazilian men was around 67 years in the same period. The results indicate that mortality levels of contemporary slaves are also higher when compared to similar individuals in the Brazilian population, such as unqualified men living in the Northeast region, or indigenous men.

Even though similar in many aspects to other individuals in the Brazilian population, contemporary slaves are subjected to extremely harsh working conditions and degrading living circumstances that may increase mortality levels. Besides, they have less access to health services, which may also negatively influence survival rates.

Degrading work conditions act cumulatively on the enslaved, leading them to illness and death in subsequent years. Its mortality rate is similar to that observed in violent regions of Latin America. Contemporary slavery can, therefore, be perceived as an external threat to the lives of

those who suffer it, which makes it a multifaceted problem associated with public health and safety, in addition to strongly affecting human and labor rights. This reinforces the need for an intersectoral approach to tackle it.

This study is directly linked to safeguarding basic human rights for poor individuals in Brazil, a basic feature of citizenship in democratic societies. It touches social, political and health issues, potentially affecting public policies designed to eradicate such practices.

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