A Disability Beneficiaries Life Table from the General Social Security Regime for Private Sector Workers (RGPS), by disability cause Brazil, 1999-2002.

Marília Miranda Forte Gomes[♦]
Everton Emanuel Campos de Lima[♦]
Marcos Roberto Gonzaga[♦]
Moema Gonçalves Bueno Fígoli[♥]

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Abstract

The main goal of this paper is to estimate a Disability Beneficiaries Life Table from the General Social Security Regime for Private Sector Workers (RGPS) by sex, age and disability cause in Brazil using multiple-decrement models. The results show that – in contradiction with the disability life tables used by the private sector – the male disability retirement hazard increases steadily until age 65 and after that it decreases. However, for females, these risks increase continuously up to the oldest age. More sex differentials show that, among women, the risk of disability retirement is larger due to circulatory diseases, musculoskeletal diseases and neoplasms. Among the men, mental disorders are the most responsible for an overweight in the number of pensioners, especially among the young and adult age groups. This paper contributes to a better understanding of work and disability, especially in the field of social security and retirement.

♦ Graduate Students, CEDEPLAR/UFMG, Brazil. E-mail: mariliamfg@gmail.com
♥ Full Professor, CEDEPLAR/UFMG, Brazil. E-mail: moema@cedeplar.ufmg.br

1. Introduction

The Brazilian demographic transition process during the last half century caused expressive changes in the Brazilian population age structure (Carvalho, 2004). The first important change is characterized by a fast child mortality decline beginning in the 1940s. The direct consequence of this process of mortality decline was the increase in life expectancy (Prata, 1992; Ortiz, 2002). In a period of almost sixty years, the life expectancy of the country rose from 44 years in 1940 to 72 years in 2004 (Carvalho, 2004; IDB, 2005). In the most developed regions of the country it has been verified that there is an increase in the number of deaths by external causes and non-transmissible diseases, but a decrease in the number of deaths by transmissible diseases (Ferreira & Catiñeiras, 1996, 1998; Gawryszewski & Jorge, 2000; Nunes, 2004; Schramm et al, 2004). Moreover, fertility has followed a similar path of continuous decline. TFR (Total Fertility Rate) fell from 6.3 to 5.8 in 1970 and to 4.4 in 1980. After the end of the 1980s the reduction in the national TFR was more pronounced, achieving the value of 2.9 in 1991. Finally, in 2006, the TFR reached the below replacement level (Rios-Neto, 2005; IDB, 2007; Alves, 2008).

This demographic transition process has important implications to labor market and social security system due to the changes in the age structure. In the case of Brazil, in order to keep the social security system working, it is necessary to have an overwhelming number of taxpayers. In this way, the Brazilian demographic transition process, characterized by a fertility decline and increasing in life expectancy, causes a reduction in the number of future active population, together with population aging. Therefore, the amount of taxpayers decrease as the number of beneficiaries increases and the social security system becomes deficient (Brito, 2007).

The Brazilian social security system defines work disability as the incapacity to develop any kind of labor activity without the possibility of recovering or exercising any payment work activity (Brasil, 1999). In Brazil, the public social security system allows early retirement, and it also covers any income lost to all insured laborers and victims of permanent work disability due to illness or work injuries. This retirement benefit shall be granted to the employee, even if he or she does not have illness assistance[1] (Gomes, 2008).

State of work incapacity is verified by periodical medical evaluation. For the worker, the possibility of a health evaluation by his own trusted physician is permissible. In any case, there is no possibility to get retirement disability when the disease or injury was notified on the day of social security membership; however, there is an exception in the case of incapacity due to progression or aggravation of this disease or injury (Brasil, 1999). According to the regulation of Brazilian Social Security (1999), the benefit of retirement disability is granted for those who pay at least twelve months to the pension public system, this being the minimum time length of contribution until the pensioner starts to receive social retirement benefits.

For those who lost the benefit of retirement, and instead, renew their membership to RGPS, the right of retirement disability is given after four months of payment to the social security system. However, in two cases the benefit of retirement is independent of the time of

[1] The illness assistance is a benefit given in the cases of temporary incapacity to work, due to illness or injury that exceeds 15 days (Brazil, 1999).

contribution[2]. The first being when the retirement occupation disability is caused by work accident, and the second, when the employee falls victim to any specific illness or injury, according to the disease list of the Health Ministry and Social Security.

The last list released by the Portaria Interministerial n° 2.998, 23 August 2001 includes the following list of diseases: active tuberculosis, leprosy, mental alienation, malignant neoplasm, blindness, irreversible and disabling paralysis, serious cardiopathy, advanced state of the illness of Paget, Syndrome of the Acquired Immune Deficiency – AIDS, radiation contamination and serious liver diseases (Brasil, 1999). Since 1991 there is no change in this list.

According to the Anuários Estatísticos da Previdência Social (AEPS) the disabilities withdraw benefit can be classified into accidental or social security retirement. The main distinction among these two is that the retirement by accident occurs when the employee exercises his work activity inside the occupational environment or during transportation to and from work. Moreover, the accidental withdraw is independent of the number of former financial contributions to the RGPS, nonetheless, this benefit will be available once the worker has paid the minimum pension contribution established by law.

In the sense that this paper brings a better understanding and knowledge of the retirement benefit flows it serves as a pillar for public policy. The estimation of such retirement flows is based on the so-called "disability beneficiaries life tables". These tables contain the transition hazards from occupational state to permanent disability withdraw. Concerning the construction of these tables, it is remarkable that population age composition is highly correlated with the transition hazards (Gomes, 2008). The knowledge of these transition hazards of retirement, in relation to the disease and injury, can serve as guide for policy makers once they can apply this information in the labor environment to develop work and health prevention policies. This information can also be applied to forecast the costs of early labor market exits, since earlier withdraws generally create more costs for the social security system (Ribeiro, 2006). Thus, our main goal is to build up **disability beneficiary life tables** by sex, age and disability causes. Theses tables consider only the laborers who are insured by the public social security regime, RGPS, during the period of January 1st, 1999 to December 31st, 2002. The main methodologies applied in this paper are multi-decrement life tables. These tables allow the opportunity to study the effects of every disability cause, separately or together, and the resultant effect on the general retirement pattern.

It is important to say that these tables represent only the disability retirement experience of each individual. They do not include the entire population of disabled individuals. Therefore, these tables include only the pensioners who retire due to some disability. All other beneficiaries are not considered in the analysis. Also not included are other beneficiaries who receive benefits from continuous payment[3] since the Ministry of Social Security (INSS) does not allow the change of these benefits in disability retirement. Furthermore, those who chose other pension system are discarded from the analyses. It is important to say that the

[2] The accidents of any nature or cause are defined as being those of traumatic origin and exposition to exogenous agents (physical, chemical and biological) that they cause bodily injuries or functional disturbance, resulting in death or permanent or temporary loss of the capacity to work (Brazil, 1999 and Ribeiro, 2006).

[3] Benefits from continuous payment are characterized by continuous monthly payments, until some cause (for example death) cease it. In this category of retirement are pensions for death, lifetime monthly incomes, allowances of permanence in service, the wage-family and maternity, etcs (AEPS 2005, 2007).

risks of retirement are competitive, since there are different kinds of benefits offered by the security system. For this reason the values of the disability retirement hazards may be affected by these competitive benefits. In order to get better estimates we try to adjust the disability life table considering only the beneficiaries from the RGPS (Gomes, 2008).

2. Data and methods

2.1 Data set and population of study

The data is built up by administrative records gathered by Technological Enterprises and Social Security Information (DATAPREV) and combined with the information of beneficiaries given by the Previdência Social do Cadastro Nacional de Informações Sociais (CNIS). The mortality tables, by sex and age, are estimated according to data from the Departamento de População e Indicadores Sociais (DEPIS) and Instituto Brasileiro de Geografia e Estatística (IBGE).

The period of analyses is from 1999 to 2002. It is a good period since it represents recent experiences of the retirees. At the same time, it is also a short period which reduces the effects of changes in the benefits rules[4] on the transitions from activity to disability state. For the estimation of the transition rates, both rural and urban beneficiaries are considered. However, the groups of special retirees[5] are discarded once these pensioners make up part of the crude rural production, therefore they may be underestimated. For the most part these workers receive social security benefit after a minimum time of exercise in some rural occupation. For these rural workers, the social security system guarantees health assistance or disability retirement in the value of minimum country wage (Brasil, 1999; AEPS 2005, 2007). Depending on which beneficiary group is considered, the transition rates will be biased due to a lack of information about the exact number of employees who belongs to this group (Gomes, 2008).

2.2 classifications of disabilities according to the ICD 10

In accordance with the revised 10th International Classification of Diseases (ICD 10) the disability retirement tables for the period of 1999-2002 were established. Among the disability withdraws in 1999, barely 20% were classified following the ICD 9. For the following periods the classification of diseases by ICD 10 was applied. For this reason, the analyses of the retirement tables did not go to more disaggregated levels of illness, according to the ICD 10, since it is expected that more detailed levels of analyses might bring incorrect classifications (Ribeiro, 2006).

The data was processed following the footsteps of the previous work of Ribeiro (2006). In this way, the structure of disability causes included information from the initial physician visit until the last physician visit. If information from the first medical visit was not available, such that a comparison could not be made, then only information from the last medical record was considered.

[4] The changes in benefit rules came after the Constitutional Emend n° 20, from 16 December 1998 (Brasil, 1998).

[5] The special retirees are classified in: the producer, the partner, the sharecropper and the agricultural leaseholder, the artisan fisherman who exercise these activities individually or in familiar economy regime, receiving eventual assistance from a third party. Also it is taken to account the respective spouses, friends and children older than 16 years, since they work with the respective familiar group (AEPS 2005, 2007).

During the classification of diseases we took into account two important changes that occurred among the 9th and 10th ICD. The first change concerns the split of the single chapter on nervous and sensory system diseases from the former ICD 9 into three new chapters in the ICD 10. Chapter VI now contains diseases of the nervous system, chapter VII diseases of the eye and adnexa, and chapter VIII contains information on the diseases of the ear and mastoid process. The second change concerns Chapters I, III and IV from ICD 10. In the former classification the immune deficiency disorders, including HIV infection, belong to Chapter III (endocrine glands, nutrition and metabolism diseases, and disorders involving the immune mechanism). In the new classification of ICD 10 HIV infection became part of other chapters, namely Chapter I detailing certain infectious and parasitic diseases, and Chapter III which covers diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism. The endocrines, nutritionals and metabolic diseases have been placed in a separate chapter in ICD 10 (Grassi and Laurenti, 1998). Furthermore, the retirement disability causes from Chapter VI in ICD 9 have been divided into other chapters in the ICD 10.

To facilitate construction of the transition tables, we introduce the category of "non-information", gathering all unexpected disability retirement causes. For example, the causes of disability classified in Chapter XV concerning pregnancy, childbirth and puerperium and in Chapter XVI covering certain conditions originating in the perinatal period and Chapter XX detailing external causes of morbidity and mortality were placed into the category "non-information" because there were no retirement benefits concerning these causes (see table 1). We also create the category of "others" gathering less representative disability information. The category contains the following chapters and diseases: Chapter III - diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism, Chapter VIII - diseases of the ear and mastoid process, Chapter XI - diseases of the digestive system, Chapter XII - diseases of the skin and subcutaneous tissue, Chapter XVII - congenital malformations, deformations and chromosomal abnormalities, Chapter XVIII - symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified and Chapter XXI - factors influencing health status and contact with health services. In table 1, however, the category "other" is discarded; it is used only to estimate the retirement hazards.

Table 1 – Structure of disability retirement causes according to the ICD 10. Brazil, 01/01/1999 a 31/12/2002.

Chapter	Start year of disability retirement				Total
	1999	2000	2001	2002	
I	6.160	6.125	5.267	6.494	24.046
II	7.734	7.399	7.327	10.267	32.727
III	406	312	220	310	1.248
IV	3.739	3.250	2.950	4.358	14.297
V	21.920	15.549	12.366	18.031	67.866
VI	10.036	8.259	7.024	9.599	34.918
VII	7.335	5.807	4.774	6.878	24.794
VIII	588	530	469	757	2.344
IX	48.676	37.976	30.780	42.547	159.979
X	4.136	3.317	2.717	3.686	13.856
XI	1.617	1.600	1.318	1.871	6.406
XII	1.210	896	734	939	3.779
XIII	26.991	24.049	22.467	33.166	106.673
XIV	2.704	2.476	2.228	3.012	10.420
XV	10	12	6	8	36
XVI	1	0	0	0	1
XVII	165	131	101	173	570
XVIII	114	0	0	0	114
XIX	10.298	9.232	8.206	11.522	39.258
XX	23	0	0	0	23
XXI	290	19	27	48	384
Non-information	970	737	664	1.083	3.454
Total	155.123	127.676	109.645	154.749	547.193

Sources: MPS/DATAPREV.

It is important to note that the strikes of social security laborers during the period of 2000-2001 could be responsible for a reduction in the number of disability retirees in that period. For example, in 2001 a strike occurred involving public sector laborers from the INSS. At this period, many retirees might have delayed their exit from the labor market, or they may have passed away before receiving the benefit (Gomes, 2008).

2.3 Decrement life tables: disability retirement life tables according to morbidity causes

In order to build up the life table, we assumed that the workers are at risk of labor market exit due to different morbidity causes. In this context of multiple events, each singular cause of retirement can be regarded as decrement or transition rates. We also assume that, at the time of retirement, every possible cause of morbidity could be experienced by the retiree (Seal, 1977; Winklevoss, 1993).

Since we know all transition states the next step is to estimate the whole life table and the retirement hazards. Thus, disability retirement hazards by a particular case are estimated, as well as the gain in years after a singular morbidity cause is discarded (Namboodiri and Suchindran, 1987). The estimates are obtained via the following steps:

- *First step*: estimate the disability retirement life table for all morbidity causes. The basic idea behind it is to estimate the disability retirement rates according to all morbidity causes – ${}_{n}r_{x}$ – between the ages *x* and *x*+*n*, in the time interval *t*:

$$ {}_{n}r_{x,+} = \left(\frac{{}_{n}I_{x,+}}{{}_{n}L_{x}^{aa}} \right) \tag{1} $$

Where:

${}_{n}I_{x,+}$: Number of pensioners among the ages *x* and *x*+*n*, at the observation period, according to the all causes C_{+};

${}_{n}L_{x}^{aa}$: Number of person-years exposed to the risk disability withdraw in ages *x* and *x*+*n*, during the observation period.

The number of permanent disabled pensioners is estimated by the number of social benefits given during the period between January 1st, 1999 and December 31st, 2002 regarding the time of exposure to the risk of retirement disability (see Gomes, 2008).

- *Second Step*: after estimating the total numbers of retirees this amount is distributed into distinguished disability causes – C_{α} – in each age. It is done considering the proportional distribution of the number of retirees by each observed morbidity reason:

$$ {}_{n}i_{x,\alpha} = {}_{n}i_{x} \times \left(\frac{{}_{n}I_{x,\alpha}}{{}_{n}I_{x,+}} \right) \tag{2} $$

Where:

${}_{n}i_{x,\alpha}$: Number of pensioners by each disability cause C_{α}, between the ages *x* and *x*+*n*, in the period of study;

${}_{n}i_{x}$: Number of pensioners in the table considering all combined disability causes C_{+}, between the ages *x* and *x*+*n* and in the study period;

${}_{n}I_{x,\alpha}$: Number of observed pensioners, between the ages *x* and *x*+*n* and in the study period according to cause C_{α};

${}_{n}I_{x,+}$: Number of observed pensioners, between the ages *x* and *x*+*n* and in the study period, by cause C_{α} according to cause C_{+};

- *Step three*: the ratio of ${}_{n}i_{x,\alpha}$ and the survive function l_{x}. We estimate the retirement hazards according to each morbidity cause. The assumption behind rationality is that the whole population at risk to survive until exact age *x* can retire due to any disability cause C_{α} since each cause of morbidity can be experienced by the pensioner (Namboodiri and Suchindran, 1987). These estimated hazards are then so-called "crude disability retirement hazards according to morbidity cause".

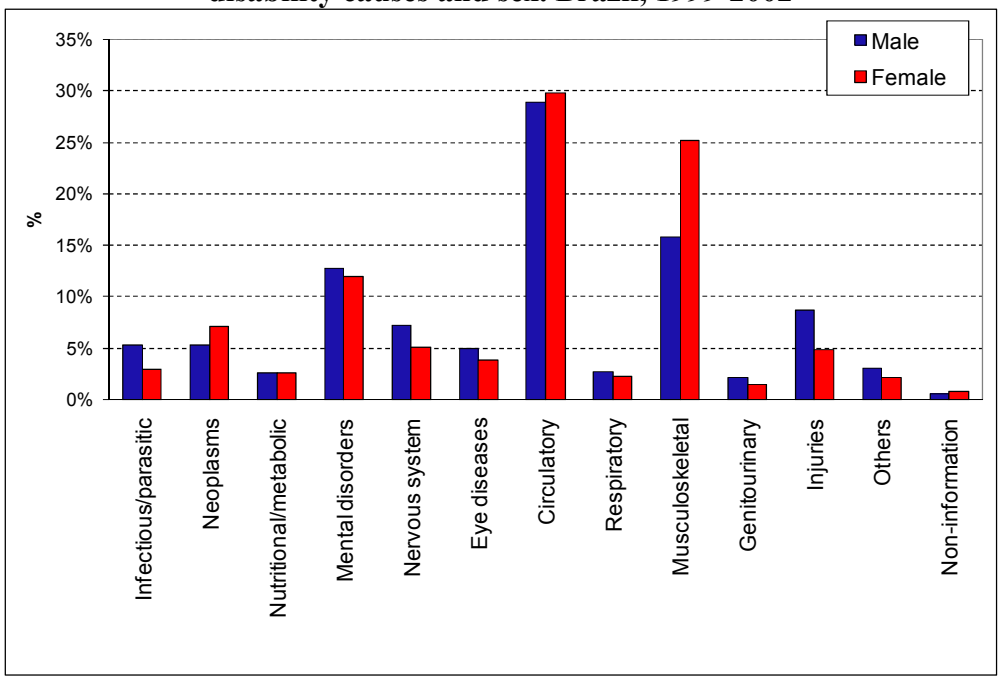
It is important to note, however, the RGPS beneficiary is at risk of disability withdraw at the commencement of his membership. This can happen as long as he is aged 15 (while the employee is a trainee) or aged 17 and above for the other beneficiaries. Although, in this paper we consider just those who retire between the age limits of 20 and 70 years old. The choice of 20 as the minimum age was due to the small number of pensioners below that age during the observation period. The upper limit was chosen based on the the same idea proposed by Ribeiro (2006). We consider the minimum age for retirement as the highest age limit, however, the population in our sample contains rural and urban retirees, and these two population groups have distinguished ages to retire. Moreover, we verified an overweight in the number of pensioners after the age of 60. For that reason, we found it reliable to consider age 70 as a consistent upper limit, although after this age we verify a small number of labor market exits - barely 1.4% of all retirement benefits. Once the retirement probabilities were estimated the next step was to build up the disability life table by sex and age for the period of analysis.

3. Results

3.1 Generally characteristics of disability retirement according to disease causes between 1999-2002

Figure 1 shows the distribution of the disability labor market exits by sex. As we can see, for both sexes, circulatory diseases were the most responsible for an overwhelming number of retirement benefits, corresponding to 29.2% of the total amount of retirees. These diseases are followed by musculoskeletal diseases and mental disorder, representing 19.5% and 12.4% of the total number of pensioners respectively. In the United States during the period 1998-2002, these diseases were also the most responsible in granting retirement benefits (Zayatz, 2005). Among the sexes, men have higher percentages of injuries than women; however, it is clearly visible that musculoskeletal diseases affect a larger percentage of women than men.

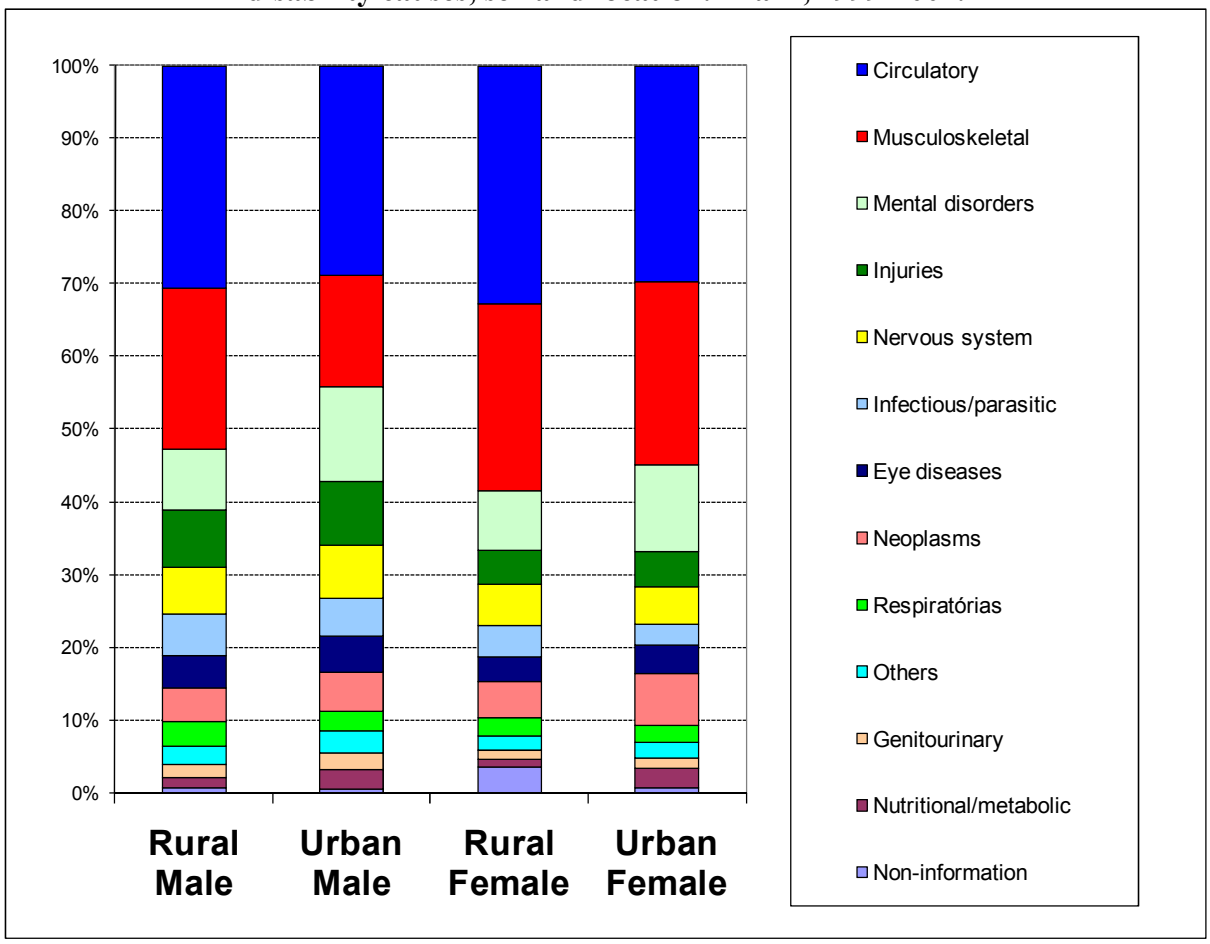
Figure 1 – Relative distribution of the disability beneficiaries from RGPS according to disability causes and sex. Brazil, 1999-2002



Source: MPS/DATAPREV.

Figure 2 shows the same conclusion as the previous graph, highlighting that circulatory and musculoskeletal diseases grant the majority of retirement benefits. Neoplasms were more commonly found among women in urban dwellings. Furthermore, in urban locations eye diseases and mental and behavioral disorders are the main diseases that promote male disability retirement. Nonetheless, distinguishing between place of residence, either urban or rural, is generally not indicative of different patterns of disease.

Figure 2 – Relative distribution of the disability beneficiaries from RGPS according to disability causes, sex and location. Brazil, 1999-2002.

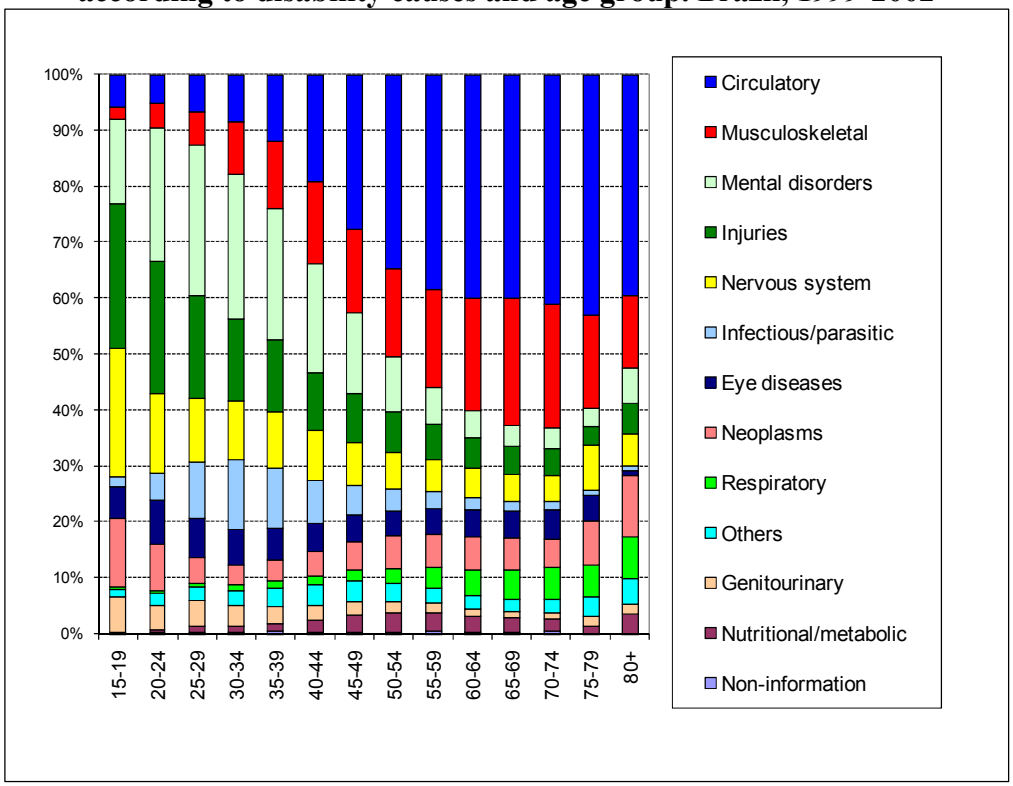


Source: MPS/DATAPREV.

Zayatz (1999, 2005) makes clear that the distribution of retirement benefits, according to disability causes, are highly correlated with the age of the pensioner. This may explain the different retirement distribution verified among the sexes.

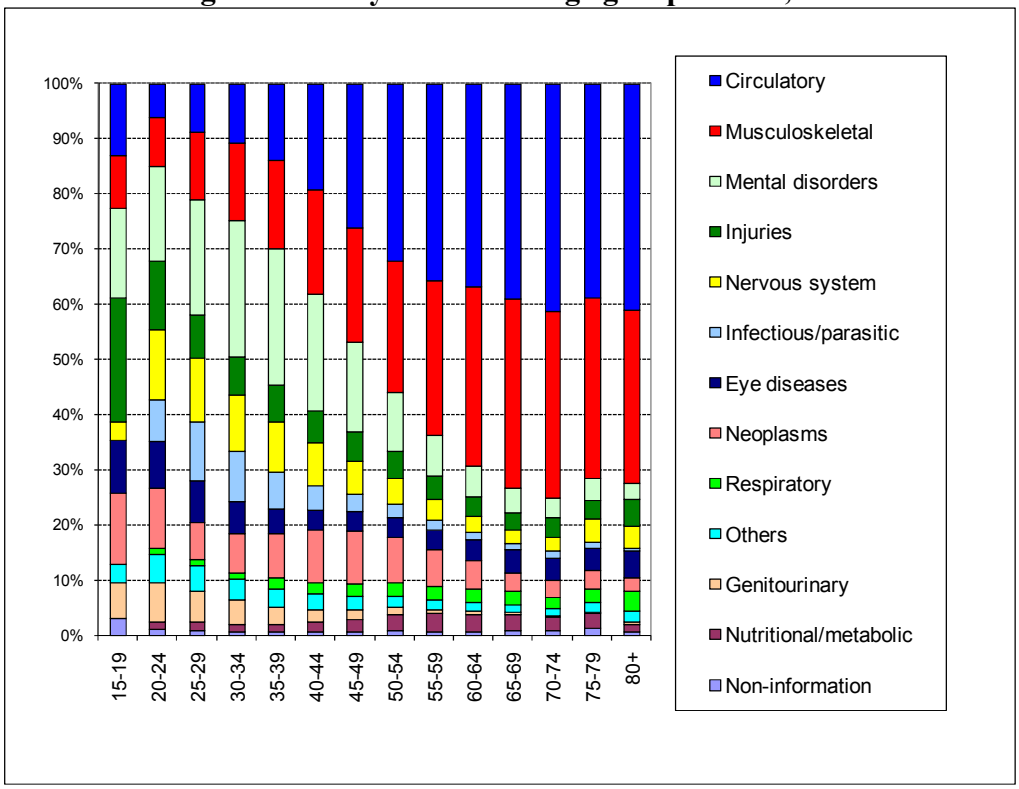
In the next graphs, 3 and 4, we observe the change in disability causes with age. Mental disorders and nervous system diseases tend to decrease with age. Other diseases like circulatory and musculoskeletal diseases are more common mainly among women. Ribeiro (2006) verifies that the health conditions of a laborer tend to deteriorate once the individual becomes older. As a direct consequence we expect that the number of other disabilities increase with the age of the employee.

Figure 3 – Male Relative distribution of the disability beneficiaries from RGPS according to disability causes and age group. Brazil, 1999-2002



Sources: MPS/DATAPREV.

Figure 4 – Female Relative distribution of the disability beneficiaries from RGPS according to disability causes and age group. Brazil, 1999-2002



Sources: MPS/DATAPREV.

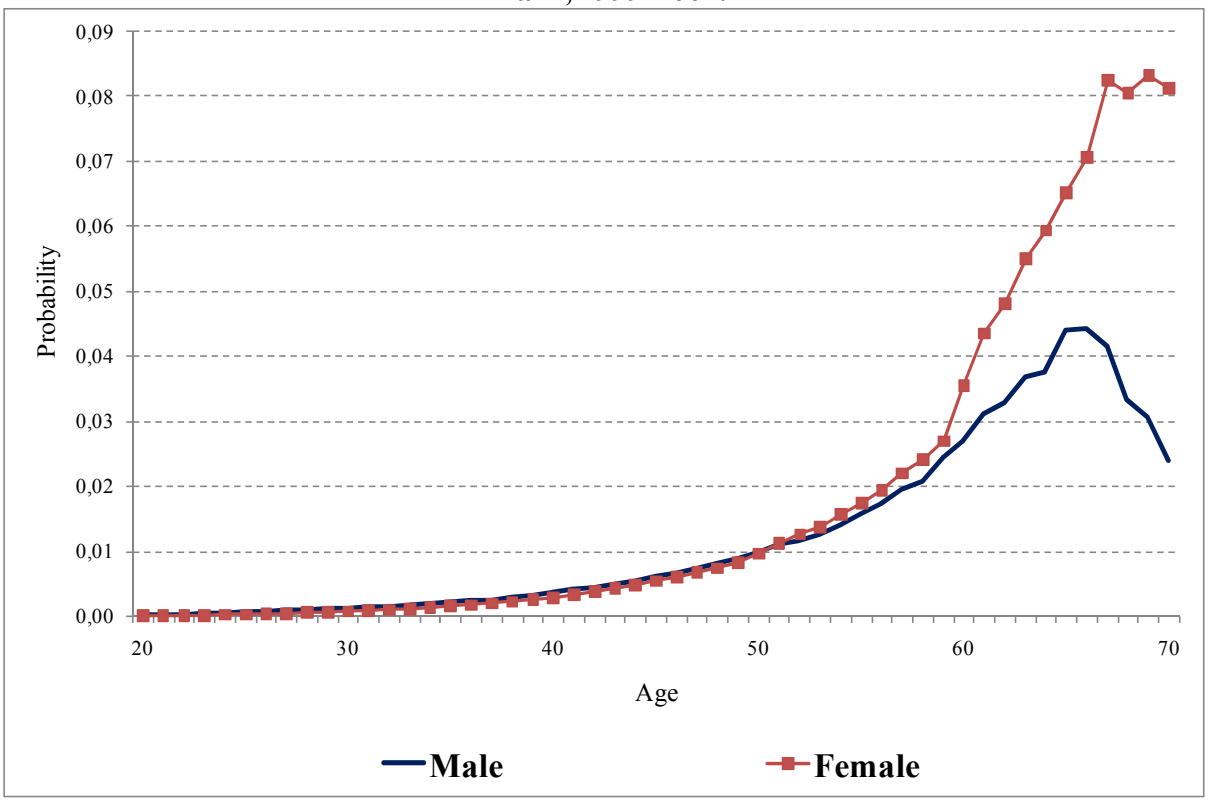
The next section presents the crude hazards of retirement according to morbidity causes, sex and age for the period of analysis.

3.2 The intrinsic pattern in the life tables

The tables 1 and 2 show crude pension hazards. It is important to note that in the construction of these tables we consider only the beneficiaries from the RGPS. Once they are employees granted with other kinds of pension benefits or members of other retirement system they are dropped from our analysis.

Generally, the male retirement hazards by morbidity cause (see TAB. 1 e GRAPH. 5) increases steadily until age 65 and after that it decreases, showing high values until the age of 70. For females, however, these risks increase continuously up to the oldest age (see TAB. 2 e GRAPH. 5). The decline in the male retirement hazards after age 65 may lead to different conclusions. An initial conclusion is that among all retirees there is some kind of selective group with better health conditions and with higher risks to stay active. A second conclusion implies that fragile retirees acquire other sorts of benefits or they simply cannot financially contribute to RGPS and keep their social benefit. Thus, as we can see, there are still a larger number of labor market exits, even after the upper age limit to retire. This can be explained by the presence of female employees, who did not fulfill the prerequisites to retire until the minimum age of pension. In this way they still belong to the risk group of disability retirement for a longer period.

Figure 5 – Crude disability retirement hazards according to sex and age. Brazil, 1999-2002.



Source: TAB. 1 e TAB. 2.

Table 1. Male crude disability retirement hazards according to health cause and age. Brazil, 1999-2002.

Age	Crude hazards													
	Infectious	Neoplasms	Nutritional/metabolic	Mental disorders	Nervous system	Eye diseases	Circulatory	Respiratory	Musculoskeletal	Genitourinary	Injuries	Others	Non-information	Total
20	0,00000	0,00001	0,00000	0,00002	0,00001	0,00001	0,00000	0,00000	0,00000	0,00000	0,00002	0,00000	0,00000	0,00009
21	0,00001	0,00002	0,00000	0,00003	0,00002	0,00001	0,00001	0,00000	0,00001	0,00001	0,00004	0,00000	0,00000	0,00015
22	0,00001	0,00002	0,00000	0,00004	0,00003	0,00002	0,00001	0,00000	0,00001	0,00001	0,00004	0,00000	0,00001	0,00020
23	0,00002	0,00002	0,00000	0,00007	0,00004	0,00003	0,00002	0,00000	0,00002	0,00002	0,00006	0,00000	0,00001	0,00030
24	0,00003	0,00003	0,00000	0,00009	0,00004	0,00003	0,00002	0,00000	0,00002	0,00002	0,00007	0,00000	0,00001	0,00038
25	0,00004	0,00003	0,00001	0,00014	0,00006	0,00003	0,00004	0,00001	0,00003	0,00003	0,00009	0,00000	0,00001	0,00051
26	0,00005	0,00003	0,00001	0,00015	0,00007	0,00004	0,00005	0,00000	0,00004	0,00003	0,00010	0,00000	0,00002	0,00059
27	0,00008	0,00004	0,00001	0,00018	0,00008	0,00005	0,00006	0,00000	0,00006	0,00004	0,00012	0,00000	0,00002	0,00074
28	0,00009	0,00004	0,00001	0,00021	0,00009	0,00006	0,00006	0,00001	0,00006	0,00004	0,00012	0,00000	0,00003	0,00084
29	0,00012	0,00005	0,00001	0,00024	0,00011	0,00007	0,00007	0,00001	0,00008	0,00005	0,00014	0,00001	0,00003	0,00098
30	0,00012	0,00005	0,00001	0,00029	0,00013	0,00008	0,00009	0,00001	0,00011	0,00005	0,00015	0,00001	0,00003	0,00113
31	0,00016	0,00006	0,00001	0,00034	0,00015	0,00008	0,00011	0,00001	0,00013	0,00006	0,00017	0,00001	0,00004	0,00132
32	0,00017	0,00007	0,00001	0,00036	0,00014	0,00009	0,00012	0,00001	0,00015	0,00006	0,00018	0,00001	0,00005	0,00143
33	0,00018	0,00007	0,00002	0,00041	0,00016	0,00010	0,00016	0,00002	0,00018	0,00006	0,00020	0,00001	0,00005	0,00164
34	0,00020	0,00009	0,00002	0,00046	0,00018	0,00011	0,00020	0,00002	0,00022	0,00006	0,00020	0,00001	0,00005	0,00181
35	0,00022	0,00011	0,00003	0,00049	0,00021	0,00012	0,00021	0,00002	0,00025	0,00008	0,00024	0,00001	0,00006	0,00205
36	0,00024	0,00010	0,00003	0,00054	0,00022	0,00011	0,00027	0,00003	0,00027	0,00007	0,00025	0,00002	0,00007	0,00223
37	0,00024	0,00012	0,00003	0,00058	0,00022	0,00013	0,00030	0,00003	0,00032	0,00007	0,00026	0,00001	0,00008	0,00241
38	0,00024	0,00015	0,00004	0,00065	0,00026	0,00014	0,00036	0,00004	0,00039	0,00008	0,00029	0,00002	0,00009	0,00275
39	0,00024	0,00017	0,00005	0,00072	0,00030	0,00015	0,00045	0,00005	0,00046	0,00009	0,00031	0,00002	0,00011	0,00312
40	0,00027	0,00020	0,00006	0,00076	0,00032	0,00016	0,00056	0,00006	0,00054	0,00010	0,00033	0,00002	0,00011	0,00350
41	0,00030	0,00023	0,00008	0,00088	0,00035	0,00018	0,00070	0,00006	0,00065	0,00009	0,00036	0,00002	0,00014	0,00404
42	0,00028	0,00027	0,00008	0,00087	0,00036	0,00020	0,00085	0,00008	0,00068	0,00012	0,00040	0,00002	0,00014	0,00435
43	0,00030	0,00030	0,00011	0,00091	0,00038	0,00022	0,00099	0,00008	0,00082	0,00013	0,00039	0,00003	0,00016	0,00482
44	0,00030	0,00037	0,00012	0,00098	0,00044	0,00024	0,00117	0,00010	0,00089	0,00013	0,00045	0,00003	0,00018	0,00539
45	0,00030	0,00040	0,00015	0,00102	0,00043	0,00026	0,00147	0,00012	0,00098	0,00014	0,00048	0,00004	0,00021	0,00600
46	0,00032	0,00044	0,00017	0,00107	0,00050	0,00030	0,00171	0,00013	0,00107	0,00014	0,00053	0,00004	0,00022	0,00664
47	0,00031	0,00047	0,00019	0,00111	0,00050	0,00030	0,00199	0,00014	0,00131	0,00016	0,00057	0,00003	0,00023	0,00731
48	0,00034	0,00054	0,00023	0,00113	0,00054	0,00034	0,00224	0,00018	0,00130	0,00017	0,00058	0,00005	0,00028	0,00794
49	0,00035	0,00060	0,00026	0,00111	0,00056	0,00037	0,00258	0,00019	0,00160	0,00018	0,00064	0,00005	0,00029	0,00878
50	0,00035	0,00068	0,00032	0,00115	0,00064	0,00041	0,00304	0,00020	0,00169	0,00020	0,00066	0,00006	0,00031	0,00969
51	0,00038	0,00076	0,00035	0,00118	0,00067	0,00044	0,00361	0,00026	0,00198	0,00020	0,00071	0,00006	0,00032	0,01092
52	0,00038	0,00080	0,00037	0,00118	0,00067	0,00047	0,00382	0,00030	0,00217	0,00019	0,00076	0,00007	0,00031	0,01149
53	0,00040	0,00081	0,00043	0,00117	0,00067	0,00050	0,00443	0,00033	0,00247	0,00019	0,00074	0,00010	0,00034	0,01259
54	0,00041	0,00094	0,00045	0,00123	0,00072	0,00057	0,00497	0,00039	0,00293	0,00021	0,00081	0,00010	0,00035	0,01408
55	0,00046	0,00099	0,00053	0,00129	0,00082	0,00065	0,00567	0,00047	0,00329	0,00022	0,00088	0,00013	0,00041	0,01581
56	0,00041	0,00111	0,00059	0,00128	0,00082	0,00074	0,00635	0,00048	0,00369	0,00024	0,00092	0,00012	0,00039	0,01713
57	0,00049	0,00121	0,00066	0,00133	0,00092	0,00083	0,00721	0,00061	0,00421	0,00026	0,00105	0,00012	0,00045	0,01934
58	0,00052	0,00129	0,00068	0,00130	0,00097	0,00078	0,00783	0,00065	0,00480	0,00023	0,00113	0,00013	0,00043	0,02072
59	0,00053	0,00148	0,00077	0,00152	0,00111	0,00101	0,00927	0,00082	0,00575	0,00025	0,00126	0,00017	0,00055	0,02447
60	0,00059	0,00167	0,00084	0,00153	0,00109	0,00116	0,01030	0,00090	0,00643	0,00025	0,00135	0,00017	0,00058	0,02686
61	0,00067	0,00168	0,00103	0,00167	0,00137	0,00126	0,01197	0,00110	0,00777	0,00028	0,00146	0,00017	0,00062	0,03106
62	0,00064	0,00183	0,00099	0,00171	0,00140	0,00144	0,01247	0,00127	0,00850	0,00028	0,00155	0,00025	0,00061	0,03295
63	0,00060	0,00192	0,00101	0,00175	0,00157	0,00161	0,01445	0,00134	0,00959	0,00028	0,00164	0,00023	0,00074	0,03673
64	0,00060	0,00215	0,00100	0,00168	0,00146	0,00154	0,01464	0,00154	0,00984	0,00036	0,00163	0,00019	0,00087	0,03750
65	0,00070	0,00226	0,00117	0,00190	0,00179	0,00202	0,01733	0,00181	0,01134	0,00036	0,00212	0,00028	0,00087	0,04395
66	0,00065	0,00213	0,00123	0,00172	0,00157	0,00180	0,01732	0,00165	0,01266	0,00037	0,00197	0,00029	0,00091	0,04426
67	0,00064	0,00163	0,00108	0,00171	0,00151	0,00187	0,01632	0,00166	0,01211	0,00023	0,00164	0,00031	0,00079	0,04150
68	0,00045	0,00149	0,00091	0,00145	0,00113	0,00159	0,01359	0,00135	0,00926	0,00024	0,00108	0,00023	0,00061	0,03338
69	0,00035	0,00131	0,00078	0,00113	0,00113	0,00155	0,01224	0,00120	0,00892	0,00023	0,00107	0,00022	0,00049	0,03062
70	0,00028	0,00081	0,00056	0,00077	0,00084	0,00106	0,00988	0,00094	0,00705	0,00017	0,00108	0,00014	0,00044	0,02401

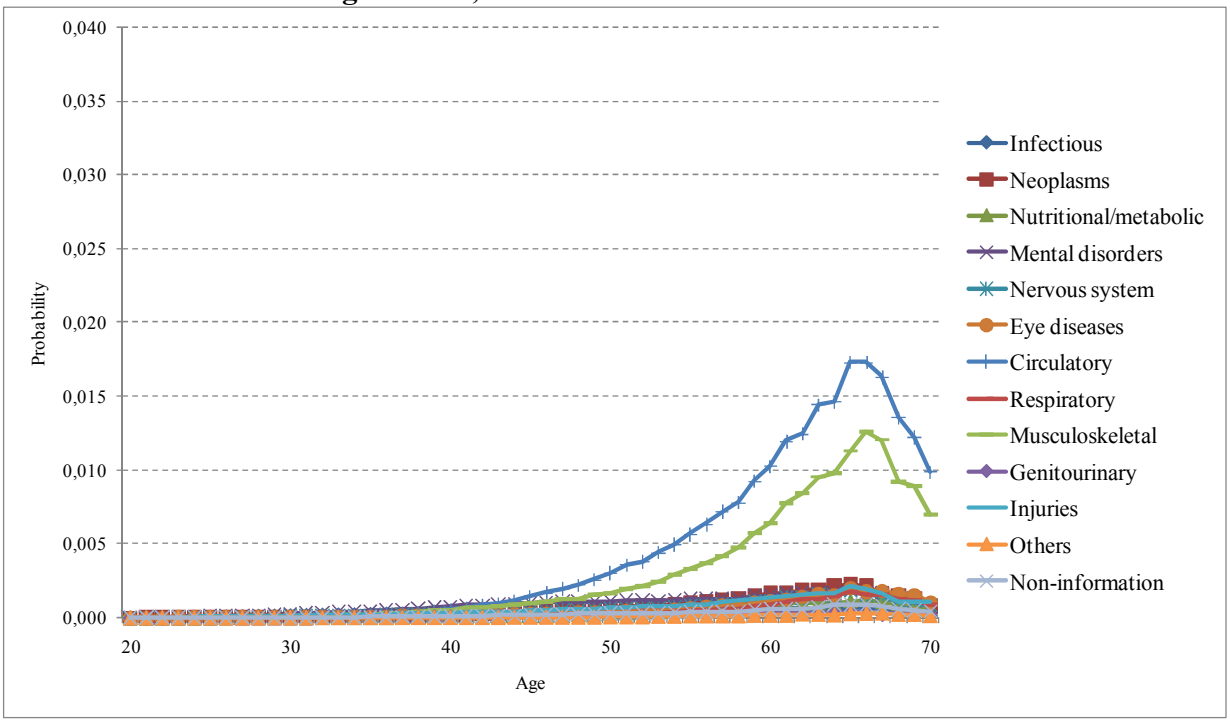
Source: MPS/DATAPREV.

Table 2. Female crude disability retirement hazards according to health cause and age. Brazil, 01/01/1999 to 31/12/2002.

Age	Crude hazards													
	Infectious	Neoplasms	Nutritional/metabolic	Mental disorders	Nervous system	Eye diseases	Circulatory	Respiratory	Musculoskeletal	Genitourinary	Injuries	Others	Non-information	Total
20	0,00000	0,00001	0,00000	0,00001	0,00001	0,00000	0,00000	0,00000	0,00000	0,00000	0,00001	0,00000	0,00000	0,00005
21	0,00000	0,00001	0,00000	0,00001	0,00001	0,00000	0,00000	0,00000	0,00000	0,00000	0,00001	0,00000	0,00000	0,00005
22	0,00000	0,00001	0,00000	0,00002	0,00002	0,00001	0,00000	0,00000	0,00000	0,00001	0,00002	0,00000	0,00000	0,00010
23	0,00001	0,00001	0,00000	0,00003	0,00002	0,00001	0,00001	0,00000	0,00001	0,00001	0,00003	0,00000	0,00000	0,00014
24	0,00001	0,00001	0,00000	0,00005	0,00002	0,00001	0,00001	0,00000	0,00001	0,00001	0,00004	0,00000	0,00000	0,00019
25	0,00002	0,00001	0,00000	0,00006	0,00003	0,00002	0,00002	0,00000	0,00002	0,00001	0,00004	0,00000	0,00001	0,00024
26	0,00003	0,00002	0,00000	0,00008	0,00004	0,00002	0,00003	0,00000	0,00002	0,00002	0,00006	0,00000	0,00001	0,00034
27	0,00004	0,00002	0,00000	0,00010	0,00005	0,00003	0,00003	0,00000	0,00003	0,00002	0,00006	0,00000	0,00001	0,00040
28	0,00006	0,00003	0,00000	0,00013	0,00006	0,00004	0,00004	0,00000	0,00004	0,00002	0,00007	0,00000	0,00002	0,00051
29	0,00007	0,00003	0,00001	0,00015	0,00006	0,00004	0,00004	0,00001	0,00005	0,00003	0,00009	0,00000	0,00002	0,00059
30	0,00008	0,00003	0,00001	0,00019	0,00008	0,00005	0,00006	0,00001	0,00007	0,00003	0,00010	0,00000	0,00002	0,00073
31	0,00010	0,00004	0,00001	0,00023	0,00010	0,00005	0,00007	0,00001	0,00008	0,00004	0,00011	0,00001	0,00003	0,00088
32	0,00012	0,00005	0,00001	0,00025	0,00010	0,00006	0,00008	0,00001	0,00011	0,00004	0,00012	0,00001	0,00003	0,00100
33	0,00013	0,00005	0,00002	0,00029	0,00011	0,00007	0,00011	0,00001	0,00013	0,00004	0,00014	0,00001	0,00004	0,00116
34	0,00014	0,00006	0,00001	0,00032	0,00013	0,00008	0,00014	0,00002	0,00015	0,00004	0,00014	0,00001	0,00004	0,00127
35	0,00016	0,00008	0,00002	0,00036	0,00015	0,00009	0,00016	0,00002	0,00018	0,00006	0,00018	0,00001	0,00005	0,00151
36	0,00018	0,00008	0,00002	0,00042	0,00017	0,00009	0,00021	0,00002	0,00021	0,00006	0,00019	0,00001	0,00006	0,00171
37	0,00019	0,00010	0,00003	0,00047	0,00018	0,00010	0,00024	0,00003	0,00026	0,00006	0,00021	0,00001	0,00006	0,00194
38	0,00019	0,00012	0,00003	0,00053	0,00021	0,00012	0,00029	0,00003	0,00032	0,00006	0,00023	0,00002	0,00007	0,00222
39	0,00020	0,00014	0,00004	0,00059	0,00025	0,00012	0,00037	0,00004	0,00038	0,00008	0,00025	0,00002	0,00009	0,00258
40	0,00022	0,00016	0,00005	0,00062	0,00026	0,00013	0,00046	0,00005	0,00044	0,00008	0,00027	0,00002	0,00009	0,00286
41	0,00024	0,00019	0,00007	0,00072	0,00029	0,00015	0,00058	0,00005	0,00053	0,00007	0,00029	0,00002	0,00011	0,00332
42	0,00024	0,00023	0,00007	0,00074	0,00031	0,00017	0,00072	0,00007	0,00059	0,00010	0,00034	0,00002	0,00012	0,00372
43	0,00027	0,00027	0,00010	0,00083	0,00035	0,00020	0,00089	0,00007	0,00074	0,00012	0,00036	0,00002	0,00015	0,00438
44	0,00026	0,00032	0,00010	0,00086	0,00039	0,00021	0,00103	0,00009	0,00078	0,00012	0,00039	0,00003	0,00016	0,00475
45	0,00027	0,00035	0,00013	0,00092	0,00039	0,00023	0,00132	0,00010	0,00088	0,00012	0,00043	0,00004	0,00019	0,00538
46	0,00028	0,00039	0,00015	0,00096	0,00045	0,00027	0,00154	0,00012	0,00096	0,00013	0,00048	0,00004	0,00020	0,00595
47	0,00029	0,00044	0,00018	0,00104	0,00047	0,00028	0,00186	0,00013	0,00122	0,00015	0,00053	0,00003	0,00022	0,00684
48	0,00032	0,00051	0,00022	0,00106	0,00051	0,00032	0,00209	0,00017	0,00122	0,00016	0,00054	0,00004	0,00027	0,00742
49	0,00033	0,00057	0,00024	0,00105	0,00053	0,00035	0,00244	0,00018	0,00151	0,00017	0,00060	0,00005	0,00027	0,00828
50	0,00035	0,00067	0,00031	0,00114	0,00063	0,00041	0,00303	0,00020	0,00169	0,00020	0,00065	0,00006	0,00031	0,00966
51	0,00039	0,00079	0,00036	0,00122	0,00069	0,00045	0,00372	0,00027	0,00204	0,00020	0,00073	0,00007	0,00033	0,01127
52	0,00042	0,00088	0,00041	0,00130	0,00073	0,00051	0,00419	0,00033	0,00238	0,00021	0,00083	0,00008	0,00034	0,01260
53	0,00044	0,00089	0,00047	0,00128	0,00073	0,00055	0,00485	0,00037	0,00270	0,00021	0,00081	0,00011	0,00037	0,01378
54	0,00046	0,00105	0,00051	0,00137	0,00081	0,00063	0,00555	0,00043	0,00327	0,00023	0,00091	0,00012	0,00039	0,01571
55	0,00050	0,00109	0,00059	0,00142	0,00090	0,00072	0,00623	0,00051	0,00361	0,00024	0,00097	0,00014	0,00045	0,01738
56	0,00047	0,00126	0,00067	0,00145	0,00093	0,00084	0,00721	0,00054	0,00419	0,00027	0,00104	0,00013	0,00044	0,01945
57	0,00056	0,00138	0,00076	0,00151	0,00104	0,00095	0,00821	0,00069	0,00479	0,00029	0,00119	0,00014	0,00051	0,02202
58	0,00061	0,00150	0,00079	0,00151	0,00112	0,00091	0,00909	0,00075	0,00558	0,00026	0,00131	0,00015	0,00050	0,02408
59	0,00058	0,00163	0,00084	0,00167	0,00123	0,00111	0,01022	0,00091	0,00633	0,00027	0,00139	0,00018	0,00060	0,02698
60	0,00078	0,00220	0,00110	0,00202	0,00144	0,00153	0,01360	0,00119	0,00850	0,00034	0,00178	0,00022	0,00076	0,03546
61	0,00094	0,00236	0,00145	0,00234	0,00192	0,00177	0,01678	0,00154	0,01089	0,00040	0,00205	0,00024	0,00086	0,04354
62	0,00093	0,00267	0,00145	0,00249	0,00205	0,00210	0,01821	0,00186	0,01242	0,00041	0,00226	0,00037	0,00089	0,04811
63	0,00090	0,00288	0,00152	0,00262	0,00235	0,00242	0,02167	0,00201	0,01438	0,00042	0,00246	0,00034	0,00112	0,05509
64	0,00095	0,00340	0,00158	0,00266	0,00231	0,00244	0,02316	0,00243	0,01558	0,00057	0,00258	0,00030	0,00137	0,05934
65	0,00103	0,00336	0,00173	0,00282	0,00266	0,00300	0,02574	0,00269	0,01684	0,00054	0,00315	0,00041	0,00129	0,06528
66	0,00103	0,00340	0,00196	0,00274	0,00251	0,00288	0,02762	0,00264	0,02018	0,00058	0,00314	0,00046	0,00145	0,07058
67	0,00127	0,00324	0,00214	0,00340	0,00300	0,00372	0,03244	0,00330	0,02408	0,00046	0,00327	0,00061	0,00157	0,08250
68	0,00108	0,00361	0,00221	0,00350	0,00272	0,00383	0,03282	0,00326	0,02237	0,00057	0,00262	0,00056	0,00147	0,08062
69	0,00095	0,00356	0,00213	0,00309	0,00309	0,00420	0,03331	0,00325	0,02426	0,00062	0,00290	0,00060	0,00135	0,08331
70	0,00095	0,00274	0,00190	0,00260	0,00285	0,00358	0,03342	0,00317	0,02385	0,00057	0,00366	0,00046	0,00149	0,08123

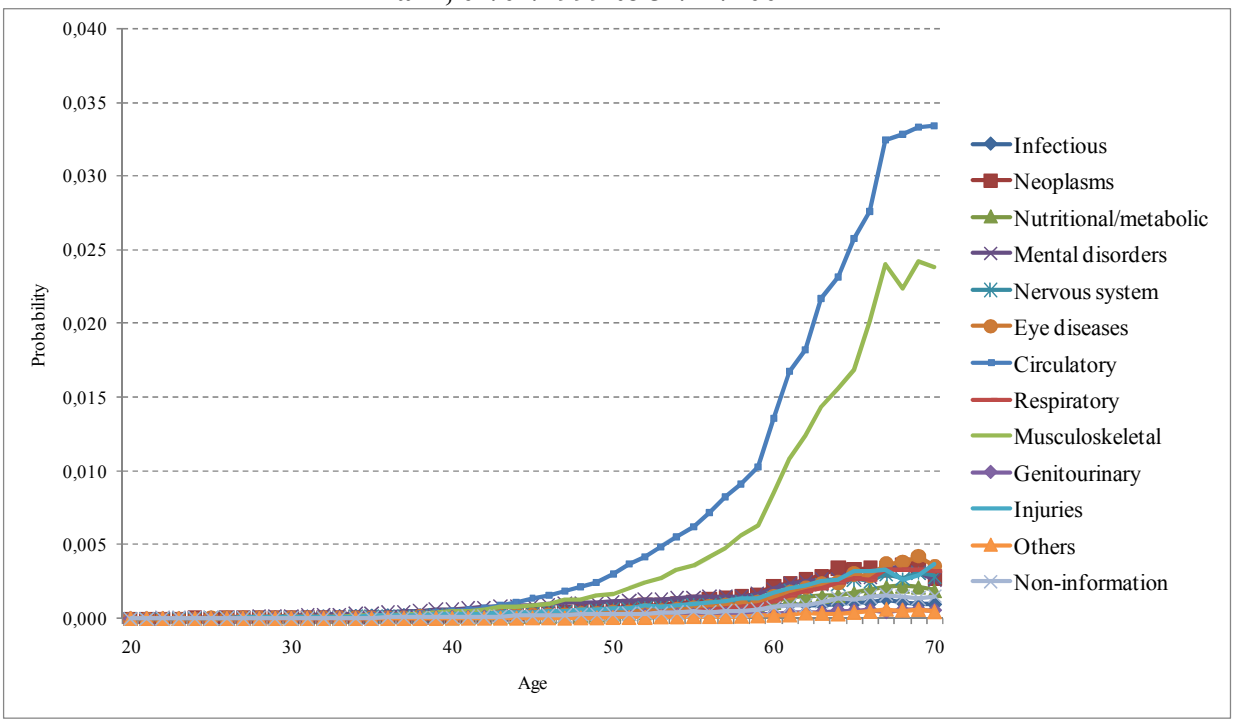
Source: MPS/DATAPREV.

Figure 6 – Male crude disability retirement hazards according to health cause and age. Brazil, 01/01/1999 to 31/12/2002.



Source: TAB. 1 e TAB. 2.

Figure 7 – P Table 2. Female crude disability retirement hazards according to health cause and age.
Brazil, 01/01/1999 to 31/12/2002



Source: TAB. 1 e TAB. 2.

In figure 6 and 7 we see that, for both sexes, the risk of disability retirement is larger due to circulatory and musculoskeletal diseases. Among women the crude disability retirement risk due to neoplasm is somewhat larger than for men. Among the men, however, mental disorders are the most responsible for an overwhelming number of pensioners, especially among the young adult age groups. Moreover, the two figures also show that the risk of retirement due to injuries and mental disorders decreases with age. On the other hand, circulatory and musculoskeletal illnesses, especially among women, tend to increase with age.

4. Discussion

In this paper, we try to describe the transition from occupational status to disability retirement for all workers from the Regime Geral de Previdência Social. In order to fulfill this objective we build up multi-decrement disability retirement life tables by sex and age for the period of 1999-2002 using the DATAPREV/MPS and administrative information from the CNIS as sources for our analysis.

After we analyzed the intrinsic pattern of the table we observed that for men the disability hazards increase progressively until age 65 and after that they decrease, although they still show high values until the age 70. Among women we observed that these risks increase continuously up to the oldest age. The decline in the male retirement hazards after age 65 may guide us to two conclusions. First, there is some kind of selective group among the retirees with better health conditions keeping them active in the labor market. Second, it is because the fragile retirees acquire another sort of benefit, or they simply cannot financially contribute to RGPS and keep their social benefit. Moreover, there are still a number of labor market exits, even after the upper age limit to retire. This can be explained by the presence of female employees who did not fulfill the prerequisites to retire until the minimum age of pension. In this way they still belong to the risk group of disability retirement for a longer period.

During the period of analysis we verified that for both sexes the risk of disability retirement is largest due to circulatory diseases and musculoskeletal diseases. As the employee age increases injuries, mental disorders and nervous system illnesses tend to decrease. However, other illnesses like circulatory and musculoskeletal diseases become more common, especially among women. Differences in the pattern of disability retirement between the sexes can be partially explained by the age structure of retirement.

The knowledge of these disability retirement hazards creates opportunity to develop policies of work prevention and health and to promote a better work environment. In this way, we expect that these tables can be used to forecast or simulate the numbers of beneficiaries in later periods. Thus, we can predict the future social security costs. The retirement hazards are another utility provided by this work. They can be used by the social security market as a reference point for planning future pension costs because our disability life tables better replicate the reality of the country than the tables used by the private sector. This makes sense given that all beneficiaries from private security are linked with the RGPS (Coletânea, 2007).

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