



**IGF**

INTERGOVERNMENTAL FORUM  
on Mining, Minerals, Metals and  
Sustainable Development

## **WOMEN AND THE MINE OF THE FUTURE**

# **A Gendered Analysis of Employment and Skills in the Large-Scale Mining Sector: Brazil**

Maria Domenica Serpa Blundi

March 2022



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Maria Domenica Serpa Blundi

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#### **IISD HEAD OFFICE**

111 Lombard Avenue  
Suite 325  
Winnipeg, Manitoba  
Canada R3B 0T4

[IISD.org](http://IISD.org)

[@IISD\\_news](https://twitter.com/IISD_news)

#### **IGF/IISD OTTAWA OFFICE**

220 Laurier Ave W.  
Suite 1100  
Ottawa, Ontario  
Canada R3B 0T4

[IGFMining.org](http://IGFMining.org)

[@IGFMining](https://twitter.com/IGFMining)



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## ACRONYMS

<b>CNAE</b>	National Classification of Economic Activities
<b>CBO</b>	Brazilian Classification of Occupations
<b>DE&amp;I</b>	Diversity, Equity & Inclusion
<b>ESG</b>	Environmental, Social and Governance
<b>GDP</b>	Gross Domestic Product
<b>IBRAM</b>	Brazilian Mining Institution
<b>IBGE</b>	Brazilian Institute of Geography and Statistics
<b>IGF</b>	Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development
<b>IPE</b>	Individual Protection Equipment
<b>IT</b>	Information Technology
<b>LSM</b>	large-scale mining
<b>MTE</b>	Ministry of Labour and Employment
<b>NRM</b>	Mining Regulatory Standards
<b>OHS</b>	Occupational Health and Safety
<b>RAIS</b>	Annual Social Information List
<b>STEM</b>	Science, Technology, Engineering and Mathematics
<b>WIM</b>	Women in Mining



## 1.0 INTRODUCTION

The mining labour market is changing. A more socially and environmentally responsible agenda has pressured companies to implement new technologies and procedures. Diversity and the inclusion of gender is one of the goals to be achieved by companies, either because the large-scale ones are being influenced by a new wave of investors committed to a more sustainable perspective or because governments' policies and societies' demands are inducing them in this direction.

However, the lack of consistent and detailed data compromises analyses of these changes and outcomes, and many questions are still without answers: Is the mining sector really implementing a gender-inclusion agenda? Has the feminization of the mining sector's labour market actually changed the historical forms of women's participation in the sector?

Furthermore, the mining sector is recognized as a very masculine environment. It is a place related to men and, historically, women have been almost invisible. Implementing a new business model in the mining sector that is focused on a more inclusive agenda is not an easy task and will require a major change in the sector's culture.

The present study aims to contribute to the Women and the Mine of the Future project by presenting the case of the Brazilian mining sector. In this sense, the work intends to identify the main characteristics of the labour market in Brazilian mining, focusing on its gender dynamic. It will also analyze whether the Brazilian mineral sector has witnessed the feminization of its labour market in the last 10 years and, if so, to what extent and with what profile.

The study is divided into five sections. After the introduction, Section 2 presents details about the adopted methodologies. In Section 3, we describe employment in large-scale mining (LSM) in Brazil, starting with general information about gender dynamics in the country's labour market and then focusing specifically on the mining sector. Section 4 presents more details about companies' strategies regarding gender issues, including the experiences of three Brazilian mining companies. Finally, Section 5 ends with final considerations.



## 2.0 METHODOLOGY

The study was based on two methodological approaches: the collection of quantitative data, which comprised disaggregated information on gender in the Brazilian mining sector labour market, followed by qualitative content that explores some specific issues revealed in the previous step.

### 2.1 Quantitative Data

The collection of quantitative data was based on an official source provided by the Brazilian Ministry of Labour and Employment (MTE): the Annual Social Information List (RAIS). The RAIS is an administrative registry created with the purpose of supplying the needs of controlling labour activity in the country and providing data for the preparation of labour statistics. It constitutes an essential instrument of fundamental importance for the monitoring and characterization of the formal Brazilian labour market.<sup>1</sup> Over time, the RAIS has become one of the most reliable statistical sources on the formal labour market and is considered a national and international reference on data related to employment in the country.

Every year, companies that have workers with a formal employment relationship must submit information about their workforce to the MTE. The ministry is responsible for the statistical treatment of the information declared and for the dissemination of the results to society. RAIS users, in turn, should present suggestions for improvements to the available data (Ministry of Economy, 2021, p. 5).

For the current study, the RAIS supplied disaggregated information about the state of play of employment in the Brazilian mining sector, encompassing the gender dynamics involving variables such as geographic distribution, age, level of education, level of occupation and monthly remuneration. It is necessary to point out that possible inconsistencies in the data available in the RAIS system arise from the information reported by the companies. Although the Ministry of Labour offers RAIS users more in-depth forms of investigation, these are procedures that require more time for research.

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<sup>1</sup>See the Appendix for more information.





For each query, we used the following parameters:

**Table 1. Parameters adopted in the RAIS investigation<sup>2</sup>**

<b>Object of analysis</b>	<b>Total number of employment bonds: number of workers with a formal contract on 12/31. Employment bonds exist whenever paid work occurs.</b>
Time series	From 2009 to 2019 <sup>3</sup>
Establishment size	1,000 employees or more
National Classification of Economic Activities (CNAE 2.0)	Extractive activities <sup>4</sup> : <ul style="list-style-type: none"><li>• Extraction of metallic minerals</li><li>• Extraction of non-metallic minerals</li><li>• Minerals extraction support activities<sup>5</sup></li></ul>

Source: Prepared by IGF

It is also important to mention that there is a difference regarding the total number of employees presented in some graphs and tables (specifically, those dated 2022). This difference is related to the government's implementation of new processes in the RAIS system and depends on the period in which the RAIS system was consulted (2021 or 2022). It resulted in the application of adjustments to some information disclosed from one year to another.<sup>6</sup> Despite differences in the stock of employees, the proportion of male and female employees remained the same.

The presentation of most quantitative data used the average of the results within the studied period (2009 to 2019).<sup>7</sup> In the case of the presentation of absolute numbers, occasionally, some totals do not match the sum of the numbers presented for each gender because the decimals were suppressed.

## 2.2 Qualitative Information

The study also counted on qualitative information, such as research from secondary sources—companies' reports and websites, mining association's publications, specialized media, and academic publications—and interviews with representatives of companies.

Diversity, equity, and inclusion (DE&I) is on the agenda of entities in the Brazilian mining sector, whose activities have sought to influence companies by incorporating gender

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<sup>2</sup>See Appendix for more information.

<sup>3</sup> In the present study, 5-year intervals (2009-2014; 2014-2019) were adopted for the presentation of some results due to the size of the data series collected.

<sup>4</sup>The present study did not consider the National Classification of Economic Activities' (CNAE) Division 05 (Extraction of coal) and Division 06 (Extraction of oil and natural gas).

<sup>5</sup>In Division 09 (Minerals extraction support activities), only Group 09.09—Activities to support the extraction of minerals, except oil and natural gas—was considered.

<sup>6</sup> For more information, see [http://pdet.mte.gov.br/images/RAIS/2020/Nota\\_T%C3%A9cnica\\_RAIS\\_2020.pdf](http://pdet.mte.gov.br/images/RAIS/2020/Nota_T%C3%A9cnica_RAIS_2020.pdf).

<sup>7</sup> See the Appendix for more information about the difference regarding the stock of employees used in the study.



issues into their strategic objectives. One of these entities, Women in Mining Brasil (WIM Brasil), carried out surveys with mining companies, whose results were included in this report (presented in Section 4) as a complement.

In Section 4, we also present a short case regarding coal producers, as this division of economic activity has not been considered in the quantitative data gathered in order not to mischaracterize the sample originally used. It was found that Brazilian coal companies encompassed in the RAIS do not fit the profile stipulated by this study—that is, establishments with 1,000 or more employees.

The following sections will present the characteristics of the workforce in the Brazilian mineral sector with a focus on gender dynamics over the years.



## 3.0 EMPLOYMENT IN THE BRAZILIAN LSM

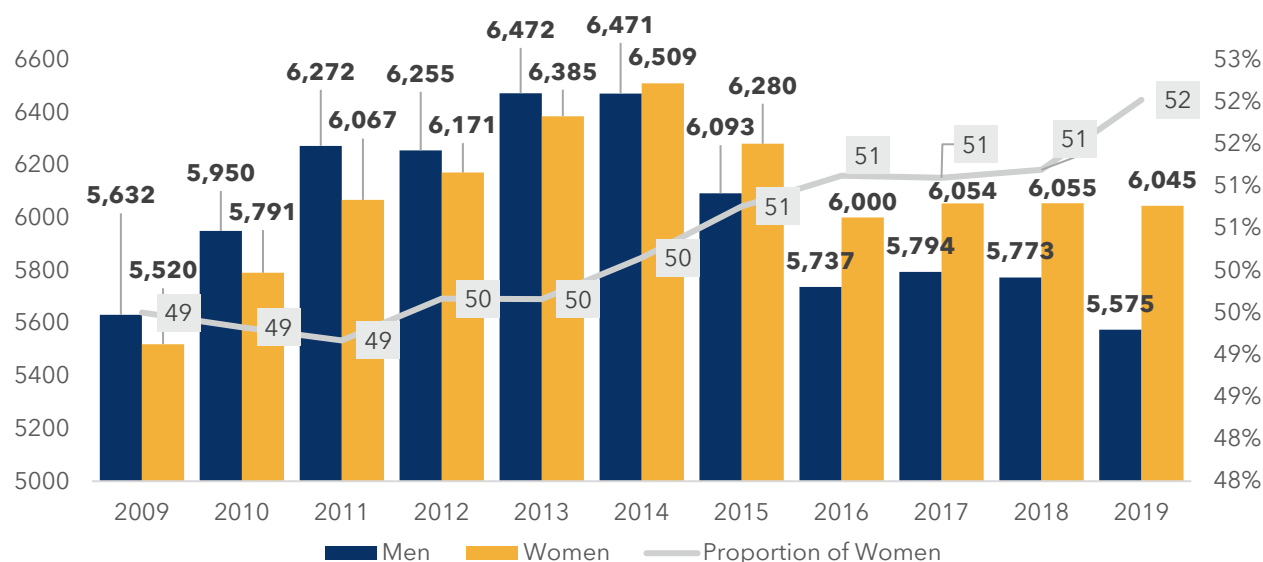
### 3.1 The Brazilian Labour Market and Gender Issues: A brief presentation

Before proceeding with the description of the labour market in the Brazilian mining sector, we will briefly present the gender characteristics of formal employment in the country in order to observe a broader picture and provide better support for further analysis.

In this section, the results represent the evolution of formal jobs and consider establishments with 1,000 employees or more that encompass sections of CNAE 2.0.<sup>8</sup>

Between 2009 and 2019, total Brazilian formal employment increased by 4%. Although men have historically dominated the Brazilian labour market, a downward trend was observed in the number of male hires. During the same period, men's participation in the formal workforce reduced by 1%, while women formally employed increased by 10%. Comparing the data, the proportion of women grew by 3%, with this growth being more evident between 2014 and 2019. Looking at 2019, women represented 52% of formal jobs, while men represented 48% of total Brazilian formal employment (Figure 1).

**Figure 1. Total number of formal jobs by gender, Brazilian economic sectors (in millions of employees)**



Source: RAIS-MTE (2021)

<sup>8</sup>These sections of Economic Activities corresponds to ISIC 4.0, Sections A to U.



Analyzing the total number of formal employees in each economic sector (Figure 2), we see that the highest proportion of men was concentrated in mining and quarrying<sup>9</sup> and construction, which represented 87% and 86%, respectively, of the total male jobs in each of these sectors, in 2019. Accommodation and food service and human health and social work employed the most women that year, totalling 75% and 72% of formal jobs, respectively. Women also appeared ahead of men in other four sectors: public administration and defence, compulsory social security (60%); real estate activities (53%); education (53%); and administrative and support services (52%).

We also see in Figure 2 that there was a great difference between male and female jobs within sectors that are related to technical expertise (and also considered traditionally male sectors), such as manufacturing, electricity and gas, construction, and mining and quarrying, among others. In the case of mining and quarrying, while it was the sector with the most male formal jobs in 2019 (87%), it also appeared as the sector with the fewer female formal jobs (13%).

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<sup>9</sup> According to CNAE 2.0, mining and quarrying encompasses five divisions: extraction of coal, extraction of oil and natural gas, extraction of metallic minerals, extraction of non-metallic minerals, and minerals extraction support activities.



**Figure 2. Groups of economic sectors by gender, Brazilian formal jobs (%) (2019)<sup>10</sup>**



Source: RAIS-MTE (2022)

However, despite this discrepancy between the total number of formal jobs for both genders, Table 2 points out where the increase in female jobs that is shown in Figure 1 occurred.

Some of the so-called male sectors have hired more women than men. The manufacturing sector hired 8% fewer men in 2019, while the same sector increased the number of women by 7%. Construction, another sector traditionally related to the male universe, also

<sup>10</sup> In descending order, according to female percentage.



presented a relevant decrease in male jobs (-32%). We can also observe that arts, entertainment and recreation, human health and social work, education, finance and insurance, administrative and support service, and accommodation and food service were some of the sectors that represented higher female employment than men in the period.

**Table 2. Groups of economic activities by gender, variation of Brazilian formal jobs (%) (2009-2019)<sup>11</sup>**

<b>Group of economic activities</b>	<b>Men</b>	<b>Women</b>
Arts, entertainment, and recreation	165	212
Human health and social work	68	93
Education	56	64
Financial and insurance activities	34	51
Administrative and support service	20	34
Accommodation and food service	-12	33
Water supply; sewerage, waste management and remediation	1	31
Transportation and storage	27	30
Wholesale and retail trade; repair of motor vehicles and motorcycles	5	26
Mining and quarrying	33	17
Manufacturing	-8	7
Professional, scientific and technical	-7	5
Public administration and defence; compulsory social security	-3	-1
Construction	-32	-2
Real estate activities	-65	-14
Electricity and gas	-19	-18
Information and communication	-12	-27
Other service	-36	-28
Agriculture, forestry and fishing	-36	-33
Activities of extraterritorial organizations and bodies	-100	-100

Source: RAIS-MTE (2022) - prepared by IGF

In fact, according to Table 2, we can observe greater growth in the number of women hired compared to men in almost all economic sectors, with the exception of mining and quarrying, which hired 33% men versus 17% women, from 2009 to 2019.

Based on this result, we can say that the Brazilian labour market witnessed a phenomenon called “feminization” from 2009 to 2019. The concept concerns both the quantitative

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<sup>11</sup> In descending order, according to female variation.



increase of women in formal work in general or in certain professions, as well as qualitative changes in labour (Yannoulas, 2011, 2013 in Carrilho, 2016, p. 19). Nevertheless, the increase in female participation in formal jobs does not always mean that women have gone through a proper process of insertion into the labour market, which is even truer when it comes to sectors commonly related to male activity.

The fact that, in this period, Brazilian women have counted on the sectors of accommodation and food service and human health and social work for insertion into the formal labour market shows that, although in the process of changing, feminization does not yet seem to have induced a real change in the sexual division of labour in the country. Brazilian women continued to be more involved in those so-called women's activities while men were in charge of the "productive world." This includes the sectors that require more technology and technical training, such as mining and quarrying, manufacturing and construction, which are still dominated by men, even with the decrease in male stock observed.

The feminization of the Brazilian labour market also appears in the gender wage comparison. According to the National Labour Market Observatory (March 2018, p. 4), from 2008 to 2018, the real increase in remuneration for women was 21% and, for men, 19%. Thus, we can state that, in addition to the increase in the proportion of women with a formal contract, the wage gap between men and women decreased. However, despite this advance, Brazilian women continue to be paid less than men, regardless of education level (Observatório Nacional do Mercado de Trabalho, 2018, p. 1).

This brief presentation of the Brazilian workforce showed that the sexual division of labour in the country still needs to be transformed in order to actually change the condition of women in the country's labour market. Although it is possible to observe an increase in female formal jobs from 2009 to 2019, this phenomenon does not guarantee that Brazilian companies are really changing their processes to include women in the productive world.

Next, we present the employment situation in the LSM sector, investigating whether the sector is dealing with the phenomenon of feminization and, if so, how it is characterized. Considering that the mining sector is recognized for being a place for men, this investigation becomes very important for the assessment of gender dynamics in the Brazilian labour market and in the mining sector itself.



## 3.2 The Brazilian Mining Sector Workforce and the Gender Dynamic

This section presents data on the total number of employees in the Brazilian mining companies from 2009 to 2019. The results refer to establishments with 1,000 or more employees, limited to the extraction of metallic and non-metallic minerals, and to activities to support the extraction of minerals, except oil and natural gas.

While the total number of formal workers in the Brazilian labour market increased by 4% between 2009 and 2019, the mining sector showed an increase of more than 100% of formal employees. Regarding the gender dynamic, male employment in the sector increased by 110%, while women's employment increased by 127%. Proportionally, we observe that the total number of women showed periods of increase and decrease between 2009 and 2015. As of 2016, the proportion of women underwent a recovery, reaching 14% in 2019 (Figure 3). In the same year, according to RAIS, the mining companies in Brazil comprised 56,861 employees<sup>12</sup>: 49,045 (86%) male workers and 7,816 (14%) female workers.

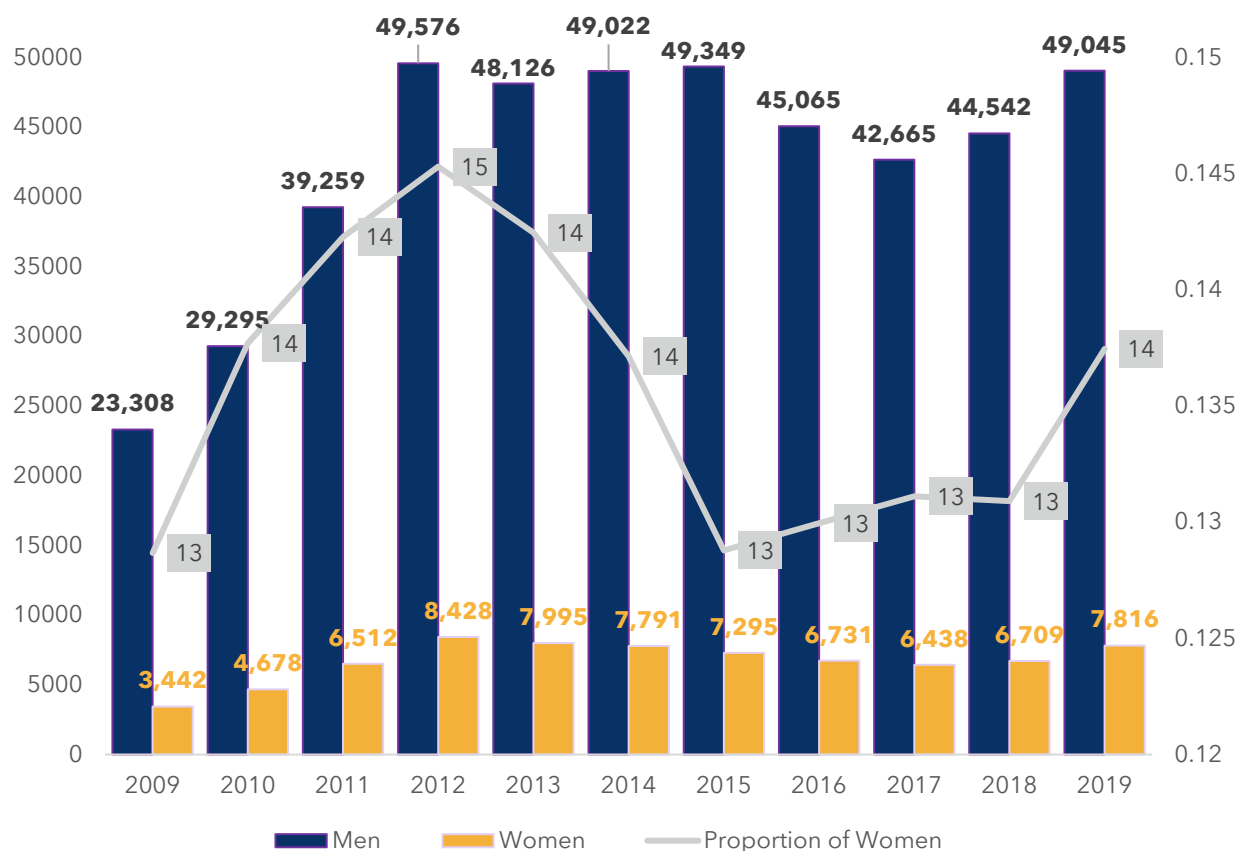
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<sup>12</sup> As mentioned in Section 2, there is a difference regarding the stock of employees presented due to the consultation period in the RAIS system. For consultations carried out in 2021, the stock was 56,861 employees, of which 49,045 (86%) were men and 7,816 (14%) were women, in 2019. For consultations carried out in 2022, the stock was 61,728 employees, of which 53,558 (87%) were men and 8,170 (13%) were women, in the same year.





**Figure 3. Total number of formal jobs by gender, Brazilian mining sector (in thousands)**



Source: RAIS-MTE (2021)

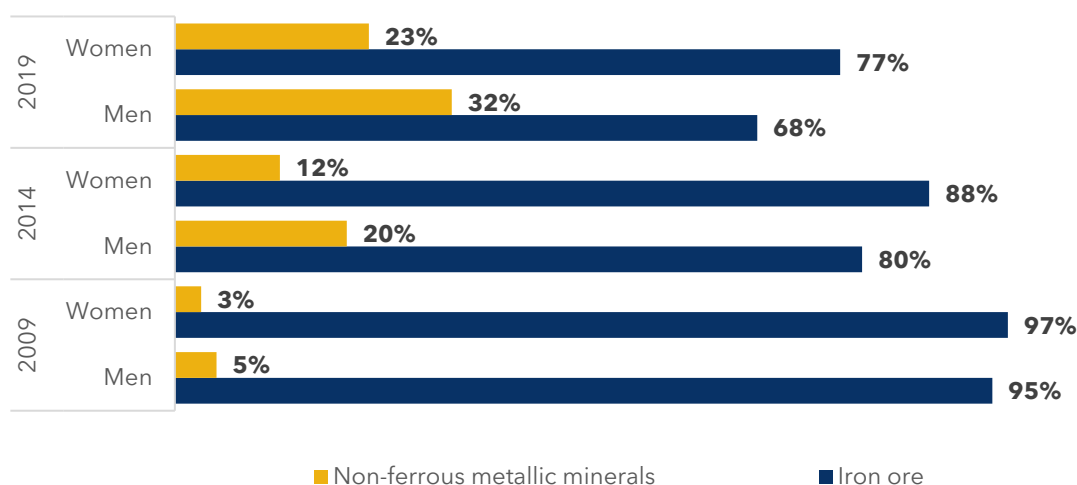
The National Labour Market Observatory (March 2018, p. 13) highlights that factors that favoured the growth in female participation in the Brazilian labour market as a whole include an increase in women's education levels, a reduction in the fertility rate, and advances in terms of the possibility of reconciling family and work. We can infer that the same factors could have also influenced the growth of women employed in the mining sector in the last 10 years. Furthermore, as we witnessed while gathering information for the present project, in addition to these factors, there seems to be a movement by LSM companies toward the environmental, social, and governance (ESG) agenda, which includes hiring more women. This new strategy may be changing the processes of some companies by encouraging a more inclusive environment.

Regarding the type of mineral produced, we can see in Figure 4 that the production of iron ore employed the most people, both men and women, in the period studied. In 2019, 69% of mining employees worked in iron ore companies, while 31% worked in non-ferrous metallic minerals companies. This result is expected, given that Brazil is known for its production of iron ore, which represented 73% of the LSM sector's revenue in 2021 (IBRAM, 2021).



Analyzing gender participation, in 2019, 77% of employed women worked in these iron ore companies, and 23% performed activities related to the production of non-ferrous minerals. In the case of men, although most of the male workers were also working in iron ore companies (68%), there was a better distribution of them in the production of non-ferrous minerals (32%). Despite this concentration in iron ore companies, the number of employees in non-ferrous mineral companies of both genders increased from 2009 to 2019.

**Figure 4. Type of mineral by gender (formal jobs in the Brazilian mining sector, 2009, 2014, 2019) (%)**



Source: RAIS-MTE (2021)

In the case of non-metallic minerals, the data collected indicated only 2% of the total workers, from 2015 to 2017, which can be considered non-representative.

### 3.2.1 Geographic Distribution

From 2009 to 2019, the average worker in the mining workforce was mostly from the southeast and northern regions, for both men and women.

Brazil is characterized by exploration and the commercialization of metallic substances, which is concentrated in these two regions—more specifically, in two iron ore producer states, Minas Gerais and Pará. There are 229 mines producing more than 10,000 tonnes of metallic substances per year (Agência Nacional de Mineração, 2020).

In 2020, 10,914 mines of all sizes and types of minerals were registered, as shown in Table 3. Of these, the vast majority are open-pit mining (10,811), with only 96 underground mines and 7 mines combining the two methods.



**Table 3. Number of mines in production by type of mining, Brazil (2020)**

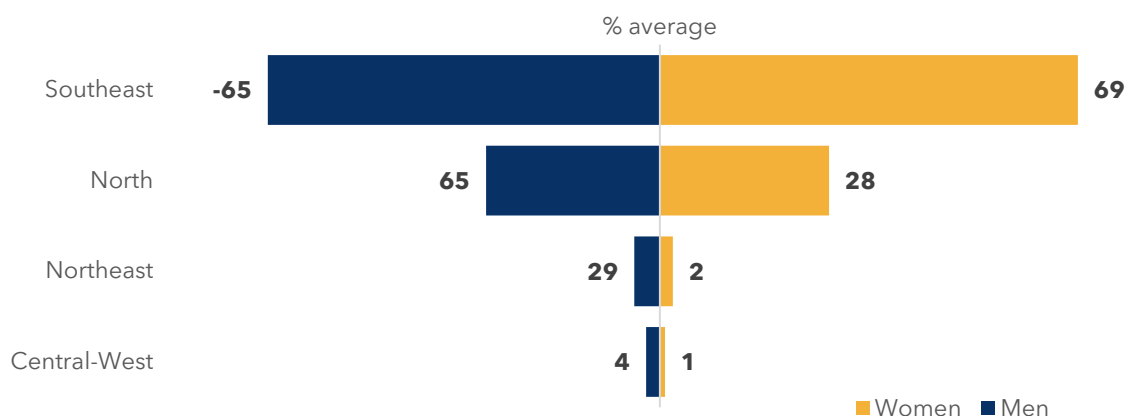
<b>Mining methods</b>	<b>Number of mines</b>
Open-pit mines	10,811
Open-pit and underground mines	7
Underground mines	96
<b>Total</b>	<b>10,914</b>

Source: Agência Nacional de Mineração, 2022.

The most exploited mineral substance in underground mines is gold, followed by gems and quartz, predominantly in small mines (Heiner, 2017:13).

The northeast and central-west regions have a higher proportion of men, showing that female mining employment tends to be more concentrated in two regions of the country (southeast and north) (Figure 5).

**Figure 5. Men and women, by region (formal jobs in the Brazilian mining sector, 2009-2019) (average)**



Source: RAIS-MTE (2021)

Analyzing the variation of women's employment over the period of study, we note in Table 4 that mining companies from the northeast and central-west hired 266% and 53% more women between 2011 and 2019, respectively. Somehow, albeit timidly, we can say that the presence of women in the mining workforce has been decentralizing and achieving other countries' regions.



**Table 4. Region by gender, variation of formal jobs in the Brazilian mining sector (2009-2019) (%)**

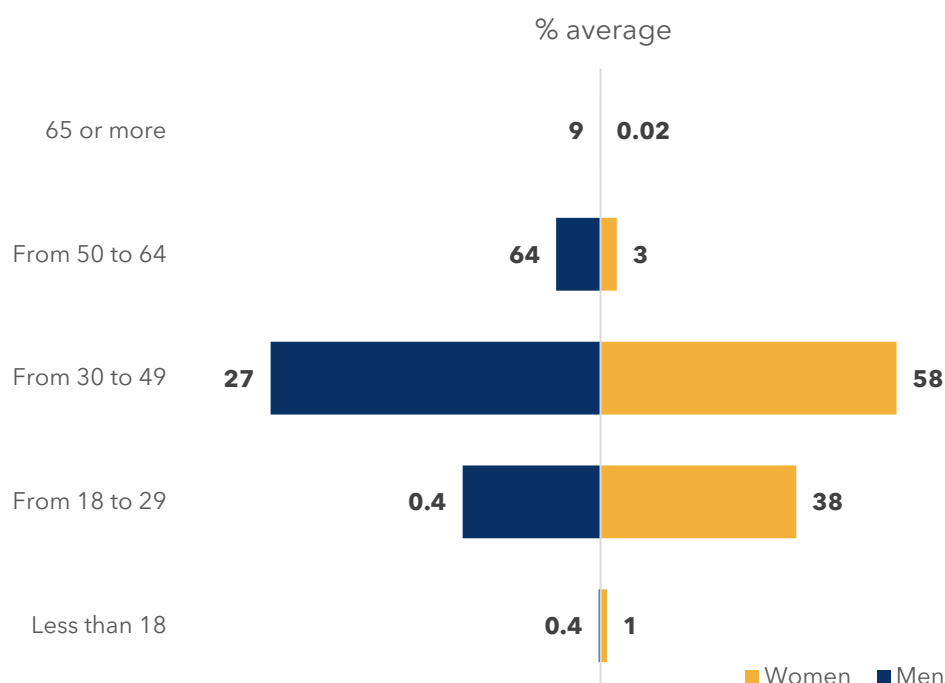
Regions	Men	Women	Period of variation
Southeast	83	121	2009-2019
North	104	99	
Northeast	84	266	2011-2019
Central-West	19	53	

Source: RAIS-MTE (2021) - prepared by IGF

### 3.2.2 Age Distribution

Considering the distribution by gender in the age group,<sup>13</sup> Figure 6 shows that both male and female employees were between 30 and 49 years old, representing an average of 63% of the total number of employees. The age group from 18 to 29 appeared in second place, and the average of women is higher in this age group, representing 38% of female employees. Proportionally, we can say that the female mining employees were younger than the male ones from 2009 to 2019. We also observe a large drop in the average of employees in the older group of age, especially among women.

**Figure 6. Men and women, by age group (formal jobs in the Brazilian mining sector, 2009-2019) (average)**



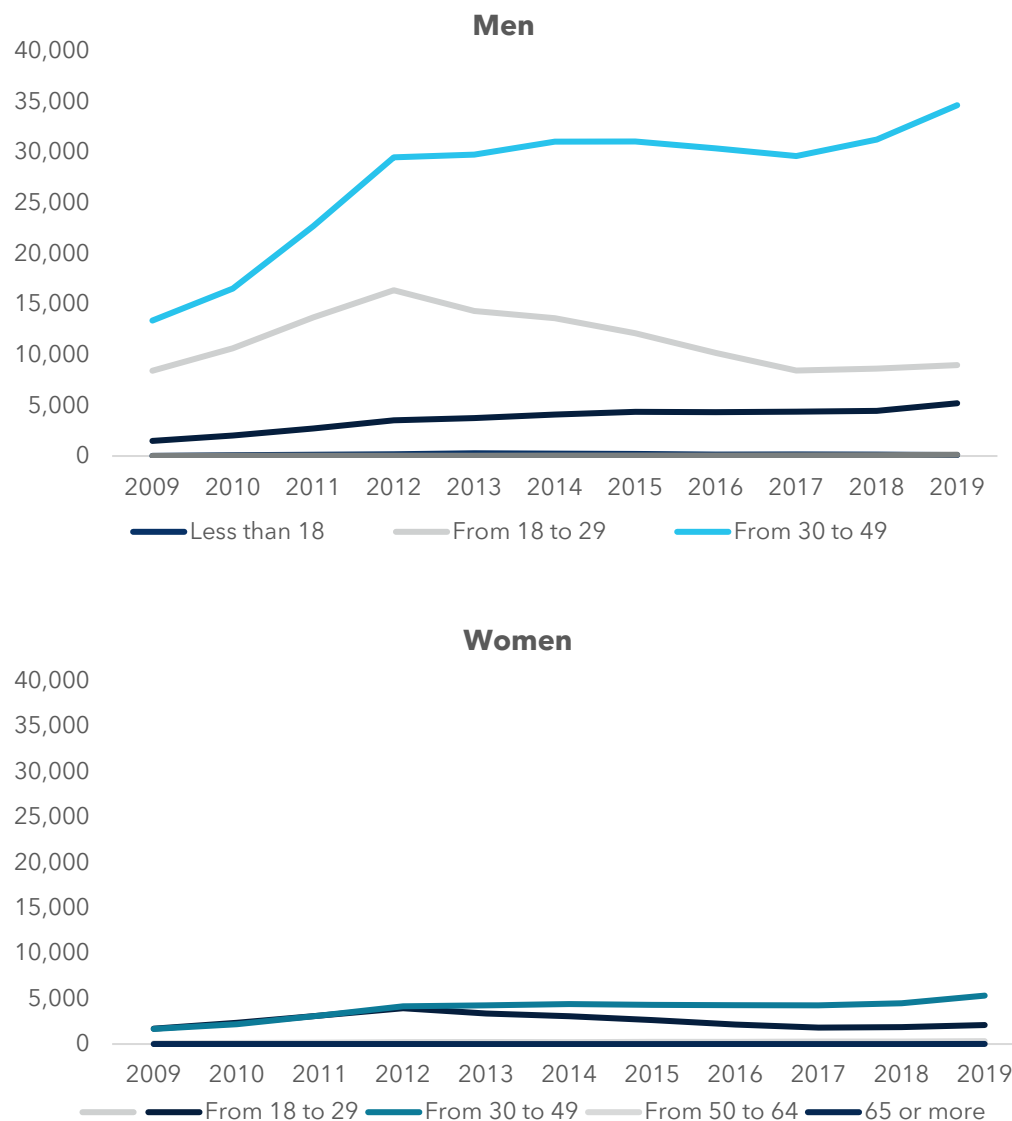
Source: RAIS-MTE (2021)

<sup>13</sup> See Appendix for more information.



When analyzing the evolution of the age groups within each gender, Figure 7 shows that the total number of older employees increased from 2012 to 2019. In the case of men, the employees in the age groups from 30 to 49 and from 50 to 64 increased, while those from 18 to 29 decreased.

**Figure 7. Men and women, by age group (evolution of formal jobs in the Brazilian mining sector, 2009-2019)**



Source: RAIS-MTE (2021)

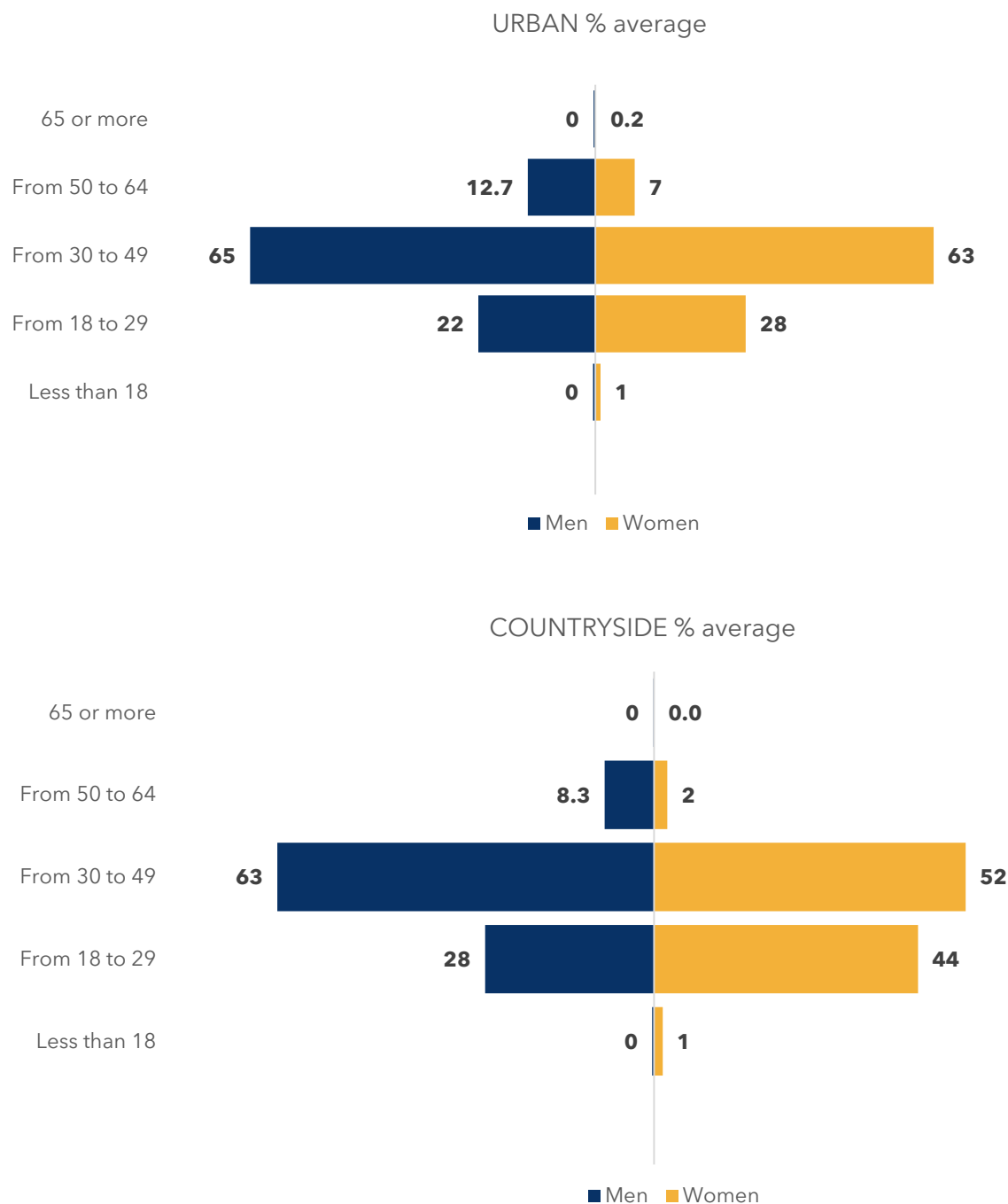
In the case of women, although more discreet, we also observe a growth in the total number of older employees in the same period. We also can say that there was less age differentiation between employed women compared to men.

Figure 8 shows how male and female age groups were distributed spatially (urban/countryside). The majority of the Brazilian mining workforce worked in the countryside: 77% of men and 63% of women. This result is justified since mining



companies maintain their operations in remote locations, far from cities and urban centres.

**Figure 8. Men and women, by age group and spatial distribution (formal jobs in the Brazilian mining sector, 2009-2019) (average)**



Source: RAIS-MTE (2022)

In both urban and countryside areas, there is a prevalence of male employees aged between 30 and 49 years (65% and 63%, respectively). In the countryside, considering female employees, we noticed a greater proportion of younger women, with 44% of the



total number of women in this area aged between 18 and 29 years old. As seen in Figure 6, the female workforce is characterized by being younger than the male workforce in the period surveyed, and, here, it is observed that this group is concentrated in the countryside.

### **3.2.3 Level of Education**

Before presenting an analysis of the level of education within the Brazilian mining sector, we briefly explain the education system in the country, in order to facilitate the understanding of the data presented.

The current structure of the Brazilian regular education system comprises basic education—formed by early childhood education, elementary education, and high school education—and higher education (or tertiary education). Early childhood education, the first stage of basic education, is offered in daycare centres for children up to 3 years of age and in preschools for children from 4 to 6 years of age. Elementary education lasts a minimum of 8 years. Secondary education, the final stage of basic education, lasts a minimum of 3 years and covers the general education of the student, which may include programs for general preparation for work and, optionally, professional qualification (EDUCABRASIL).

In addition to regular education, formal education includes special education for people with special needs; the education of young people and adults; vocational education (professional qualification); and technical education, which is provided independently of regular secondary education. This, however, is a requirement for obtaining the technical diploma (EDUCABRASIL).

Higher education encompasses undergraduate courses in different professional areas, open to candidates who have completed high school or equivalent and have been classified in selection processes. This level of education also includes postgraduate courses, which include masters, doctoral programs, and specialization courses.

For the analysis of the level of education of Brazilian mining employees, the present study used the variable “aggregate education” available in the RAIS, which is composed of nine levels of education. For the purpose of this study, we reduced them into four levels.<sup>14</sup> We also provided a benchmark in order to compare the mining sector with another four economic sectors: manufacturing, construction, administrative and support service, and human health and social work (Figure 10).

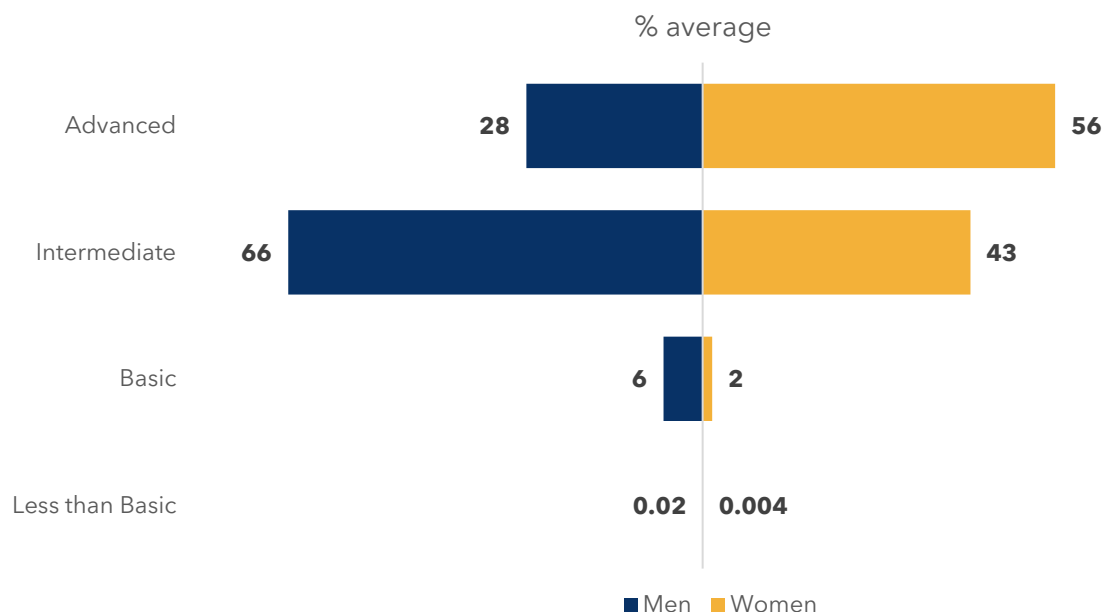
Considering the average of the mining employees during the period of study, the majority fit into the intermediate level of education (63%). Then we have the advanced level, representing 32% of workers.

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<sup>14</sup>See Appendix for more information.



**Figure 9. Men and women, by level of education (formal jobs in the Brazilian mining sector, 2009-2019) (average)**



Source: RAIS-MTE (2021)

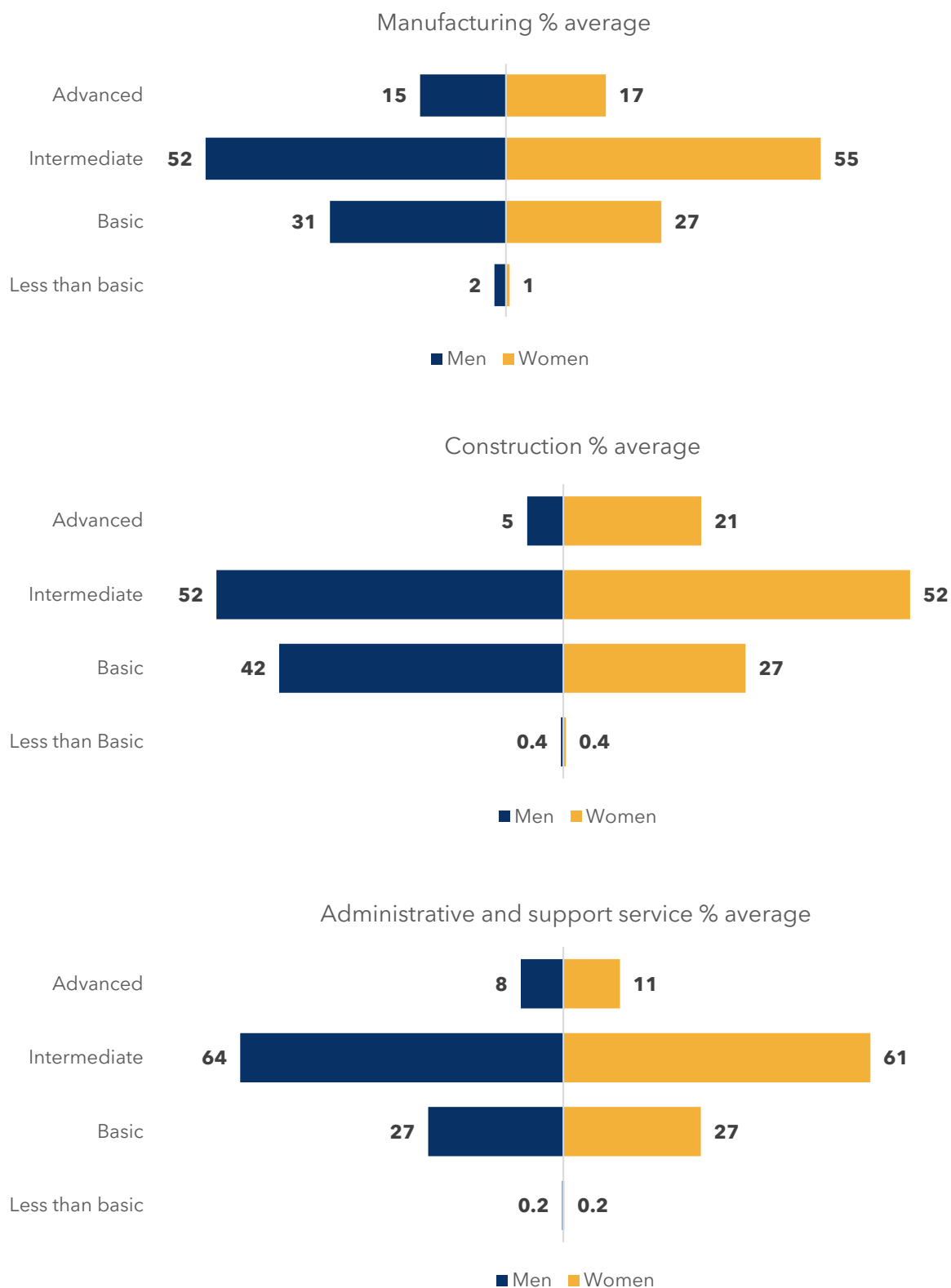
When we analyze the data within each gender group (Figure 9), it is observed that the advanced level of education was composed, on average, of 56% of women, representing twice the number of men. These, for the most part, were in the intermediate level in the same period (66%). The result shows that, proportionally, the women employed in the Brazilian mining sector had a higher education during the period studied.

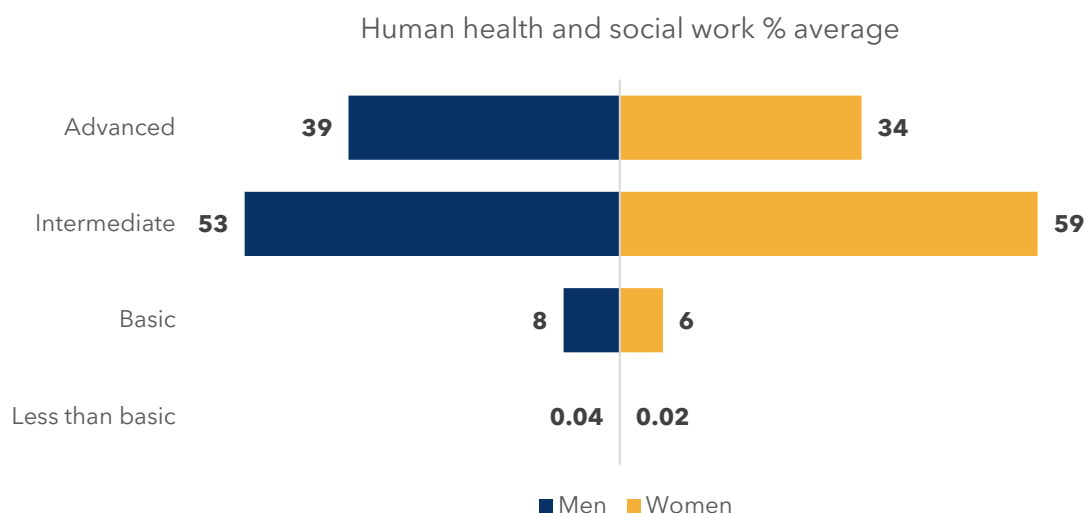
Comparing the results with other economic sectors, Figure 10 shows that, among women, the proportion of employees with an advanced education level remained higher than that of men in three of the sectors presented below: manufacturing, construction, and administrative and support services. As we can see in Figure 2, in 2019, the first two sectors—manufacturing and construction—employed only 27% and 15% women, respectively. Even with little representation in this type of activity, Brazilian women seem to have more years of study than men in the traditionally male-dominated professions.





**Figure 10. Men and women, by level of education (formal jobs in other economic sectors Brazil, 2009-2019) (average)**



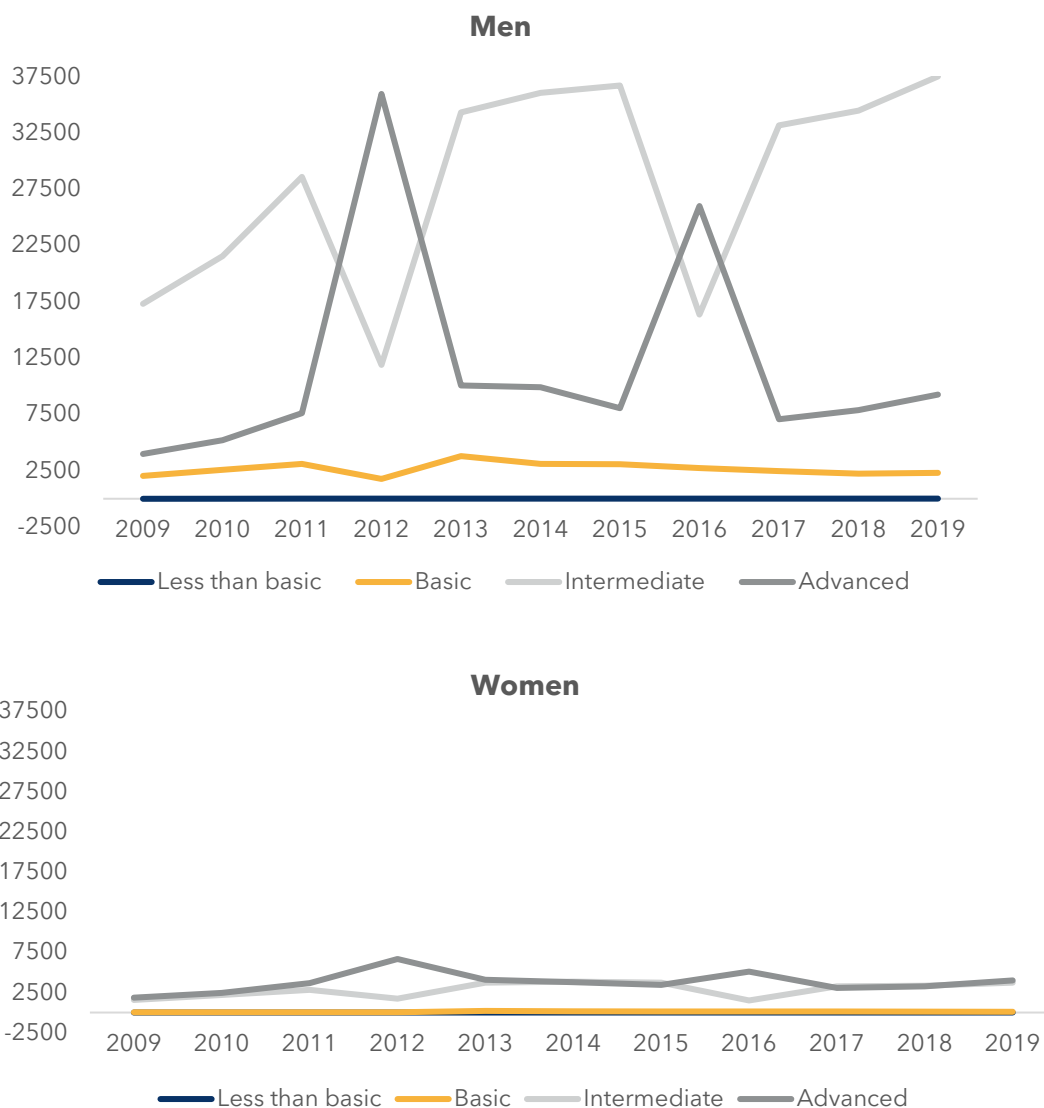


Source: RAIS-MTE (2022)

Figure 11 shows the evolution of education level within each gender from 2009 to 2019. In the period studied, regarding male education, there was a predominance of intermediate to the detriment of other levels of education. However, there was a considerable and punctual increase in the number of male employees with an advanced level of education in 2012 and 2016, with a drop in the total number of employees at the intermediate level.



**Figure 11. Men and women, by level of education (evolution of formal jobs in the Brazilian mining sector, 2009-2019)**



Source: RAIS-MTE (2021)

In relation to female education, there was an equivalence between intermediate and advanced levels of education. 2012 and 2016 were the only years when there was a notable difference, with women occupying a higher level of education.

### 3.2.4 Occupation

The analysis of the occupation of the Brazilian mining employees was based on the Brazilian Classification of Occupations,<sup>15</sup> version 2002 (CBO, 2002). For the purpose of this study, we used the CBO 2002's Major Group of classification.

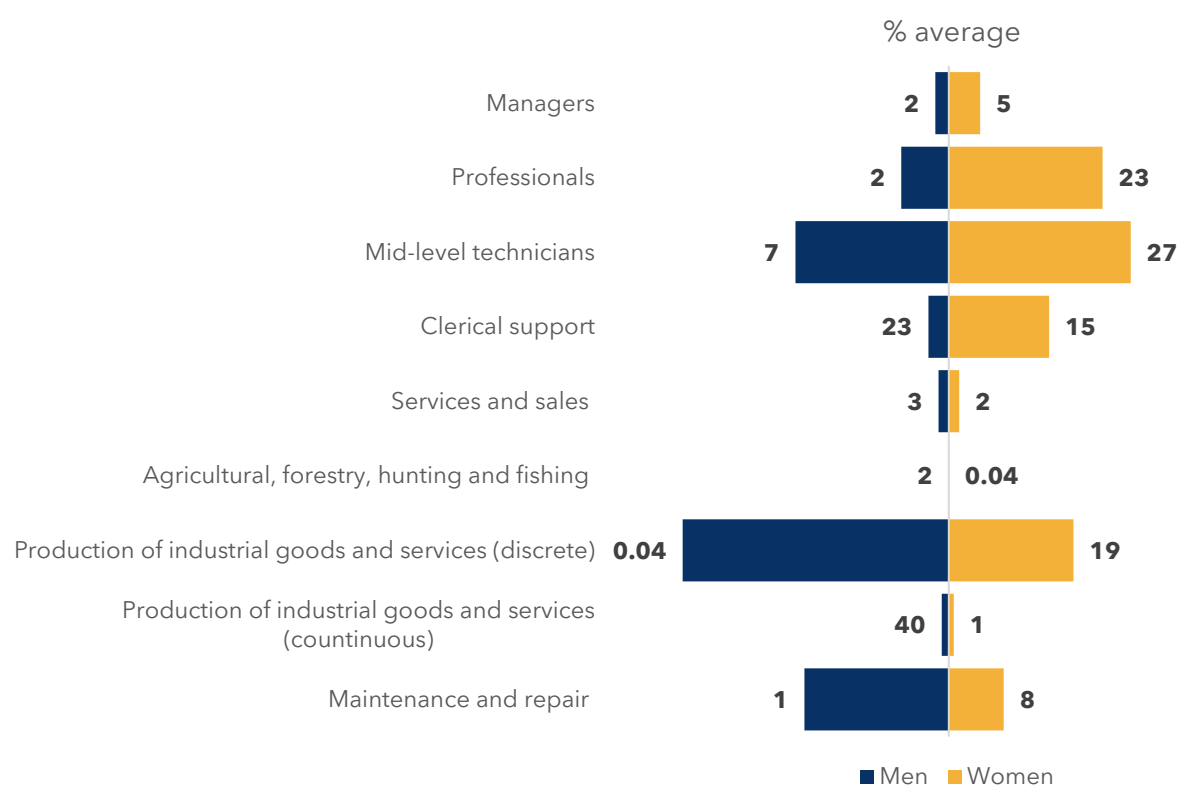
<sup>15</sup> See the Appendix for more information.



During the period of the study, 81% of the Brazilian mining employees were related to three occupational groups: production of industrial goods and services (discrete production system) (37%); mid-level technicians (24%); and maintenance and repair (20%). Of this total, 91% were men and 9% were women.

Observing the occupations within each gender, Figure 12 shows that mid-level technicians, professionals, and clerical support seem to be more related to female employment in the Brazilian mining sector. As we can see, the average number of female jobs is proportionally greater than that of men in these three occupational groups, with 27%, 23%, and 15% of women, respectively.

**Figure 12. Men and women, by occupation (formal jobs in the Brazilian mining sector, 2009-2019) (average)**

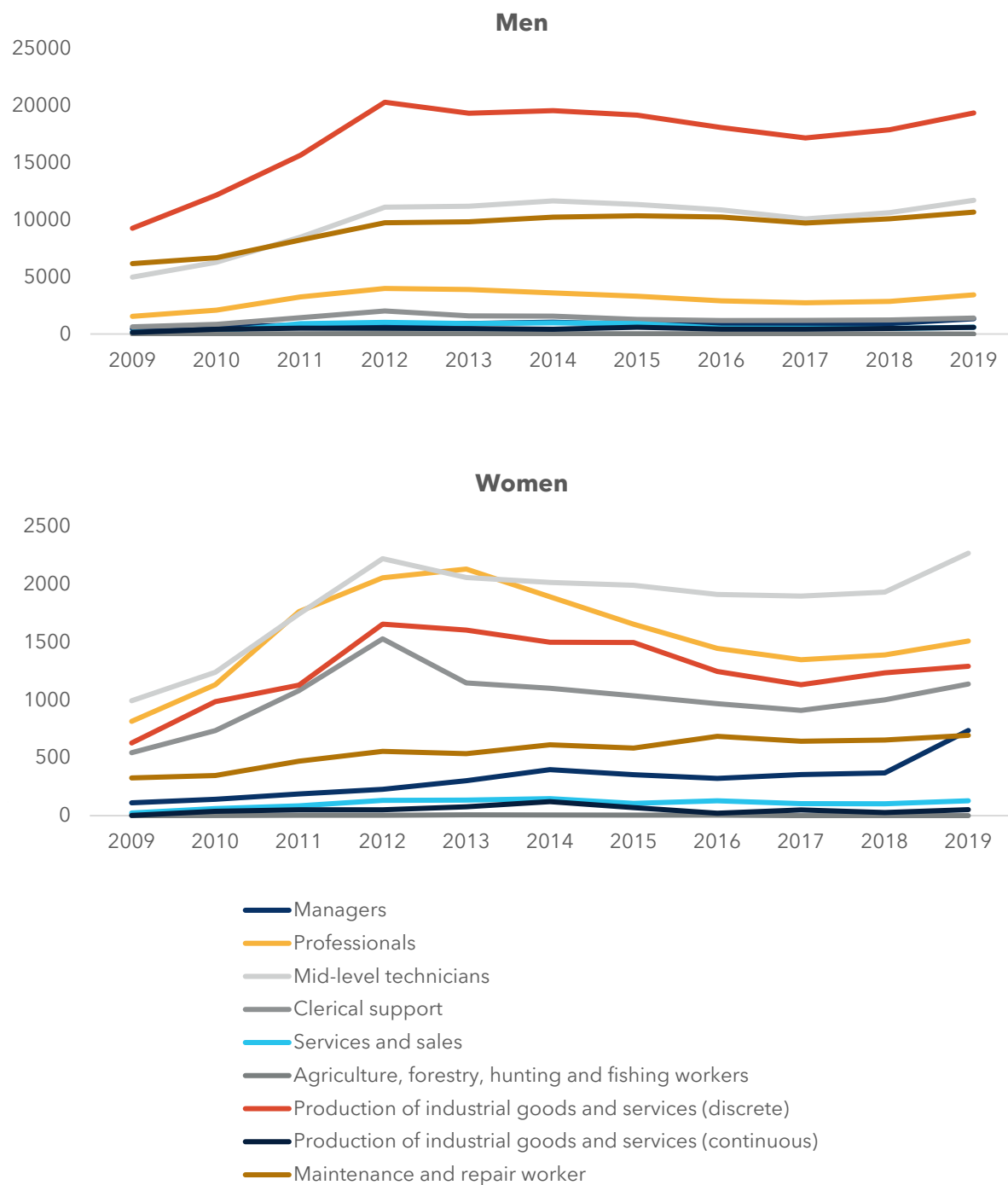


Source: RAIS-MTE (2021)

Besides mid-level technicians, also noteworthy are maintenance and repair and production of industrial goods and services (discrete), which showed an evolution during the period of study (Figure 13). Although not historically related to female employment, they had greater female participation in 2011, representing a variation of 128%, 113%, and 106% of employed women (2009-2019), respectively (Table 5). The second appears as the third most common occupation among women, ahead of clerical support (15%) (Figure 12).



**Figure 13. Number of men and women by occupation (evolution of formal jobs in the Brazilian mining sector, 2009-2019)**





**Table 5. Occupation by gender (variation of formal jobs in Brazilian mining, 2009-2019) (%)**

<b>Occupation</b>	<b>Variation (M)</b>	<b>Variation (W)</b>
Managers	194%	563%
Professionals	122%	85%
Mid-level technicians	135%	128%
Clerical support workers	123%	109%
Services and sales	285%	461%
Agricultural, forestry, hunting and fishing workers	100%	0%
Production of industrial goods and services (discrete)	109%	106%
Production of industrial goods and services (continuous)	329%	2500%
Maintenance and repair worker	73%	113%
<b>Total</b>	<b>110%</b>	<b>127%</b>

Source: RAIS-MTE (2021) - Prepared by IGF

In the case of the occupation of production of industrial goods and services (continuous),<sup>16</sup> although the variation draws attention, the data collected indicated only 1% of the total workers from 2009 to 2019, which can be considered as non-representative.

If we relate different occupations to the workers' levels of education, Figure 14 confirms what we saw in Section 3.2.3, that there was a greater proportion of women with an advanced level of education. In 2019, we observed this presence, even considering the occupations that tend to require more technical skills, such as mid-level technicians, maintenance and repair, and production of industrial goods and services (continuous and discrete). Considering the first two, among the average of employed women, 47% and 11% had higher education levels, respectively, while almost half of the men (23% and 6%) had the same levels of education.

The presence of women with advanced levels of education was also greater in the leadership position. Among managers, 97% of women and 91% of men presented advanced levels of education.

Figure 15, in turn, shows the relationship between occupation and age group. As noted in Section 3.2.1, 38% of the average female workers were aged between 18 and 29 years. We observe that, in 2019, younger women were also more concentrated in occupations related to technical skills: mid-level technicians (23%), maintenance and repair (58%), and

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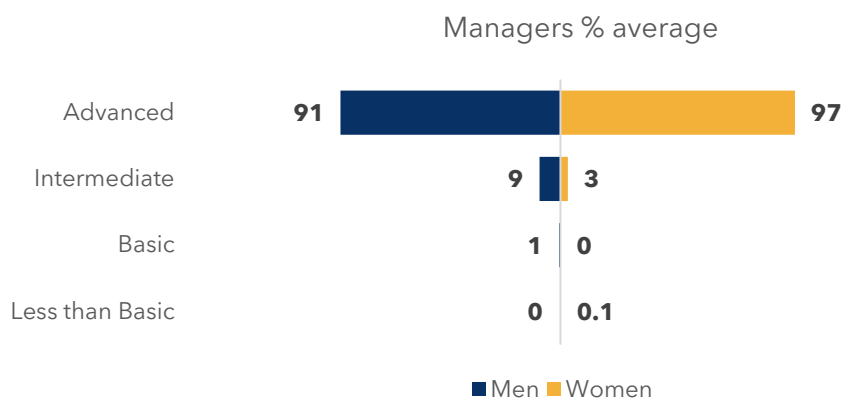
<sup>16</sup> According to Brazilian Classification of Occupations (CBO, 2002), the so-called discrete and continuous production systems differ as follows, based on the competences required by each of them:  
Discrete: workers that tend to deal more with the form of the product than with its physical-chemical content.  
Continuous: workers that tend to deal with the physical-chemical content of the products (chemistry, steel, among others). See: <http://www.mtecbo.gov.br/cbosite/pages/informacoesGerais.jsf#3>



production of industrial goods and services (continuous and discrete) (37%; 47%). Clerical support was another occupation that appeared with a concentration of young female workers (40%). Furthermore, the results show a large drop in women employees over 50 years old, even in those occupations where they should be more commonly represented. The reasons why the older female age group has not been well represented in the mining sector may motivate further investigations.

Among managers, Figure 15 shows that of leadership roles in the mining sector, 22% were filled by men aged over 50 years, while only 10% of women managers were concentrated in the same age group.

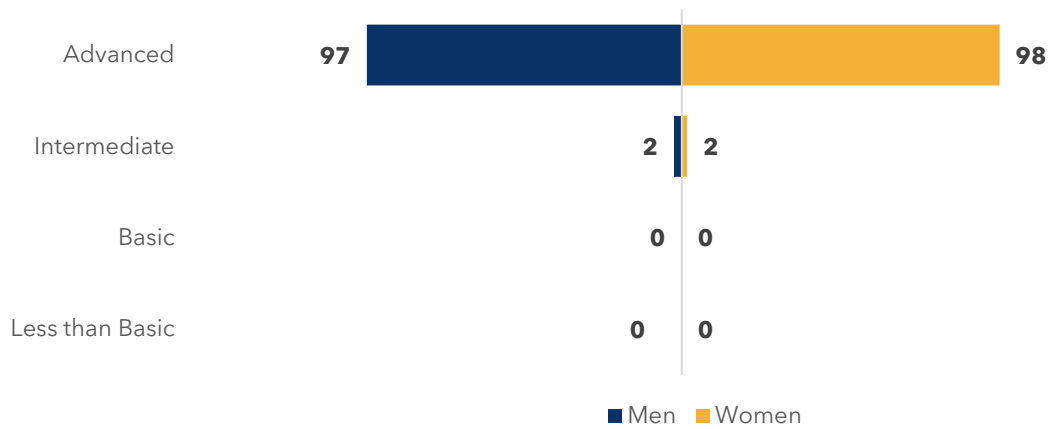
**Figure 14. Men and women, by education level and occupation (formal jobs in the Brazilian mining sector, 2019) (average)<sup>17</sup>**



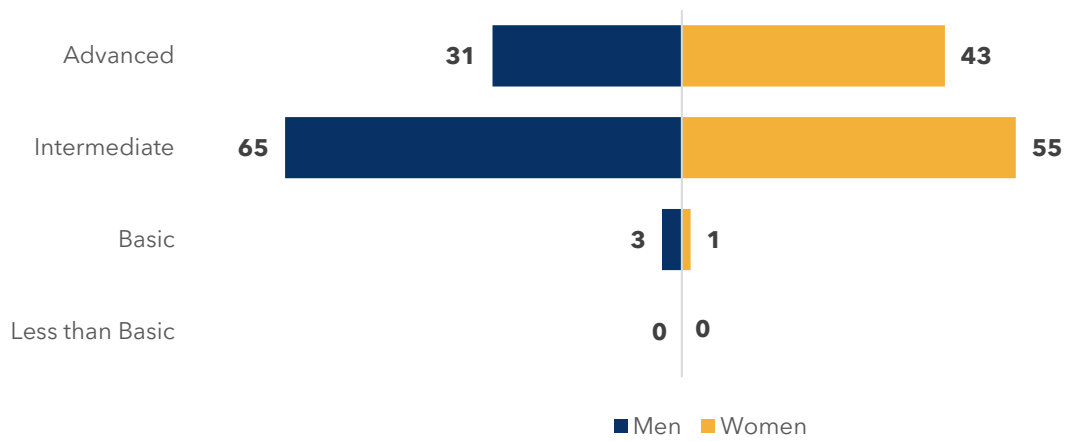
<sup>17</sup> In the case of the occupations of agricultural, forestry, hunting and fishing workers, the data collected indicated zero stock of women in 2019. Therefore, we did not include them in Figures 14, 15, and 16.



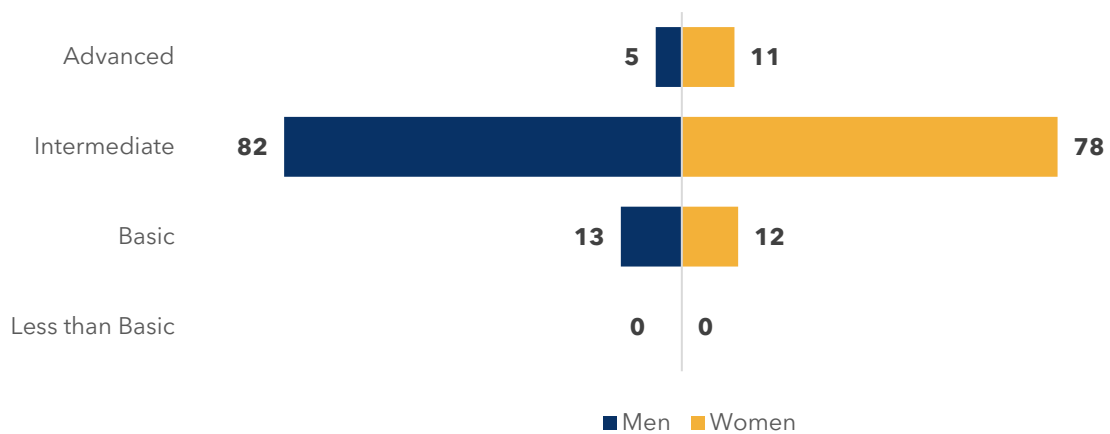
### Professionals % average



### Clerical support % average



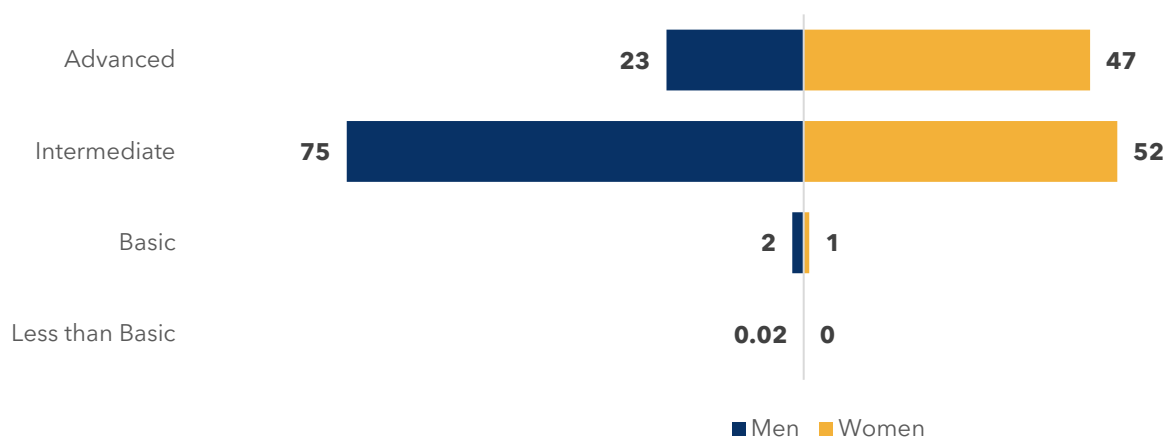
### Services and sales % average



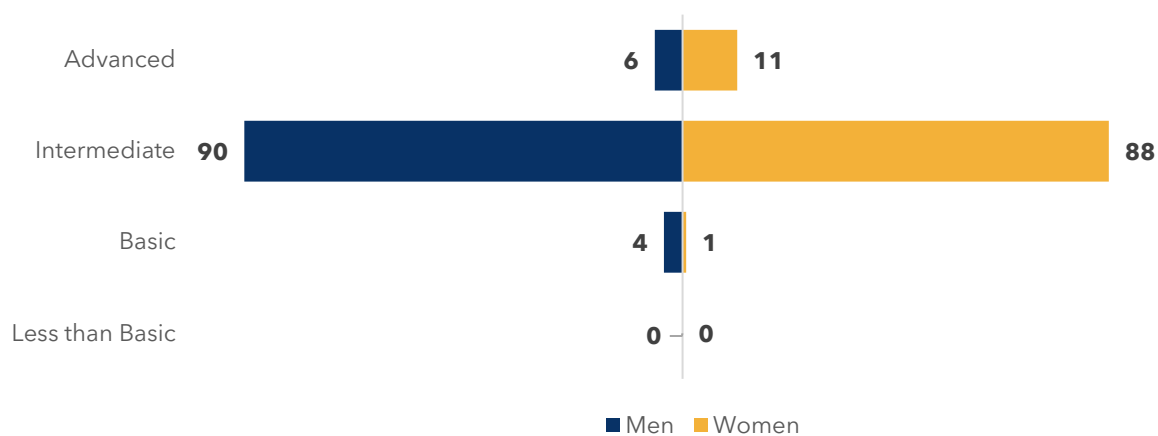




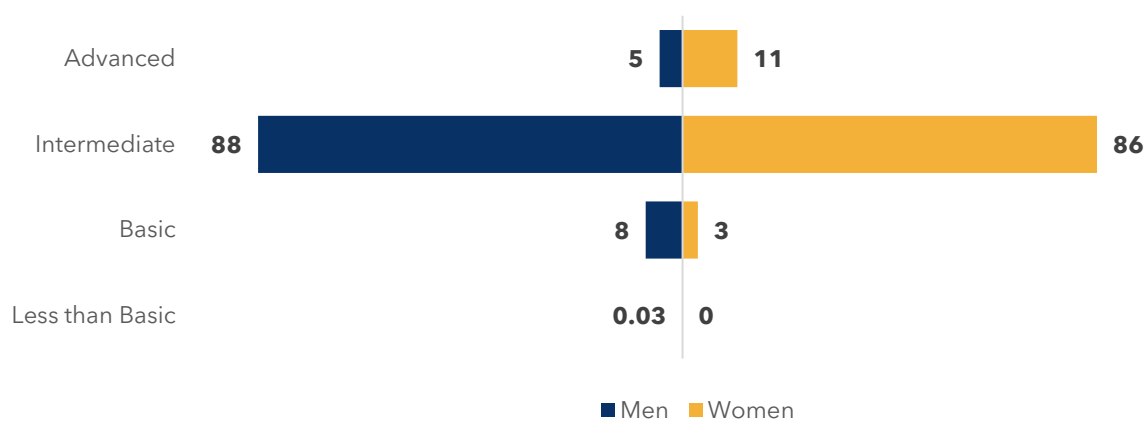
Mid-level technicians % average



Maintenance and repair % average



Production of industrial goods and services (discrete)  
% average

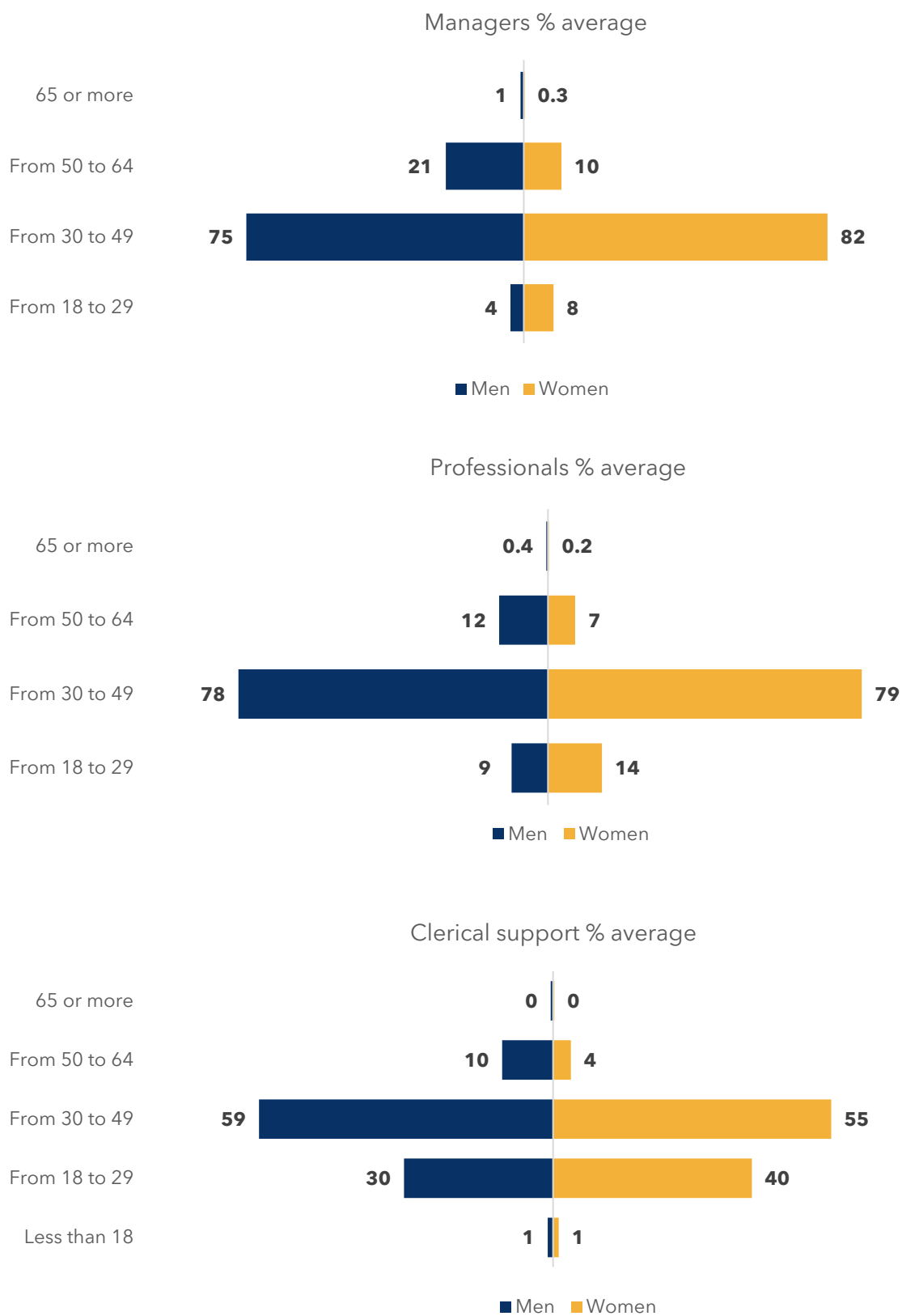




Source: RAIS-MTE (2022)

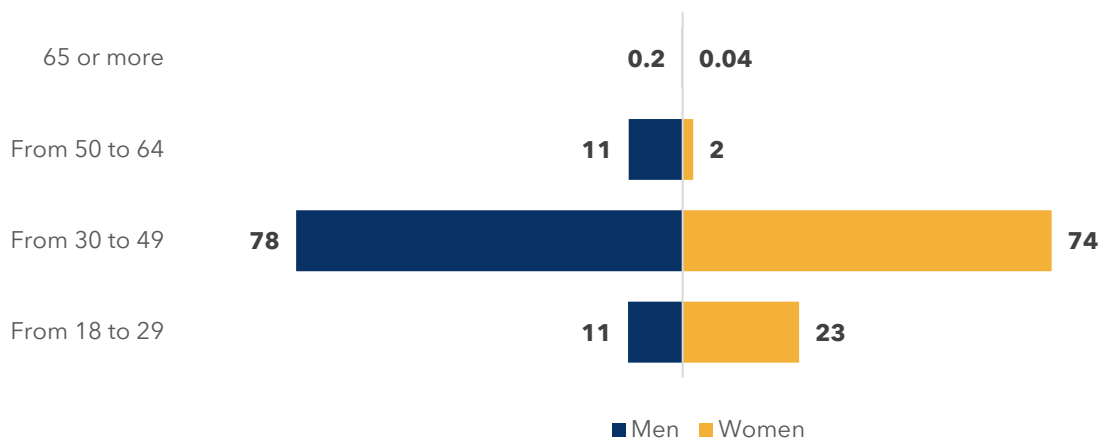


**Figure 15. Men and women, by occupation and group of age (formal jobs in the Brazilian mining sector, 2019) (average)**

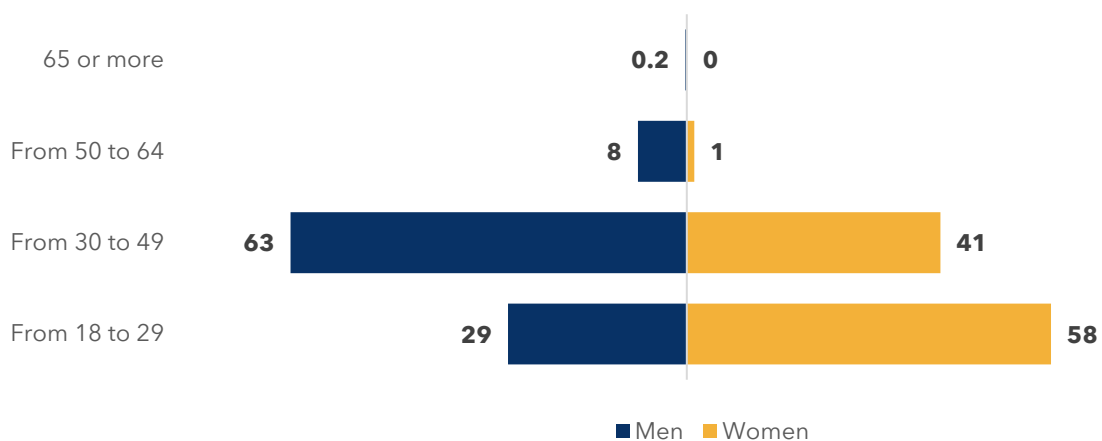




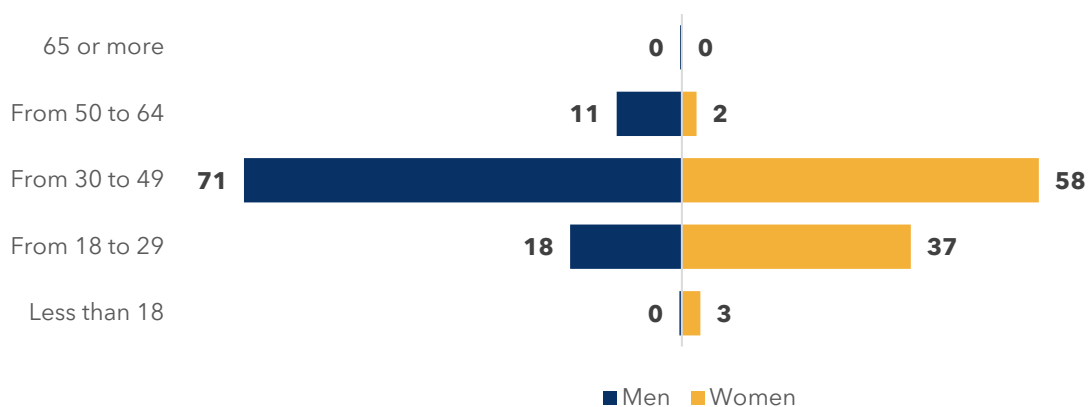
### Mid-level technicians % average



### Maintenance and repair % average

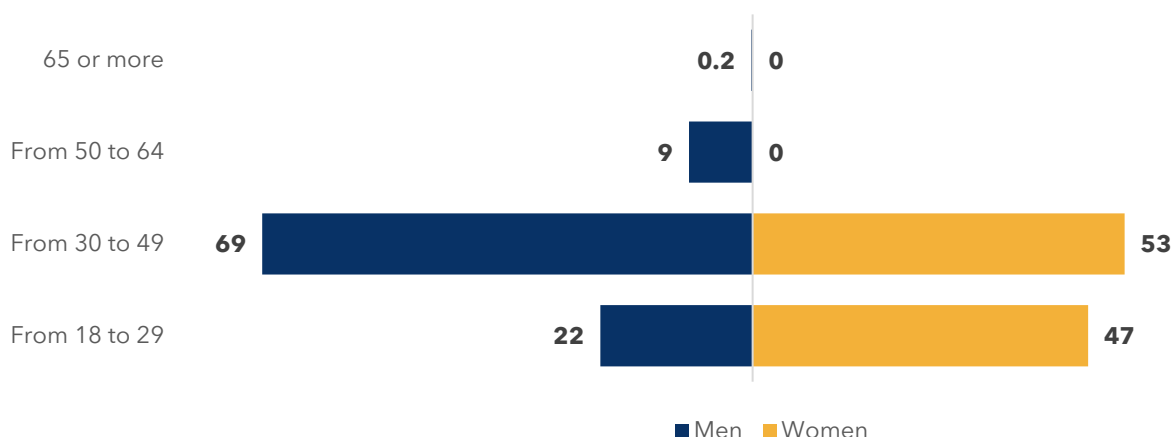


### Production of industrial goods and services (discrete) % average





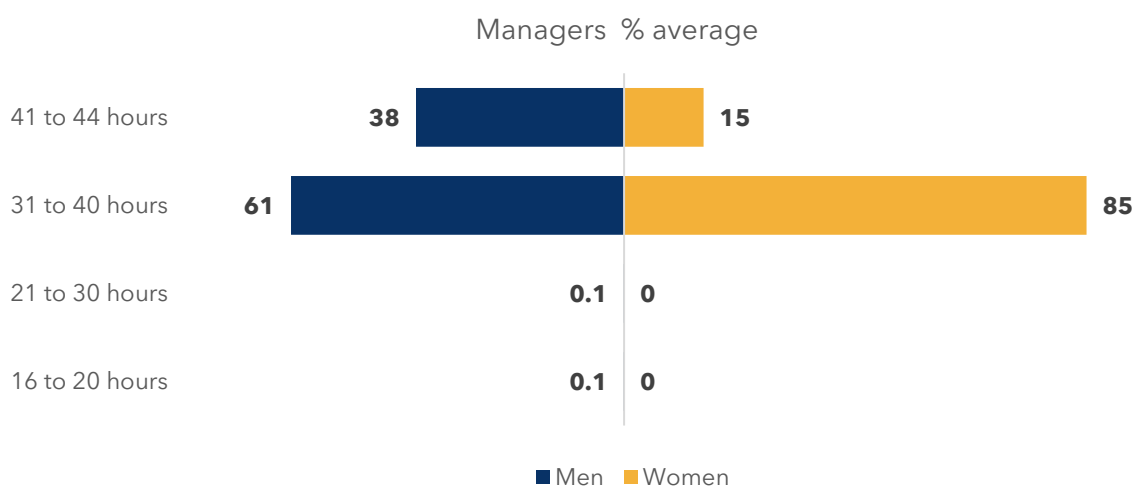
Production of industrial goods and services (countinuous) % average



Source: RAIS-MTE (2022)

Figure 16 shows the intersection between occupations, weekly hours worked,<sup>18</sup> and gender. In 2019, most mining employees, men (72%) and women (67%), averaged between 31 and 40 hours each week. Considering each occupation, we observe that the occupations of managers, maintenance and repair, and production of industrial goods and services (discrete) presented a higher proportion of men working more hours—41 to 44 weekly hours—than women. Female employees appeared proportionally more concentrated in this range of worked hours only in the occupation of production of industrial goods and services (continuous). It is important to highlight that the full-time work regime in Brazil comprises 44 hours per week, while part-time work must not exceed 30 hours per week.

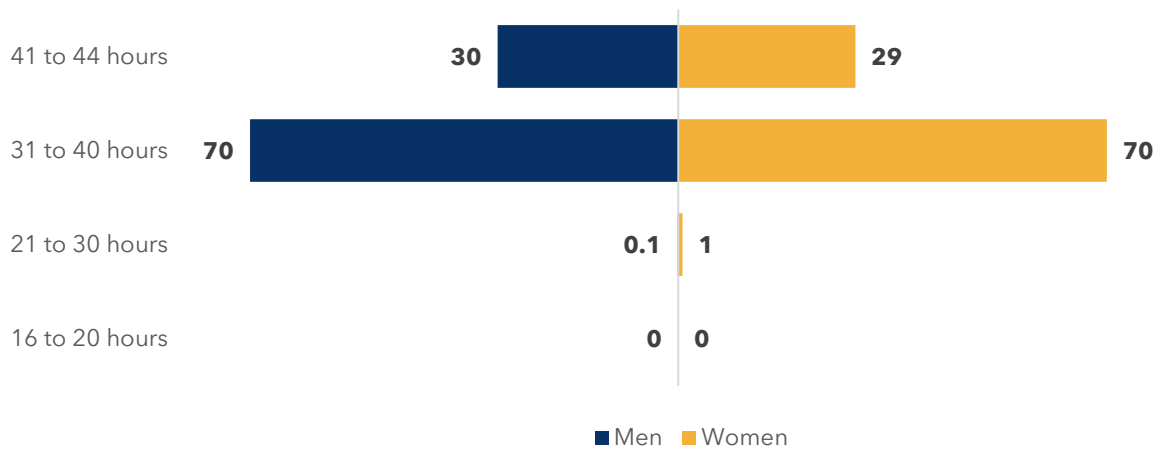
**Figure 16. Men and women by occupation and weekly hours worked (formal jobs in the Brazilian mining sector, 2019) (average)**



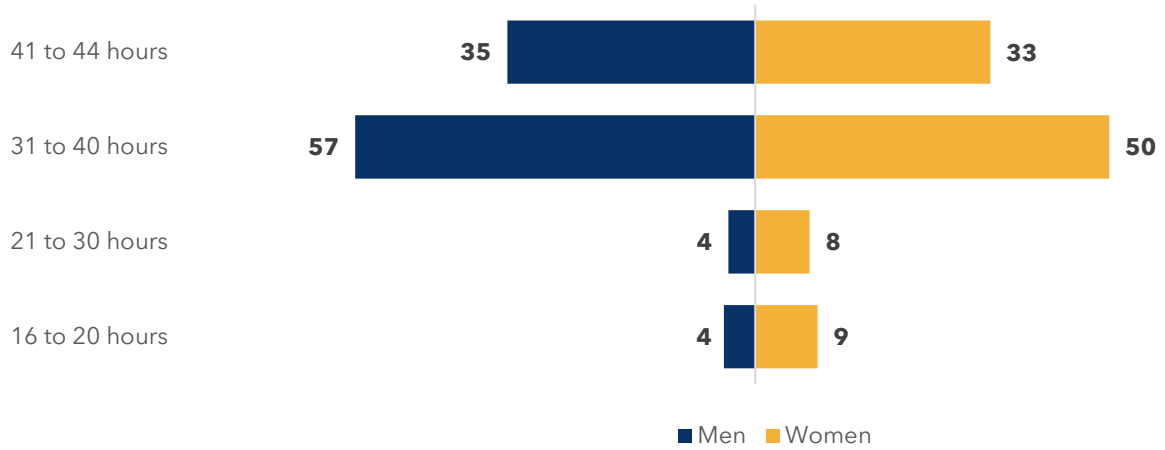
<sup>18</sup> See Appendix for more information.



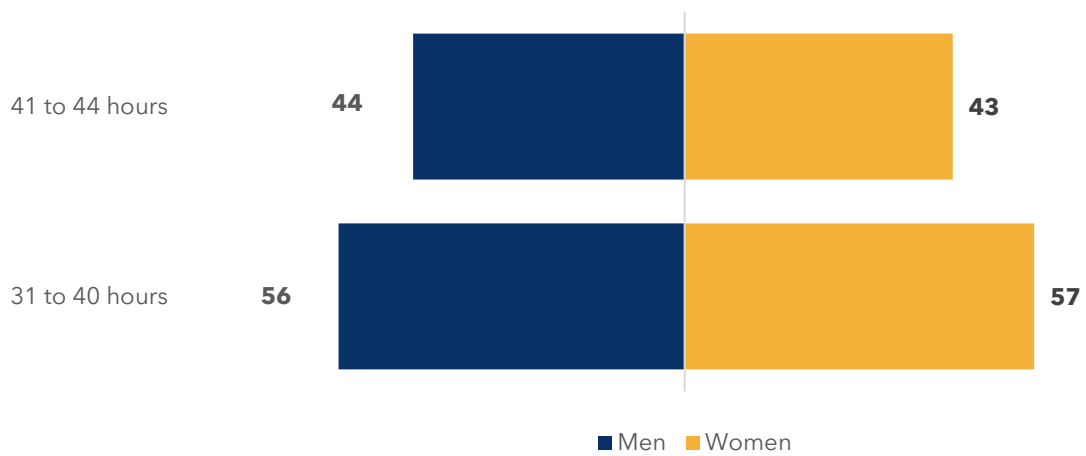
### Professionals % average



### Clerical support % average

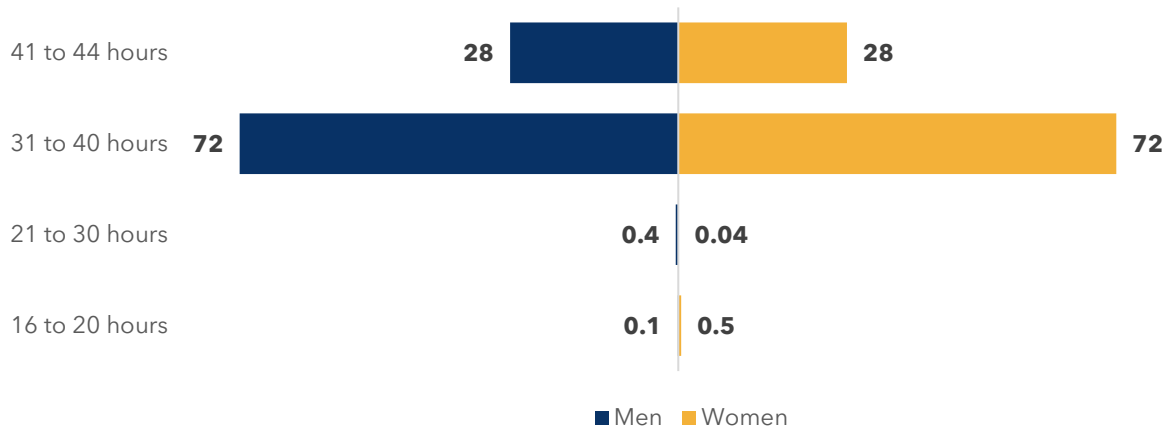


### Services and sales % average

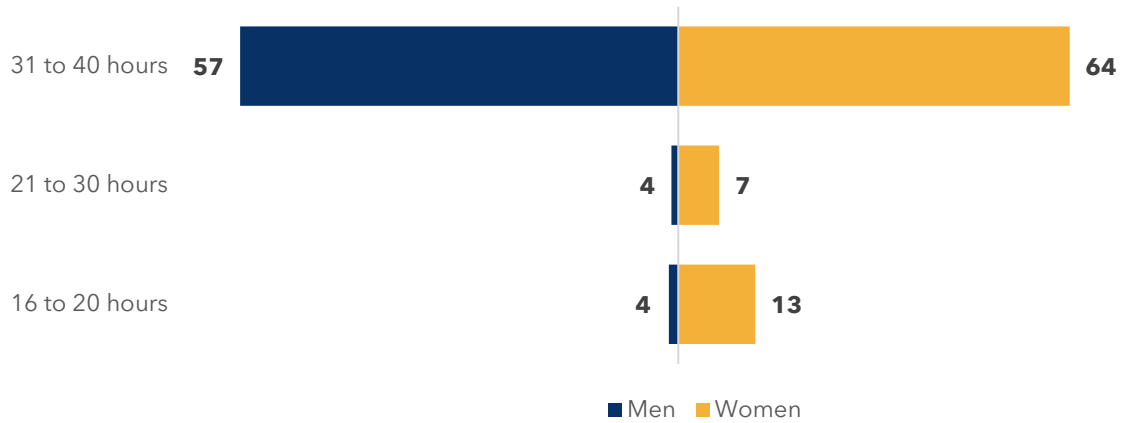




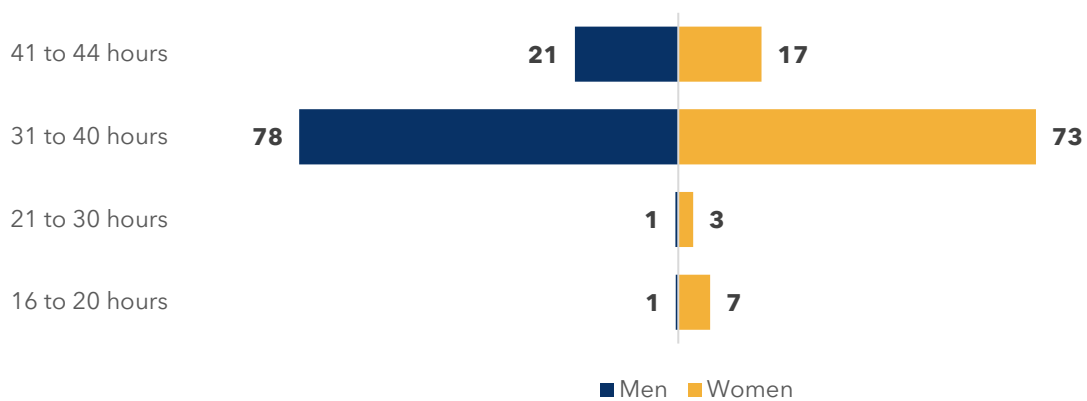
### Mid-level technicians % average



### Maintenance and repair % average



### Production of industrial goods and services (discrete) % average





Source: RAIS-MTE (2022)

### 3.2.5 Remuneration

For the analysis of the gender salary gap in Brazilian mining companies, the present study adopted the “average monthly remuneration” available in the RAIS system.<sup>19</sup> The remuneration is presented in Brazilian currency (Real).<sup>20</sup>

Figure 17 shows the average monthly remuneration by occupation and gender. Women’s earnings were higher than men's in two occupations: services and sales<sup>21</sup> and agricultural, forestry, hunting and fishing.<sup>22</sup>

<sup>19</sup> See the Appendix for more information.

<sup>20</sup> Dollar / Real exchange rate: USD 1.00/R\$ 5.43 (<https://www.bcb.gov.br/en>, accessed in October 15, 2021).

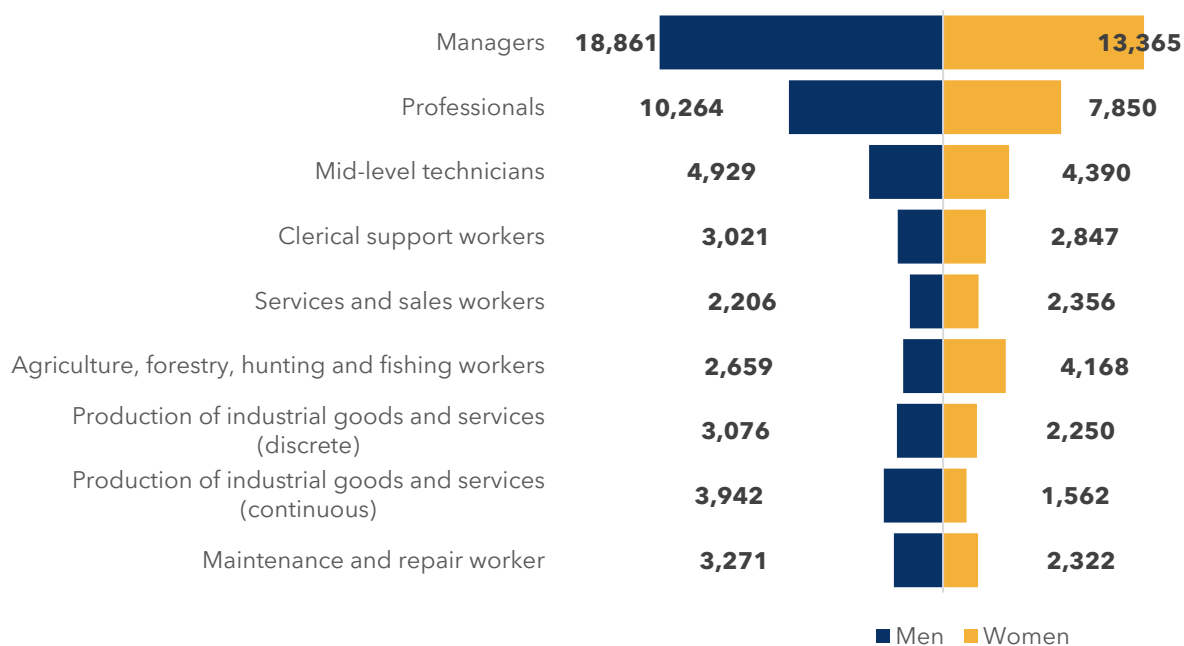
<sup>21</sup> According to the CBO 2002 Subgroups, mining establishments reported to RAIS the following activities under the occupation of services and sales: “Employees in hotel and administration services,” “Workers in protection and security services,” and “Service provision supervisors,” among others.

<sup>22</sup> According to the CBO 2002 Subgroups, mining establishments reported to RAIS the following activities under the occupation of agricultural, forestry, hunting and fishing: “Agricultural workers,” “Workers in livestock,” “Supervisors in forestry and fishing,” “Forestry extractors,” and “Agricultural mechanization workers.”





**Figure 17. Men and women, by monthly remuneration and occupation (formal jobs in the Brazilian mining sector, 2009-2019) (average) (R\$1,000)**



Source: RAIS-MTE (2021)

According to Table 6, which presents the ratio of the average salary of women and men, women earned 107% of men's salary in services and sales and 157% in agricultural, forestry, hunting and fishing. In total, the results showed that women earned an average of 109% of men's remuneration in the period analyzed.

However, this result must be analyzed carefully. This may be explained by the fact that there were some significant differences in women's remuneration in specific occupations. In agricultural, forestry, hunting, and fishing, for example, the average female salary from 2009 to 2016 was significantly higher than that of men (more than 100%). This may have contributed to increasing the value of the average female remuneration, considering the low number of women employed in the mining sector compared to men (see Figure 3). Furthermore, the average of employees in this occupation is very low, representing 0.08 for both genders, as we see in Figure 12. That is why this occupation was not presented in other graphs of this study.



**Table 6. Ratio of female/male remuneration by occupation (formal jobs in the Brazilian mining sector, 2009-2019) (%)**

<b>Occupation</b>	<b>Men</b>	<b>Women</b>	<b>Variation</b>
Managers	18,861	13,364.98	71%
Professionals	10,264	7,849.84	76%
Mid-level technicians	4,929	4,390.15	89%
Clerical support workers	3,021	2,846.71	94%
Services and sales	2,206	2,356.29	107%
Agricultural, forestry, hunting and fishing workers	2,2659	4,168.49	157%
Production of industrial goods and services (discrete)	3,076	2,249.71	73%
Production of industrial goods and services (continuous)	3,942	1,561.93	40%
Maintenance and repair worker	3,271	2,322.28	71%
<b>Total</b>	<b>4,386.39</b>	<b>4,760.14</b>	<b>109%</b>

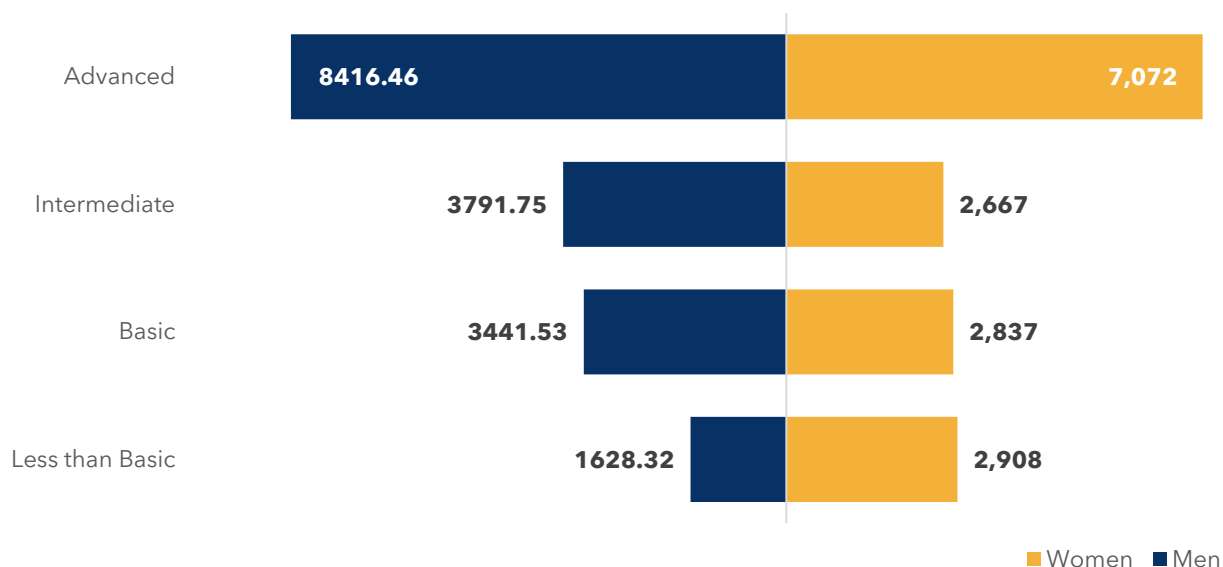
Source: RAIS-MTE (2021) - prepared by IGF

When we observe the average monthly remuneration disaggregated by groups of occupation (Figure 17), we see that the gap between women's and men's salaries was present in most of them, including those that showed a strong presence of women in the period studied—professionals, mid-level technicians, and clerical support. Even within the group of managers, which had an increase in female participation from 2018 onwards, the salary gap was still present, with women managers earning the equivalent of 71% of men's pay in the same occupation (Table 6).

The analysis of the average monthly salary was also carried out by comparing it to the level of education and gender. As we can see in Figure 18, despite having more years of education on average (see Figure 9), women still had lower remuneration than men, regardless of their level of education during the period of study.



**Figure 18. Men and women, by monthly remuneration and level of education (formal jobs in the Brazilian mining sector, 2009-2019) (average) (R\$1,000)**



Source: RAIS-MTE (2021)

Women who had advanced education earned on average 84% of men's wages, as shown in Table 7. According to the RAIS system, only women with a less than a basic level of education earned more, an average of 179% of male pay, between 2009 and 2019. However, we must consider that there may have been an inconsistency in the RAIS data in this case, which can be better investigated at the next opportunity.

**Table 7. Ratio of female/male monthly remuneration by level of education (formal jobs in the Brazilian mining sector, 2009-2019) (%)**

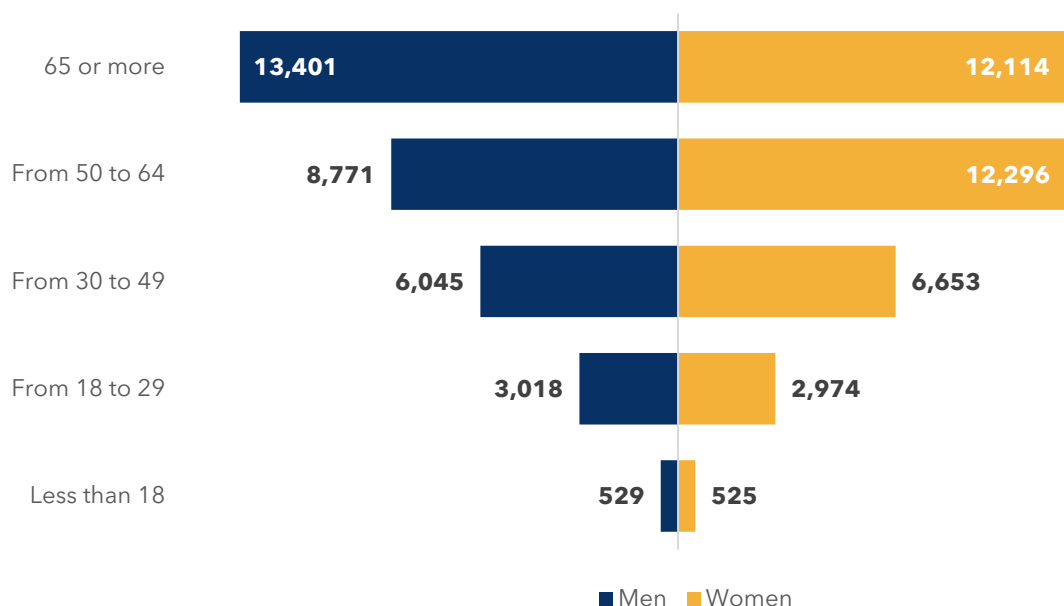
Level of education	Monthly remuneration Ratio F/M (%)
Advanced	84
Intermediate	70
Basic	82
Less than Basic	179
<b>Total average</b>	<b>109</b>

Source: RAIS-MTE (2021) – prepared by IGF

We also can see the relationship between the monthly remuneration and age group in Figure 19. Proportionally, women employees of two age groups—from 50 to 64 and from 30 to 49 years old—tended to earn more than men in 2019. Considering the other age groups, we see an equivalence of remuneration between both genders.



**Figure 19. Men and women, by monthly remuneration and age group (formal jobs in the Brazilian mining sector, 2019) (average) (R\$1,000)**



Source: RAIS-MTE (2022)

### **3.2.6 Ownership Structure, Nature of Employment, and Work Time**

According to the RAIS system, 100% of Brazilian mining establishments reported that they were private sector.<sup>23</sup> In 1997, the largest Brazilian mining company, Vale S.A. (then Companhia Vale do Rio Doce), was privatized,<sup>24</sup> changing the ownership structure of the Brazilian mining sector.

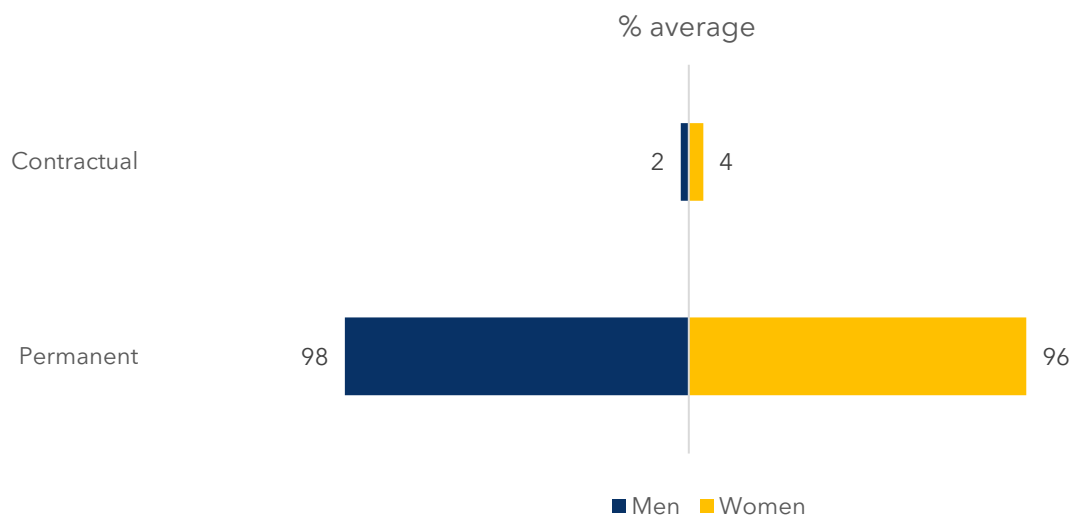
With regard to the nature of employment and working hours, Figures 20 and 21 show that almost the entire contingent of workers was permanent and working full time. This may be influenced by the fact that we are working with a sample of larger companies, with 1,000 or more employees.

<sup>23</sup> There is no information on the origin of capital in the RAIS, in order to differentiate between national and multinational companies.

<sup>24</sup> <http://www.vale.com/brasil/PT/aboutvale/Paginas/espaco-memoria.aspx>

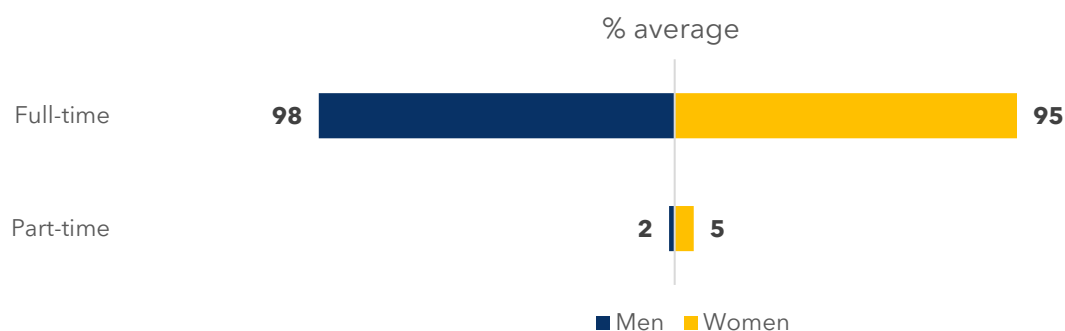


**Figure 20. Men and women, by nature of employment (formal jobs in the Brazilian mining sector, 2009-2019) (average)**



Source: RAIS-MTE (2021)

**Figure 21. Men and women, by work time (formal jobs in the Brazilian mining sector, 2009-2019) (average)<sup>25</sup>**



Source: RAIS-MTE (2021)

Despite the fact that the total number of contractual and part-time employees represents only 4% and 2% of the total, respectively, we observe that the proportion of women working in these two regimes is twice that of men (Figures 20 and 21).

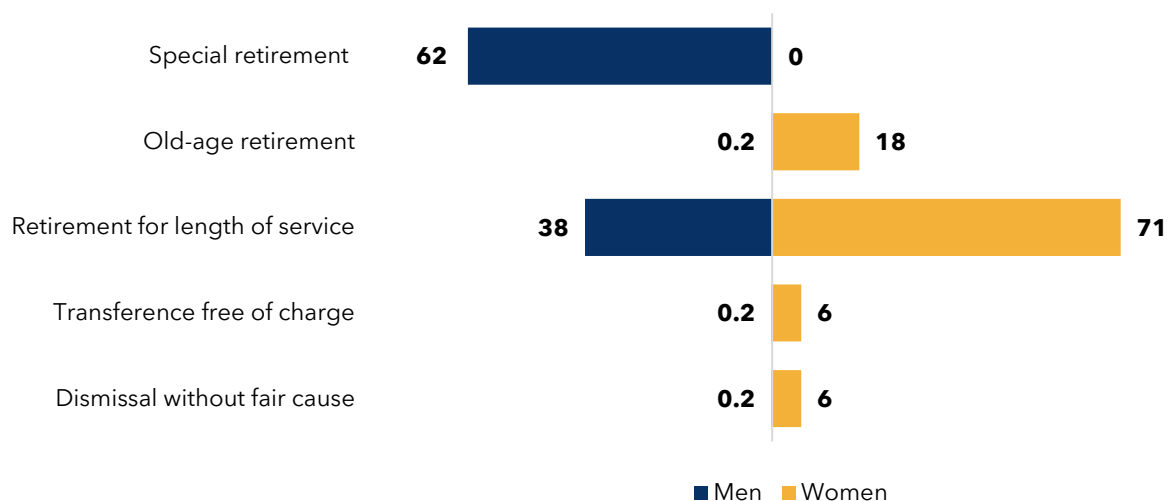
In Figure 22,<sup>26</sup> we observe the reasons for leaving work for both genders from 2009 to 2019. Among men, on average, most left work due to **special retirement** (62%) and **retirement due to length of service** (38%). The majority of women, in turn, left work because of **retirement due to length of service** (71%) and **old-age retirement** (18%) in the same period.

<sup>25</sup> These results did not consider 670 entries in the RAIS system that were reported as "not classified."

<sup>26</sup> See the Appendix for more information about the Brazilian retirement system.



**Figure 22. Men and women, reasons for leaving work (formal jobs in the Brazilian mining sector, 2009-2019) (%) (average)**



Source: RAIS-MTE (2022)

It is important to note that the RAIS system reported very low numbers in all cases of leaving work, especially dismissals and resignations, which contributed to unreliability in presenting a broader spectrum of reasons for employees leaving in the period studied.

In the present section, we observed that the Brazilian mining sector has been experiencing movement in gender diversification in the last decade. It can be said that a process of feminization is underway, not only with the increase in the number of women in the mining workforce but also due to a trend of gender regional decentralization in recent years. There are more women in different places. We also observed, albeit timidly, an increase in the number of women being hired in commonly male occupations (i.e., production of industrial goods and services, mid-level technicians, and maintenance and repair) (Figure 12 and Table 5).

However, if, on the one hand, there was a change in numbers, on the other, the gender diversification process still needs more change in the Brazilian mineral sector. Regarding the activities performed, the data indicated that employed women are still closely related to what were traditionally considered "female" occupations. Women also earn less in most occupations, despite having more years of education and performing the same activities as men.



To analyze these issues, the following section presents qualitative information that focuses on whether and how Brazilian mining companies have been changing their processes to actually implement gender diversification in their work environment and strengthen the ongoing process of feminization.



## 4.0 BRAZILIAN LSM AND GENDER DIVERSIFICATION PROCESSES

In this section, we explore how Brazilian mining companies are dealing with important processes that could improve their feminization phenomenon. For this purpose, we selected three gender issues—the female workforce capacity and the operational areas; retention, promotion, and salaries of the female workforce; and adaptation of work environments to the needs of women—with the aim of analyzing the strategies of Brazilian mining companies in relation to DE&I processes.

The analysis was based on interviews with representatives of three Brazilian mining companies<sup>27</sup> and was complemented with specific content obtained from company reporting, academic publications, and official data. For confidentiality purposes, each company interviewed was given a fictitious name. We mentioned names of other Brazilian mining companies that have published information in publicly available reports and websites.

The qualitative analysis was also based on the results of the *Progress Report of the Action Plan for the Advancement of Women in the Mining Industry*,<sup>28</sup> carried out by WIM Brasil. These results were generated by a survey conducted with WIM Brasil's 16 signatories in January 2021. The survey's objective was to understand the current situation and realities of gender diversity in the Brazilian mining sector. The diagnosis is part of a wider initiative by WIM Brasil, which started in March 2020 with a letter of commitment to the greater inclusion of women in mining. The initiative had the support of the Brazilian Mining Institute (IBRAM) and the participation of the major Brazilian mining companies.

Finally, among the companies interviewed, there is a coal producer. As mentioned in Section 2.2, coal producers were not included in the quantitative data since they didn't fit the profile stipulated in the study. Because of this, in Section 4.4, we presented a short case of a Brazilian coal producer to include this kind of mineral in the current project.

### 4.1 The Female Workforce Skills and the Operational Areas

Before focusing on women's skills in the Brazilian mining sector, we need to take a step back and analyze whether Brazilian education is providing women with the expertise needed. For this purpose, we analyzed the profile of students from secondary and tertiary education since they are potential future employees of the mining sector.

In the Organisation for Economic Co-operation and Development's (OECD's) publication *Education at Glance* (2019), in Brazilian upper secondary education, 11% of enrollments

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<sup>27</sup> See the Appendix for more information about the interviewed companies.

<sup>28</sup> <https://wimbrasil.org/indicadores-wim-brasil/>





were linked to professional training programs (integrated or concomitant). Among high school graduates, only 8% were in these programs, while in the OECD, the average was 40%. Within this total, 57% were women (above the OECD average of 48%), positioning Brazil among the five countries with the highest female participation in this modality of education<sup>29</sup> (OECD, 2019, in Diretoria de Estatísticas Nacionais, 2019:14).

Regarding the profile of upper secondary graduates by area of study, in OECD countries, 34% of students who completed professional training education were in engineering, manufacturing, and construction. The percentage drops to 18% in the area of business sciences, administration, and law; 17% in services; and 12% in health and well-being. In Brazil, Italy, Luxembourg, the United Kingdom, and Switzerland, the most common area for completing vocational secondary education is Business Science, Administration, and Law (OECD, 2019, in Diretoria de Estatísticas Nacionais, 2019:14).

With respect to female participation, the percentage of women who completed professional training education in engineering, manufacturing, and construction was only 12% in the OECD average. In Brazil, this percentage was 32%, representing the smallest disparity between men and women in this area.<sup>30</sup> However, Brazilian women's participation predominates in the areas of health and well-being, and services. Here, among the students who completed the course, 77% and 66%, respectively, were women. In the two areas, the OECD's average of women was 82% for health and well-being and 61% for services (OECD, 2019, in Diretoria de Estatísticas Nacionais, 2019:14, 15).

In relation to tertiary education level, the research project Gender Equality in STEM (science, technology, engineering, and mathematics)<sup>31</sup> shows that, in 2018, 56% of all Brazilian students attending higher education were women. Observing the courses that are not considered STEM, the number rose to 63% of women students. In the case of STEM courses, female participation dropped to 30% (Figure 23).

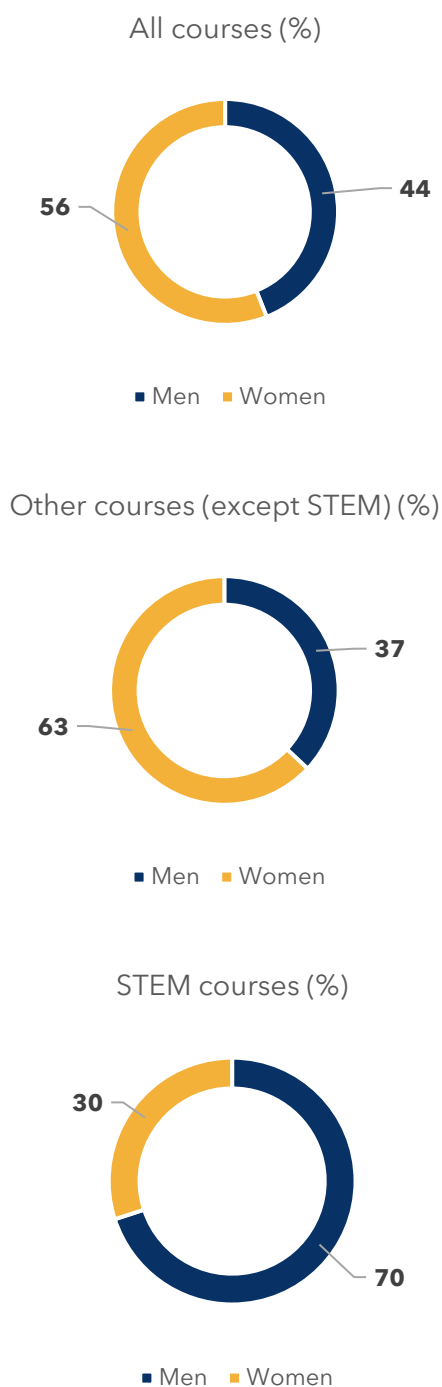
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<sup>29</sup> Brazil is ahead of United Kingdom (52%) and Colombia (55%), and behind Ireland (61%) and New Zealand (63%).

<sup>30</sup> Among all countries with available data, this percentage does not exceed 20%.

<sup>31</sup>The project is based on a survey of official data on the labour market and higher education, is conducted by Laboratory of the Future, a research group at the Federal University of Rio de Janeiro, and is based on the Brazilian Census of Higher Education (2018) - INEP/Ministry of Education and Culture. See: <https://www.igualdadestem.com/>

**Figure 23. Brazilian students in higher education, by gender (2018) (%)**



Source: Igualdade/STEM - prepared by IGF

Gender inequality was more accentuated in courses in the areas of information technology and engineering. In 2018, female students represented less than 8% of the total number of students in IT courses and 10% in mechanical engineering courses.<sup>32</sup>

<sup>32</sup> <https://www.igualdadestem.com/>



These results show that there seems to be a lack of qualified women graduating from university courses with the specialized content required by the mining sector. To cope with that, mining companies should offer professional training to improve the female presence in operational areas, such as, for example, the operation of mines.

According to the trends in the DE&I agenda observed throughout the survey of Brazilian mining companies carried out by WIM Brasil, 35% of the research participants have partnerships with technical schools to provide STEM training for their workforce, including women (WIM Brasil; EY, 2021:11).

One example is the Aripuanã project, located in the state of Mato Grosso (the central west region), carried out by Nexa Resources, whose operations are underground. The project starts in 2022 and provides for the exploration and processing of zinc, copper, and lead. In partnership with a Brazilian technical school, Nexa is developing the Professional Qualification Program to train young people and adults from the municipality and region for the job market in general. Of the 500 vacancies offered, 54% were filled by women (Brasil Mineral, 2020, p. 8).

Another example is the Professional Training Program, exclusively for women, carried out by Vale S.A. Through the program, 1,000 women were hired by the company in 2020-2021. The people selected in the program took technical training courses customized by Vale in areas such as maintenance, railways, and ports. Once trained, they gained professional experience performing practical activities in the company's operations (Vale, 2021, p. 19).

One of the companies interviewed for the project (Company A) has been working on changing processes related to issues involving women's roles and their respective competencies. The interviewee, a female employee from the supply-chain area, mentioned that the company sought to deconstruct the idea that there are activities exclusively for men. Currently, all open positions mention both genders. In addition, the company worked with managers on the possibility of female employees having the freedom to choose whether they are able to perform certain activities instead of this definition being guided by the section's management. The woman candidate is allowed to test her ability before confirming if she intends to apply for a specific vacancy. It is important to mention that Company A's operation is underground, which could present greater complexity regarding the presence of women in operational activities.

"Is it really something a woman can't do, or can we let a woman decide? 99% of the options were that we can leave it to the woman's discretion. Every woman has a type of physique, just like the man too. There will be a man who won't be able to either. So, that's what we broke: every vacancy is no longer an 'electrical engineer'; it is a 'male electrical engineer' or a 'female electrical engineer.' Sometimes, we even start the vacancy announcement with a 'female engineer,' before a 'male engineer.'" (Female employee- Supply-chain area, Company A)

According to the interviewee, the company has been achieving new targets related to gender diversification since it started this new process.



Company B is also revised its processes to become a more inclusive environment for women in operational areas. They are in a remote location in the middle of the Amazon rainforest, accessible by air or river. Travelling by speedboat to the nearest town takes seven hours. This characteristic makes it difficult for employees from other regions to remain on-site, and, therefore, the company's strategy is to focus on programs to recruit young people from the local community. When asked about the company's strategies regarding gender diversity, the interviewee mentioned the importance of making concrete changes in the recruitment and selection processes.

“We placed an employee as a poster girl for the Young Apprentice Program, which is aimed at the community and we had a record number of female enrollments: of the 13 professionals who entered, 11 were women (...) they were engineers who went on to be trainees in the technical areas.” (Female manager, Communication area, Company B)

On the other hand, the number of companies that do not invest in the future workforce is still relevant. Considering WIM Brasil's survey, 31% of the companies reported not investing in the future workforce (WIM Brasil; EY, 2021, p. 39), indicating that the sector needs to focus on a structured education program to address the lack of qualifications in the female workforce whenever necessary.

Another important aspect to be taken into account is the fact that, despite exercising the same functions as men, occupying the same workplace, and having the same professional training, there are cases in which women are responsible for stereotypically feminine tasks. Quirino, in 2011, sought to analyze the sexual division of labour from a female perspective in a Brazilian iron ore company. In her study, she interviewed 10 women in operational roles. At that time, the women employed in the mechanical maintenance sector of mobile equipment indicated that there was an invisible boundary separating “male” and “female” tasks in the machine workshops. Men performed more technical activities, while women stayed in offices organizing files, answering the phone, and planning maintenance activities (Quirino, 2011, p. 221).

Cases like this show that, despite a greater presence of women in the operational areas, the mining companies need to go further in the concretization of an equal division of tasks in the operational areas, in order to actually implement the company's DE&I strategy.



### Box 1. Training for women in the workforce

According to WIM's Brazil report, the provision of technical training for women reduces the competitive disadvantage resulting from the lack of specialized knowledge prior to their entry into the sector. Such initiatives are essential for creating a more inclusive mining sector. Otherwise, the tendency is for women to occupy more generalist positions, perpetuating the sexual division of labour that has historically prevailed (WIM Brasil; EY, 2021, p. 38).

In this box, we present the average hours of training programs per employee, given by three Brazilian mining companies: Samarco Mineração, Nexa Resources, and Vale S.A. The information was based on their annual report.

#### Average hours of training by gender (2020)

Companies	Men	Women	Total
Samarco	48,89	21,22	70,11
Nexa	18	13	31
Vale	49	50	99

Due to the COVID-19 pandemic, the three companies reported that training became online. In the case of Nexa, any training that was not adaptable to the new models was rescheduled, which led to a 36% reduction in the total number of training hours in 2020.

Vale S.A., the largest Brazilian mining company, is the only one where the average number of hours of training for the female workforce exceeds that of men, and, even so, it is a small difference. In the other two companies, Samarco and Nexa, the average number of hours of training for the female workforce is below the participation of male employees in the same training.

#### Average hours of training by functional category and gender (2020)

Vale			
Functional category	Gender	Stock of employees (permanent)	Average hours of training by employee
Leadership	Women	829	49
	Men	4,202	57
Specialist	Women	4,823	38
	Men	7,603	42
Technical-operational	Women	6,726	58
	Men	46,228	50



### Average hours of training by functional category and gender (2020)

#### Nexa

Functional category	Gender	Stock of employees (permanent)	Average hours of training by employee
Manager	Women	33	6
	Men	117	10
Coordinator/consultant	Women	182	7
	Men	418	6
Technician/analyst/supervisor	Women	278	19
	Men	894	28
Operational	Women	269	16
	Men	3,148	18
Intern	Women	96	6
	Men	87	5
Apprentice	Women	31	4
	Men	37	3

Vale and Nexa presented gender-disaggregated data about the functional category that was attending training programs in 2020. At Vale, the technical-operational category presented a higher average number of hours of training among female employees. This data could be considered evidence of the focus that LSM companies have started to place on training women in operational activities that have historically considered male roles. At Nexa, considering its functional categories, we observe that coordinator/consultant, intern, and apprentice were the occupations that constituted a higher average of hours of training among female employees in 2020. On the other hand, in the functions of operational and technician/analyst/supervisor, women had fewer hours of training than men, proportionally. In this case, the women that occupy technical functions seem to be less involved in training programs.

## 4.2 Retention, Promotion, and Salaries of the Female Workforce

As noted in Section 3.2, the women employed in the Brazilian mining sector represented 14% of the total workforce in the sector from 2009 to 2019 (Figure 3). In relation to managerial positions, women represented 27% of the total employees within this occupational role. The same occurred with female remuneration, which was lower than men's in seven of the nine occupations analyzed in Section 3.2.5. Despite the increase in



female hiring in the sector and the advances witnessed, one can agree that the numbers are still low.

This scenario contributes to the lack of women's interest in being part of the mining sector. According to McKinsey & Company report (2021),<sup>33</sup> the reasons that favour women leaving the mining sector are few growth opportunities, remuneration, and incompatible skill sets, among others.

In the case of the Brazilian mining sector, there is still progress to be made. WIM Brasil's research showed that, of the 16 mining companies that responded to the survey, 31% of leadership hires<sup>34</sup> and 18% of participants in leadership development programs are women. The same survey pointed out that 38% reported not monitoring the remuneration segmented by gender and that only 11% of the participants' Executive Boards are composed of women (WIM Brasil; EY, 2021, p. 24, 25, 40). These numbers show that growth opportunities for women are still an issue among Brazilian mining companies.

Some mining companies have been trying to mitigate the absence of women by implementing an internal process of attracting and retaining the female workforce. In Nexa, 15% of the company's entire workforce is women. Of this number, in 2020, 18% already occupied a leadership position. To increase the participation of women in its workforce, Nexa has started an internal initiative with the theme "woman" within the company's Plurality Program, in order to increase female representation in positions of high and middle leadership and foster the career development of women in the company (Brasil Mineral, 2020, p. 6).

In another case, Anglo American has set a goal to have 33% of leadership positions held by women by 2023. In 2018, the company had 15 women in management and board positions in Brazil, representing 14.7% of the total number of executives (Brasil Mineral, 2020:11). At Vale, the number of women in leadership positions, such as Executive Managers and Directors, has increased 60% since 2019. The company adjusted contracts with headhunter companies so that at least 50% of the nominated candidates were women. Vale, through its DE&I initiatives, has also reduced the number of women voluntarily leaving the company by 33% (Vale, 2021, pp. 21-22).

Company B is another case that showed concern about the position of women in managerial positions, although its numbers are not representative since the company reported 7.7% of women in its total staff in 2020. As stated by the interviewee, women have been managing male teams in technical areas.

"We know that it is a predominantly male sector, but today we have women in strategic positions within the company. General Managers are two. Me, for Communication and another for the area of Community Relations. We also have women occupying the position of technical manager, one in the beneficiation plant, the other in the railroad operation. So, we have women managing

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<sup>33</sup> <https://www.mckinsey.com/industries/metals-and-mining/our-insights/why-women-are-leaving-the-mining-industry-and-what-mining-companies-can-do-about-it>

<sup>34</sup> Leadership positions were comprised of the supervisor role and above.



predominantly male teams and considered benchmarks for the entire company.”  
(Female manager, Communication area, Company B)

According to the testimony, the valorization of women as competent professionals is not an easy task since cultural aspects involving sexist attitudes are still rooted in social behaviour. These attitudes contribute to the slow progress of change.

“We have to remember that there is a very strong cultural issue. It is very common for a woman to quit her job to accompany her husband. We are talking about an isolated site in the middle of the Amazon rainforest. So, bringing a woman into an operational area in a management position is five times more of a challenge.”  
(Female manager, Communication area, Company B)

“I will tell you about an experience: I have a technical degree in Chemistry, before graduating in Communication (...) There were women in metallurgical engineering, but they were few. There was a little joke at the time: ‘Either she wants to be pretty, or if she wants to be an engineer.’ It was a recurring joke in the Engineering field. There is nothing more discriminatory than that. It is a discourse influenced by cultural issues, and we have to say that, here, we have this cultural issue as well.”  
(Female manager, Communication area, Company B)

“People used to turn to me and ask, ‘But who did you come here with? With your parents?’ I replied, ‘No...’; ‘Oh, so with your husband?’ The thought is that the wife decided to accompany her husband and not by her own choice.” (Female manager, Communication area, Company B)

Company A’s interviewee also mentioned the role of cultural aspects. She agreed that, from the point of view of male employees, there is still discomfort with female leadership. The company has been doing very consistent work in raising awareness in men and women, and the interviewee commented that, contrary to what happened before, employees are currently questioning why there are no women in the vice presidency. However, when asked about what needs to change, the interviewee highlighted the cultural aspect, realizing that even women act in a sexist way in the work environment. She presented the following reflections:

“We are being influenced by a sexist culture. Women and men, 100%, will have an unconscious bias related to the superiority of the male gender (...) The mining sector is starting to create an awareness that it is not just numbers, that no, we (women) don’t feel included. How many women have said they prefer to work with men? Women criticizing the promotion of other women (...) There is a lack of awareness of this publicly. You can't just be bottom-up and you can't be just leadership.” (Female employee, Supply-chain area, Company A)

In order to bring about changes involving cultural aspects, a company’s internal processes related to people management, such as recruiting and selection, succession mapping, salary adjustment, training, etc., must reflect the company's DE&I strategy in order to create concrete experiences and stimulate new ways of behaviour. In the research conducted with the WIM Brasil’s signatories, 56% of the respondents had the process of





recruitment and selection, and 22% had succession mapping in accordance with the DE&I strategy. However, only 6% of them presented the process of salary adjustment linked to it (WIM Brasil; EY, 2021, p. 26).

### **4.3 Adapting Work Environments to the Needs of Women**

One way that mining companies can facilitate the hiring of women is how adequately the work environment caters to women's needs. Here, we are referring to the availability of the proper facilities, mainly in operational areas, such as bathrooms separated by gender, private places for hygiene and changing clothes, nursing rooms, etc. In addition to the facilities, we are also referring to processes that promote a balance between employees' professional and private lives.

Regarding the proper facilities, 38% of the respondents in the WIM Brasil's survey do not adapt the workplace in the context of diversity, while 50% of the companies claim to have a formalized practice of equipping the workplace according to gender needs (WIM Brasil; EY, 2021, p. 31).

In relation to work-life balance, another process that contributes to growing women's employment in the workplace is the benefits related to parental leave. In 2016, the Brazilian government instituted the extension of maternity and paternity leave, which became 180 days and 20 days, respectively. The program is called the Citizen Company program<sup>35</sup> and is considered an advance in relation to parental leave adopted by the Labour Law,<sup>36</sup> which sets it at 120 days for women and 5 days for men. The Citizen Company Program is not compulsory: companies may adhere to it if they want to offer the benefit to their employees.

Considering the WIM Brasil survey's results, most mining companies adhere to the parental leave model in accordance with labour laws (120 days for women and 5 days for men), while 33% adhere to the Citizen Company Program (180 days for women and 20 for men). The same survey showed that 44% of the respondents provide flexible benefits for their workforce, encompassing new routines and ways of working, such as the adoption of flexible working hours and a hybrid working model, finding the ideal balance between remote and office work (WIM Brasil; EY, 2021, p. 31).

A safe work environment, physically and psychologically, is also relevant to growing female employment in the sector. An important factor is adequate safety structures, including personal protective equipment (PPE) and uniforms, for the female workforce. According to the WIM Brasil survey, 67% of signatories said they have PPE suited to the needs of men and women. On average, 85% of its structures are adapted for this purpose.

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<sup>35</sup> Law No. 13,257/2016. <https://www.gov.br/receitafederal/pt-br/assuntos/orientacao-tributaria/isencoes/programa-empresa-cidada/orientacoes>.

<sup>36</sup> Article 392 of Decree Law No. 5,452 of May 1, 1943.



This may be related to the fact that the issue of work safety is regulated by specific rules and laws (WIM Brasil; EY, 2021, p. 31).

Company A is continually adapting its uniforms. According to the information provided in the interview, small details were created to make uniforms more comfortable for women; in addition, they have created specific uniforms for pregnant women.

“For around four to five years, we adapted the uniforms for women and for pregnant women (...) So, for example, the men's uniform is entire. For the woman to go to the bathroom, she needs to take off her uniform. The difference is that we made the uniform with a zipper at the waist, so she can just take off her pants. The little details make a big difference. For the pregnant woman, we managed to make the blouse different, and it has a strap at the waist to also help with comfort. We are continually adapting. It is no longer a point of complaint.” (Female employee, Supply-chain area, Company A)

Pregnant women were also the focus of adapting the uniform at Company B. The interviewee stated that the adaptation of the uniform for women is a demand.

“In the past, I had to have everything customized. (...) One thing that was requested is the uniform for pregnant women. We don't have them yet, but we will soon. (...) We had a model of pants that was brown and we are moving to a pair of jeans, which allows us to have that elastic band for people who are pregnant.” (Female manager, Communication area, Company B)

The Anglo American company has implemented a variety of actions that consider psychological and emotional health to ensure a psychologically safe environment. After the actions were implemented, feedback showed that the number of complaints by organizational channels more than doubled. As stated by the company, this is not seen as negative. The company understands that, before, the feedback was not being reported to the correct channels (e.g., grievance channels), which aim to guarantee the anonymity, accessibility, and transparency of complaints (WIM Brasil, 2021:35). There was also a significant growth in the retention of—and increase in—female representation in leadership positions. According to the testimony of Anglo American's Human Resources director, these actions sought to reduce resistance and change cultural beliefs, eliminating the resignation of minority groups (WIM Brasil, 2021:35).

In the case of Company A, the interviewee mentioned that the company has been working on more inclusive language for the reporting channel, in order to give greater support to cases of moral and sexual harassment involving women. Besides, the company has adopted a multicultural and diverse committee to avoid any kind of bias during the investigation process.

“We are constantly reformulating, so that the most used channel (the website) has an inclusive and welcoming language. (...) It is normal that, with these changes, at the beginning, there is an increase in complaints because people feel more confident and then stabilize. Today we are already in this stabilization stage. Any type of harassment is dealt with by a multicultural and plural committee to assess



the evidence. (...) Regardless of whether there is evidence or not, everything is investigated.” (Female employee, Supply-chain area, Company A)

Company B’s strategy to deal with issues involving moral and sexual harassment was to implement a booklet in 2020, in order to improve employee awareness. In addition, it also maintains a channel to receive complaints related to the topic.

“We launched a booklet last year, and we work on it several times a year so people don’t forget. We also have a reporting channel within the company, where you can make complaints anonymously, without exposing yourself.” (Female manager, Communication area, Company B)

The fact that Company B is in a remote place and has employees in the same location, living close by, was mentioned as an aspect that contributes to inhibiting cases of harassment.

“Because we are a project, everyone here knows who is who. So, the issue of conduct is very strong, it is a matter of coexistence. The person you live with at work is the same person you will meet at the supermarket. This kind of practice is not accepted at all.” (Female manager, Communication area, Company B)

In this sense, we can assume that an environment of more familiarity among employees can help to restrain cases involving harassment issues, causing healthy acquaintanceships. Companies could consider this whenever they need to implement new processes to deal with gender issues.

## 4.4 Brazilian Coal Producer: A short case

The occurrence of coal in Brazil is found mainly in Rio Grande do Sul, Santa Catarina, and Paraná, the three states of the south region. About 85% of coal produced is used in thermoelectric plants. The cement industry in the country is supplied with approximately 6%, with a remaining 4% for the production of cellulose paper and only 5% in the food, ceramics, and grain sectors. However, the country still needs to import around 50% of the coal consumed because of the low quality of the coal produced (Técnico em Mineração, accessed December 3, 2021).

Historically, the Brazilian coal industry is made up of small and medium businesses. In the 1970s, only 11 mining companies were active, the majority belonging to local entrepreneurs. At the beginning of the 1990s, the sector was deregulated by a federal government decree, impacting producers in the southern region of the country (Associação Brasileira de Carvão Mineral). Currently, the sector has six companies, four of which are considered large and two small.

For the present study, we interviewed a coal producer (Company C), based in the south region. The producer has existed for more than 20 years, and most of the coal production (95%) is destined for energy generation. Company C is dedicated to the extraction, processing, and commercialization of fuel coal. It is located in a city of approximately 15,000 inhabitants, with most of its annual GDP coming from mining, evidence of the



economic importance of the activity for the place. According to the information provided, Company C has 640 permanent employees, of which 37 are women (5.8%). A woman, who gave the interview for this project, runs the company.

### **The operational activities, remuneration and benefits**

The mining activity of mineral coal is characterized by being underground, which, in principle, requires greater physical capacity and adaptability of the workforce. When asked about the participation of women in operational activities, the interviewee mentioned that employed women are in strategic positions. In the office, in addition to the interviewee herself (who is a partner and administrator of the company), women lead the legal, accounting, and controlling sectors. In operations, most of the company's activities are mechanized, with few requiring the use of force. The women employed in operational activities are in charge of the engineering services, and most of them coordinate the underground team.

If, on the one hand, women occupy strategic positions, on the other, Company C has been facing some difficulties in finding women for technical functions, as we can observe in the testimony below:

“Actually, we have no distinction (...) but there are some specific cases, for example, Security Engineering. We even assign it to women (even though it is demanding, because it is not a light job). Why? Because the concern, responsibility, care, humanization, all this in women is much stronger (...) but, in the underground, on a daily basis (...), it is not that we don't want to put it. The women simply do not seek. I don't have a female mechanic in the candidate pool. They are not available in the region; it doesn't work at the level of their interest. And, in our sector, they would have many privileges: salaries are good, retirement is faster, because of unhealthy conditions, but they aren't interested.” (Female administrator, Company C)

Regarding the remuneration of the workforce, there is no difference between male and female employees. Salaries are based on a minimum wage, and women and men have equal opportunities for promotion.

“The company pays well and there is no difference between men and women. (...) We are based on minimum wages. We have a female security technician and she earns the same value as the men in the same function. (...) Promotion is something we encourage a lot. When we see that you are a good professional, we encourage you to study to develop and grow.” (Female Administrator, Company C)

Women employees also can count on the flexibility of Company C whenever they need to reconcile professional and personal life.

“The company is extremely flexible. It doesn't matter if the women employee needs to leave to take the child to school. (...) Everything that is agreed and that is necessary has flexibility. Sometimes, the female professional goes on leave and



take advantage of the vacation to amend it, so she can have another month or two." (Female administrator, Company C)

### **The operational area and the training needs**

When asked if Company C needs to train women when they enter the operational area, in order to increase their presence in technical activities, the interviewee commented that there is a technical school in the region that plays this role. In her opinion, women have the opportunity to enter a technical career, but, in the end, they are not interested. According to her, there must be some cultural issue that makes them uncomfortable in this kind of environment.

"They have the opportunity, but they don't have the interest. It is cultural, the challenge is that they might feel uncomfortable in this type of environment (...) Maybe the husband does not allow it, there are risks. (...) In our case, we have been trying to work with underground female technicians for more than ten years. They had stayed five, six years and left." (Female administrator, Company C)

### **The infrastructure**

Regarding the gender adequacy of the infrastructure, according to the information provided, Company C does not have exclusive facilities for women in underground activities. Bathrooms are chemical and not separated by gender. Women need to use the same bathrooms as men.

"When the women are there, men try to make the cleaning even better. They are kind. It's all the same workspace." (Female Administrator, Company C)

When asked if women would feel more comfortable with changes in the work infrastructure in order to better meet women's needs, the interviewee mentioned that there is no such need, asking the opinion of some office women employees, who immediately responded that they are very well treated by men when they are in the operational area.

"We are treated very well, they leave spaces in the drawer, they serve us coffee in the cup they brought. There is a differentiated treatment and we end up not feeling the need to have an adaptation, you know?" (Female employee, Company C)

PPE is also not adapted for gender differences. The uniforms, helmets, and boots are the same for both genders.

### **Sexual and moral harassment**

Another subject addressed during the interview was the occurrence of sexual and moral harassment against female employees. The interviewee mentioned that there is an environment of respect in the company, from men to women, and justifies this condition by the fact that the company has female management.



“Maybe, because the management is female, they already have this respect thing. I've been here for 22 years, I've never been hit on by an employee. Male employees may even feel uncomfortable being led by a woman, some do, but those who come to work here already know what it is like. I used to be very present in the underground (...) they prepare the environment to receive me. (...) There must be some discomfort, but nobody says they are against it. On the contrary, they have me as a supportive, humane person.” (Female administrator, Company C)

The interviewee commented that the company does not have a reporting channel for cases of sexual and moral harassment, and, according to her, they have never had such a problem.

“We never think about it, because we never had an explicit complaint, you know? We have a very active workers' union here. (...) So, I think that if there was anything, the union would have already expressed it. This harassment issue is not a problem we face here.” (Female administrator, Company C)

Finally, when asked about the main challenges involving gender diversity in the mining sector and how coal companies could contribute to minimizing them, the interviewee commented that it is necessary to start working at the basic levels of education.

“We started talking here and I already thought: I'm going to school. I'm going to talk to the director (of the college and school) and I'm going to propose this to him. We will introduce our company, already in the first year of education. I think it has to be through the school, and we need to work very hard on the issue of school dropouts. (...) I think the challenge is this: dissemination in the school institution itself.” (Female administrator, Company C)

Based on the case of Company C, we can infer some topics of analysis involving gender issues among coal producers.

Company C has female leadership. This characteristic could have ensured an organizational process more focused on gender differentiation. However, what the interview showed was a male work environment with almost no gender-adapted processes, such as facilities, the same PPE, a reporting channel for cases of sexual and moral harassment, and training.

There is a technical school in the city where Company C is located, but, somehow, this fact is not enough to guarantee a pool of female candidates to fill the company's technician profile. Despite facing difficulties in finding women to fill technical roles, Company C showed the same behaviour as the 65% of companies that took part in WIM Brasil's survey, which did not have a partnership with technical schools to offer STEM training to their workforce, especially women (WIM Brasil; EY, 2021, p. 11). In fact, this idea had not occurred to the company's administrator until the subject was mentioned during the interview.



The administrator observed that the lack of women in technical roles is justified by their lack of interest in this type of career. According to her, this is related to cultural issues, which is certainly true. We must agree that the sociocultural environment has to be taken into account when a company intends to direct specific changes in its production processes. In the case of Company C, it is located in a small town with few inhabitants, which contributes to the preservation of traditional moral and cultural values. As the interviewee said, the changes could be stimulated starting with basic education by articulation among companies and schools.

Another aspect that stands out is that Company C is an example of a company where the women themselves do not realize that they are part of an environment dominated by male logic. This could be seen from the woman employee's testimony, when she mentioned that there is no need for gender adaptation in relation to the facilities since male colleagues are kind and provide a clean and pleasant work environment when women go to underground operations. It seems that the whole company has naturalized this aspect as normal.

The case of Company C might indicate that, among other Brazilian mining producers, there may be management standards that still disregard issues involving gender diversity in the workforce. Once again, there seem to be few initiatives that actually change internal processes in order to absorb women as operational agents in the sector. The fact that there is a consensus among employees that no change is needed is, actually, an indication that something must change.



## 5.0 FINAL CONSIDERATIONS

The questions raised at the beginning of the study were whether the Brazilian mining sector has been implementing an equal agenda in terms of gender inclusion and whether the feminization of the mining sector's labour market has actually changed the historical forms of women's insertion. We also intended to identify the main characteristics of the labour market in Brazilian mining, focusing on its gender dynamic.

The qualitative part of the study showed that LSM companies started to consider the DE&I in their strategic agenda, initiating a change in the management of internal processes. Quantitative data also brought a scenario where it is possible to notice an indication of change, such as the increase in the number of women employed in the sector and a slight decentralization of their region of work. We also observed an increase in female hiring in occupations traditionally linked to men, in addition to a growth in the presence of women in leadership positions.

However, in proportional terms, the gender gap is still large. The discrepancy shows that feminization is more of a trend than a change that has structurally altered the Brazilian mining sector, despite the advances so far.

In this section, we highlight some points that were revealed through the study that help us provide some analysis for the questions presented.

### 5.1 Who Are the Women Employed in the Brazilian Mining Sector?

In 2019, the Brazilian female workforce encompassed 7,816 women, representing 14% of the total number of employees in the mining sector (Figure 3). As noted, there was a considerable increase in the number of women employed (127%, from 2009 to 2019), indicating that the sector has been witnessing a phenomenon of feminization, discussed in Section 3.1. In fact, this has not happened only in the mining sector. There has been an increase in the number of women in formal work in the country in recent years, although it has not represented an increase in this amount.

According to the study, the women employed were more concentrated in iron ore companies, especially in establishments in the southeast and northern regions. As of 2011, there was an increase in the female workforce in the central-west and northeast regions, showing a greater presence of women in establishments in other states of the country, which also corresponded to other types of mineral production. This shift to different regions and types of mineral production may have contributed to women acquiring new knowledge and skills.

Regarding the age group, the study showed that the concentration of employees is in the range of 30 to 39 years old for both genders. However, it was presented that, on average, women in the Brazilian mining sector tend to be younger than men, as we could see in





Section 3.2.2. As to the spatial distribution, younger female employees were more concentrated in the countryside.

Brazilian women in the mining sector tended to have more years of schooling than men, both in corporate and technical occupations, and this has also been a trend in other economic sectors. These results correspond to the statement presented in the OECD's publication, *Education at Glance* (2019). According to that report, "in Brazil, schooling has a greater impact on women than men on access to the labour market. In the youngest age group (from 25 to 34 years old), 82% of women with tertiary education were employed, a percentage much higher than the 63% of women with secondary education and 45% with elementary education. For men in the same age group, the employment rates observed were 89%, 84% and 76%, respectively" (OECD, 2019 in Diretoria de Estatísticas Nacionais, 2019, p. 9).

Considering the monthly remuneration, we saw in Section 3.2.5 that, despite having more years of study, female mining employees still have lower remuneration. The contrary happens only in the lowest level of education, with women earning more. It seems that the mining sector follows the Brazilian labour market as a whole, which also is characterized by a salary gap, despite women having more years of schooling (The National Labour Market Observatory, March 2018, p. 1).

The study noted that Brazilian women were more concentrated in four occupations: Mid-level technicians, Professionals, Production of industrial goods and services (discrete),<sup>37</sup> and Clerical support. Two of these occupations—mid-level technicians and production of industrial goods and services (discrete)—are, historically, dominated by male workers, which could signal a change towards the feminization phenomenon. There was also an increase in the hiring of women as managers, especially from 2018 onwards. However, the study also highlighted that, proportionally, the discrepancy between the number of male and female leaders is still very high.

Among women employed in so-called male groups of occupations, including maintenance and repair, the study revealed a higher proportion of women with an advanced level of education (Section 3.2.4). Besides, these occupations also presented a considerable proportion of younger women, aged from 18 to 29 years old.

When the same groups of occupations were related to monthly remuneration, the discrepancy between gender wages became evident. The salary gap was higher in occupations of production of industrial goods and services (continuous), maintenance and repair, and manager.

In short, the Brazilian mining sector is characterized by having a younger and more educated female workforce, whose presence has been increasing in the sector, but

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<sup>37</sup> Workers in production systems that tend to deal more with the form of the product than with its physicochemical content (see: <http://www.mtecbo.gov.br/cbosite/pages/informacoesGerais.jsf#3>).



working conditions still need to improve. We also noticed that the leaky pipeline<sup>38</sup> is not a myth, and its reason should be explored in further studies.

## 5.2 What Has Changed in Women's Working Conditions?

The qualitative part of the study presented how Brazilian mining companies have been changing their management processes to become more inclusive and diversified, and what have been the main challenges to achieving it. Besides the quantitative increase of women in the labour market, the phenomenon of feminization requires changes in processes and behaviours. As we can see, mining companies have developed affirmative actions through programs to encourage the insertion of women.

It was observed that companies started to establish annual targets for hiring women with the aim of increasing their female workforce. It was also revealed that they have changed their recruitment processes by creating ways to attract women to the place where they operate. Some have used a more inclusive language, seeking to explicitly specify that open positions include male and female candidates. The testimonies also mentioned that the recruitment processes do not differentiate between male and female skills anymore. For the three companies interviewed, the chances have been the same for both sexes, regardless of the activity to be performed. Furthermore, two of them have developed training programs that have been offered to both genders and have contributed to the growth of women's recruitment.

The companies also demonstrated initiatives to increase the number of female leaders, trying to face the imbalance that still occurs in the reality of the mining sector. Among the strategies to achieve this objective is the review of contracts with headhunters, with the objective of focusing on women candidates for leadership positions.

Another aspect that seems to be changing in the Brazilian mining sector is the increased flexibility of work, with the aim of allowing women a way of reconciling their professional and personal lives. The testimonies of the companies showed that there has been a greater concern with the extension of maternity leave, as well as with the flexibility of working hours and the adoption of the home office model.

As for the infrastructure, we observed that the adaptation of uniforms was one of the female employees' demands. Some mining companies reported that they adapted the uniforms for women's needs, including for pregnant women. Facilities adaptation, such as bathrooms and locker rooms, was another concern mentioned by companies. Psychological support, including report channels and grievance mechanisms, has also been a new process implemented within some companies, mainly for cases involving moral and sexual harassment.

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<sup>38</sup> Leaky pipeline is often used as a metaphorical reference to the way that members of certain demographics fail to continue progression towards particular careers at the top of the profession, leading to underrepresentation in related industries (<https://www.techtarget.com/whatis/definition/leaky-pipeline>).



## 5.3 What Are the Challenges of the Feminization of the Brazilian Mining Sector?

In a study on the feminization of the mining labour market, Carrilho (2017) pointed out that changing processes and encouraging the feminization of a masculine profession or sector can reinforce stereotypes and disregard challenges that will be faced in the daily life of occupations guided by male perspectives.

She mentioned that the normative framework that regulates the Brazilian mining labour market<sup>39</sup> brought stricter health and safety rules and general working conditions, including higher wages, better benefits, and “early” retirement (in the case of underground activities or activities considered unhealthy/dangerous). However, according to her, a broad quantitative–qualitative feminization of mining is insufficient. The obstacles to the insertion of women in these jobs are, above all, symbolic rather than objective (Carrilho, 2017:202).

Another way of approaching the same aspect is the argument proposed by Macedo et al. (2012), which aimed to analyze how gender relations were processed in the organizational context of a Brazilian mining company. According to the authors, stereotyped codes remain and have been reinforced by men and women. To be included, women tend to adopt masculine postures, such as strength and resistance (Macedo et al., 2012, p. 235). In this context, feminization takes place through a process of masculinization without a real respect for differences. In this sense, Macedo et al. (2012) mentioned that the legitimization of female work tends to occur when it conforms to male standards and within its own parameters.

The testimonies of the companies in the present study also mentioned the weight of cultural behaviour. Aspects such as the supposed incompatibility between a woman’s physical appearance and her professional competence; the discomfort caused by the presence of women leaders; or even the questioning of having women in remote areas by choice, and not because they are accompanying their husbands were some examples reported. The coal company, for instance, presented a naturalized view of male and female roles, revealing that there still exist places where gender DE&I is not even questioned. One of the consequences of this naturalization is the fact that companies exempt themselves from responsibility in relation to their roles as agents of change. In the case of the coal company, the lack of female candidates in the technical areas was justified by a lack of interest by women in occupying such a position. The company does not perceive itself as part of this problem and does not act as a catalyst for change.

In line with Carrilho (2017), we can say that, although there are advances described by companies’ interviewees, sometimes myths and symbolic discourses are so internalized that objective measures or laws fail to work. More than improving the number of women working in operational activities or increasing the number of adapted facilities in operational areas, initiatives that really consider the female perspective should be

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<sup>39</sup> Mining Regulatory Standards–NRM–provided for in the Mining Code of 1967 (Decree-Law 227 of February 28, 1967) *apud* Carrilho (2017, p. 202).



developed, instead of them having to adapt to the male perspective. It is observed, thus, that the feminization process that has been taking place in the Brazilian mining sector still needs a more structured way forward in order to achieve real gender equivalence.

Therefore, the biggest challenge lies in replacing punctual actions and marketing strategies based on discourses and images that are established to respond to market demands with a strategy that actually rebuilds human relationships within the company. According to Carrilho (2017), the current formulation and operationalization of affirmative actions do not guarantee structuring and significant impacts, as the efforts are not integrated. A real inclusive initiative should be multisectoral, involving a variety of actors, such as the government, the education sector, civil society entities, and companies.



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# APPENDIX

## Methodological information

This section contains methodological information regarding the research sources adopted in the Brazilian study.

### Quantitative data

#### Annual Social Information List (RAIS)<sup>40</sup>

- Nature of the survey: administrative registration.
- Period: annual. Statements are generally made in the period from January to March and refer to the previous year.
- Data coverage: from 2002 to 2019. RAIS data are updated until 2019.
- Geographical coverage: the entire national territory.
- Coverage: Brazilian formal market.
- Establishment: the survey of RAIS is carried out at the establishment level, considering as such the units of each company spatially separated, that is, with distinct addresses.
- Main variables investigated: jobs on December 31<sup>st</sup> and hired and terminated according to gender, age group, level of education, length of service and income, disaggregated by establishment size, payroll, and employee nationality.
- Size of establishment: determined by the number of jobs in it as of December 31 of the base year; 1,000 or more employees is the maximum range available in the tool's database.
- Age group: the classification of bonds in the age group considers the completed years on December 31<sup>st</sup>.
- Worked hours: part-time employment is defined by weekly hours that cannot exceed 30 hours.
- Non-classified registers: registers presented in the RAIS without classification (empty) were not considered in the researched sample, as they are non-representative.

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<sup>40</sup><http://pdet.mte.gov.br/o-que-e-rais>



## Total number of employees

The RAIS system was consulted in two different periods: 2021 and 2022. Due to some updates made to the system from one year to the other, the stock of employees in the Brazilian mining sector changed as follows:

Year of data consultation at RAIS	Total number of employees in 2019		
	Total	Men	Women
2021	56,861	49,045	7,816
2022	61,728	53,556	8,168

Source: RAIS-MTE (2021 and 2022)

The same occurred to the average of the results presented in the study:

Year of data consultation at RAIS	Total number of employees (average)		
	Total	Men	Women
2021	49,229	42,517	6,712
2022	56,073	48,454	7,619

Source: RAIS-MTE (2021 and 2022)

## Mining sector activities

The mining sector activities' classification was based on the National Classification of CNAE 2.0,<sup>41</sup> which is derived from version 4 of the International Standard Industrial Classification of All Economic Activities - ISIC 4.

For the data collection, all queries were filtered as below, at the two-digit level:

### CNAE 2.0

Section B	Extractive Industries
Division 07	Extraction of metallic minerals
Division 08	Extraction of non-metallic minerals
Division 09	Mining support service activities
Group 09.9	Activities to support the extraction of minerals, except oil and natural gas

Source: IBGE (2021)

## Age

The RAIS platform has eight age groups: 10 to 14; 15 to 17; 18 to 24; 25 to 29; 30 to 39; 40 to 49; 50 to 64; 65 or more).

41

[https://cnae.ibge.gov.br/?option=com\\_cnae&view=estrutura&Itemid=6160&tipo=cnae&versao\\_classe=7.0.0&versao\\_subclasse=](https://cnae.ibge.gov.br/?option=com_cnae&view=estrutura&Itemid=6160&tipo=cnae&versao_classe=7.0.0&versao_subclasse=)



For the purposes of the present project, it was decided to work with five age groups, aggregating the information provided: less than 18; from 18 to 29; from 30 to 49; from 50 to 64; 65 or more.

## Education

In the RAIS, the variable “aggregate education” is composed of nine levels of education (first column). We created the following correspondence (second column):

<b>RAIS aggregate education</b>	<b>Correspondent level of education</b>
Illiterate	Less than basic
Up to incomplete 5th grade	Basic
Elementary (5th grade)	
Elementary (6th to 9th grade)	
Elementary	
High school (incomplete)	Secondary
High school	
Tertiary (incomplete)	Advanced
Tertiary	

Source: RAIS-MTE - prepared by IGF (2021)

The RAIS aggregate education covers information about masters and doctorate levels at the tertiary level.

## Occupation

The Brazilian Classification of Occupations (CBO) is the standardizing document for recognition, naming, and coding the titles and contents of occupations in the Brazilian labour market. The latest version of the CBO (CBO 2002)<sup>42</sup> takes as reference the version of the International Statistical Classification of Occupations - ISCO-88 (Classification International Uniform of Occupations - CIUO-88).

For data collection about mining employee’s occupations, the queries used the CBO 2002 structure as follows:

### **CBO 2002**

#### **Major Groups**

0	Armed Forces, Police and Military Firefighters
1	Senior members of public power, directors of public interest organizations and companies and managers
2	Science and arts professionals
3	Mid-level technicians

<sup>42</sup><http://www.mtecbo.gov.br/cbsite/pages/informacoesGerais.jsf#3>



4	Administrative service workers
5	Service workers, commerce sellers in stores and markets
6	Agricultural, forestry, hunting and fishing workers
7	Workers in the production of industrial goods and services
8	Workers in the production of industrial goods and services
9	Maintenance and repair workers

Source: CBO 2002-MTE (2021)

The Major Groups 7, 8 and 9 hold some differences between ISCO-88 and CBO 2002. For each classification, these three Major Groups comprise the following occupations<sup>43</sup>:

Major Groups	ISCO-88	CBO 2002
7	Occupational families of the industry that perform "craft" work	Workers in production systems that tend to be discrete and that deal more with the form of the product than with its physicochemical content
8	Machine operators	Workers in production systems that are or tend to be continuous (chemistry, steel, among others)
9	Elementary skill level workers (unskilled)	Maintenance and repair workers

Source: ISCO-88 / CBO 2002-MTE - prepared by IGF (2021)

The CBO 2002 classifies Major Group 7—Production of industrial goods and services—as those who are able to deal with production systems that tend to be discrete and that deal more with the form of the product than with its physicochemical content.

According to ISCO-08, Major Group 7 corresponds to Craft and Related Trades Workers, in which the production system is carried out by hand, by hand-powered and other tools, which are used to reduce the amount of physical effort and time required for specific tasks, as well as to improve the quality of the products. The tasks call for an understanding of all stages of the production process, the materials and tools used, and the nature and purpose of the final product.<sup>44</sup> The unskilled workers category was abolished in CBO 2002.

## Weekly hours worked

According to the Brazilian Labour Court, every worker hired with a formal contract has the working hours stipulated in the employment contract. The Constitution of the Republic establishes that the duration of normal work must not exceed eight hours a day and 44

<sup>43</sup>Idem.

<sup>44</sup><https://www.ilo.org/public/english/bureau/stat/isco/docs/groupdefn08.pdf>



hours a week. For work carried out in uninterrupted shifts, six working hours are established, except for collective bargaining.<sup>45</sup>

Part-time work is valid in the following cases: (a) duration does not exceed 30 hours per week, without the possibility of extra hours per week, or (b) duration does not exceed 26 hours per week, with the possibility of adding up to six extra hours per week.<sup>46</sup>

In the RAIS, the weekly working hours are presented in eight different ranges: until 12 hours; 13 to 15; 16 to 20; 31 to 30; 31 to 40; 41 to 44; 45 to 48; more than 48 hours.

## Remuneration

Due to filling errors presented in the information sent by the establishments to the RAIS system, some salaries were reported as R\$ 0.00. In order not to interfere in the calculation of average wages, these cases were removed, representing 1% of the original sample.

According to the RAIS Manual, part-time cannot exceed 30 weekly hours (Ministério da Economia, 2021:32). Based on that, the present study aggregated the information provided as follow:

Part-time work: until 12 hours; 13 to 15; 16 to 20; 31 to 30 hours

Full-time work: 31 to 40; 41 to 44; 45 to 48; more than 48 hours

## Retirement system<sup>47</sup>

In Brazil, workers can retire by age and length of service, which includes time spent in the social security system (contribution). On November 13, 2019, there was a reform in the retirement rules (PEC 06/2019) and the new requirements can be summarized as follows (for urban workers):

- Men must be at least 65 years old and have 15 years of work and contribution. Those who started their professional lives after the reform will need to prove 20 years of work.
- Women must be at least 62 years old and have 15 years of work and contribution.

Special retirement: those who carry out unhealthy or dangerous activities are entitled to Special Retirement if they participate in a special activity for 15, 20, or 25 years.

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<sup>45</sup><https://www.tst.jus.br/jornada-de-trabalho#:~:text=A%20Constitui%C3%A7%C3%A3o%20da%20Rep%C3%BAblica%2C%20em,ou%20conven%C3%A7%C3%A3o%20coletiva%20de%20trabalho%E2%80%9D>

<sup>46</sup> Law 13,467/2017. See: [http://www.guiatrabalhista.com.br/guia/tempo\\_parcial.htm](http://www.guiatrabalhista.com.br/guia/tempo_parcial.htm)

<sup>47</sup> <http://www.guiatrabalhista.com.br/tematicas/reforma-da-previdencia-sinopse.htm>



## Qualitative information

The table below presents the profile of the three interviewed companies:

Company	Operation	Location in Brazil	Minerals	Number of employees [permanent] <sup>48</sup>		
				Total	Men	Women
Company A	Global	Southeast, Central-West	zinc, copper, lead, silver, gold	5,918	4,954 (83.5%)	976 (16.5%)
Company B	National	North	bauxite	1,582	1,460 (92.2%)	122 (7.7%)
Company C	National	South	coal	640	603 (94.2%)	37 (5.8%)

Source: Prepared by IGF (2021)

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<sup>48</sup> Information was provided during the interview or through company reports. The numbers include operations in other countries, where applicable, and refer to 2020 or 2021.



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