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ARTICLE

Profile analysis and confunding for life quality: disabled people and race[1]

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Abstract

Disability means a physical, intellectual or sensory disability, permanent or temporary nature, which limits the ability to perform one or more activities. It is characterized as complex, dynamic and multidisciplinary. They are affected by poor health outcomes, lower educational attainment, lower economic participation, higher poverty rates, greater dependency and restriction on participation and inclusion. Racism is a behavior that is the result of aversion, hatred, towards people who have a racial resemblance that it is possible to observe, through traits such as skin color, hair type, it results from the belief in the existence of superior human races or types and inferior, in an attempt to impose itself as unique or true. Life Quality results from the relationship between biological, social and psychological factors and also from the integration between the individual and society, being transformed according to the period of life and the socio-cultural environment in which the individual is inserted. In terms of Brazil, the existence of these two situations can be noted that are subject to assistance from the public authorities, such as the quota laws for disabled people and for races the black, brown and indigenous. The objective of this work is to evaluate the effect for race, disability and the interaction between race and disability for the variable's education, income and gender through a comparative study using descriptive analysis and experimental design for the 2010 Demographic Census data and that can contribute to a better life quality for these groups.

Keywords: Disabled people; Races; Experimental design; Confounding; Life quality

1. Introduction

Since the dawn of humanity, the image that many disabled people carried was the image of deformation of the body and mind. Such an image betrayed human imperfection. There are reports, according to Gugel (2007), of parents who abandoned children in baskets, thrown into rivers or other places considered sacred. Those who survived were exploited in cities or became circus attractions. It constitutes a group of excluded people that has always aroused the most

varied feelings, from disgust to extreme pity, coming to be seen as less human or devoid of any humanity (Silva, 1987; Oliveira, 2013). Most of the issues involving disabled people in Brazil, such as exclusion mechanisms, welfare policies, feelings of pity, among others, were culturally constructed (Figueira, 2008). They were diabolical beings who should be punished in order to be able to purify themselves. During this period, the Church constituted itself as a great ally of the disabled, as they welcomed them.

Disability can be of a permanent or temporary nature and it limits the ability to exercise one or more activities such as seeing, hearing, moving and intellectual. It is characterized as a complex multidimensional experience and poses several measurement challenges (Oliveira, 2015).

According to the World Health Organization (WHO, 2011) is estimated that one billion people live with at least one disability; the lack of statistics on disabled people contributes to the invisibility of these people, which represents a barrier to the planning and implementation of development policies that improve life quality; living with at least one disability increases living cost by one third of the average income;, and finally; in statistical terms, improve comparability of data at national and international levels, develop appropriate tools and fill gaps between different surveys (WHO, 2008, 2011).

On the other hand, surveys carried out in developed countries show that 35% of disabled people and 78% of people without disability are in activity, and the employers interviewed said that disabled people can´t effectively perform the work tasks required is one of the main reasons for not hiring is the fear of special facilities cost.

In Brazil, according to estimates from the 2010 demographic census by the Brazilian Institute of Geography and Statistics (IBGE), 45.6 million people live with at least one disability, representing approximately 23.9% of its population; among disabled people, 65.9% have income between 0 and 1 minimum wage and 25.1% between 1 and 3; disabilities children with aged among 13 to 18 years, 67.3% did not complete elementary school, while the same occurred with 73.6% males and 65.1% females, and finally; people without disabilities predominate in proportional terms for positions with a formal contract and employers, while people with disabilities predominate in self-employed, unpaid work and production for their own consumption.

Approaches to measuring disability vary across countries with influence outcomes. The operational measures of disability depend on the purpose, data application data, conceptions, limitations to perform certain tasks, restrictions to participate in certain activities, related health problems, environmental factors, sources of information, method of data collection and performance expectations.

Racism is defined as an aversion behavior, sometimes hateful, towards people who have a racial belonging that can be observed through traits such as skin color, hair type and eye shape, among others that result from the belief from the existence of superior and inferior human races, the attempt to impose itself as unique or true (Munanga and Gomes, 2000).

However, race relations in Brazil have not been harmonious, especially in relation to the disadvantaged role of black and indigenous peoples, groups heavily exploited in the country's colonial period that tend to occupy less prestigious positions, in addition to issues of cultural shock and difficulties of racial preservation.

The practice of racism is historical and was socially constructed in social relations and power relations that were present in different historically organized social models (by race, ethnicity and sexual option, among others).

In the Brazilian case, according to the IBGE in the 2010 demographic census, it is estimated (in millions) that we have a population made up of 47% (89) of whites, 7.1% (13.4) of black, 1% (1.9) of yellow, 44.3% (44) of brown and 0.5% (1) indigenous race.

Emerging in India in the 1930s, quotas are considered a form of affirmative action, something that seeks to reverse historical discrimination against certain social classes such as black, brown and indigenous races; disabled people, and finally; low income in economic terms. Although many consider quotas as a social action system, there are controversies about their consequences and constitutionality in many countries (Domingos, 2005; Oliveira, 2014).

Life quality indicates basic level and supplementary conditions of the human being. These conditions range from physical, mental, psychological and emotional well-being, social relationships, with family and friends, health, education and other parameters that affect human life.

The issue of quality of life has been growing in importance, under various aspects in recent years, especially with regard to its assessment or measurement, either individually or collectively (Ferro, 2012).

For this work, life quality score was created by weighing the variables obtained in the 2010 demographic census, attributing more points to the levels of each variable that may favor a better life quality.

In statistical terms, we intend to use analysis of variance (ANOVA), a technique that allows us to analyze one or more qualitative or categorical variables (factors) as a function of a continuous dependent variable.

For this work, we are considering the independent variables sex, income, education, race and visual, hearing, physical, intellectual or multiple disabilities, considering only one of the different disabilities in each ANOVA, all possible interactions and considering in all cases as an answer life quality score, in order to carry out comparative studies and explore the confounding between different disabilities and race in terms of education, sex and income.

2. Matherials and Methods

2.1 Motivation

To better understand the differences between disabled people and quota races. We propose a study considering data from the 2010 IBGE Census, according to which disabled people represent 23.9% of the population and races black 7.1%, brown 44.3% and indigenous 0.5% and confounding (Montgomery, 2013), that is, of the groups of people who are simultaneously disabled and belong to a quota race.

2.2 Deficiency

The term disability means a physical, intellectual or sensory disability, of a permanent or temporary nature, which limits the ability to perform one or more activities. Disabled person refers to any person who has a disability and who is under the protection of a law.

According to the 2010 IBGE Census, disabilities were divided into physical, hearing, visual and intellectual.

In its questionnaire, IBGE established four different degrees of severity for each of the first three types of disability mentioned below: 1 - cannot at all; 2 - can, but with great difficulty; 3 - can, but with some difficulty; and finally; 4 - does not present any difficulties, and for intellectual disability the following possibilities were considered: 1 - yes, if you have an intellectual disability, which is permanent, and 2 - no, if you don't.

The most serious cases are considered as candidates to obtain assistance and receive benefits from public authorities, that is, those represented by groups 1 and 2 and all cases considered to be intellectually handicapped. In this work, however, we are considering all possible cases.

2.3 races

It can be understood as a social construct, used to distinguish people in terms of one or more physical marks. In other words, race is a category used to refer to a group of people whose physical marks are considered socially significant. In this way, race is an important analytical tool for sociology, as the perceptions and conceptions of race can affect and organize people's social life, being mainly responsible for the creation and maintenance of a system of social inequality.

With this scenario, it generated a situation of inequality that puts groups formed by blacks and indigenous in a disadvantaged position in relation to the group formed by whites, bringing negative impacts to black and indigenous groups on educational and work opportunities.

2.4 Life Quality

Indicates the level of basic and supplementary conditions for the human being's life quality. These conditions range from physical, mental, psychological and emotional well-being to social relationships such as family, friends, health, education and other parameters that affect human life (Pereira et al., 2012).

For this work, an Analysis of Variance planning model was considered with a dependent variable, the life quality score was created from the weighting of a set of variables related to family, housing, work, other assets and identification so that the higher the value. The best achieved value will be the life quality for the individual according to this variable and with independent variables race, education, gender, categorized income, disability and all its possible interactions in a fixed and crossed way, so that each of the different deficiencies are considered in each ANOVA, so that five ANOVAs were adjusted to test not only the main effects, but also their interactions. The criteria used are shown in Table 1 below.

Table 1 (parts a and b) shows the variables considered as well as the scores defined for each of its levels.

It can be seen in Table 1 that the score was elaborated in such a way that the lower the possibility of a person becoming a person with a disability, the higher the score assigned to the score.

Table 1. Conversion of each variable, level and score considered in the score calculated for each individual in the sample (part a).

Variables	levels	points
ZONE	Urban	2
	Rural	1
CATEGORICAL AGE	under 15 years old	2
	among 15 and 65 years old	1
	over 65 years old	0
VISUAL DUSABILITY	complete disability	3
	several disability	2
	mild disability	1
	without disabiity	0
HEARING DISABILITY	complete disability	3
	several disability	2
	mild disability	1
	without disabiity	0
PHISYCAL DISABILITY	complete disability	3
	several disability	2
	mild disability	1
	without disabiity	0
INTELLLECTUAL DISABILITY	Yes	3
	No	0
NURSERY	yes, public	1
	yes, private	1
	No, already attended	1
	No, never attended	0
ANOTHER GRADUATION	YES	1
	NO	0
DISPLACEMENT HOME TO WORK	Up to 05 minutes	5
	From 06 minutes to half an hour	4
	More than half an hour to an hour	3
	More than one hour to two hours	2
	more than two hours	1

Variables	levels	points
EXPANDED EDUCATION LEVEL	without any instruction	0
	incomplete elementary level up to the fourth year or corresponding	1
	from fifth year to incomplete primary level	2
	between complete elementary school and incomplete high school	3
	between complete high school and incomplete higher education	4
	between complete higher education and incomplete master's degree	5
	specialization after graduation	6
	between complete master's and incomplete doctorate	7
	full doctorate or more	8
	indeterminate	0
LIVING WITH SPOUSE OR COMPANION	Yes	1
	no but lived	0
	no, never lived	0
WORK, PRODUCTS OR MONEY	yes	1
	no	0
RETURN, PAID WORK	yes	1
	no	0
UNPAID WORK	yes	1
	no	0
PLANTING OR BREEDING WORK	yes	1
	no	0
CATEGORICAL INCOME	between 0 and 1 minimum wage	1
	between 1 and 3 minimum wages	2
	between 3 and 7 minimum wages	3
	between 7 and 15 minimum wages	4
	15 salaries or more	5
SONS	childless	3
	between 1 and 2 children	2
	between three and five children	1
	six children or more	0

Variables	levels	points
MAIN WORK FUNCTIONS	Employee with a formal contract	5
	Military or public service	6
	Employed by the legal regime for civil servants	4
	Employee without a formal contract	1
	own account	2
	Employer	3
	Unpaid	0
CONTRIBUTES TO SOCIAL SECURITY	Yes, in the main job	2
	Yes, in another job	1
	NO	0
ACTIVITY IN REFERENCE WEEK	yes	1
	no	0
BUSY	yes	1
	no	0
MAIN JOB	Employees with a formal contract	5
	Military and statutory civil	6
	Employees without a formal contract	4
	own account	1
	Employers	2
	Unpaid	3
	Workers in production for their own consumption	0
SECUNDARY JOB	Employees with a formal contract	5
	Military and statutory civil servants	6
	Employees without a formal contract	4
	own account	1
	Employers	2
	Unpaid	3
	Workers in production for their	0

Variables	levels	points
MONTHLY WITHDRAWAL	between 0 and 1mw	1
	between 1 and 3mw	2
	between 3 and 7 mw	3
	between 7 and 15mw	4
	15mw or more	5
INCOME FROM OTHER WORK	between 0 and 1mw	1
	between 1 and 3mw	2
	between 3 and 7 mw	3
	between 7 and 15mw	4
	15mw or more	5
PER CAPITA INCOME	between 0 and 1mw	1
	between 1 and 3mw	2
	between 3 and 7 mw	3
	between 7 and 15mw	4
	15mw or more	5
HOUSEHOLD INCOME	between 0 and 1mw	1
	between 1 and 3mw	2
	between 3 and 7 mw	3
	between 7 and 15mw	4
	15mw or more	5
POVERTY	between 0 and 0.125mw	7
	between 0.125 and 0.25m	6
	between 0.25 and 0.5mw	5
	between 0.5 and 1mw	4
	between 1 and 3mw	3
	between 3 and 7 mw	2
	between 7 and 15mw	1
	from 15mw or more	0

Table 1. Conversion of each variable, level and score considered in the score calculated for each individual in the sample (part b).

Variables	levels	points
DOMINANT MATERIAL OF EXTERNAL WALLS	coated masonry	8
	uncoated masonry	7
	Suitable wood for construction (trimmed)	6
	coated rammed earth	5
	uncoated rammed earth	4
	reclaimed wood	3
	Straw	1
	other material	2
	no wall	0
CATEGORIZED BATHROOMS	1	4
	2	3
	3	2
	4	1
CHANNELED WATER SUPPLY	Yes, in at least one room	2
	Yes, only on property or land	1
	NO	0
ELECTRIC ENERGY	Yes, from a distribution company	2
	Yes, from other sources	1
	There is no electricity	0
ELECTRIC ENERGY METER OF THE DISTRIBUTION COMPANY	Yes, for exclusive use	2
	Yes, in common use	1
	No meter or clock	0
WASHING MACHINE	yes	1
	no	0
CELLULAR	yes	1
	no	0
MOTO	yes	1
	no	0
INCOME FROM ALL WORKS	between 0 and 1mw	1
	between 1 and 3mw	2
	between 3 and 7 mw	3
	between 7 and 15mw	4
	15mw or more	5

Variables	levels	points
CATEGORIZED ROOMS	1	5
	2	4
	3	3
	4	2
	5	1
NUMBER OF CATEGORIZED DORMITORIES	1	2
	2	1
	3	0
SANITARY	YES	1
	NO	0
TYPE OF SANITARY SEWAGE	General sewage or rainwater network	6
	septic tank	5
	rudimentary cesspool	4
	Ditch	3
	river, lake or sea	2
	Other	1
WASTE DESTINATION	Collected directly by cleaning service	6
	Placed in cleaning service bucket	5
	Burned (on property)	4
	Buried (on property)	3
	Played in vacant land or backyard	2
	Played in river, lake or sea	1
	have another destination	1
REFRIGERATOR	yes	1
	no	0
PC	yes	1
	no	0
CAR	yes	1
	no	0
INCOME SOCIAL PROGRAMS	between 0 and 1mw	1
	between 1 and 3mw	2
	between 3 and 7 mw	3
	between 7 and 15mw	4
	15mw or more	5

Variables	levels	points
HOUSEHOLD OCCUPATION CONDITION	Own of a resident - already paid	5
	Own of a resident - still paying	4
	rented	2
	Provided by employer	3
	otherwise given away	1
	other condition	0
CATEGORIZED BEDROOM	1	1
	2	2
	3	3
	4	4
	5	5
	6	6
RADIO	yes	1
	no	0
TELEVISION	yes	1
	no	0
Landline	yes	1
	no	0
TYPE OF WATER SUPPLY	general distribution network	10
	Well or spring on the property	9
	Well or spring off property	8
	water car	7
	Rainwater stored in cistern	6
	Rainwater stored otherwise	5
	Rivers, weirs, lakes and streams	4
	Other	3
	Well or spring in the village	2
	Well or spring outside the village	1
PC WITH INTERNET	yes	1
	no	0
INCOME FROM OTHER SOURCES	between 0 and 1mw	1
	between 1 and 3mw	2
	between 3 and 7 mw	3
	between 7 and 15mw	4
	15mw or more	5

Variables	levels	points
WORK	between 0 and 1mw	1
	between 1 and 3mw	2
	between 3 and 7 mw	3
	between 7 and 15mw	4
	15mw or more	5
DISABILITY TYPE	without disability (SD)	15
	visual (DV)	14
	hearing (DO)	13
	physical (DF)	12
	intellectual (DI)	11
	visual and hearing (DOI)	10
	visual and physical (DVF)	9
	visual and intellectual (DV	8
	hearing and physical (DO	7
	hearing and intellectual (D	6
	physical and intellectual (	5
	visual,hearing and physical (DVOF)	4
	visual, hearing and intellectual (DVOI)	3
	visual, physical and intellectual (DVFI)	2
	hearing, physical and intellectual (DOFI)	1
	visual, hearing, physical and Intellectual (DVOFI)	0
GOODS NUMBER	zero	0
	one	1
	two	2
	three	3
	four	4
	five	5
	six	6
	seven	7
	eight	8
	nine	9
	ten	10

2.5 Analysis of Variance (ANOVA)

The ANOVA is a statistical methodology for dealing situations with a variable response that depends on one or more qualitative (categorical) variables, that is, one or more factors, and was developed in the 1930s at the Agricultural Experimental Station in Rot Hamstead (England) by RA Fisher (1890-1962).

It consists of obtaining independent estimates of population groups in order to determine whether there is a significant difference (Montgomery, 2013).

In order to characterize and identify which factors affect the response, that is, a life quality index created from the weighting of different variables collected from the data obtained by the 2010 Demographic Census collected by the IBGE

For this work, an analysis of variance planning model was considered dependent variable life quality score and as independent variables race, education, gender, categorized income, disability and all its possible interactions in a fixed and cross-over manner. so that each of the different deficiencies is considered in each ANOVA, so that five ANOVAs were adjusted, according to the model proposed in appendix A.

3. Results and Discussion

For this work, we propose creation of the life quality score variable obtained by scoring the different variables linked to the group's disability, education, family, work, housing and possession of other goods; descriptive analysis for the frequency of different levels of education for each of the different disabilities and race; descriptive analysis for the frequency of different levels of income for each of the different disabilities and race; profile chart for each of the different disabilities, education level and race, and finally; ANOVA considering as response life quality score and the following independent variables as the response variable: disability (visual (A1), hearing (A2), physical (A3), intellectual (A4) or multiple (A5)), race (B), education (C), income (D) and sex (E), and finally; multiple comparison tests were performed using the Scheffe, Tukey and Bonferroni criteria (Peres and Saldiva, 1982).

For tables 3 to 7, for education were considered: 1, between no education and incomplete fundamental; 2, between incomplete elementary school and incomplete high school; 3, between complete high school and incomplete higher education, and, finally; 4, higher complete or more and that level 1 is marked in bold red (considered worst situation) and levels 3 and 4 are marked in bold dark blue (considered best situation). Also, the following levels of income in minimum wages were considered: 1, between 0 and 1 minimum wage; 2 , between 1 and 3 minimum wages; 3, between 3 and 7 minimum wages; 4, between 7 and 15, and finally; 5, 15 minimum wages or more, option whose first digit is the level of disability considered and the second is the race, and, for each cell, the frequencies and proportions were calculated.

Note in figures 1 to 5 that the profile of blue is for the white race, yellow is for the yellow race, black for the black race, brown for the brown race and orange for indigenous.

Table 3a shows the result of crossing visual disability with the levels: 1 - can't do it at all, 2 - can do it with great difficulty, 3 - with a little difficulty and 4 has no problem and race with the levels: 1 – white, 2 – black, 3 – yellow, 4 – brown and 5 – indigenous.

From Table 3, for item a) it can be seen that the group with the highest proportion of people with a complete high school or more is the group formed by without vision disabled people and yellow race with 30.2%, followed by the group formed by people without vision disability and white race with 30.1%. Meanwhile, the worst situation was that of the group formed by disabled visual people and indigenous race with a proportion of people with high school level or more reaching only 6.8%. On the other hand, among the groups marked in red, the worst situation is that of the total visual disability indigenous group (option 51) with 87.6% of people who failed to complete elementary school and the best situation is the of the group formed by blacks and without visual disability (option 24) with 54.6%.

The indigenous race has the highest proportion of people who have not completed elementary school, while the white and yellow races have the smallest, regardless of the degree of severity of visual disability they present.

Table 2 shows the summary of calculations for the formation of the ANOVA Table and shows how to calculate Sum of Squares (SQ), degrees of freedom (gl), MQ (Mean Square (MQ) and the significance level (F0) for all main effects, interactions, residuals and total.

Table 2. Resume ANOVA

SV	SS	Df	MS	F_0
A	SQ_A	a-1	MQ_A	MQ_A/MQ_ε
B	SQ_B	b-1	MQ_B	MQ_B/MQ_ε
C	SQ_C	c-1	MQ_C	MQ_C/MQ_ε
D	SQ_D	d-1	MQ_D	MQ_D/MQ_ε
E	SQ_E	e-1	MQ_E	MQ_E/MQ_ε
AB	SQ_{AB}	$(a-1)(b-1)$	MQ_{AB}	MQ_{AB}/MQ_ε
AC	SQ_{AC}	$(a-1)(c-1)$	MQ_{AC}	MQ_{AC}/MQ_ε
AD	SQ_{AD}	$(a-1)(d-1)$	MQ_{AD}	MQ_{AD}/MQ_ε
AE	SQ_{AE}	$(a-1)(e-1)$	MQ_{AE}	MQ_{AE}/MQ_ε
BC	SQ_{BC}	$(b-1)(c-1)$	MQ_{BC}	MQ_{BC}/MQ_ε
BD	SQ_{BD}	$(b-1)(d-1)$	MQ_{BD}	MQ_{BD}/MQ_ε
BE	SQ_{BE}	$(b-1)(e-1)$	MQ_{BE}	MQ_{BE}/MQ_ε
CD	SQ_{CD}	$(c-1)(d-1)$	MQ_{CD}	MQ_{CD}/MQ_ε
CE	SQ_{CE}	$(c-1)(e-1)$	MQ_{CE}	MQ_{CE}/MQ_ε
DE	SQ_{DE}	$(d-1)(e-1)$	MQ_{DE}	MQ_{DE}/MQ_ε
ABC	SQ_{ABC}	$(a-1)(b-1)(c-1)$	MQ_{ABC}	MQ_{ABC}/MQ_ε
ABD	SQ_{ABD}	$(a-1)(b-1)(d-1)$	MQ_{ABD}	MQ_{ABD}/MQ_ε
ABE	SQ_{ABE}	$(a-1)(b-1)(e-1)$	MQ_{ABE}	MQ_{ABE}/MQ_ε
ACD	SQ_{ACD}	$(a-1)(c-1)(d-1)$	MQ_{ACD}	MQ_{CD}/MQ_ε
ACE	SQ_{ACE}	$(a-1)(c-1)(e-1)$	MQ_{ACE}	MQ_{ACE}/MQ_ε
ADE	SQ_{ADE}	$(a-1)(d-1)(e-1)$	MQ_{ADE}	MQ_{ADE}/MQ_ε
BCD	SQ_{BCD}	$(b-1)(c-1)(d-1)$	MQ_{BCD}	MQ_{BCD}/MQ_ε
BCE	SQ_{BCE}	$(b-1)(c-1)(e-1)$	MQ_{BCE}	MQ_{BCE}/MQ_ε
BDE	SQ_{BDE}	$(b-1)(d-1)(e-1)$	MQ_{BDE}	MQ_{BDE}/MQ_ε
CDE	SQ_{CDE}	$(c-1)(d-1)(e-1)$	MQ_{CDE}	MQ_{CDE}/MQ_ε
ABCD	SQ_{ABCD}	$(a-1)(b-1)(c-1)(d-1)$	MQ_{ABCD}	MQ_{ABCD}/MQ_ε
ABCE	SQ_{ABCE}	$(a-1)(b-1)(c-1)(e-1)$	MQ_{ABCE}	MQ_{ABCE}/MQ_ε
ABDE	SQ_{ABDE}	$(a-1)(b-1)(d-1)(e-1)$	MQ_{ABDE}	MQ_{ABDE}/MQ_ε
ACDE	SQ_{ACDE}	$(a-1)(c-1)(d-1)(e-1)$	MQ_{ACDE}	MQ_{ACDE}/MQ_ε
BCDE	SQ_{BCDE}	$(b-1)(c-1)(d-1)(e-1)$	MQ_{BCDE}	MQ_{BCDE}/MQ_ε
ABCDE	SQ_{ABCDE}	$(a-1)(b-1)(c-1)(d-1)(e-1)$	MQ_{ABCDE}	$MQ_{ABCDE}/MQ_\varepsilon$
ERROR	SQ_{erro}	$abcde(f-1)$	MQ_{erro}	
TOTAL	SQ_T	$abcdef$-1		

Table 3. Descriptive analysis a) Educational by visual disability and race.

			white			black			yellow			brown			indigenous	
visual disability		instruction level	Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)
complete disability	option 11	1	16470	**65.6**	option 21	3227	**80.1**	option 31	355	**67.5**	option 41	15039	**79.3**	option 51	191	**87.6**
		2	2924	11,6		370	9.2		58	11.0		1821	9.6		12	5.5
		3	3804	**15.1**		360	**8.9**		66	**12.5**		1734	**9.1**		11	**5.0**
		4	1920	**7.8**		74	**1.8**		47	**8.9**		369	**1.9**		4	**1.8**
several disability	option 12	1	218406	**81.8**	option 22	51251	**81.8**	option 32	6201	**73.9**	option 42	246372	**80.7**	option 52	2797	**84.5**
		2	32568	8.7		5426	8.7		894	10.6		27955	9.2		264	8.0
		3	35366	**7.9**		4981	**7.9**		929	**11,1**		25559	**8.4**		201	**6.1**
		4	12677	**1.6**		997	**1.6**		371	**4.4**		5223	**1.7**		49	**1.5**
mild duisability	option 13	1	871154	**61.0**	option 23	176236	**72.2**	option 33	22061	**60.0**	option 43	992715	**71.6**	option 53	9304	**77.6**
		2	192994	13.5		28850	11.8		4889	13.3		168168	12.1		1249	10.4
		3	248142	**17.4**		31908	**13.1**		6496	**17.7**		182199	**13.1**		1149	**9.6**
		4	115342	**8.1**		7104	**2.9**		3314	**9.0**		42576	**3.1**		282	**2.4**
without disabiity	option 14	1	7366986	**64,7**	option 24	4338598	**54.9**	option 34	91303	**55.3**	option 44	5006207	**67.7**	option 54	79511	**83.0**
		2	172175	15,1		1189817	15.0		23947	14.5		1060430	14.3		8351	8.7
		3	196990	**17,3**		1690201	**21.4**		34217	**20.7**		1133009	**15.3**		6802	**7.1**
		4	32429	**2,8**		690519	**8.7**		15718	**9.5**		196607	**2.7**		1175	**1.2**

In general, people with severe visual disability have higher proportions of people with an education level up to incomplete elementary school, and lower proportions at other levels.

Table 3b shows the crossover between levels of visual disability and race by income level.

Table 3. Descriptive analysis b) Income by visual disability and race

			white			black			yellow			brown			indigenous	
visual disability		income	Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)
complete disabiity	option 11	1	14324	**45.8**	option 21	2900	**9.3**	option 31	327	**1.0**	option 41	13556	**43.4**	option 51	158	**0.5**
		2	5821	59,0		766	7.8		103	1,0		3149	31.9		20	0.2
		3	1824	70.8		138	5.4		27	1,0		582	22.6		7	0.3
		4	729	**78.8**		28	**3.0**		25	**2.7**		142	**15.4**		1	**0.1**
		5	378	**87.7**		4	**0.9**		13	**3.0**		36	**8.4**		0	**0.0**
severa diusabiity	option 12	1	190335	**40.2**	option 22	46253	**9.8**	option 32	5937	**1.3**	option 42	228450	**48.2**	option 52	2513	**0.5**
		2	78055	50.9		13316	8.7		1736	1.1		59773	38.9		583	0.4
		3	18034	61.6		1883	6.4		407	1.4		8855	30.2		97	0.3
		4	4938	**68.7**		360	**5.0**		108	**1.5**		1767	**24.6**		17	**0.2**
		5	2171	**76.9**		75	**2.7**		53	**1.9**		518	**18.4**		5	**0.2**
mild disabiity	option 13	1	790570	**40.5**	option 23	164181	**8.4**	option 33	23087	**1.2**	option 43	966303	**49.5**	option 53	8780	**0.4**
		2	412146	52.4		61249	7.8		8433	1.1		302732	38.5		2310	0.3
		3	130667	63.9		11507	5.6		2789	1.4		59188	28.9		397	0.2
		4	43112	**70.7**		2464	**4.0**		1075	**1.8**		14213	**23.3**		111	**0.2**
		5	21094	**78.2**		645	**2.4**		612	**2.3**		4601	**17.1**		24	**0.1**
without disabiity	option 14	1	3625033	**41.2**	option 24	674905	**7.7.**	option 34	87774	**1.0**	option 44	4359103	**49.5**	option 54	57120	**0.6**
		2	1964279	55.5		257724	7.3		32666	0.9		1274621	36.0		8029	0.2
		3	628955	68.5		45317	4.9		11296	1.2		231327	25.2		1402	0.2
		4	214405	**75.5**		9684	**3.4**		4745	**1.7**		54963	**19.3**		352	**0.1**
		5	104069	**81.1**		2731	**2.1**		2444	**1.9**		18928	**14.8**		113	**0.1**

From Table 3b it can be seen that the proportion increases with the increase in the income level for the white race, and for visual disability and yellow race, on the other hand; the proportion decreases as the income level increases for the black, brown and indigenous races;

According to IBGE, visual disability is present in 18.6% of the population, and finally; in terms of proportion, the income for severe visual disability is lower than complete visual disability.

Figure 1 shows the evolution of the proportion of people who had completed high school education or more for each of the different races for the different levels of visual disability; note that the blue profile is for the white race, yellow for the yellow race, black for the black race, brown and indigenous orange, and finally; VD1 visual complete disability; VD2, visual severe disability; VD3, mild visual disability, and finally; VD4 without visual disability.

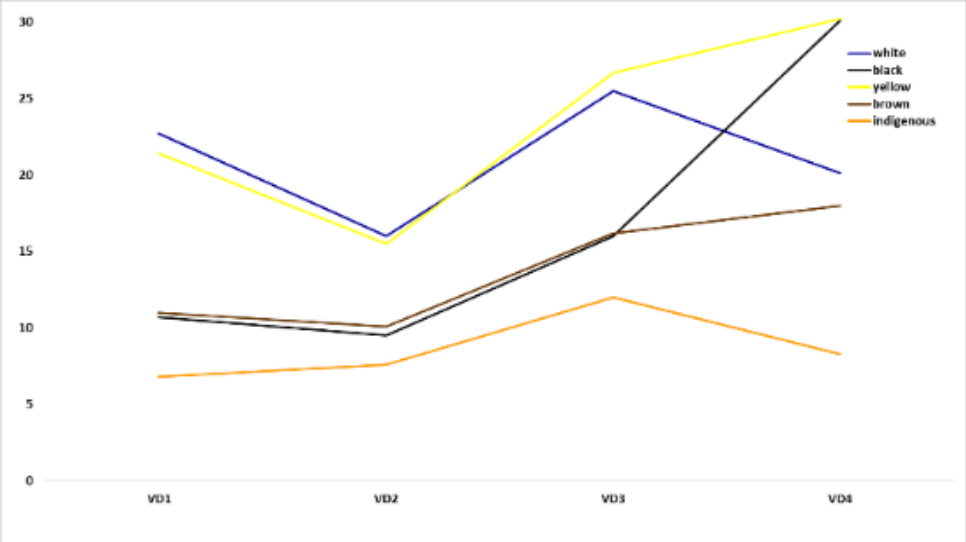

Figure 1. Profile graph for visual disability by race.

Studying Figure 1, it is possible to verify that for the white, yellow, brown and black races show greater difficulty in reaching high school or more, for level VD2 and it is believed that this result is due to greater difficulties in satisfying the needs of the people who make up this group, as they present a visual residue requiring devices such as magnifying glasses, tele loupes and similar high-cost and often imported, more specialized monitoring by more specialized professionals and lack of greater incentives for different governments at the federal, state and municipal level.

The only group that did not show this type of behavior was the indigenous, but with lower performance compared to all other races and I believe that this may be due to the fact that indigenous groups tend to live more isolated in more isolated villages. far from large centers with more precarious infrastructure in terms of roads and housing, assistance in terms of poor health, language and customs barriers and fewer people.

For the groups of white and indigenous races, it shows a decrease in the proportion of people who

reached the education level from VD4 to VD3, while for blacks, whites and browns they show growth, which is more accentuated for blacks.

Table 4a shows the result of crossing between hearing disability with the levels: 1 – can't do it at all, 2 – can't do it with great difficulty, 3 – with a little difficulty and 4 doesn't present any problem and race with the levels: 1 – white, 2 – black, 3 – yellow, 4 – brown and 5 – indigenous.

Table 4. Descriptive analysis a) by education, hearing loss l and race level

			white			black			yellow			brown			indigenous	
hearing disability		instruction level	Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)
complete disability	option 11	1	12484	**70.3**	option 21	1995	**82.3**	option 31	249	**71,1**	option 41	12307	**83.3**	option 51	157	**90.8**
		2	1958	11.0		221	9.1		38	10.9		1194	8.1		8	4.6
		3	2315	**13.0**		176	**7.3**		38	**10.9**		1095	**7.4**		3	**1.7**
		4	1007	**5.7**		31	**1.3**		25	**7.1**		179	**1.2**		5	**2.9**
several disability	option 12	1	82178	**79.3**	option 22	13996	**86.4**	option 32	2042	**79.6**	option 42	72226	**86.1**	option 52	838	**90.1**
		2	8931	8.6		1148	7.1		212	8.3		5799	6.9		49	5.3
		3	9065	**8.8**		934	**5.8**		229	**8.9**		4994	**6.0**		34	**3.7**
		4	3417	**3.3**		127	**0.8**		83	**3.2**		870	**1.0**		9	**1.0**
mild duisability	option 13	1	284782	**71.7**	option 23	533160	**80.3**	option 33	7572	**72.0**	option 43	283728	**79.4**	option 53	3429	**84.9**
		2	42957	10,8		6010	9.1		1160	11.0		33991	9.5		309	7.7
		3	48492	**12.2**		6024	**9.1**		1288	**12.2**		33081	**9.3**		251	**6.2**
		4	20867	**5.3**		1023	**1.5**		502	**4.8**		6570	**1.8**		49	**1.2**
without disabiity	option 14	1	5065601	**55.4**	option 24	898616	**65.8**	option 34	110063	**55.7**	option 44	5892356	**68.1**	option 54	87380	**82.3**
		2	1364689	14.9		199474	14.6		28383	14.4		1217525	14.1		9510	9.0
		3	1917896	**21.0**		227131	**16.6**		40163	**20.3**		1303482	**15.1**		7877	**7.4**
		4	795216	**8.7**		39424	**2.9**		18840	**9.5**		237171	**2.7**		1447	**1.4**

On the other hand, in Table 4a), it can be seen that the best situation for high school education or more (marked in blue) was for the group formed by without disabled hearing and yellow race with 29.8% followed de without disabled hearing and white race with 29.7%. While, the worst situation was the group formed by complete disabled hearing and 4.6% indigenous race, followed by severe disabled hearing and indigenous race with 4.7% with full high school education level or more. On the other hand, among the groups marked in red, the worst situation is the indigenous group with complete disabled hearing (option 51) with 90.8% of people who failed to complete elementary school and the best situation is the of the group formed by blacks and without hearing disability (option 24) with 55.4%.

On the other hand, for the indigenous race, there is a greater proportion of people who failed to complete elementary school, while the smallest proportions were presented by whites and yellows, regardless of the level of severity in terms of hearing loss.

On the other hand, Table 4b shows the intersection between the different levels of hearing loss and race by income level.

Table 4. Descriptive analysis b) by income, hearing loss and race level

			white			black			yellow			brown			indigenous	
hearing disability		income	Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)
complete disabiity	option 11	1	10988	**45.2**	option 21	1813	**7.5**	option 31	221	**0.9**	option 41	11166	**45.9**	option 51	122	**0.5**
		2	3777	60.7		398	6.4		61	1.0		1968	31.6		15	0.2
		3	1074	74.3		63	4.4		27	1.9		278	19.2		4	0.3
		4	375	**79.3**		13	**2.7**		11	**2.3**		74	**15.6**		0	**0.0**
		5	214	**87.7**		3	**1.2**		5	**2.0**		22	**9.0**		0	**0.0**
severa diusabiity	option 12	1	63275	**45.2**	option 22	12092	**8.6**	option 32	1739	**1.2**	option 42	62252	**44.4**	option 52	703	**0.5**
		2	28194	58.6		3211	6.7		584	1.2		16016	33.3		147	0.3
		3	7327	69.9		479	4.6		137	1.3		2510	24.0		23	0.2
		4	2000	**75.2**		82	**3.1**		36	**1.4**		536	**20.2**		4	**0.2**
		5	958	**84.0**		16	**1.4**		12	**1.1**		154	**13.5**		0	**0.0**
mild disabiity	option 13	1	216306	**41.7**	option 23	45643	**8.8**	option 33	6590	**1.3**	option 43	246876	**47.6**	option 53	2968	**0.6**
		2	117657	54.9		15774	7.4		2539	1.2		77717	36.3		677	0.3
		3	36605	67.1		2615	4.8		707	1.3		14484	26.6		113	0.2
		4	11579	**73.8**		550	**3.5**		236	**1.5**		3306	21.1		20	**0.1**
		5	5742	**81.1**		129	**1.8**		129	**1.8**		1073	15.2		8	**0.1**
without disabiity	option 14	1	4329836	**40.9**	option 24	828717	**7.8**	option 34	108583	**1.0**	option 44	5247293	**49.6**	option 54	64778	**0.6**
		2	2311273	54.8		313761	7.4		39764	0.9		1544920	36.6		10105	0.2
		3	734640	67.5		55698	5.1		13651	1.3		282741	26.0		1764	0.2
		4	249263	**74.5**		11894	**3.6**		5671	**1.7**		67178	**20.1**		457	**0.1**
		5	120815	**80.5**		3307	**2.2**		2976	**2.0**		22836	**15.2**		134	**0.1**

From Table 4b it can be seen that the higher the income level, the greater the proportion of whites, and the smaller the proportion of blacks, browns and indigenous people, and, finally; according to IBGE, 5.2% of the population are people with hearing disability.

Figure 2 shows the evolution of the proportion of people who had completed high school education or more for each of the different races for different levels of hearing loss; note that the blue profile is for the white race, yellow for the yellow race, black for the black race, brown, indigenous dark orange, and finally; HD1 complete disability hearing; HD2, severe disability hearing, but with great difficulty; HD3, mid disability hearing, and finally; HD4 without disability hearing.

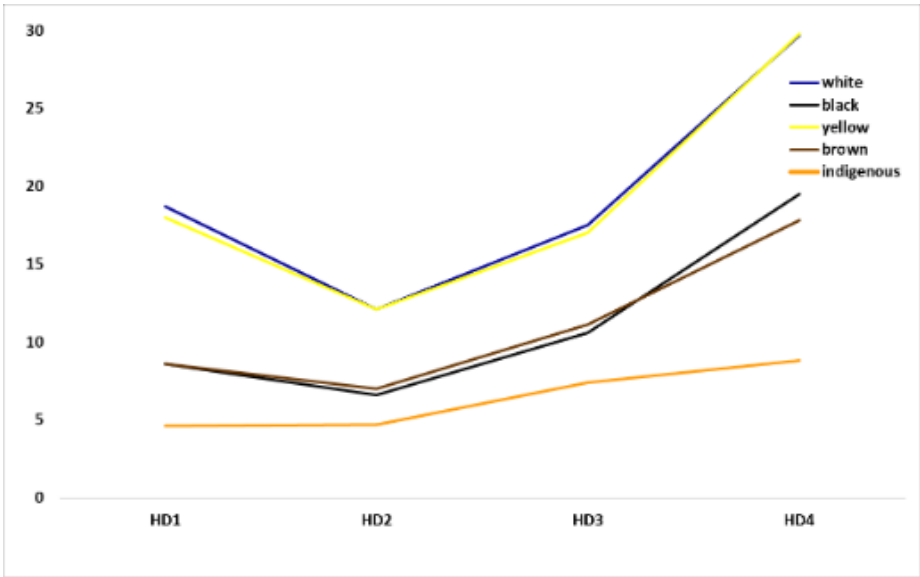

Figure 2. Profile chart for hearing disability by race.

Figure 2 shows the profile of the white race very close to the yellow race, followed by the brown race very close to the black race, and, finally, in a worse situation the indigenous race, which shows, for all different levels of hearing disability, a smaller proportion of people who complete high school level or more.

By making a comparison between the different levels of hearing disability, it was possible to verify that for the white, yellow, black and brown races, the worst situation in terms of being able to complete high school or more was for the HD2 level, severe disability hearing, this may be due to difficulties in prevention policies and monitoring of these cases in the health and social areas.

The only exception to this statement was for the indigenous race, in which the proportion of people who completed high school or more increases with the decrease in the of hearing loss, but it is believed that this is due to more serious infrastructural problems when compared to other breeds that mask these results.

Table 5a shows the result of crossing between physical disability with the levels: 1 – complete physical disability, 2 – severe physical disability, 3 – mild physical disability and 4 without physical disability and race with the levels: 1 – white, 2 – black, 3 – yellow, 4 – brown and 5 – indigenous.

Table 5. Descriptive analysis a) By education, physical disability and race level

			white			black			yellow			brown			indigenous	
physical disability		instruction level	Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)
complete disability	option 11	1	34862	**80.7**	option 21	4847	**88.4**	option 31	598	**80.5**	option 41	26165	**88.5**	option 51	239	**89.8**
		2	3035	7.0		292	5.3		59	7.9		1607	5.4		12	4.5
		3	3668	**8.5**		288	**5.3**		61	**8.2**		1496	**5.1**		9	**3.4**
		4	1623	**3.8**		58	**1.1**		25	**3.4**		294	**1.0**		6	**2.3**
several disability	option 12	1	160863	**81.7**	option 22	34017	**88.4**	option 32	3846	**83.5**	option 42	151357	**87.3**	option 52	1768	**88.1**
		2	16032	8.1		2406	6.2		349	7.6		11384	6.6		128	6.4
		3	14705	**7.5**		1766	**4.6**		305	**6.6**		8915	**5.1**		94	**4.7**
		4	5339	**2.7**		313	**0.8**		105	**2.3**		1694	**1.0**		17	**0.8**
mild duisability	option 13	1	339694	**75.6**	option 23	71784	**83.5**	option 33	8621	**77.0**	option 43	348003	**82.7**	option 53	4221	**85.8**
		2	44772	10.0		6887	8.0		1076	9.6		35221	8.4		370	7.5
		3	45972	**10.2**		6085	**7.1**		1116	**10.0**		31177	**7.4**		259	**5.3**
		4	18773	**4.2**		1230	**1.4**		390	**3.5**		6584	**1.6**		71	**1.4**
without disabiity	option 14	1	4909548	**54.7**	option 24	857100	**65.0**	option 34	106858	**55.0**	option 44	5735036	**67.6**	option 54	85576	**82.2**
		2	1354668	15.1		197261	14.9		28308	14.6		1210273	14.3		9366	9.0
		3	1913386	**21.3**		226126	**17.1**		40235	**20.7**		1301025	**15.3**		7803	**7.5**
		4	794766	**8.9**		39003	**3.0**		18930	**9.7**		236216	**2.8**		1416	**1.4**

For Table 5a, it was possible to verify that for complete high school or more (marked in blue) the best situation was the group of people without physical disability and yellow race with 30.4% of people with high school level or more followed by the group of people without physical disability and white race with 30.2%. While the worst situation is the group made up of people complete physical disability all and the black race

with 5.4%, followed by the group of people with severe physical disability and the indigenous race with 5.5% and the group of complete physical disability people and indigenous race with 5.7% of people who obtained high school level or more. On the other hand, among the groups marked in red, the worst situation is that of the indigenous group with complete physical disability (option 51) with 89.8% of people who failed to complete elementary school and the best situation is that of the group formed by blacks and who can walk normally (option 24) with 54.7%.

It is also noted that the indigenous race has the highest proportion of people who failed to complete elementary school, while the white and yellow races have the smallest, regardless of the degree of severity of physical disability presented.

Table 5b shows the crossing between the levels of the physical disability and race variables by income level.

Table 5. Descriptive analysis b) by income, physical disability and race

			white			black			yellow			brown			indigenous	
physical disability		income	Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)
complete disabiity	option 11	1	26801	**51.0**	option 21	4175	**7.9**	option 31	503	**1.0**	option 41	20938	**39.8**	option 51	168	**0.3**
		2	7962	63.4		779	6.2		105	0.8		3685	29.5		27	0.2
		3	2156	74.3		123	4.2		34	1.2		585	20.2		3	0.1
		4	730	**79.3**		34	**3.7**		12	**1.3**		142	**15.4**		3	**0.3**
		5	398	**90.0**		2	**0.5**		3	**0.7**		38	**8.6**		1	**0.2**
severa diusabiity	option 12	1	128438	**43.6**	option 22	29381	**10.0**	option 32	3345	**1.1**	option 42	131960	**44.8**	option 52	1549	**0.5**
		2	50768	55.0		7539	8.2		968	1.0		32634	35.4		343	0.4
		3	11229	64.7		1077	6.2		184	1.1		4811	27.7		49	0.3
		4	2892	**72.1**		173	**4.3**		42	**1.0**		894	**22.3**		12	**0.3**
		5	1278	**79.8**		34	**2.1**		16	**1.0**		270	**16.9**		3	**0.2**
mild disabiity	option 13	1	272655	**41.7**	option 23	62294	**9.5**	option 33	7527	**1.2**	option 43	308010	**47.1**	option 53	3760	**0.6**
		2	123424	53.2		19052	8.2		2618	1.1		86232	37.1		833	0.4
		3	33385	64.4		3019	5.8		652	1.3		14639	28.2		141	0.3
		4	9588	**70.7**		624	**4.6**		162	**1.2**		3161	**23.3**		26	**0.2**
		5	4383	**78.8**		155	**2.8**		67	**1.2**		950	**17.1**		8	**0.1**
without disabiity	option 14	1	4192478	**40.9**	option 24	792400	**7.7**	option 34	105757	**1.0**	option 44	5106644	**49.8**	option 54	63095	**0.6**
		2	2278668	54.9		305763	7.4		39253	0.9		1518004	36.6		9741	0.2
		3	732843	67.7		54635	5.0		13652	1.3		279959	25.9		1711	0.2
		4	250005	**74.7**		11708	**3.5**		5738	**1.7**		66898	**20.0**		440	**0.1**
		5	121669	**80.6**		3264	**2.2**		3036	**2.0**		22827	**15.1**		130	**0.1**

From Table 5b it was verified that the income level increases proportionally for the white race and decreases in proportional terms for the black, brown and indigenous races, except for total physical disability, and finally;

According to the IBGE Demographic Census, 7.1% of the population has physical disabilities.

Figure 3 shows the evolution of the proportion of people who had completed high school or more for each of the different races for the different levels of physical disability; note that the blue profile is for the white race, yellow for the yellow race, black for the black race, brown and indigenous dark orange, and finally; PD1 complete physical disability; PD2, several physical disabilities; PD3, mild physical disability, and finally; PD4 without physical disability.

Figure 3 shows the profiles for the white and yellow races in better conditions, and much below are the profiles for the black and brown race, closely followed by the indigenous and in such a way that the better the situation in terms of physical disability, the indigenous race. distance from the brown and black races with regard to the proportion of high school level or more, from the PD2 level with a less accentuated improvement even with less seriousness in terms of physical disability.

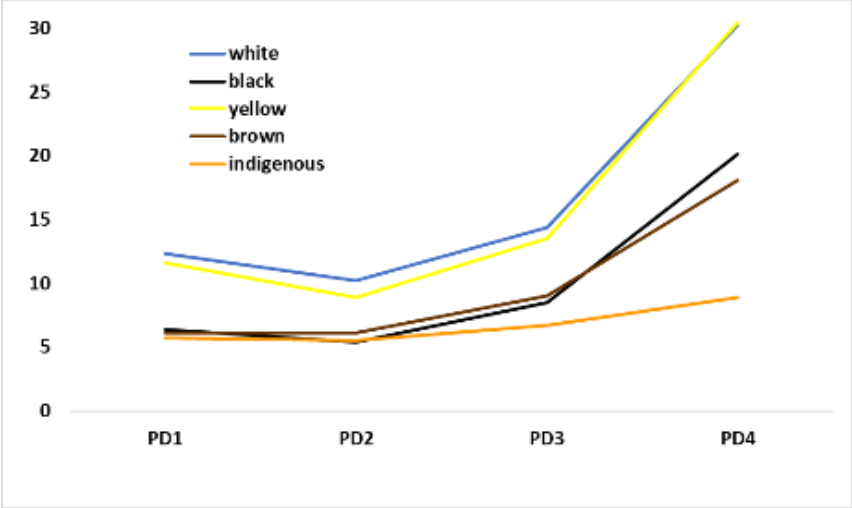

Figure 3. Physical disability profile chart by race.

For white and yellow breeds there is a greater decrease of PD1 to PD2 compared to other breeds.

Table 6a shows the result of crossing between intellectual disability with levels: 1 – intellectual disability and 2 – without intellectual disability and race with levels: 1 – white, 2 – black, 3 – yellow, 4 – brown and 5 – indigenous.

Table 6. Descriptive analysis a) by educational, intellectual disability and race level

			white			black			yellow			brown			indigenous	
intellectual disability		instruction level	Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)
yes	option 11	1	111279	**83.6**	option 21	21428	**89.2**	option 31	2575	**84.4**	option 41	118132	**89.4**	option 51	1209	**89.7**
		2	9789	7.4		1440	6.0		218	7.1		7791	5.9		72	5.3
		3	9188	**6.9**		1010	4.2		184	6.0		5457	4.1		54	4.0
		4	2832	**2.1**		142	0.6		74	2.4		729	0.6		13	1.0
no	option 12	1	5333811	**56.0**	option 22	946352	**66.4**	option 32	117352	**56.5**	option 42	6142532	**68.4**	option 52	90595	**82.4**
		2	1408764	14.8		205418	14.4		29576	14.2		1250726	13.9		9804	8.9
		3	1968703	**20.7**		233266	**16.4**		41534	**20.0**		1337214	**14.9**		8111	**7.4**
		4	817680	**8.6**		40463	**2.8**		19376	**9.3**		244062	**2.7**		1497	**1.4**

Table 6a shows that for people who completed high school or more (marked in blue) the best situation was for the groups formed by without intellectual disability and white race, and without intellectual disability and yellow race, with 29.3% of people with completed high school or more. While the worst situation was obtained by the group of without intellectual disabled people and brown race with 4.7%, followed by people with intellectual disabilities and black race with 4.8%, and, finally, followed by intellectual disabled people and indigenous race with 5% of the people obtaining as a level of education completed high school or more.

On the other hand, among the groups marked in red, the worst situation is that of the indigenous group of people with intellectual disabilities (option 51) with 89.7% of people who failed to complete elementary school and the best situation is that of the group formed by whites and without intellectual disabilities (option 24) with 56.0%.

The indigenous race has the highest proportion of people with incomplete elementary school, while the white and yellow races have the lowest, regardless of whether they have an intellectual disability or not.

Table 6b shows a descriptive analysis for the variable's intellectual disability, income and race by life quality index and their respective means is noted.

Continuing, Table 6b shows the crossing between levels of the intellectual disability variable with levels of race by income level.

Table 6. Descriptive analysis b) by income, intellectual disability and race level

			white			black			yellow			brown			indigenous	
intellectual disability		income	Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)
yes	option 11	1	99948	**43.3**	option 21	19856	**8.6**	option 31	2318	**1.0**	option 41	107838	**46.7**	option 51	1001	**0.4**
		2	17483	55.3		2415	7.6		373	1.2		11217	35.5		114	0.4
		3	4246	66.2		344	5.4		77	1.2		1725	26.9		22	0.3
		4	1200	**73.9**		62	**3.8**		29	**1.8**		324	**20.0**		8	**0.5**
		5	598	**82.3**		20	**2.8**		5	**0.7**		103	**14.2**		1	**0.1**
no	option 12	1	4520497	**41.0**	option 22	868420	**7.9**	option 32	114816	**1.0**	option 42	5459794	**49.5**	option 52	67571	**0.6**
		2	2443458	54.8		330744	7.4		42575	1.0		1629434	36.6		10830	0.2
		3	775408	67.5		58514	5.1		14446	1.3		298289	26.0		1882	0.2
		4	262019	**74.5**		12477	**3.5**		5925	**1.7**		70771	**20.1**		473	**0.1**
		5	127132	**80.6**		3435	**2.2**		3117	**2.0**		23982	**15.2**		141	**0.1**

Studying Table 6b it is observed that the level of income increases with increasing proportions of whites and yellows, and decreases with increasing proportions of blacks, browns and indigenous people, and finally. According to the IBGE Census. 1.4% of the population are people with intellectual disabilities.

Figure 4 shows the evolution of the proportion of people who had completed high school or more for each of the different races for the different levels of intellectual disability; and finally; ID1 means has an intellectual disability and ID2 without an intellectual disability.

Examining Figure 4, it was observed that the profiles of the white and yellow races are similar and are the ones with the best proportions of people who reached high school or more.

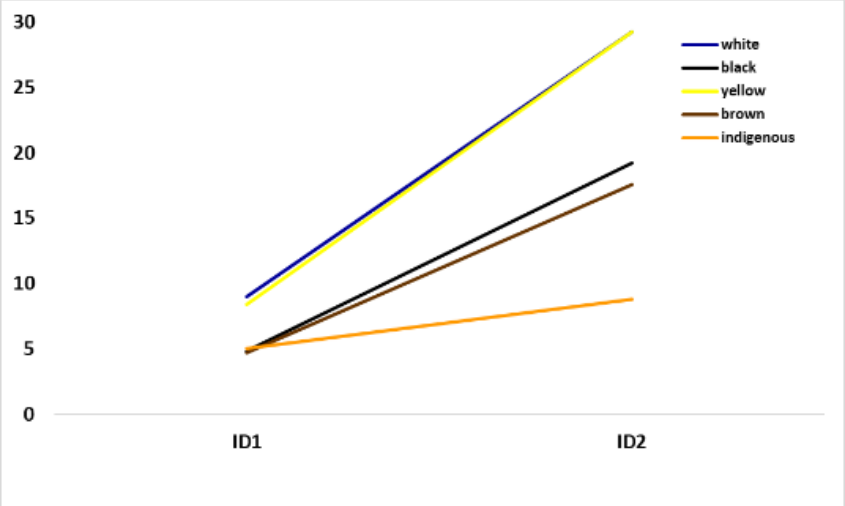

Figure 4. Profile chart for intellectual disability by race.

Table 7a shows the result of crossing between disabilities with levels: 0 - without disability, 1 - one, 2 - two 3 - three and 4 four disabilities and race with levels: 1 - white, 2 - black, 3 - yellow, 4 - brown and 5 – indigenous.

Table 7. Descriptive analysis a) by education, multiple disability and race level

			white			black			yellow			brown			indigenous	
desabilities number		instruction level	Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)
nothing	option 11	1	3969405	**53.8**	option 21	669614	**63.6**	option 31	92909	**54.1**	option 41	4648150	**67.0**	option 51	75542	**82.9**
		2	1130215	15.3		163738	15.5		23649	14.8		1014716	14.6		7975	8.8
		3	1620721	**22.0**		188734	**17.9**		32662	**21.3**		1088969	**15.7**		6488	**7.1**
		4	661725	**9.0**		31021	**2.9**		15101	**9.8**		188342	**2.7**		1099	**1.2**
one	option 12	1	969421	**59.0**	option 22	194100	**70.4**	option 32	23957	**58.2**	option 42	1100298	**70.2**	option 52	10300	**76.7**
		2	232604	14.2		34803	12.6		5663	13.8		200620	12.8		1432	10.7
		3	303919	**18.5**		38662	**14.0**		7653	**18.6**		217458	**13.9**		1360	**10.1**
		4	137845	**8.4**		8270	**3.0**		3860	**9.4**		48988	**3.1**		333	**2.5**
two	option 13	1	367310	**77.7**	option 23	76654	**84.7**	option 33	9323	**77.2**	option 43	381386	**83.9**	option 53	4161	**85.8**
		2	44799	9.5		6834	7.6		1181	9.8		35861	7.9		372	7.7
		3	43490	**9.2**		5865	**6.5**		1166	**9.7**		30892	**6.8**		251	**5.2**
		4	17215	**3.6**		1119	**1.2**		399	**3.3**		6343	**1.4**		63	**1.3**
three	option 14	1	128693	**85.0**	option 24	25411	**90.9**	option 34	3443	**85.4**	option 44	121674	**90.3**	option 54	1677	**91.0**
		2	10262	6.8		1401	5.0		280	6,9		6947	5.2		91	4.9
		3	9004	**5.9**		968	**3.5**		225	**5.6**		5047	**3.7**		61	**3.3**
		4	3438	**2.3**		189	**0.7**		82	**2.0**		1058	**0.8**		14	**0.8**
four	option 15	1	10513	**85.8**	option 25	2075	**92.9**	option 35	297	**87.4**	option 45	9488	**92.0**	option 55	125	**91.2**
		2	743	6.1		94	4.2		22	6.5		437	4.2		6	4.4
		3	702	**5.7**		59	**2.6**		13	**3.8**		331	**3.2**		5	**3.6**
		4	302	**2.5**		6	**0.3**		8	**2.4**		60	**0.6**		1	**0.7**

Finally, Table 7a verifies for the groups of people who completed high school or more (marked in red) that the best situation was for without disabled people and yellow race, with 31.1% of them obtaining completed high school or more followed by people without disabilities and white race with 31.0%. While the worst situation is the one presented by the group formed by people with the four disabilities and black race, with only 2.9% of people having completed high school education or more. On the other hand, among the groups marked in red, the worst situation is that of the black group who present the four studied disabilities (option 51) with 92.9% of people who failed to complete elementary school and the best situation is that of the group formed by whites and without disability (option 11) with 53.8%.

Note that, for the maximum of two disabilities, the indigenous race had the highest proportion of people who did not complete elementary school, while the white and yellow races had the lowest.

For groups of people with three or four disabilities, the black, brown and indigenous races, in proportional terms, are approximately equivalent at a level with higher proportions of people who failed to complete elementary school, while for the white and yellow races feature the smallest.

Table 7b shows the crossing between the variables number of disabilities and race by income level and note that for each cell of race level and number of disabilities it presents the distribution of people for each of the different income levels. values marked in red are those with lower income which is level 1, while values in blue are levels 4 and 5 with higher income levels.

Table 7. Descriptive analysis b) by income, multiple disability and race level

			white			black			yellow			brown			indigenous	
disabilities number		income	Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)		Frequency	(%)
		1	3327699	**41.0**		615292	**7.6**		80383	**1.0**		4041956	**49.8**		53849	**0.7**
		2	1825200	55.4		239547	7.3		30014	0.9		1189555	36.1		7325	0.2
zero	option 11	3	584703	68.5	option 21	42018	4.9	option 31	10562	1.2	option 41	215060	25.2	option 51	1269	0.1
		4	200357	**75.5**		8990	**3.4**		4464	**1.7**		51195	**19.3**		321	**0.1**
		5	97274	**81.1**		2555	**2.1**		2331	**1.9**		17662	**14.7**		104	**0.1**
		1	890575	**40.8**		183027	**8.4**		25332	**1.2**		1075933	**49.3**		9443	**0.4**
		2	468572	53.1		68520	7.8		9302	1.1		334143	37.8		2463	0.3
one	option 12	3	152710	64.8	option 22	13179	5.6	option 32	3107	1.3	option 42	66145	28.1	option 52	454	0.2
		4	51143	**71.6**		2833	**4.0**		1285	**1.8**		16028	**22.4**		130	**0.2**
		5	24942	**78.7**		743	**2.3**		682	**2.2**		5284	**16.7**		28	**0.1**
		1	293163	**41.4**		66455	**9.4**		8254	**1.2**		337271	**47.6**		3673	**0.5**
		2	127191	52.6		19598	8.1		2742	1.1		91275	37.8		877	0.4
two	option 13	3	33463	63.9	option 23	2946	5.6	option 33	642	1.2	option 43	15153	28.9	option 53	142	0.3
		4	9324	**70.4**		595	**4.5**		169	**1.3**		3129	**23.6**		19	**0.1**
		5	4368	**78.7**		132	**2.4**		94	**1.7**		950	**17.1**		8	**0.1**
		1	100585	**43.5**		21745	**9.4**		2922	**1.3**		104554	**45.2**		1495	**0.6**
		2	37651	55.2		5197	7.6		826	1.2		24326	35.6		264	0.4
three	option 14	3	8233	65.4	option 24	683	5.4	option 34	198	1.6	option 44	3434	27.3	option 54	38	0.3
		4	2240	**72.2**		117	**3.8**		31	**1.0**		703	**22.7**		10	**0.3**
		5	1060	**83.1**		24	**1.9**		15	**1.2**		175	**13.7**		2	**0.2**
		1	8746	**45.4**		1854	**9.6**		247	**1.3**		8303	**43.1**		112	**0.6**
		2	2345	57.4		298	7.3		64	1.6		1363	33.4		15	0.4
four	option 15	3	553	66.9	option 25	32	3.9	option 35	14	1.7	option 45	226	27.4	option 55	1	0.1
		4	158	**75.6**		4	**1.9**		5	**2.4**		41	**19.6**		1	**0.5**
		5	89	**85.6**		1	**1.0**		0	**0.0**		14	**13.5**		0	**0.0**

From Table 7b) it was possible to verify that the higher the income level, the greater the proportion of whites and yellows, and; smaller is the proportion of blacks, browns and indigenous peoples; the black, brown and indigenous races covered by affirmative action as the quota law, constitute about 52% of the population; in terms of quantity, the largest is the brown race represents 47%, while the smallest is the indigenous with 0.5%; disabled people represent 76.1%; with a 17.2% deficiency; with two deficiencies 5.0%; three deficiencies, 1.5%, and finally; with the four deficiencies 0.1%. And finally; the most present disability in the population is visual with 18.6%; followed by physics with 7.1%; hearing with 5.2%, and finally; intellectual with 1.4%.

Figure 5 shows the evolution of the proportion of people who had completed high school education or more for each of the different races for the different amounts of disability; note that the blue profile is for the white race, yellow for the yellow race, black for the black race, brown and indigenous dark orange, and finally; DN0 means no disability; DN1, has a disability; DN2, has two shortcomings; DN3, has three deficiencies, and finally; DN4, presents the four deficiencies studied.

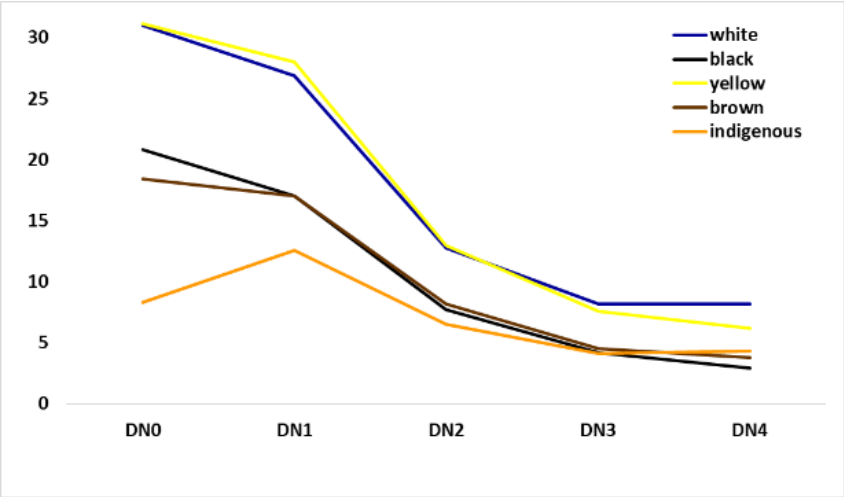

Figure 10. Profile graph for number of disabilities by race.

From Figure 10, it is observed that the profiles of the yellow and white races very close and in better positions, followed by the profiles of the black and brown races also close, but in lower positions than the positions of the white and yellow races, and, by finally; in the worst position, there is the profile of the indigenous race, which only approximates the profiles of the black and brown races at levels DN3 and DN4.

In general, the greater the number of disabilities, the lower the proportion of people who have completed high school education or more, and the only exception to this rule is found in the indigenous race, where this proportion increases when the number of disabilities increases from zero to one.

Tables 8 to 12 show the results of the ANOVA tests considering in all cases the life quality of life score as a dependent variable or response and the factors race (B), education level (C), income (D) and gender (E) as independent variables, also adding as a factor visual disability (A1 - Table 8), hearing disability (A2 - Table 9), physical disability (A3 - Table 10), intellectual disability (A4 - Table 11) and multiple disability (A5 - Table 12) and the significance level values highlighted in bold red were the cases in which the test was considered significant in the situation in question and the tests were performed for all main effects, all possible interactions, it is about a procedure used to also assess the confounding between disabled people and quota races and multiple comparison tests between the main effects.

From tables 8 to 12 it is observed that the effects and significance levels that are in red (sig < 0.05) were considered significant and because the higher order interaction effects were considered significant, all other effects were considered significant, continued to be included in the model.

Table 8. ANOVA with visual disability (A1) as factor

Dependent variable: blind disability

Source of variation	Type III Sums of squares	df	Average square	Z	P-value
Corrected model Interpretetaion	1386098258,468[a]	757	1831041,293	21373,071	**0,000**
	17684424,384	1	17684424,384	206423,772	**0,000**
A1	7928,178	3	2642,726	30,848	**,000**
B	2845,188	4	711,297	8,303	**,000**
C	117058,384	3	39019,461	455,460	**,000**
D	370416,446	4	92604,111	1080,934	**0,000**
E	1236,068	1	1236,068	14,428	**,000**
A1 * B	11073,989	12	922,832	10,772	**,000**
A1 * C	1538,804	9	170,978	1,996	**,036**
A1 * D	44700,575	12	3725,048	43,481	**,000**
A1 * E	415,359	3	138,453	1,616	,183
B * C	2241,216	12	186,768	2,180	**,010**
B * D	11201,970	16	700,123	8,172	**,000**
B * E	1400,553	4	350,138	4,087	**,003**
C * D	5409,668	12	450,806	5,262	**,000**
C * E	3806,803	3	1268,934	14,812	**,000**
D * E	653,412	4	163,353	1,907	,106
A1 * B * C	4880,726	36	135,576	1,583	**,014**
A1 * B * D	12881,404	47	274,072	3,199	**,000**
A1 * B * E	1739,093	12	144,924	1,692	**,062**
A1 * C * D	23876,098	36	663,225	7,742	**,000**
A1 * C * E	767,177	9	85,242	,995	,441
A1 * D * E	1206,287	12	100,524	1,173	,296
B * C * D	11623,671	48	242,160	2,827	**,000**
B * C * E	1508,959	12	125,747	1,468	,128
B * D * E	2134,052	16	133,378	1,557	,071
C * D * E	10789,879	12	899,157	10,496	**,000**
A1 * B * C * D	28243,151	133	212,355	2,479	**,000**
A1 * B * C * E	3713,867	36	103,163	1,204	,186
A1 * B * D * E	4210,589	44	95,695	1,117	,274
A1 * C * D * E	6166,890	36	171,302	2,000	**,000**
B * C * D * E	7891,246	48	164,401	1,919	**,000**
A1 * B * C * D * E	14881,288	117	127,190	1,485	**,001**
Error	1484095574,684	17323301	85,670		
Total	72184151841,000	17324059			
Corrected total	2870193833,153	17324058			

It is also noted that, in terms of effects considered significant (marked in red), it was possible to verify that in Table 8, 23 effects were found; in Table 9, 25 effects; Table 10, 28 effects; Table 11, 23; and finally; Table 12, 4 effects out of a total of 31 effects tested for each case, it is also noted that in all these analyzes of variance, the main and higher order effects were considered significant, which justifies the non-exclusion in each model, of the effects considered to be non-significant.

Finally, it is noted that after applying the ANOVA technique, the quality score proposed for this model has good sensitivity for detecting a large number of effects and also, for all the main effects of race, education, income, sex and disability: visual (Table 8), hearing (Table 9), physical (Table 10), intellectual (Table 11) and multiple (Table 12) with the exception of of main effect of sex in tables 9 and 11, for all main effects the ANOVA assumptions as independent samples; Homogeneity of variances between groups are homoscedastic and the residuals are normally distributed.

Table 9. ANOVA hearing loss (A2) as a factor

Dependent variable: hearing disability

Source of variation	Type III Sums of squares	df	Average square	Z	P-value
Corrected model Interpretetaion	1387489609,846[a]	727	1908513,906	22297,113	**0,000**
	10878297,672	1	10878297,672	127090,840	**0,000**
A2	24286,103	3	8095,368	94,578	**,000**
B	3360,902	4	840,225	9,816	**,000**
C	69772,389	3	23257,463	271,716	**,000**
D	183727,138	4	45931,785	536,620	**0,000**
E	6,341	1	6,341	,074	,785
A2 * B	25615,984	12	2134,665	24,939	**,000**
A2 * C	1524,625	9	169,403	1,979	**,037**
A2 * D	15195,078	12	1266,256	14,794	**,000**
A2 * E	769,439	3	256,480	2,996	**,029**
B * C	2523,407	12	210,284	2,457	**,003**
B * D	6019,974	16	376,248	4,396	**,000**
B * E	653,065	4	163,266	1,907	,106
C * D	3950,528	12	329,211	3,846	**,000**
C * E	2078,646	3	692,882	8,095	**,000**
D * E	1812,195	4	453,049	5,293	**,000**
A2 * B * C	6860,763	36	190,577	2,227	**,000**
A2 * B * D	9395,236	45	208,783	2,439	**,000**
A2 * B * E	4086,558	12	340,546	3,979	**,000**
A2 * C * D	4982,207	36	138,395	1,617	**,011**
A2 * C * E	1451,073	9	161,230	1,884	**,049**
A2 * D * E	648,579	12	54,048	,631	,817
B * C * D	7908,453	48	164,759	1,925	**,000**
B * C * E	2245,615	12	187,135	2,186	**,010**
B * D * E	1526,872	16	95,429	1,115	,333
C * D * E	5982,533	12	498,544	5,824	**,000**
A2 * B * C * D	20017,248	122	164,076	1,917	**,000**
A2 * B * C * E	4762,351	35	136,067	1,590	**,015**
A2 * B * D * E	5006,677	42	119,207	1,393	**,047**
A2 * C * D * E	3440,982	36	95,583	1,117	,289
B * C * D * E	5088,655	48	106,014	1,239	,124
A2 * B * C * D * E	11944,005	102	117,098	1,368	**,008**
Error	1482929173,839	17325019	85,595		
Total	72193157288,000	17325747			
Corrected total	2870418783,684	17325746			

Table 10. ANOVA considering physical disability (A3) as a factor

Dependent variable: physical disability

Source of variation	Type III Sums of squares	df	Average square	Z	P-value
Corrected model Interpretetaion	1399574163,879[a]	745	1878623,039	22128,448	**0,000**
	12870225,564	1	12870225,564	151599,393	**0,000**
A3	57534,921	3	19178,307	225,903	**,000**
B	4386,058	4	1096,514	12,916	**,000**
C	79674,419	3	26558,140	312,830	**,000**
D	222646,016	4	55661,504	655,641	**0,000**
E	399,251	1	399,251	4,703	**,030**
A3 * B	39886,831	12	3323,903	39,153	**,000**
A3 * C	1634,238	9	181,582	2,139	**,023**
A3 * D	33402,284	12	2783,524	32,787	**,000**
A3 * E	236,742	3	78,914	,930	,425
B * C	4611,506	12	384,292	4,527	**,000**
B * D	13861,569	16	866,348	10,205	**,000**
B * E	3103,286	4	775,821	9,138	**,000**
C * D	5504,196	12	458,683	5,403	**,000**
C * E	2499,230	3	833,077	9,813	**,000**
D * E	2703,814	4	675,954	7,962	**,000**
A3 * B * C	6442,670	36	178,963	2,108	**,000**
A3 * B * D	11775,490	48	245,323	2,890	**,000**
A3 * B * E	4640,752	12	386,729	4,555	**,000**
A3 * C * D	10096,750	36	280,465	3,304	**,000**
A3 * C * E	913,588	9	101,510	1,196	,292
A3 * D * E	4252,071	12	354,339	4,174	**,000**
B * C * D	7173,436	48	149,447	1,760	**,001**
B * C * E	3098,212	12	258,184	3,041	**,000**
B * D * E	2793,305	16	174,582	2,056	**,008**
C * D * E	2348,365	12	195,697	2,305	**,006**
A3 * B * C * D	22229,070	127	175,032	2,062	**,000**
A3 * B * C * E	5872,114	36	163,114	1,921	**,001**
A3 * B * D * E	6125,288	42	145,840	1,718	**,003**
A3 * C * D * E	4280,108	36	118,892	1,400	,056
B * C * D * E	7932,913	48	165,269	1,947	**,000**
A3 * B * C * D * E	14137,337	111	127,363	1,500	**,001**
Error	1470803297,589	17324707	84,896		
Total	72191677737,000	17325453			
Corrected total	2870377461,468	17325452			

Table 11. Analysis of variance with intellectual disability (A4) as factor

Dependent variable: intellectual disability

Source of variation	Type III Sums of squares	df	Average square	Z	P-value
Corrected model ° **Interpretetaion**	1382787371,743[a]	380	3638914,136	42374,603	**0,000**
	9820449,963	1	9820449,963	114357,650	**0,000**
A4	13520,222	1	13520,222	157,441	**,000**
B	2200,486	4	550,121	6,406	**,000**
C	89911,285	3	29970,428	349,001	**,000**
D	282890,873	4	70722,718	823,555	**0,000**
E	314,464	1	314,464	3,662	,056
A4 * B	4483,129	4	1120,782	13,051	**,000**
A4 * C	93,143	3	31,048	,362	,781
A4 * D	736,007	4	184,002	2,143	,073
A4 * E	14,415	1	14,415	,168	,682
B * C	4199,579	12	349,965	4,075	**,000**
B * D	17763,321	16	1110,208	12,928	**,000**
B * E	1892,048	4	473,012	5,508	**,000**
C * D	3326,941	12	277,245	3,228	**,000**
C * E	4116,675	3	1372,225	15,979	**,000**
D * E	2948,308	4	737,077	8,583	**,000**
A4 * B * C	966,930	12	80,578	,938	,507
A4 * B * D	2375,741	16	148,484	1,729	**,035**
A4 * B * E	992,414	4	248,103	2,889	**,021**
A4 * C * D	2821,683	12	235,140	2,738	**,001**
A4 * C * E	859,224	3	286,408	3,335	**,019**
A4 * D * E	1289,827	4	322,457	3,755	**,005**
B * C * D	6871,041	48	143,147	1,667	**,003**
B * C * E	2069,844	12	172,487	2,009	**,020**
B * D * E	2631,082	16	164,443	1,915	**,015**
C * D * E	3236,955	12	269,746	3,141	**,000**
A4 * B * C * D	8178,662	42	194,730	2,268	**,000**
A4 * B * C * E	1764,546	12	147,045	1,712	,057
A4 * B * D * E	1955,717	15	130,381	1,518	,089
A4 * C * D * E	952,405	12	79,367	,924	,521
B * C * D * E	7368,599	48	153,512	1,788	**,001**
A4 * B * C * D * E	4350,001	36	120,833	1,409	**,049**
Error	1487830980,638	17325566	85,875		
Total	72193930012,000	17325947			
Corrected total	2870618352,382	17325946			

Table 12. ANOVA with multiple disability (A5) as factor

Dependent variable: multiple disability

Source of variation	Type III Sums of squares	df	Average square	Z	P-value
Corrected model	1403923346,767[a]	921	1524346,739	17979,370	**0,000**
Interpretetaion	12626126,937	1	12626126,937	148922,681	**0,000**
A5	54312,196	4	13578,049	160,150	**,000**
B	3314,018	4	828,504	9,772	**,000**
C	98977,962	3	32992,654	389,142	**,000**
D	240415,916	4	60103,979	708,915	**0,000**
E	538,282	1	538,282	6,349	**,012**
A5 * B	49684,377	16	3105,274	36,626	**,000**
A5 * C	1415,527	12	117,961	1,391	,161
A5 * D	63063,303	16	3941,456	46,489	**,000**
A5 * E	598,252	4	149,563	1,764	,133
B * C	5676,639	12	473,053	5,580	**,000**
B * D	8510,585	16	531,912	6,274	**,000**
B * E	1833,075	4	458,269	5,405	**,000**
C * D	5238,347	12	436,529	5,149	**,000**
C * E	435,486	3	145,162	1,712	,162
D * E	629,979	4	157,495	1,858	,115
A5 * B * C	9641,957	47	205,148	2,420	**,000**
A5 * B * D	17360,567	61	284,599	3,357	**,000**
A5 * B * E	7979,411	16	498,713	5,882	**,000**
A5 * C * D	28584,403	48	595,508	7,024	**,000**
A5 * C * E	2724,900	12	227,075	2,678	**,001**
A5 * D * E	4651,081	16	290,693	3,429	**,000**
B * C * D	6005,068	48	125,106	1,476	**,018**
B * C * E	3155,100	12	262,925	3,101	**,000**
B * D * E	2998,680	16	187,418	2,211	**,004**
C * D * E	3606,109	12	300,509	3,544	**,000**
A5 * B * C * D	37064,668	165	224,634	2,650	**,000**
A5 * B * C * E	9751,470	47	207,478	2,447	**,000**
A5 * B * D * E	8786,166	57	154,143	1,818	**,000**
A5 * C * D * E	7853,592	48	163,616	1,930	**,000**
B * C * D * E	6040,444	48	125,843	1,484	**,016**
A5 * B * C * D * E	21183,461	152	139,365	1,644	**,000**
Error	1468942118,773	17325883	84,783		
Total	72194651369,000	17326805			
Corrected total	2872865465,540	17326804			

4. Conclusions

The worst situation with regard to not completing elementary school was for the indigenous race, followed by the black and brown races, with a better situation for the white and yellow races. Conclusion confirmed by tables 3 to 7 and profile charts 1 to 5; for cases of visual, hearing and physical disability; it was noted that the group formed by "can do it, but with great difficulty" has greater difficulty in obtaining a better level of education than the group formed by "can't do it at all" even considering that the former has a much higher amount of that the second; income level worsens with the level of education, greater severity of disability, with greater aggravating factors for indigenous, black and brown races, and, finally; the greater the number of disabilities, the greater the difficulties in obtaining a better level of education regardless of which race you belong to.

For future work, there is a need to assess in more detail the situations of confusion, contrasts and repetition of this analysis by: region, state and municipality.

Improve the quality of existing statistics, with regard to the collection and availability of data on people with disabilities that are able to respond to other research objectives and improve the accuracy of the results.

Elimination of the different types of barriers that prevent disabled people from being better included in society and enabling them to better enjoy all their rights.

Improvements in the infrastructure of indigenous villages, enabling this race to improve health care, education and employment conditions for its population.

Advance further in studies on life quality.

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Conflicts of Interest

The authors declare no conflict of interest.

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Appendix A - Proposed Model

For each ANOVA, the proposed model was in accordance with Equation (1).

$$\begin{aligned} y_{ijklmn} &= \mu + \alpha_i + \beta_j + \tau_k + \delta_l + \theta_m + (\alpha\beta)_{ij} + (\alpha\tau)_{ik} + (\alpha\delta)_{il} + (\alpha\theta)_{im} + \\ &+ (\beta\tau)_{jk} + (\beta\delta)_{jl} + (\beta\theta)_{jm} + (\tau\delta)_{kl} + (\tau\theta)_{km} + +(\delta\theta)_{lm} + (\alpha\beta\tau)_{ijk} + \\ &+ (\alpha\beta\delta)_{ijl} + (\alpha\beta\theta)_{ijm} + (\alpha\tau\delta)_{ikl} + (\alpha\tau\theta)_{ikm} + (\alpha\delta\theta)_{ilm} + (\beta\tau\delta)_{jkl} + (\beta\tau\theta)_{jkm} + \\ &+ (\beta\delta\theta)_{jlm} + (\tau\delta\theta)_{klm} + +(\alpha\beta\tau\delta)_{ijkl} + (\alpha\beta\tau\theta)_{ijkm} + (\alpha\beta\delta\theta)_{ijlm} + (\alpha\tau\delta\theta)_{iklm} + \\ &+ (\beta\tau\delta\theta)_{jklm} + (\alpha\beta\tau\delta\theta)_{ijklm} + \varepsilon_{ijklmn} = 0 \end{aligned} \quad \begin{cases} i = 1, 2, \cdots, a \\ j = 1, 2, \cdots, b \\ k = 1, 2, \cdots, c \\ l = 1, 2, \cdots, d \\ m = 1, 2, \cdots, e \\ n = 1, 2, \cdots, f \end{cases} \quad (1)$$

where:

α_i is the effect of the level of factor A (disability to be studied, which can be visual, hearing, physical, intellectual or multiple); β_j is the effect of the i-th level of factor B (race); τ_k is the effect of the k-th level of the factor C (education level); δ_l is the interaction effect of the l-th level of factor D (income); θ_m is the effect of the m-th level of factor E (sex); $\alpha\beta_{ij}$ is the interaction effect between the i-th level of A and the j-th level of B; $\alpha\tau_{ik}$ is the interaction effect between the i-th level of A and the k-th level of C; $\alpha\delta_{il}$ is the interaction effect between the i-th level of A and the l-th level of D; $\alpha\theta_{im}$ is the interaction effect between the i-th level of A and the m-th level of E; $\beta\tau_{jk}$ is the interaction effect between the j-th level of B and the k-th level of C; $\beta\delta_{jl}$ is the interaction effect between the j-th level of B and the l-th level of D; $\beta\theta_{jm}$ is the interaction effect between the jth level of B and the m-th level of E; $\tau\delta_{ikl}$ is the interaction effect between the k-th level of C and the l-th level of D; $\tau\theta_{km}$ is the interaction effect between the k-th level of C and the m-th level of E; $\delta\theta_{lm}$ is the interaction effect between the l-th level of D and the m-th level of E; $\alpha\beta\tau_{ijk}$ is the interaction effect between the i-th level of A, j-th level of B and k-th level of C; $\alpha\beta\delta_{ijl}$ is the interaction effect between the i-th level of A, j-th level of B and l-th level of D; $\alpha\beta\theta_{ijm}$ is the interaction effect between the i-th level of A, j-th level of B and the m-th level of E; $\alpha\tau\delta_{ikl}$ is the interaction effect between the i-th level of A, k-th level of C and the l-th level of D; $\alpha\tau\delta_{ikl}$ is the interaction effect between the i-th level of A, k-th level of C and the m-th level of E; $\alpha\delta\theta_{ilm}$ is the interaction effect between the i-th level of A, l-th level of D and the m-th level of E; $\beta\tau\delta_{jkl}$ is the interaction effect between the jth level of B, kth level of C and the lth level of D; $\beta\tau\theta_{jkm}$ is the interaction effect between the j-th level of B, k-th level of C and the m-th level of E; $\beta\delta\theta_{jlm}$ is the interaction effect between the j-th level of B, l-th level of D and the m-th level of E; $\tau\delta\theta_{klm}$ is the interaction effect between the kth level of C, lth level of D and the m-th level of E; $\alpha\beta\tau\delta_{ijkl}$ is the interaction effect between the i-th level of A, j-th level of B, k-th level of C and the, l-th level of D; $\alpha\beta\tau\theta_{ijkm}$ is the interaction effect between i-th level of A, j-th level of B, k-th level of C and m-th level of E; $\alpha\beta\delta\theta_{ijlm}$ is the interaction effect between the i-th level of A, j-th level of B, l-th level of D and the m-th level of E; $\alpha\tau\delta\theta_{iklm}$ is the interaction effect between the i-th level of A, k-th level of C, l-th level of D and the m-th level of E; $\beta\tau\delta\theta_{jklm}$ is the interaction effect between the j-th level of B, k-th level of C, l-th level of D and the m-th level of E; and finally $\alpha\beta\tau\delta\theta_{ijklm}$ is the interaction effect between the i-th level of A, j-th level of B, k-th level of C, l-th level of D and m-th level of E.

The assumptions associated with the model are that errors $\varepsilon_{ijklmn} \sim N(0, \sigma^2)$, independents.

From the definitions of the model parameters, the following restrictions are followed:

$$\begin{aligned} y_{ijklmn} \sim N\big(&\mu + \alpha_i + \beta_j + \tau_k + \delta_l + \theta_m + \alpha\beta_{ij} + \alpha\tau_{ik} + \alpha\delta_{il} + \alpha\theta_{im} + \beta\tau_{jk} + \beta\delta_{jl} + \beta\theta_{jm} + \tau\delta_{kl} + \tau\theta_{km} + \\ &+\alpha\beta\delta_{ijl} + \alpha\beta\theta_{ijm} + \alpha\tau\delta_{ikl} + \alpha\tau\theta_{ikm} + \alpha\delta\theta_{ilm} + \beta\tau\delta_{jkl} + \beta\tau\theta_{jkm} + \beta\delta\theta_{jlm} + \tau\delta\theta_{klm} + \alpha\beta\tau\delta_{ijkl} + \alpha\beta\tau\theta_{ijkm} + \\ &+\alpha\beta\delta\theta_{ijlm} + \alpha\tau\delta\theta_{iklm} + \delta\theta_{lm} + \alpha\beta\tau_{ijk} + \beta\tau\delta\theta_{jklm} + \alpha\beta\tau\delta\theta_{ijklm} + \varepsilon_{ijklmn}, \sigma^2\big), \text{ independents.} \end{aligned}$$

As a result of the assumptions made about the distribution of errors, we have to:

For this model, we have the following hypotheses to be tested:

$H_{01}: \alpha_1 = \alpha_2 = \ldots = \alpha_a = 0$ (there is no effect of factor A);

$H_{02}: \beta_1 = \beta_2 = \ldots = \beta_b = 0$ (there is no effect of factor B);

$H_{03}: \tau_1 = \tau_2 = \ldots = \tau_c = 0$ (there is no effect of factor C);

$H_{04}: \delta_1 = \delta_2 = \ldots = \delta_c = 0$ (there is no effect of factor D);

$H_{05}: \theta_1 = \theta_2 = \ldots = \theta_c = 0$ (there is no effect of factor E);

$H_{06}: \alpha\beta_{11} = \alpha\beta_{12} = \ldots = \alpha\beta_{ij} = 0$ (there are no effect beetwen the factors A and B);

$H_{07}: \alpha\tau_{11} = \alpha\tau_{12} = \ldots = \alpha\tau_{ik} = 0$ (there are no effect beetwen the factors A and C);

$H_{08}: \alpha\delta_{11} = \alpha\delta_{12} = \ldots = \alpha\delta_{il} = 0$ (there are no effect beetwen the factors A and D);

$H_{09}: \alpha\theta_{11} = \alpha\theta_{12} = \ldots = \alpha\theta_{im} = 0$ (there are no effect beetwen the factors A and E);

$H_{010}: \beta\tau_{11} = \beta\tau_{12} = \ldots = \beta\tau_{jk} = 0$ (there are no effect beetwen the factors B and C);

$H_{11}: \beta\delta_{11} = \beta\delta_{12} = \ldots = \beta\delta_{jl} = 0$ (there are no effect beetwen the factors B and D);

$H_{12}: \beta\theta_{11} = \beta\theta_{12} = \ldots = \beta\theta_{jm} = 0$ (there are no effect beetwen the factors B and E);

$H_{13}: \tau\delta_{11} = \tau\delta_{12} = \ldots = \tau\delta_{kl} = 0$ (there are no effect beetwen the factors C and D);

$H_{14}: \tau\theta_{11} = \tau\theta_{12} = \ldots = \tau\theta_{km} = 0$ (there are no effect beetwen the factors C and E);

$H_{15}: \delta\theta_{11} = \delta\theta_{12} = \ldots = \delta\theta_{lm} = 0$ (there are no effect beetwen the factors D and E);

$H_{16}: \alpha\beta\tau_{111} = \alpha\beta\tau_{112} = \ldots = \alpha\beta\tau_{ijk} = 0$ (there are no effect among the factors A, B and C);

$H_{17}: \alpha\beta\delta_{111} = \alpha\beta\delta_{112} = \ldots = \alpha\beta\delta_{ijl} = 0$ (there are no effect among the factors A, B and D);

$H_{18}: \alpha\beta\theta_{111} = \alpha\beta\theta_{112} = \ldots = \alpha\beta\theta_{ijm} = 0$ (there are no effect among the factors A, B and E);

$H_{19}: \alpha\tau\delta_{111} = \alpha\tau\delta_{112} = \ldots = \alpha\tau\delta_{ikl} = 0$ (there are no effect among the factors A, C and D);

$H_{20}: \alpha\tau\theta_{111} = \alpha\tau\theta_{112} = \ldots = \alpha\tau\theta_{ikm} = 0$ (there are no effect among the factors A, C and E);

$H_{21}: \alpha\delta\theta_{111} = \alpha\delta\theta_{112} = \ldots = \alpha\delta\theta_{ilm} = 0$ (there are no effect among the factors A, D and E);

$H_{22}: \beta\tau\delta_{111} = \beta\tau\delta_{112} = \ldots = \beta\tau\delta_{jkl} = 0$ (there are no effect among the factors B, C and D);

$H_{23}: \beta\tau\theta_{111} = \beta\tau\theta_{112} = \ldots = \beta\tau\theta_{jkm} = 0$ (there are no effect among the factors B, C and E);

$H_{24}: \beta\delta\theta_{111} = \beta\delta\theta_{112} = \ldots = \beta\delta\theta_{jlm} = 0$ (there are no effect among the factors B, D and E);

$H_{25}: \tau\delta\theta_{111} = \tau\delta\theta_{112} = \ldots = \tau\delta\theta_{klm} = 0$ (there are no effect among the factors C, D and E);

$H_{26}: \alpha\beta\tau\delta_{1111} = \alpha\beta\tau\delta_{1112} = \ldots = \alpha\beta\tau\delta_{ijkl} = 0$ (there are no effect among the factors A, B, C and D);

$H_{27}: \beta\tau\delta\theta_{1111} = \beta\tau\delta\theta_{1112} = \ldots = \beta\tau\delta\theta_{jklm} =$ (there are no effect among the factors B, C, D and E);

$H_{28}: \alpha\tau\delta\theta_{1111} = \alpha\tau\delta\theta_{1112} = \ldots = \alpha\tau\delta\theta_{iklm} = 0$ (there are no effect among the factors A, C, D and E);

$H_{29}: \alpha\beta\delta\theta_{1111} = \alpha\beta\delta\theta_{1112} = \ldots = \alpha\beta\delta\theta_{ijlm} = 0$ (there are no effect among the factors A, B, D and E);

$H_{30}: \alpha\beta\tau\theta_{1111} = \alpha\beta\tau\theta_{1112} = \ldots = \alpha\beta\tau\theta_{ijkm} = 0$ (there are no effect among the factors A, B, C and E);

$H_{31}: \alpha\beta\tau\delta\theta_{11111} = \alpha\beta\tau\delta\theta_{11112} = \ldots = \alpha\beta\tau\delta\theta_{ijklm} = 0$ (there are no effect among the factors A, B, C, D and E).

Where A means main effect of the type of disability under study, B main effect of race, C effect of educational level, D income effect, E sex effect and interaction effect are the combination effects between the different factors.

The sum of squares can be obtained as follows:

- Sum of total square

$$SQ_T = \sum_{i=1}^{a}\sum_{j=1}^{b}\sum_{k=1}^{c}\sum_{l=1}^{d}\sum_{m=1}^{e}\sum_{n=1}^{f} y_{abcdef}^2 - \frac{y_{\ldots\ldots}^2}{abcdef}$$

Sums of squares of main effects

$$SQ_A = \sum_{i=1}^{a}\frac{y_{i\ldots\ldots}^2}{bcdef} - \frac{y_{\ldots\ldots}^2}{abcdef}$$

$$SQ_B = \sum_{j=1}^{b}\frac{y_{.j\ldots.}^2}{acdef} - \frac{y_{\ldots\ldots}^2}{abcdef}$$

$$SQ_C = \sum_{k=1}^{c}\frac{y_{..k\ldots}^2}{abdef} - \frac{y_{\ldots\ldots}^2}{abcdef}$$

$$SQ_D = \sum_{l=1}^{d}\frac{y_{...l..}^2}{abcef} - \frac{y_{\ldots\ldots}^2}{abcdef}$$

$$SQ_E = \sum_{m=1}^{e}\frac{y_{....m.}^2}{abcdf} - \frac{y_{\ldots\ldots}^2}{abcdef}$$

Sums of Squares of First Order Interactions

$$SQ_{AB} = \sum_{i=1}^{a}\sum_{j=1}^{b}\frac{y_{ij....}^2}{cdef} - \frac{y_{\ldots\ldots}^2}{abcdef} - SQ_A - SQ_B$$

$$SQ_{AC} = \sum_{i=1}^{a}\sum_{k=1}^{c}\frac{y_{i.k...}^2}{bdef} - \frac{y_{\ldots\ldots}^2}{abcdef} - SQ_A - SQ_C$$

$$SQ_{AD} = \sum_{i=1}^{a}\sum_{l=1}^{d}\frac{y_{i..l..}^2}{bcef} - \frac{y_{\ldots\ldots}^2}{abcdef} - SQ_A - SQ_D$$

$$SQ_{AE} = \sum_{i=1}^{a}\sum_{m=1}^{e}\frac{y_{i...m.}^2}{bcdf} - \frac{y_{\ldots\ldots}^2}{abcdef} - SQ_A - SQ_E$$

$$SQ_{BC} = \sum_{j=1}^{b}\sum_{k=1}^{c}\frac{y_{.jk...}^2}{adef} - \frac{y_{\ldots\ldots}^2}{abcdef} - SQ_B - SQ_C$$

$$SQ_{BD} = \sum_{j=1}^{b}\sum_{l=1}^{d}\frac{y_{.j.l..}^2}{acef} - \frac{y_{\ldots\ldots}^2}{abcdef} - SQ_B - SQ_D$$

$$SQ_{BE} = \sum_{j=1}^{b}\sum_{m=1}^{e}\frac{y_{.j..m.}^2}{acdf} - \frac{y_{\ldots\ldots}^2}{abcdef} - SQ_B - SQ_E$$

$$SQ_{CD} = \sum_{k=1}^{c}\sum_{l=1}^{d}\frac{y_{..kl..}^2}{abef} - \frac{y_{\ldots\ldots}^2}{abcdef} - SQ_C - SQ_D$$

$$SQ_{DE} = \sum_{l=1}^{d}\sum_{m=1}^{e}\frac{y_{...lm.}^2}{abcf} - \frac{y_{......}^2}{abcdef} - SQ_C - SQ_E$$

Sums of squares of second and third order interactions:

$$SQ_{ABC} = \sum_{i=1}^{a}\sum_{j=1}^{b}\sum_{k=1}^{c}\frac{y_{ijk...}^2}{def} - \frac{y_{......}^2}{abcdef} - SQ_A - SQ_B - SQ_C - SQ_{AB} - SQ_{AC} - SQ_{BC}$$

$$SQ_{ABD} = \sum_{i=1}^{a}\sum_{j=1}^{b}\sum_{l=1}^{d}\frac{y_{ij.l..}^2}{cef} - \frac{y_{......}^2}{abcdef} - SQ_A - SQ_B - SQ_D - SQ_{AB} - SQ_{AD} - SQ_{BD}$$

$$SQ_{ABE} = \sum_{i=1}^{a}\sum_{j=1}^{b}\sum_{l=1}^{d}\frac{y_{ij..m.}^2}{cdf} - \frac{y_{......}^2}{abcdef} - SQ_A - SQ_B - SQ_E - SQ_{AB} - SQ_{AE} - SQ_{BE}$$

$$SQ_{ACD} = \sum_{i=1}^{a}\sum_{k=1}^{c}\sum_{l=1}^{d}\frac{y_{i.kl..}^2}{bef} - \frac{y_{......}^2}{abcdef} - SQ_A - SQ_C - SQ_D - SQ_{AC} - SQ_{AD} - SQ_{CD}$$

$$SQ_{ACE} = \sum_{i=1}^{a}\sum_{k=1}^{c}\sum_{m=1}^{e}\frac{y_{i.k.m.}^2}{bdf} - \frac{y_{......}^2}{abcdef} - SQ_A - SQ_C - SQ_E - SQ_{AC} - SQ_{AE} - SQ_{CE}$$

$$SQ_{ADE} = \sum_{i=1}^{a}\sum_{l=1}^{d}\sum_{m=1}^{e}\frac{y_{i..lm.}^2}{bcf} - \frac{y_{......}^2}{abcdef} - SQ_A - SQ_D - SQ_E - SQ_{AD} - SQ_{AE} - SQ_{DE}$$

$$SQ_{BCD} = \sum_{j=1}^{b}\sum_{k=1}^{c}\sum_{l=1}^{d}\frac{y_{.jkl..}^2}{aef} - \frac{y_{......}^2}{abcdef} - SQ_B - SQ_C - SQ_D - SQ_{BC} - SQ_{BD} - SQ_{CD}$$

$$SQ_{BCE} = \sum_{j=1}^{b}\sum_{k=1}^{c}\sum_{m=1}^{e}\frac{y_{.jkm.}^2}{adf} - \frac{y_{......}^2}{abcdef} - SQ_B - SQ_C - SQ_E - SQ_{BC} - SQ_{BE} - SQ_{CE}$$

$$SQ_{BDE} = \sum_{j=1}^{b}\sum_{L=1}^{d}\sum_{m=1}^{e}\frac{y_{.j.lm.}^2}{acf} - \frac{y_{......}^2}{abcdef} - SQ_B - SQ_D - SQ_E - SQ_{BD} - SQ_{BE} - SQ_{DE}$$

$$SQ_{CDE} = \sum_{k=1}^{c}\sum_{l=1}^{d}\sum_{m=1}^{e}\frac{y_{..klm.}^2}{abf} - \frac{y_{......}^2}{abcdef} - SQ_C - SQ_D - SQ_E - SQ_{CD} - SQ_{CE} - SQ_{DE}$$

$$SQ_{BCDE} = \sum_{j=1}^{b}\sum_{k=1}^{c}\sum_{l=1}^{d}\sum_{m=1}^{e}\frac{y_{ijklm.}^2}{af} - \frac{y_{......}^2}{abcdef} - SQ_B - SQ_C - SQ_D - SQ_E - SQ_{BC} - SQ_{BD} - SQ_{BE} - SQ_{CD} -$$
$$-SQ_{CE} - SQ_{DE} - SQ_{BCD} - SQ_{BCE} - SQ_{BDE} - SQ_{CDE} - SQ_{BCDE}$$

$$SQ_{ACDE} = \sum_{i=1}^{a}\sum_{k=1}^{c}\sum_{l=1}^{d}\sum_{m=1}^{e}\frac{y_{i.klm.}^2}{bf} - \frac{y_{......}^2}{abcdef} - SQ_A - SQ_C - SQ_D - SQ_E - SQ_{AC} - SQ_{AD} -$$
$$-SQ_{AE} - SQ_{CD} - SQ_{CE} - SQ_{DE} - SQ_{ACD} - SQ_{ACE} - SQ_{ADE} - SQ_{CDE} - SQ_{ACDE}$$

$$SQ_{ABDE} = \sum_{i=1}^{a}\sum_{j=1}^{b}\sum_{l=1}^{d}\sum_{m=1}^{e}\frac{y_{ij.lm.}^2}{cf} - \frac{y_{......}^2}{abcdef} - SQ_A - SQ_B - SQ_D - SQ_E - SQ_{AB} - SQ_{AD} -$$
$$-SQ_{AE} - SQ_{BD} - SQ_{BE} - SQ_{DE} - SQ_{ABD} - SQ_{ABE} - SQ_{ADE} - SQ_{BDE} - SQ_{ABDE}$$

$$SQ_{ABCE} = \sum_{i=1}^{a}\sum_{j=1}^{b}\sum_{k=1}^{c}\sum_{m=1}^{e}\frac{y_{ijk.m.}^2}{lf} - \frac{y_{......}^2}{abcdef} - SQ_A - SQ_B - SQ_C - SQ_E - SQ_{AB} - SQ_{AC} -$$
$$-SQ_{AE} - SQ_{BC} - SQ_{BE} - SQ_{CE} - SQ_{ABC} - SQ_{ABE} - SQ_{ACE} - SQ_{BCE} - SQ_{BCE}$$

$$SQ_{ABCD} = \sum_{i=1}^{a}\sum_{j=1}^{b}\sum_{k=1}^{c}\sum_{l=1}^{d}\frac{y_{ijkl..}^2}{mf} - \frac{y_{......}^2}{abcdef} - SQ_A - SQ_B - SQ_C - SQ_D - SQ_{AB} - SQ_{AC} - SQ_{AD} -$$
$$- SQ_{BC} - SQ_{BD} - SQ_{CD} - SQ_{ABC} - SQ_{ABD} - SQ_{ACD} - SQ_{BCD} - SQ_{ABC}$$

$$SQ_{ABCDE} = \sum_{i=1}^{a}\sum_{j=1}^{b}\sum_{k=1}^{c}\sum_{l=1}^{d}\sum_{m=1}^{e}\frac{y_{ijklm.}^2}{f} - \frac{y_{.....}^2}{abcdef} - SQ_A - SQ_B - SQ_C - SQ_D - SQ_E - SQ_{AB} - SQ_{AC} - SQ_{AD} -$$
$$- SQ_{AE} - SQ_{BC} - SQ_{BD} - SQ_{BE} - SQ_{CD} - SQ_{CE} - SQ_{DE} - SQ_{ABC} - SQ_{ABD} - SQ_{ABE} - SQ_{ACD}SQ_{ACE} - SQ_{ADE} -$$
$$- SQ_{BCD} - SQ_{BCE} - SQ_{BDE} - SQ_{CDE} - SQ_{ABCD} - SQ_{ABCE} - SQ_{ABDE} - SQ_{ACDE} - SQ_{BCDE}$$

$$SQ_{BCDE} = \sum_{j=1}^{b}\sum_{k=1}^{c}\sum_{l=1}^{d}\sum_{m=1}^{e}\frac{y_{ijklm.}^2}{af} - \frac{y_{.....}^2}{abcdef} - SQ_B - SQ_C - SQ_D - SQ_E - SQ_{BC} - SQ_{BD} - SQ_{BE} - SQ_{CD} -$$
$$- SQ_{CE} - SQ_{DE} - SQ_{BCD} - SQ_{BCE} - SQ_{BDE} - SQ_{CDE} - SQ_{BCDE}$$
$$SQ_{ACDE} = \sum_{i=1}^{a}\sum_{k=1}^{c}\sum_{l=1}^{d}\sum_{m=1}^{e}\frac{y_{i.klm.}^2}{bf} - \frac{y_{.....}^2}{abcdef} - SQ_A - SQ_C - SQ_D - SQ_E - SQ_{AC} - SQ_{AD} -$$
$$- SQ_{AE} - SQ_{CD} - SQ_{CE} - SQ_{DE} - SQ_{ACD} - SQ_{ACE} - SQ_{ADE} - SQ_{CDE} - SQ_{ACDE}$$
$$SQ_{ABDE} = \sum_{i=1}^{a}\sum_{j=1}^{b}\sum_{l=1}^{d}\sum_{m=1}^{e}\frac{y_{ij.lm.}^2}{cf} - \frac{y_{.....}^2}{abcdef} - SQ_A - SQ_B - SQ_D - SQ_E - SQ_{AB} - SQ_{AD} -$$
$$- SQ_{AE} - SQ_{BD} - SQ_{BE} - SQ_{DE} - SQ_{ABD} - SQ_{ABE} - SQ_{ADE} - SQ_{BDE} - SQ_{ABDE}$$
$$SQ_{ABCE} = \sum_{i=1}^{a}\sum_{j=1}^{b}\sum_{k=1}^{c}\sum_{m=1}^{e}\frac{y_{ijk.m.}^2}{lf} - \frac{y_{.....}^2}{abcdef} - SQ_A - SQ_B - SQ_C - SQ_E - SQ_{AB} - SQ_{AC} -$$
$$- SQ_{AE} - SQ_{BC} - SQ_{BE} - SQ_{CE} - SQ_{ABC} - SQ_{ABE} - SQ_{ACE} - SQ_{BCE} - SQ_{BCE}$$

Error sum of squares

$$SQ_{error} = SQ_T - \sum_{i=1}^{a}\sum_{j=1}^{b}\sum_{k=1}^{c}\sum_{l=1}^{d}\sum_{m=1}^{e}\frac{y_{ijklm.}^2}{f} - \frac{y_{.....}^2}{abcdef}$$

Mean squares

$$MQ_A = \frac{SQ_A}{a-1}; MQ_B = \frac{SQ_B}{b-1}; MQ_C = \frac{SQ_C}{c-1}; MQ_D = \frac{SQ_D}{b-1}; MQ_E = \frac{SQ_E}{e-1};$$
$$MQ_{AB} = \frac{SQ_{AB}}{(a-1)(b-1)}; MQ_{AC} = \frac{SQ_{AC}}{(a-1)(c-1)}; MQ_{AD} = \frac{SQ_{AD}}{(a-1)(d-1)}; MQ_{AE} = \frac{SQ_{AE}}{(a-1)(e-1)};$$
$$MQ_{BC} = \frac{SQ_{BC}}{(b-1)(c-1)}; MQ_{BD} = \frac{SQ_{BD}}{(b-1)(d-1)}; MQ_{BE} = \frac{SQ_{BE}}{(b-1)(e-1)}; MQ_{CD} = \frac{SQ_{CD}}{(c-1)(d-1)};$$
$$MQ_{CE} = \frac{SQ_{CE}}{(c-1)(e-1)}; MQ_{DE} = \frac{SQ_{DE}}{(d-1)(e-1)};$$
$$MQ_{ABC} = \frac{SQ_{ABC}}{(a-1)(b-1)(c-1)}; MQ_{ABD} = \frac{SQ_{AC}}{(a-1)(b-1)(c-1)}; MQ_{ABE} = \frac{SQ_{ABE}}{(a-1)(b-1)(e-1)};$$
$$MQ_{ACD} = \frac{SQ_{ACD}}{(a-1)(c-1)(d-1)}; MQ_{ACE} = \frac{SQ_{ACE}}{(a-1)(c-1)(e-1)};$$
$$MQ_{ADE} = \frac{SQ_{ADE}}{(a-1)(d-1)(e-1)}; MQ_{BCD} = \frac{SQ_{BCD}}{(b-1)(c-1)(d-1)}; MQ_{BCE} = \frac{SQ_{BCE}}{(b-1)(c-1)(e-1)};$$