



**30th Congress of the International Commission on Occupational Health**  
**Occupational Health for all: From research to practice**

**RISK PERCEPTION AND ACCIDENTS AT WORK – A  
STUDY WITH PETROL STATION WORKERS IN  
SOUTHERN BRAZIL**

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# INTRODUCTION

- This study is part of the research project “Health, Risks and Occupational Diseases: integrated study in different work environments”.
- Developed with public funds and linked to the research group LAMSA.

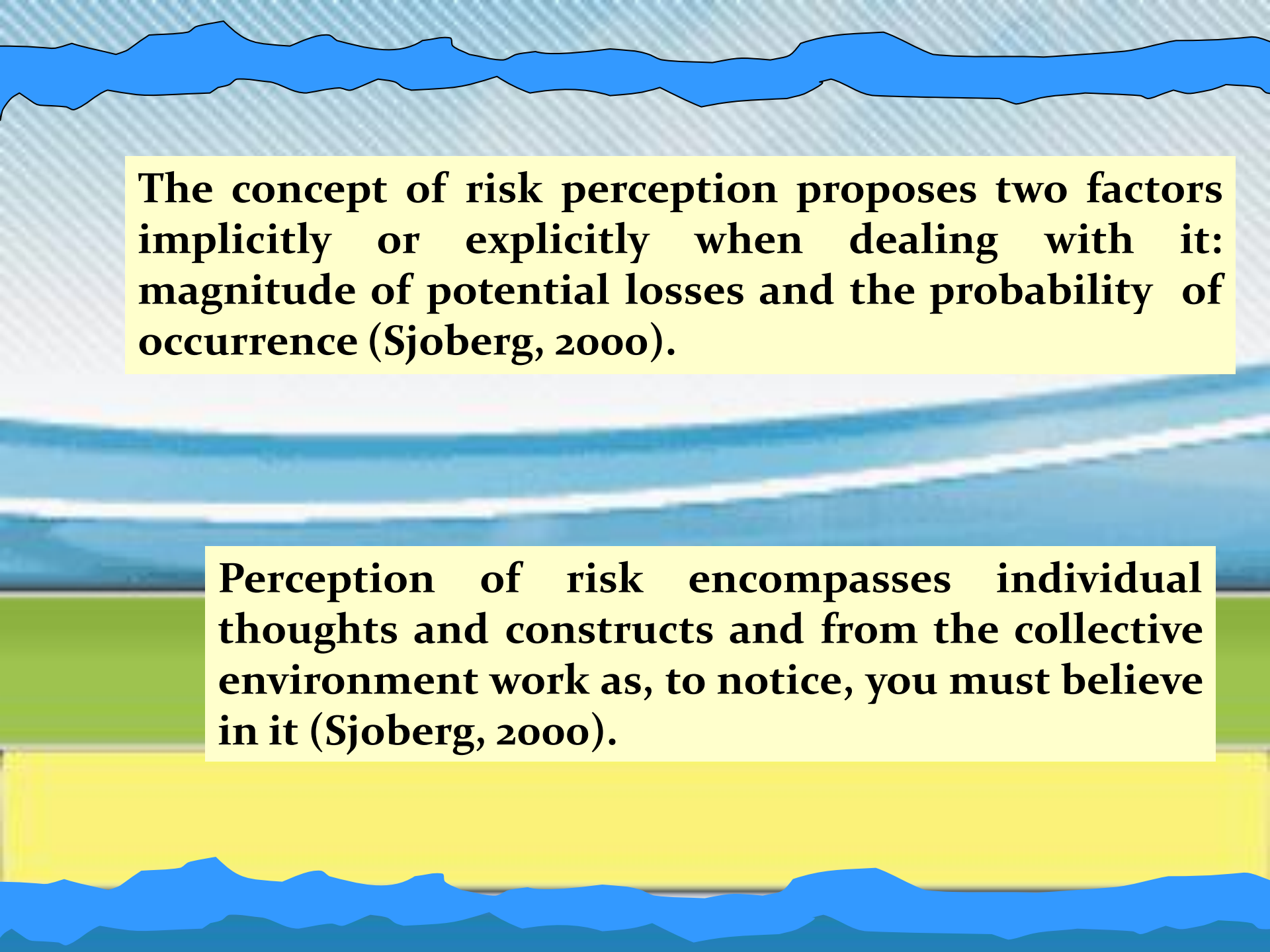
▪ Laboratory of Socio-environmental Processes Studies and Collective Production of Health – LAMSA / FURG



**Concept of Risk Perception**

**Concept of Risk Communication**

**Concept of Work Accident**



**The concept of risk perception proposes two factors implicitly or explicitly when dealing with it: magnitude of potential losses and the probability of occurrence (Sjoberg, 2000).**

**Perception of risk encompasses individual thoughts and constructs and from the collective environment work as, to notice, you must believe in it (Sjoberg, 2000).**

**A work accident is understood as a situation that “happens at a work place and time and produces direct or indirect injury, functional disorder or illness resulting reduction in work capacity, earning or death” (Brazil, 2009).**

**A fundamental assumption underlying efforts to communicate accurate risk information to the public is that individuals will be more capable of making important decisions about precautionary and risk behaviors if they are more aware about the consequences of those behaviors.**

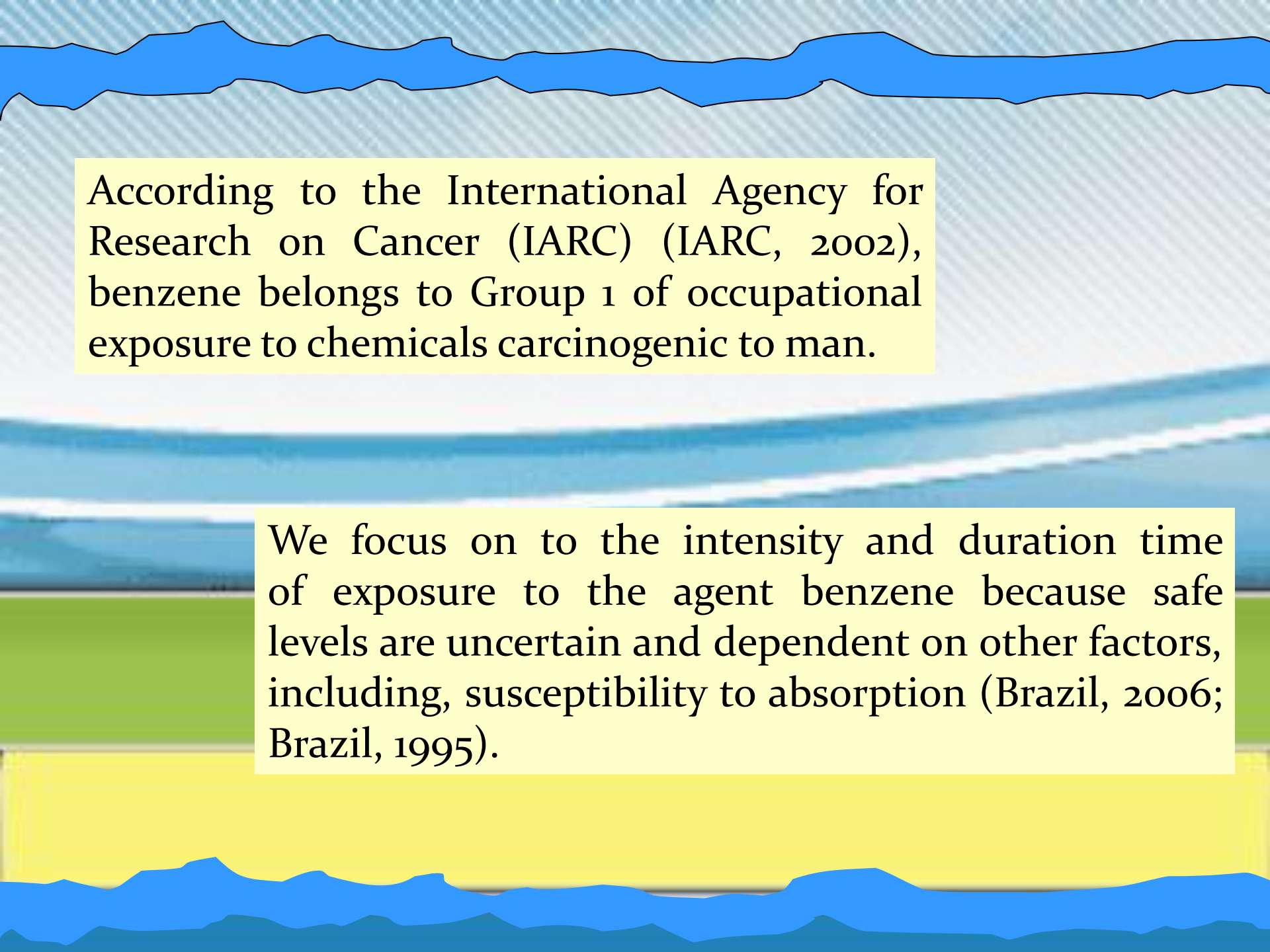
## **Petrol station**

**Physical risks** – irritation or decreased visual acuity, deafness and pains

**Biological risks** - causing viruses, fungi.

**Ergonomic risks** - cervical spine injuries, pains, physical and mental stress arising from poor posture, long working hours standing and repetitive effort.

**Chemical risks** – exposure to the chemical agent benzene, constituent of gasoline and causing poisoning of the airways, gastric and skin lesions



According to the International Agency for Research on Cancer (IARC) (IARC, 2002), benzene belongs to Group 1 of occupational exposure to chemicals carcinogenic to man.

We focus on to the intensity and duration time of exposure to the agent benzene because safe levels are uncertain and dependent on other factors, including, susceptibility to absorption (Brazil, 2006; Brazil, 1995).

The existing risk at work may occur while doing it, conducted by the action of the group of workers. Surely that the degree of risk is related to the type of work. In the case of petrol stations, the worker is in a high-risk environment because of the characteristics of the work environment, the activities and the toxic chemicals that the workers are exposed to.



# AIM

We aimed at identifying the workers' risk perception and relate it to the time exposed to benzene and the self-referred prevalence of accidents at work by the workers. It aimed at the theoretical approach of risk perception.

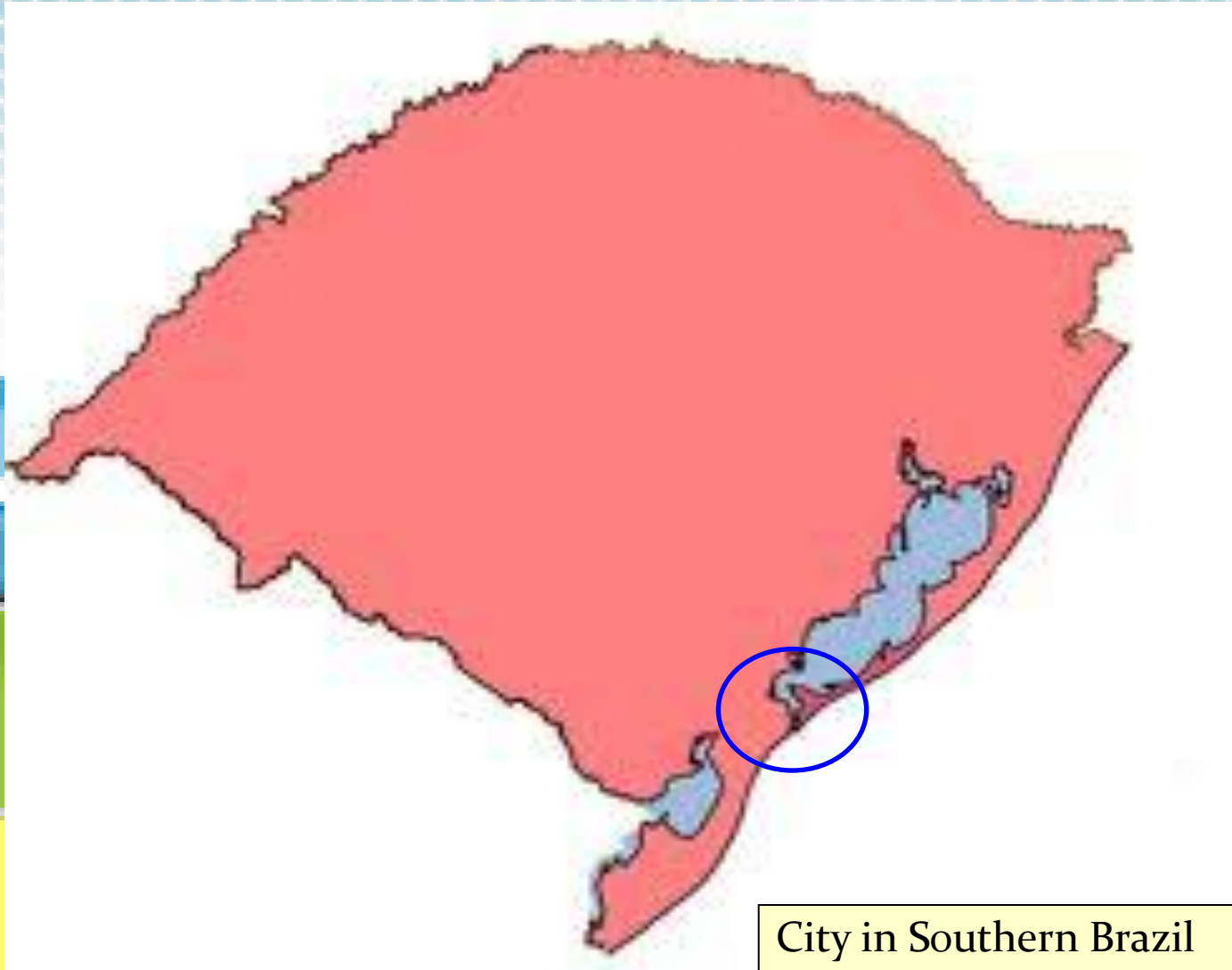
# METHOD

## Two phases

**First phase is an exploratory and descriptive study, with a quantitative analysis.**

**The second phase is an experience report about a risk communication during socioenvironmental intervention of occupational health nursing.**

# Place of study



City in Southern Brazil



Southern Brazil

# Participants

**Workers from petrol stations – 221 workers (first phase) from 22 petrol station, nine workers (second phase) from three petrol station.**

In Brazil, in 2009, the number of employees of petrol stations was 294,086 and in the State of Rio Grande do Sul was 22,921 workers.

# Data Collection

The data collection happens in two moments:

## First phase

Structured interviews with two hundred and twenty-one workers of twenty-two petrol stations.

Workers were asked about: time performing the job and hours worked per week multiplied by 52 weeks of the year (**duration of occupational exposure**); identification of chemical, physical, ergonomic and biological risks (**risk perception**); and occurrence of **work accidents** self-referred by workers.

## Second phase

### Risk Communication

The second moment of data collection was the risk communication during socioenvironmental intervention.

All the two hundred twenty-one participants from twenty-two petrol station were invited.

Nine workers from three petrol stations participated.

The process of risk communication was recorded on audio and video.

# Data Analysis – Phase 1

Measure reliability and validity – Cronbach's Alpha (0,96).

Statistical Package for the Social Sciences (SPSS) 19.0 – descriptive analysis.

**Risk perception and work accidents** were related to duration of worker's exposure risks – Fisher's exact test

**Work accidents and exposure time** – Mann-Whitney test.

# Collective approach of risk perception

Work process

**Risk Perception**  
**Risk Communication**

**Manual of Diseases  
Related to Work**

**U.S. EPA. Toxicological  
Review of Benzene**

**IARC Monographs on the  
evaluation of carcinogenic  
risks to humans**



# RESULTS

**Results were divided in:**

- **Characterization of participants;**
- **Risk perception self-referred in environment work;**
- **Work accidents self-referred by workers;**
- **Risk communication during socioenvironmental intervention.**

**Table 1** – Distribution of workers in petrol stations according to socio-demographic variables – city in Southern Brazil – 2010

<b>Variables</b>	<b>Categories</b>	<b>N</b>	<b>%</b>
Sex	Male	200	90.5
	Female	21	9.5
Marital status	Single	115	52.0
	Married	97	43.9
	Divorced	9	4.1
Race/Ethnicity	White	189	85.9
	Black	16	7.3
	Hispanic	13	5.9
	Indigene	2	0.9
	Unknown	1	0.5
Education	Elementary School	29	13.1
	Basic Education	38	17.2
	Incomplete High School	32	14,5
	High School	111	50,2
	Incomplete Higher Education	8	3,6
	Higher Education	1	0,5
	Graduate	1	0,5

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The results show a sample of 221 workers in 22 (65%) petrol stations in a city in Southern Brazil. Most workers, 200 (90.5%) were male, 189 (85.9%) were caucasian, 115 (52%) were single. Age range varied between 19 and 64 years, mean of 30.25 years ( $\pm 9.58$ ) and 111 (50.2%) had completed high school.

Characterization of petrol station workers.

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Workers were predominantly male, Caucasian and age range that includes young adults, which is similar to other publications. The fact that the majority being male may be related to some professions even more widespread among men, as works that present the most obvious risks, such as truck drivers, dock workers and workers exposed to benzene.

Characterization of petrol station workers.

# Results

Concerning risk perception at work environment, 207 (93.7%) workers identify chemical risks; 195 (88.2%), physical risks; 142 (64,3%), ergonomic risks and 138 (62,4%), biological risks.

The risks self-referred were adjusted to exposition time (time of work x hours of work per week x 52 weeks a year), in which no difference was noticed.

**Figure 1 - Risks self-reffered by petrol station workers**

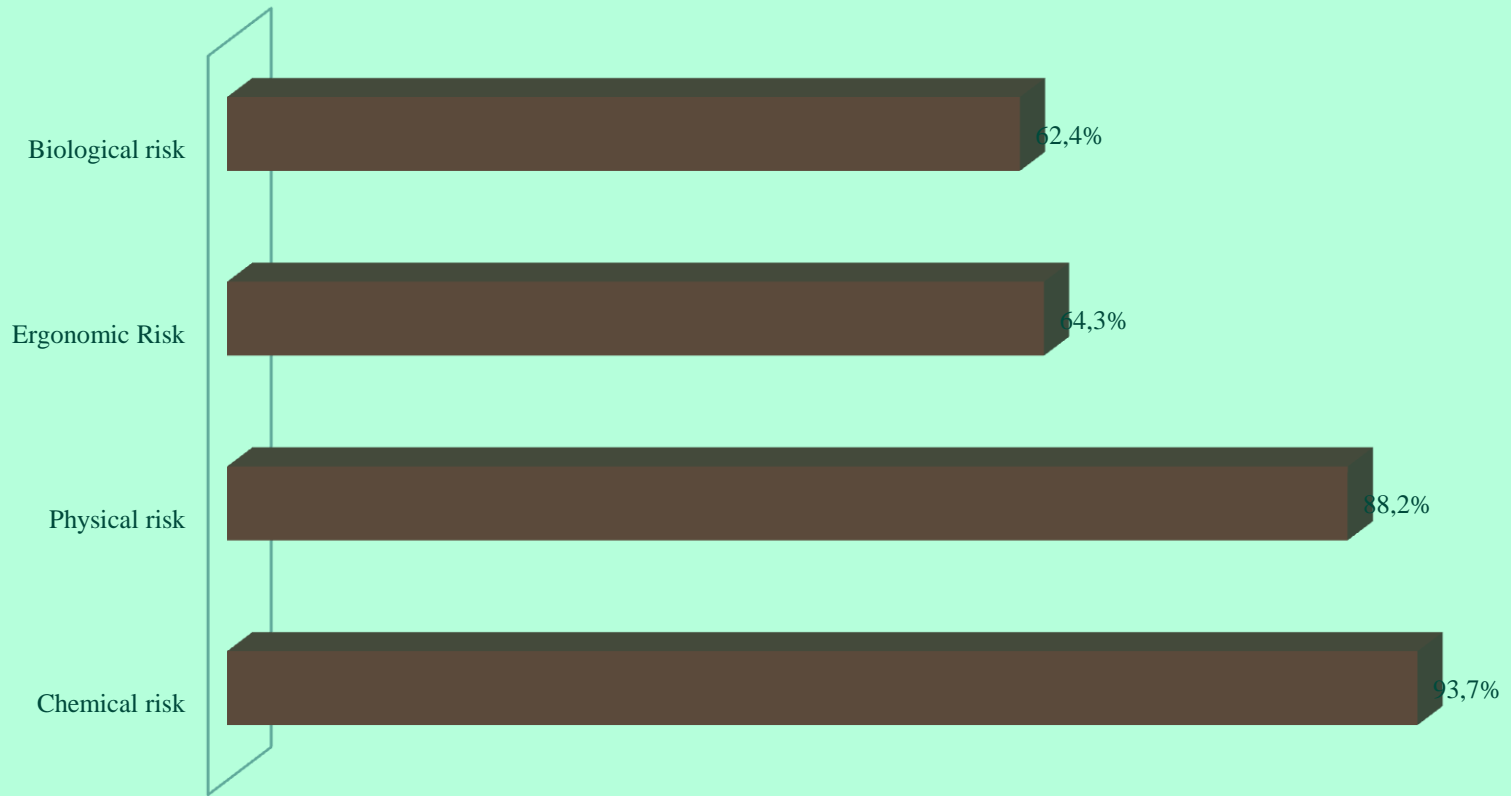
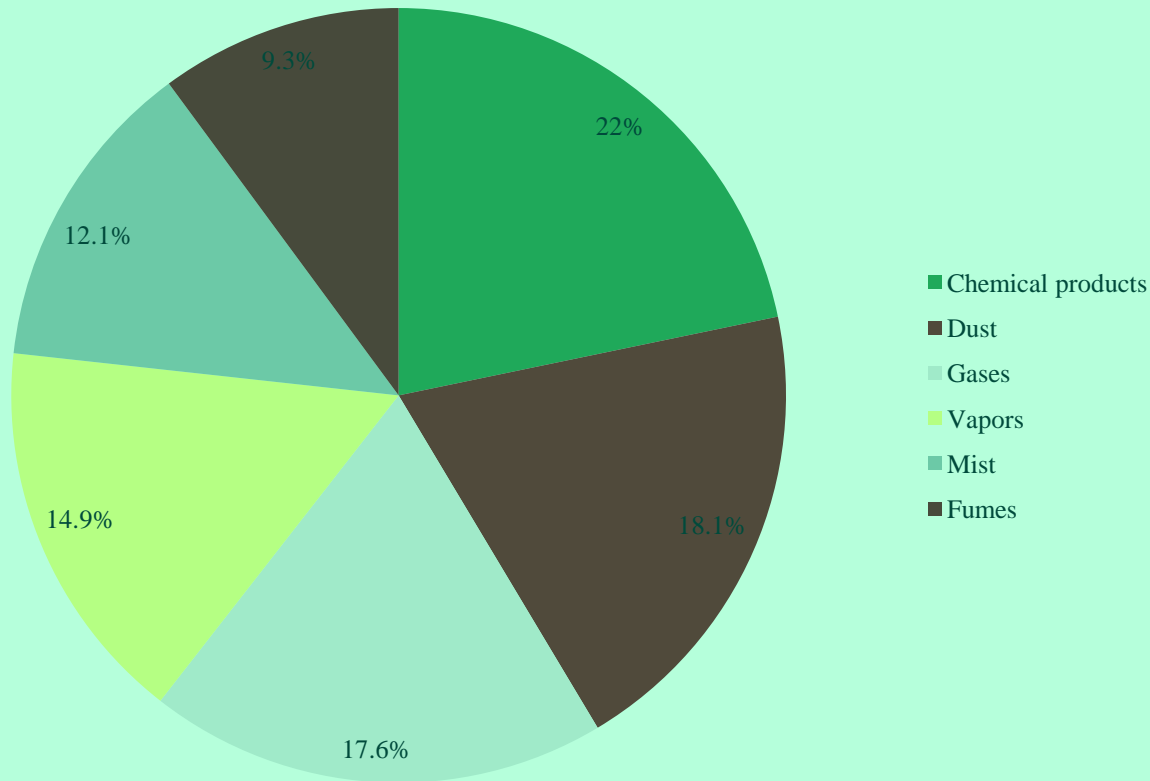


Figure 2 - Chemical risks self-referred by petrol station workers



It was found that perception of chemical risk at environment work was self-referred by workers and there is a tendency to link to work accident due to dangers at the work place.

# Results

According to Brazilian law, guaranteed by the Ministry of Labor and Employment, the Norm 16 - that covers activities and operations with flammable hazardous, in Annex 2, assigns the workers who operate fuel pumps and other flammable liquids in the area of risk in petrol stations, an additional 30% due to existing hazard in the workplace.

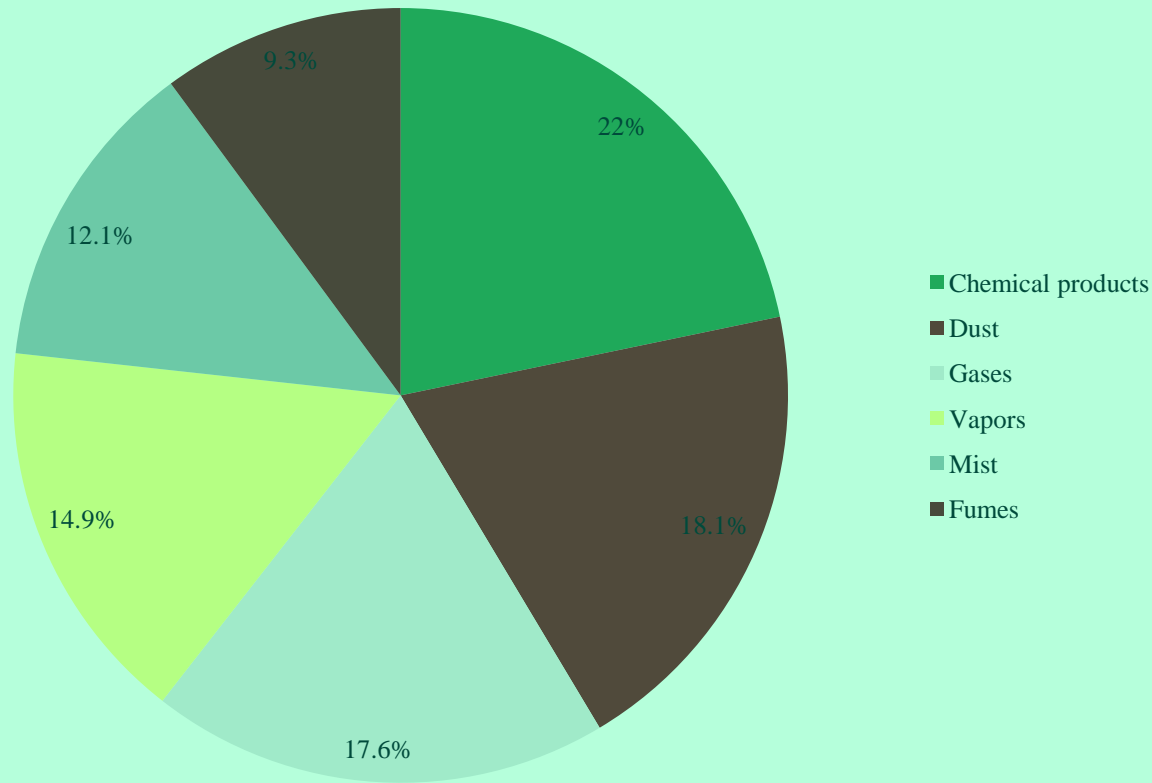


# Results

**As for the risks identified by the workers, the chemical was the most evident: 93.7%, which demonstrates the awareness of its existence.**

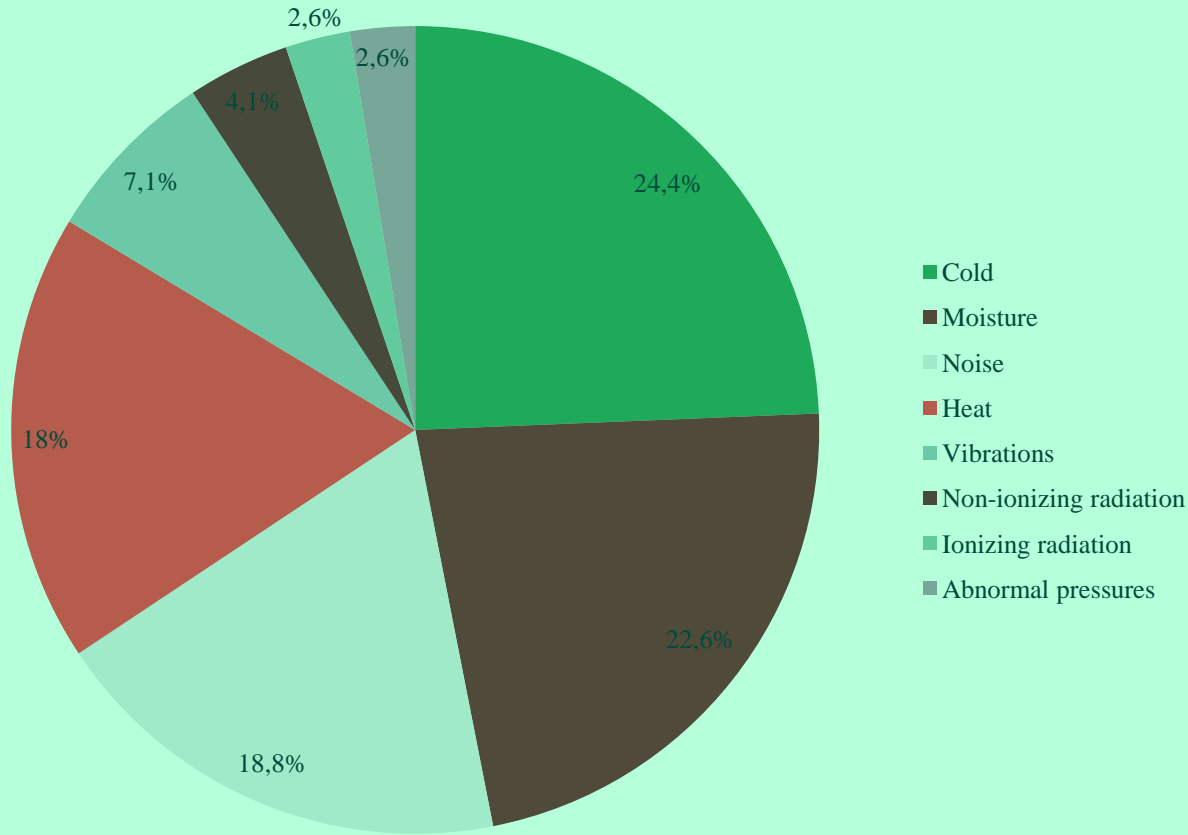
**The perception of risk perception in another work environment showed that although workers perceive the existence of risk, they do not care about this aspect of their continuously work. One possible explanation for this is to living with a constant awareness of risk is not tolerable.**

Figure 2 - Chemical risks self-referred by petrol station workers



The frequent inhalation of vapors emitted by vehicles during the work day, direct manipulation with petrol bombs and daily exposure to several liters of fuel, were main factors of exposure.

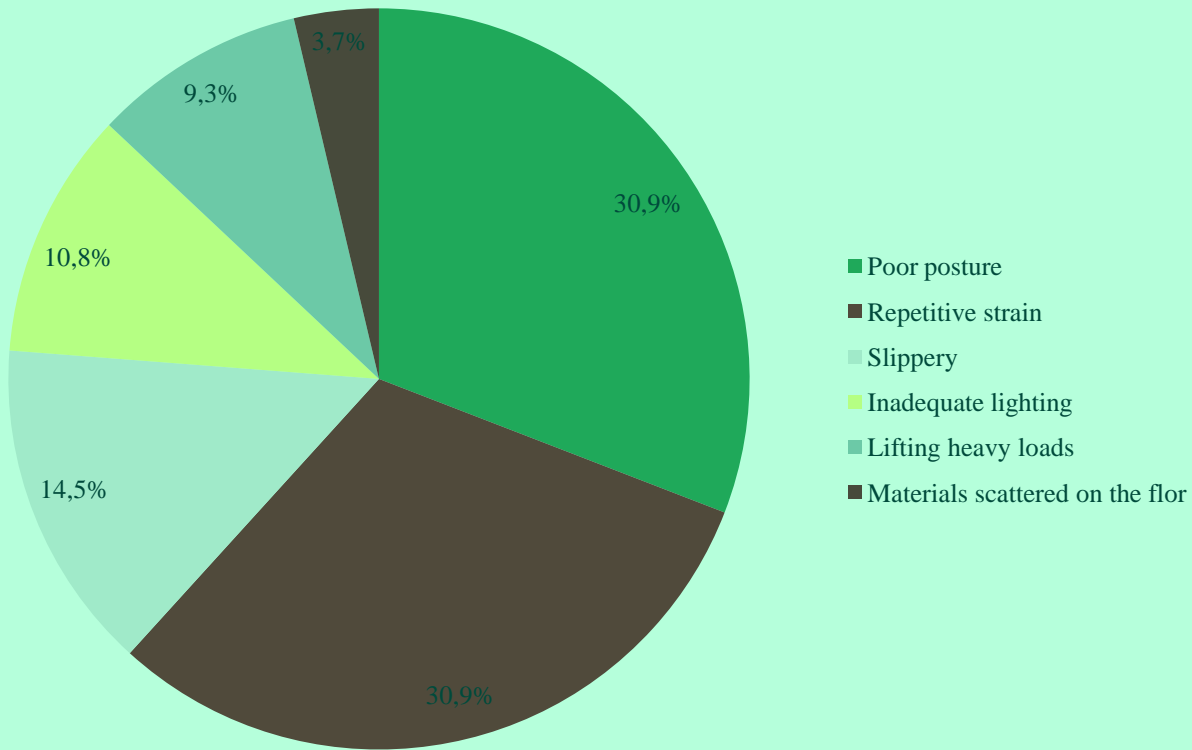
Figure 3 - Physical risks self-referred by petrol station workers



We emphasize the insecurity due to the risk of exposure to climate change on a daily basis.

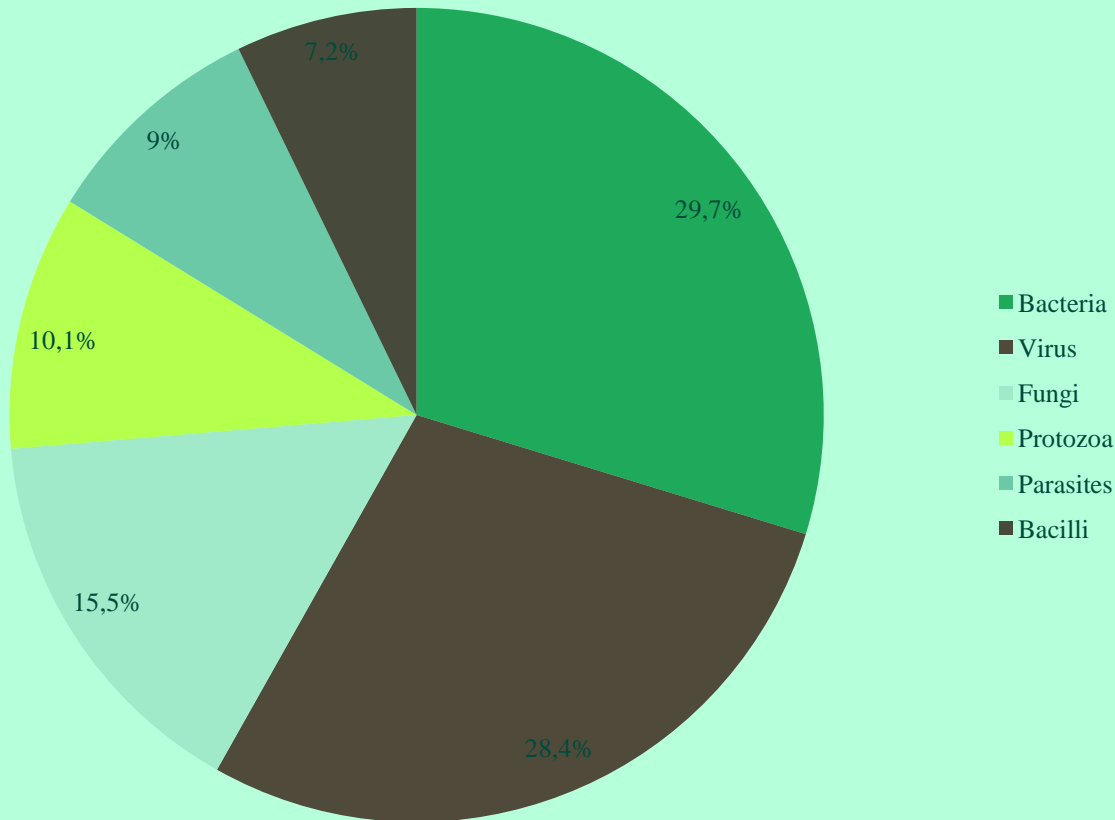
Physical risks represent the discomfort of the work environment.

Figure 4 - Ergonomic risk self-referred by petrol station workers



The workers of petrol stations stand out as the biggest complaint in health the need to remain standing up throughout the workday.

Figure 5 - Biological risks self-referred by petrol station workers



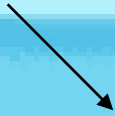
The identification of this type of risks, may be related to the numerous assistance to the public, inadequate hygienic conditions in the workplace and the lack of personal protection (5,28, 30).

Chemical  
risk

Physical  
risk

Ergonomic  
risk

Biological  
risk



**Work accident**

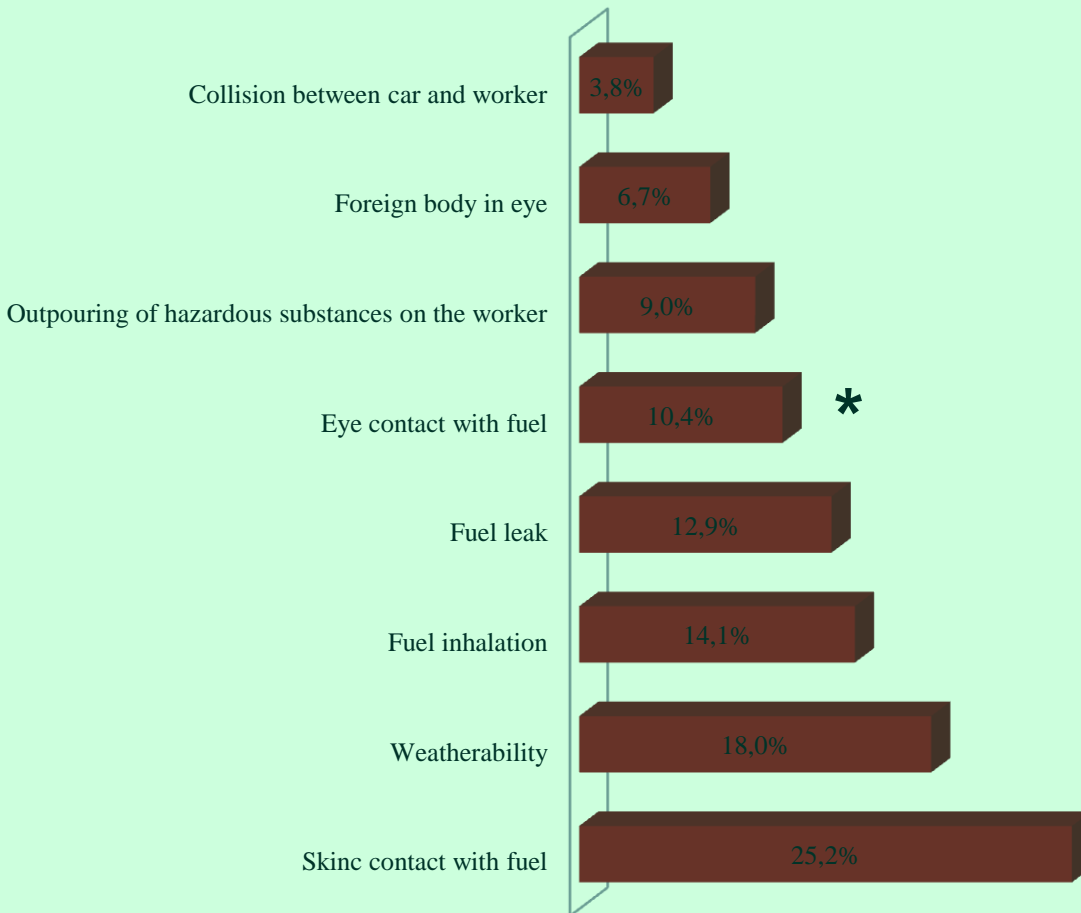
Risks	Working time (years)	Hours per week	Yes (n)	%	No (n)	%
Chemical	0-5	30-40	59	89.4	07	10.6
		40-50	69	97.2	02	2.8
		>50	16	100.0	00	0.0
	5-10	30-40	09	100.0	00	0.0
		40-50	16	100.0	00	0.0
		>50	02	100.0	00	0.0
	>10	30-40	15	83.3	03	16.7
		40-50	14	87.5	02	12.5
		>50	06	100.0	00	0.0
Physical	0-5	30-40	56	84.8	10	15.2
		40-50	64	90.1	07	9.9
		>50	13	81.3	03	18.8
	5-10	30-40	08	88.9	01	11.1
		40-50	16	100.0	00	0.0
		>50	01	50.0	01	50.0
	>10	30-40	15	83.3	03	16.7
		40-50	15	93.8	01	6.3
		>50	06	100.0	00	0.0
Ergonomic	0-5	30-40	40	60.6	26	39.4
		40-50	52	73.2	19	26.8
		>50	11	68.8	05	31.3
	5-10	30-40	07	77.8	02	22.2
		40-50	08	50.0	08	50.0
		>50	01	50.0	01	50.0
	>10	30-40	11	61.1	07	38.9
		40-50	09	56.3	07	43.8
		>50	02	33.3	04	66.7
Biological	0-5	30-40	34	51.5	32	48.5
		40-50	49	69.0	22	31.0
		>50	10	62.5	06	37.5
	5-10	30-40	05	55.6	04	44.4
		40-50	13	81.3	03	18.8
		>50	02	100.0	00	0.0
	>10	30-40	11	61.1	07	38.9
		40-50	10	62.5	06	37.5
		>50	03	50.0	03	50.0

We identified a higher percentage of perception in individuals with lower working time.

The result obtained is justified as most workers (71) have an occupational exposure time of 0-5 years and 40-50h per week.

Relation between self-referred risks, working time and hours of work per week.

**Figure 6 - Work accidents self-referred by petrol station workers**



Work accidents were adjusted for exposure time (time of work x hours of work per week x 52 weeks of the year), showing significant difference ( $p = 0.012$ ) for the accident eye contact with the fuel.



**The risks (chemical, physical, ergonomic and biological) self-referred were adjusted for the occurrence of work accidents for each type of risk and all risks.**

**When adjusted one by one, the chemical and biological hazards were significant ( $p = 0.05$ ).**

**When grouped all risks also showed statistical significance ( $p = 0.029$ ).**

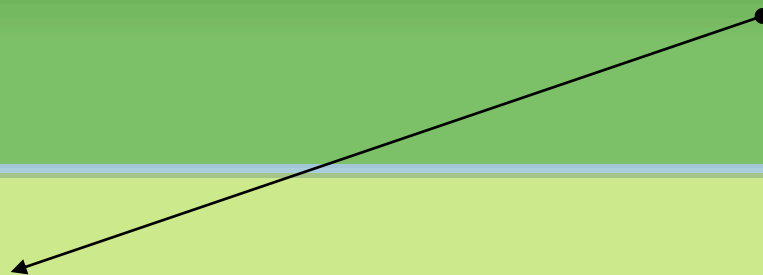
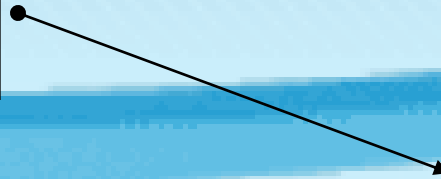
# Risk Communication [Socioenvironmental intervention]

**Health – disease  
Occupational  
Risks**

**Risk Perception**

**Work/ Human  
intervention**

**Health and Disease  
conditions Socio-  
environmental**



Regarding the development process of socioenvironmental intervention with petrol station workers we emphasized some aspects.

Number of participants	09 workers	06 researchers
Time dispensed	Planning and organization - 40 hours	Direct intervention 4 hours
Issues in focus	<p>1 – Relation between health-work-environment relation at petrol stations and risks arising from the work characteristics.</p> <p>2 – Chemical risks – occupational exposure to benzene (routes of entry, signs and symptoms, injuries and diseases, results of national and international research, prevention and protection).</p> <p>3 – Risk perception – risks: physical, chemical, biological, ergonomic or psychosocial and mechanical or of accident</p>	

Development  
process

Development plan (aim, theme, activities/dynamics, time for each activity and responsible for each activity).

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Introduction of participants, coffee break e dialogue about health and healthy eating.

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Multimedia presentation, discussion and questions on topics 1 and 2.

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Distribution of pen and paper after questioning: "What are the risks you identify in your work?" Request for workers to imagine the workplace to respond.

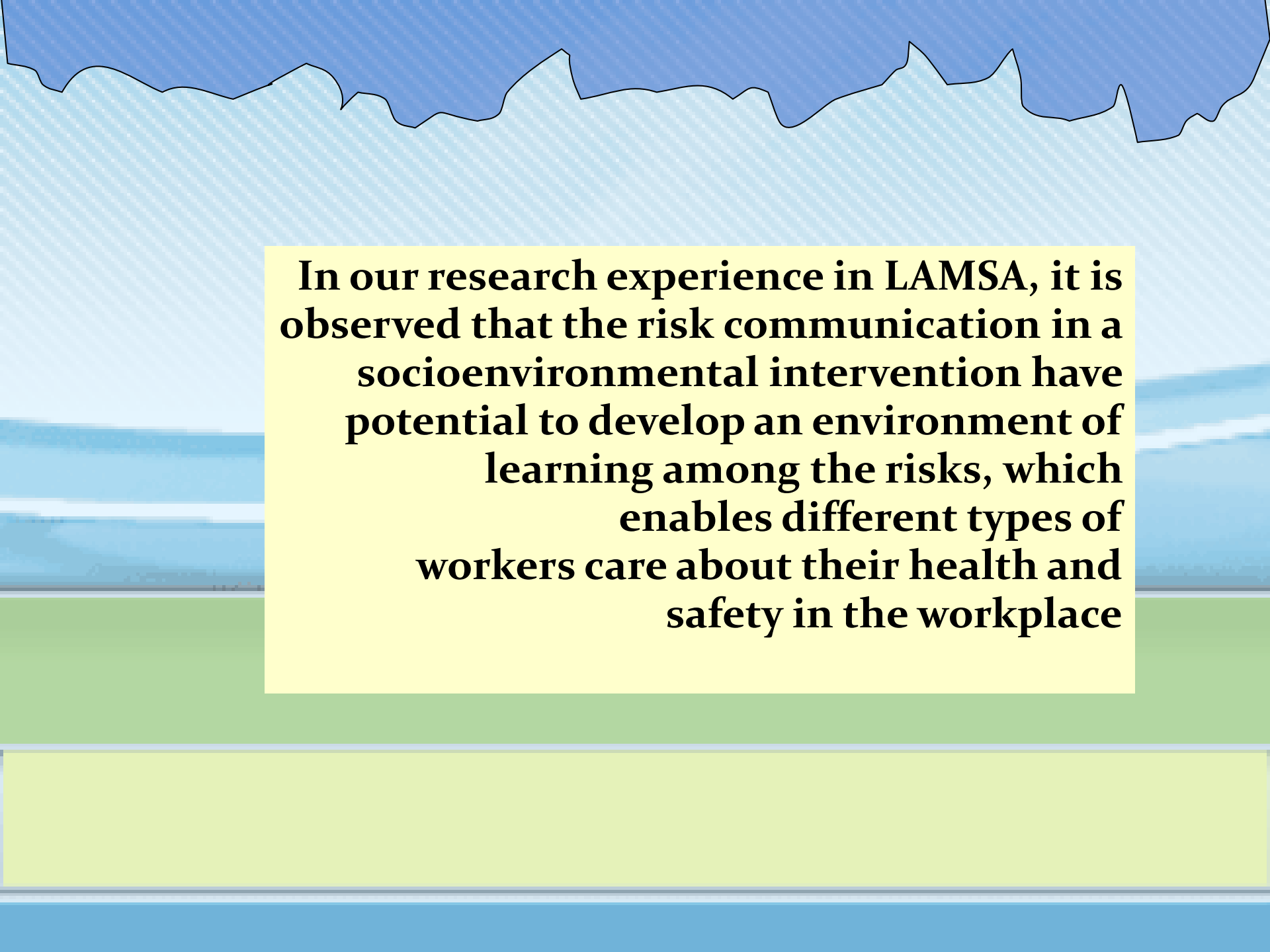
The materials were collected and discussed in parallel with the explanation of a picture (multimedia) with examples of the five types of risks. What allowed the demonstration of workers through comparisons, considerations and suggestions on the theme.

Informative posters were distributed to workers to put in the work environment of petrol stations and encourage workers to talk about risk communication.

# CONCLUSION

We conclude that the perception of risk of petrol station workers should be considered in order to develop strategies for change at the workplace.

The nurse, based on the social and environmental health intervention, has the possibility to instigate a change on the risk perception of the worker and on the work environment.



**In our research experience in LAMSA, it is observed that the risk communication in a socioenvironmental intervention have potential to develop an environment of learning among the risks, which enables different types of workers care about their health and safety in the workplace**

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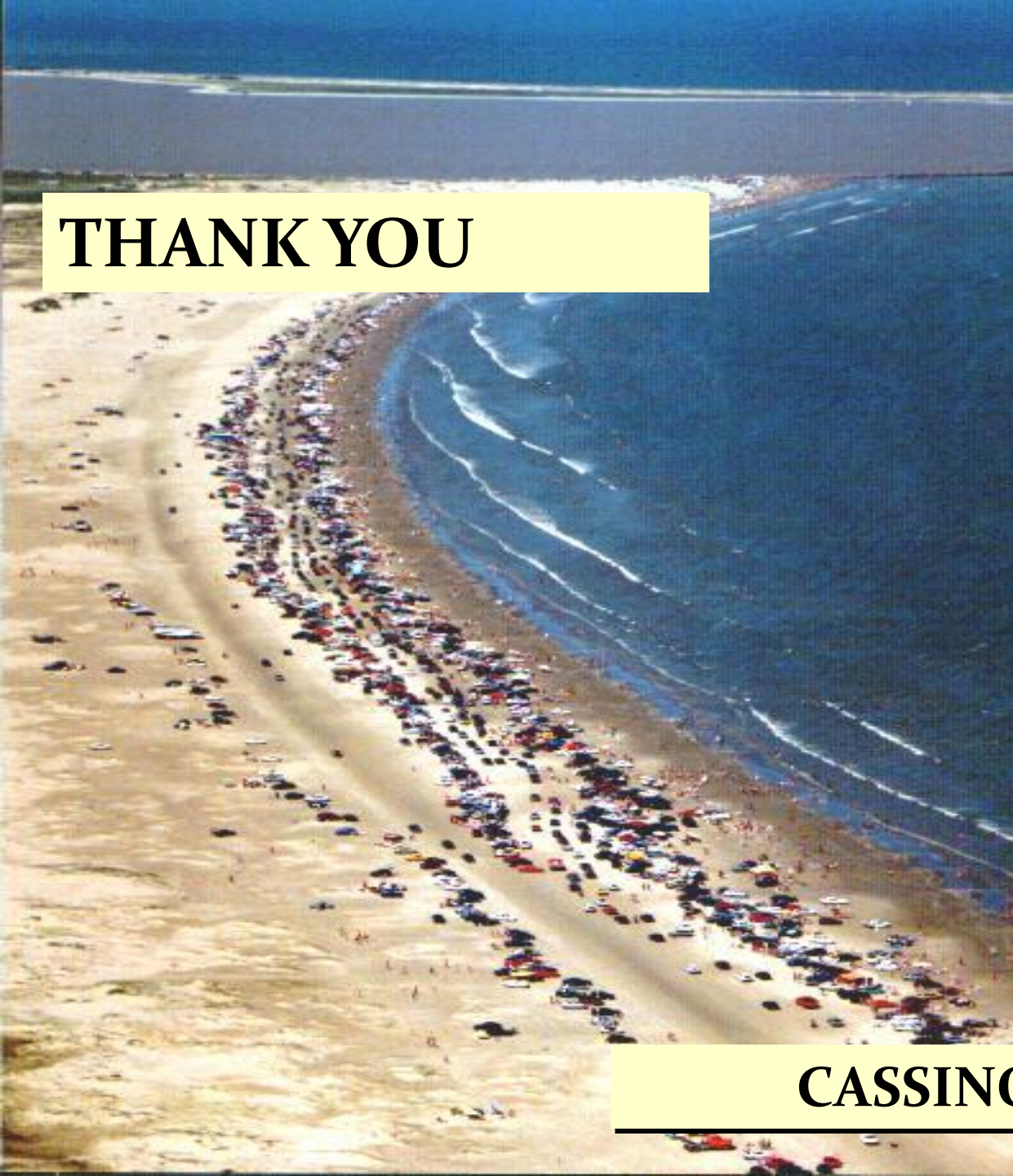
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**THANK YOU**



**CASSINO BEACH**

# Welcome to Rio Grande

