

# PREVALENCE OF OXYGEN DESATURATION IN ADULTS AT SEA LEVEL AND AT AN ALTITUDE OF 950 M AND 2240 M.

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## Background

- Chronic hypoxemia produces several adverse health effects.
- Hypoxemic subjects have reduced survival rate that improves with oxygen therapy.
- Altitude is one of the main determinants of hypoxemia.

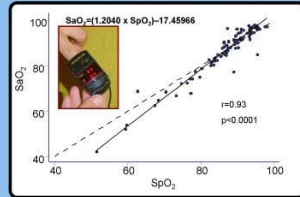
## Aim

- To determine the prevalence of hypoxemia in adults older than 40 years of age at sea level (Montevideo, Uruguay), at 950 m (Caracas, Venezuela) and 2,240 m (Mexico City) above sea level.

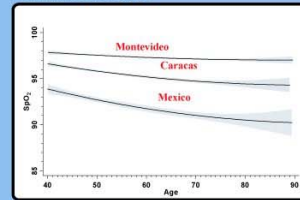
## Methods

- A population-based cross-sectional survey in adults  $\geq 40$  years, living in metropolitan areas of the three Cities.
- Multistage cluster sampling.
- Written informed consent.
- The subjects answered a standard respiratory symptoms questionnaire
- Anthropometric measurements
- SpO<sub>2</sub> was the mean of 6 measurements.
- The accuracy of the pulse oximeter was measured previously.
- Spirometry (ATS)
- Altitude and temperature was registered

### Good accuracy of pulse oximeter (Nonin Onyx 9500) compared to saturation in an arterial blood sample



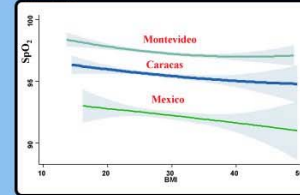
### SpO<sub>2</sub> decreased with age and with altitude



### Population's characteristics

	Montevideo	Caracas	Mexico
Altitude	35	950	2240
n	853	1357	1052
Mean age	60.2	55.4	55.9
% men	40.1	35.7	40.5
FEV <sub>1</sub> %ip	95.3	92.2	98.5
FVC %ip	101.9	95.3	99.3
FEV <sub>1</sub> /FVC	72.9	76.3	77.7
% COPD	18.8	13.3	7.8
% GOLD	33.7	25.2	34.3
% with >10 pack years	18.1	13.3	6.9

### SpO<sub>2</sub> decreased with BMI and with altitude



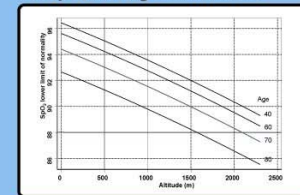
### Factors associated to SpO<sub>2</sub> (multivariable analysis)

Altitude  
Age  
Body mass index  
FEV<sub>1</sub> (%p)  
Gender

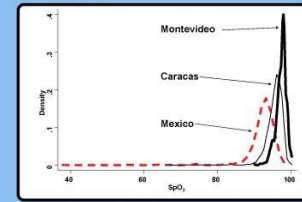
#### REGRESSION EQUATIONS BY CITY AND TOGETHER

Population variables	Montevideo	Caracas	Mexico	All cities
Intercept	100.0000	99.9999	99.9999	99.9999
Altitude	-0.0000	-0.0000	-0.0000	-0.0000
Age	-0.0000	-0.0000	-0.0000	-0.0000
BMI	-0.0000	-0.0000	-0.0000	-0.0000
FEV <sub>1</sub>	0.0000	0.0000	0.0000	0.0000
Gender	0.0000	0.0000	0.0000	0.0000
R <sup>2</sup>	0.0000	0.0000	0.0000	0.0000
F	0.0000	0.0000	0.0000	0.0000
df	0.0000	0.0000	0.0000	0.0000
p	0.0000	0.0000	0.0000	0.0000
Adjusted R <sup>2</sup>	0.0000	0.0000	0.0000	0.0000
Standard error	0.0000	0.0000	0.0000	0.0000
Adjusted p	0.0000	0.0000	0.0000	0.0000
Adjusted F	0.0000	0.0000	0.0000	0.0000
Adjusted df	0.0000	0.0000	0.0000	0.0000
Adjusted p	0.0000	0.0000	0.0000	0.0000

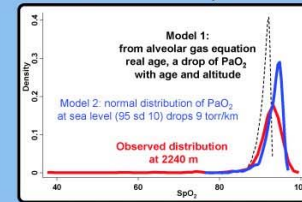
### Estimated lower limit of normality for SpO<sub>2</sub> with age and altitude



### With altitude, the distribution of SpO<sub>2</sub> is displaced to the left and develops an importante left skew



### Current models failed to predict the long left skew and low oxygen saturations at Mexico City



### PREVALENCE OF HYPOXEMIA AND USE OF OXYGEN BY CITY

City	% population hypoxemic	% hypoxemic using oxygen	% using oxygen without hypoxemia
Montevideo (35 m)	0	0	0
Caracas (950 m)	1.0%	8%	75%
Mexico (2240 m)	6.9%	8% †	59%

Home oxygen is used by few of hypoxemics  
 Most users of oxygen do not have resting hypoxemia

Large proportion of hypoxemics in Mexico City (adds to 250,000)

### Hypoxemics have a lower physical score in SF-12

Adjustment in multiple regression	Change in score hypoxemics/ non hypoxemics	95% CI
Altitude	-4.9	-3.0 to -6.9
Altitude, BMI, gender, FEV <sub>1</sub> , level of education	-2.4	-0.6 to -4.3

## Conclusions

- Prevalence of hypoxemia was closely related to altitude.
- Hypoxemia defined with criteria of home oxygen predicts a lower quality of life
- Priorities for oxygen prescription have to be defined in moderate altitudes, because it is unfeasible to provide it to all subjects fulfilling the criteria commonly used.
- The distribution of SpO<sub>2</sub> and hypoxemia could not be predicted closely by models of gas exchange

# Snoring and sleep-related symptoms in four Latin-American Cities

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## Background

- Snoring and hypersomnia are clinical indicators of sleep-disordered breathing (SDB).
- SDB is a underdiagnosed potential cause of morbidity and mortality.
- Sleep apnea has been associated with cardiovascular diseases, vehicle accidents and decreased quality of life.

## Aim

To report the main related-symptoms prevalences and some sleep habits in adults 40 years of age and older in México City (MX), Montevideo Uruguay (MN), Santiago de Chile (ST) and Caracas Venezuela (CA).

## Methods

- A population-based cross-sectional survey in adults > 40 years, living in metropolitan areas of the four Cities.
- Multistage cluster sampling.
- Written informed consent
- A 13 item sleep habits and symptoms questionnaire.

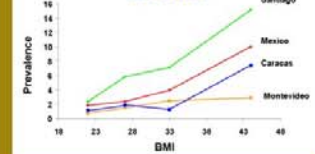
Characteristics of studied population (n=4,571)

	MEXICO (n=106)	MONTVIDEO (n=84)	SANTIAGO (n=1,288)	CARACAS (n=1,387)
Age (years)	35.9	40.2	36.9	35.1
Male (%)	42.9	42.6	36.4	38.9
Mean BMI (range)	27.9 (16.9-36.9)	26.9 (16.4-35.5)		
Ever Smokers (%)	25.9	26	38.5	26.9
Mean past-years smoked	2.5	8.1	3.2	5.9
Obesity (%) (WHO)	38	33.9	32.1	29.2

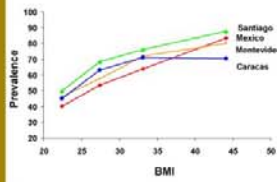
Prevalence of sleep symptoms (n=4,571)

	MEXICO (n=106)	MONTVIDEO (n=84)	SANTIAGO (n=1,288)	CARACAS (n=1,387)
Habitual Snoring (%)	54.9	53.4	59.3	53.9
Daytime somnolence + snoring (%)	4.9	9.1	11.0	9.8
Daytime somnolence (%)	17.7	16.5	22.7	14.7
Somnolence + apnoea + snoring (%)	2.91	1.58	15.4	1.59
Insomnia (%)	36.0	31.8	42.0	30.8
Siesta (%)	21.9	20.9	29.9	19.2

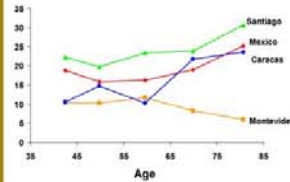
Prevalence of habitual snoring + somnolence + apnoea increases with BMI



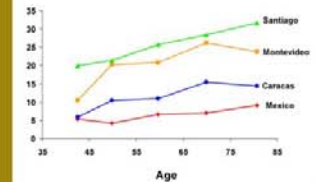
Reported habitual snoring increases with BMI



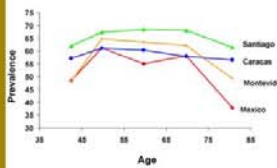
Daytime somnolence is common



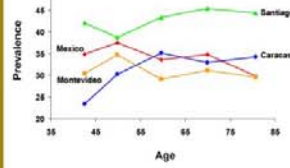
Use of sedatives varies considerably among cities



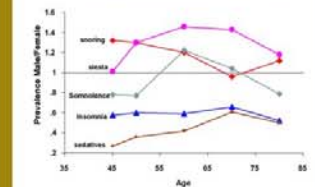
Reported Habitual Snoring



Insomnia



Snoring and siesta are commoner in men, insomnia in women



	OSAS (snoring + somnolence + apnoea)	INSOMNIA	SOMNOLENCE	SIESTA	SEDATIVES
Gender	2.68	1.49		1.91	1.79
Female					
Male	1.68	1.49			
OSAS ratio (OR)					
Obesity	1.28	1.12	1.38		
Obesity BMI	1.08	0.98	0.97	0.99	0.97
BP < 120/80	0.98	0.94	0.87	1.009	0.98
BP < 120/80	1.02	1.02	1.02	0.79	0.88
City					
Santiago	1.74	0.83	0.81	1.82	1.58
Caracas					
Montevideo					
Mexico					
Alcohol use	1.46				
Ever smoker	1.88				
Smoker	1.75	2.38		1.47	
Non-smoker	2.08		1.38	0.81	
Use of sedatives		2.44			
Somnolence	1.43		2.38		
Clonidine	1.17				
Insomnia		1.44			4.71
Habitual snoring		1.32	1.18		
Unadjusted apnoea		1.62			

## Important associations

Variable	Associated factors
Snoring + somnolence + apnoea	Obesity, male, alcohol, tobacco, Santiago
Insomnia	Women, use of sedatives, somnolence
Somnolence	Insomnia, snoring, apnoea, siesta, Santiago
Siesta	male, use of sedatives, Caracas, somnolence
Use of sedatives	women, insomnia, siesta, Santiago

## Conclusions

- Sleep-related symptoms are very frequent in an adult general population. Sleep-disorders can be considered a public health problem.
- Snoring + somnolence + apnoea, insomnia and somnolence prevalences were higher in Santiago
- Insomnia and use of sedatives were more frequent in women
- Adverse impact in quality of life
- Estimated prevalence of OSAS was 2.2% (women) and 3.9% (men)