Burden of obesity in Mexico: prevalence, comorbidities, and associations with quality of life, resource utilisation and productivity

Introduction

- The prevalence of obesity in Mexico has risen substantially since the 1980s, with over 30% of individuals in Mexico having obesity in 2010.¹⁻²
- Obesity-related comorbidities such as cardiovascular disease and type 2 diabetes (T2D),³⁻⁴ have a profound economic impact on the Mexican medical system, totalling \$US 806 million in 2010.¹
- However, no study has yet explored the relationship between obesity, Health-Related Quality of Life (HR-QoL) and work productivity.

Objective

- To examine the association between body mass index (BMI) and HR-QoL, work productivity, activity impairment, healthcare resource utilisation (HCRU), and associated costs, in Mexico.

Methods

Sample and procedure

- Data were collected in 2014 using a cross-sectional survey of adults in Mexico (N=2511).
- Potential respondents were identified from an online panel, with some offline recruitment to ensure representation in all demographic strata.
- The first 2011 respondents (the “general population”) were recruited to reflect the demographics of Mexican adults based on the International Database of the United States Census.⁵
- A supplemental 500 respondents with T2D were recruited to ensure adequate sample size for subgroup analyses.

Measures

- Demographics:** age, sex, marital status, education, employment, and socioeconomic status (SES).
- Health history:** self-reported BMI class (underweight [BMI <18.5 kg/m²], normal weight [BMI 18.5–≤24.9 kg/m²], overweight [BMI 25–≤29.9 kg/m²], obese class I [BMI 30–≤34.9 kg/m²], class II [BMI 35–≤39.9 kg/m²], and class III [BMI ≥40 kg/m²]), smoking history, alcohol use and exercise frequency.
- Comorbidities:** self-reported diagnosed comorbidities associated with the Charlson Comorbidity Index (CCI). Self-reported blood pressure (systolic; >140 mmHg, diastolic; >90 mmHg) was used to classify hypertension.
- Health outcomes:** HR-QoL and the Work Productivity and Activity Impairment questionnaire were used to assess quality of life and overall work impairment. HCRU was self-reported.

Table 1 Regression-adjusted health outcome differences across BMI classes among the overall sample and those with T2D, pre-diabetes, and hypertension.

Dependent variable	BMI group (kg/m ²)	Overall (N=2476)		Type 2 diabetes (N=819)		Pre-diabetes (N=425)		Hypertension (N=825)	
		Adjusted mean	p-Value	Adjusted mean	p-Value	Adjusted mean	p-Value	Adjusted mean	p-Value
EQ-5D: Health utility	Overweight (25 to <30)	0.83	0.0187	0.8	0.5873	0.84	0.5398	0.79	0.1221
	Obese class I (30 to <35)	0.82	0.0003	0.77	0.0172	0.83	0.353	0.77	0.0079
	Obese class II-III (35+)	0.78	<.0001	0.76	0.0043	0.76	0.0067	0.74	<0.0001
	Normal weight (18.5 to <25)	0.85	.	0.81	.	0.85	.	0.81	.
Overall work impairment, %	Overweight (25 to <30)	20.34	0.2898	26.62	0.2985	18.48	0.2601	27.17	0.5143
	Obese class I (30 to <35)	23.29	0.0219	31.55	0.6386	24.6	0.0548	30.66	0.0999
	Obese class II-III (35+)	25.81	0.0134	30.49	0.8618	40.14	0.0063	31.4	0.1299
	Normal weight (18.5 to <25)	18.85	.	29.72	.	12.49	.	25.4	.
Activity impairment, %	Overweight (25 to <30)	18.31	0.038	23.94	0.8742	15.12	0.4741	23.4	0.5419
	Obese class I (30 to <35)	20.83	0.0023	28.88	0.0982	15.84	0.4129	28.3	0.0247
	Obese class II-III (35+)	24.82	0.0003	30.25	0.0793	28.87	0.0411	32.38	0.0047
	Normal weight (18.5 to <25)	15.78	.	23.55	.	11.69	.	21.99	.
Number of provider visits	Overweight (25 to <30)	3.22	0.4151	4.21	0.124	2.75	0.7135	3.96	0.5938
	Obese class I (30 to <35)	3.4	0.1319	4.87	0.7715	2.84	0.5945	4.13	0.9957
	Obese class II-III (35+)	3.73	0.0235	4.79	0.9137	3.12	0.3667	4.46	0.4361
	Normal weight (18.5 to <25)	3.09	.	4.74	.	2.59	.	4.13	.
Number of ER visits	Overweight (25 to <30)	0.29	0.1414	0.42	0.9373	0.16	0.5282	0.46	0.1387
	Obese class I (30 to <35)	0.35	0.0126	0.72	0.0271	0.23	0.2616	0.58	0.0161
	Obese class II-III (35+)	0.26	0.6042	0.41	0.8506	0.22	0.3459	0.34	0.97
	Normal weight (18.5 to <25)	0.24	.	0.43	.	0.1	.	0.34	.
Number of hospitalisations	Overweight (25 to <30)	0.17	0.3924	0.27	0.0366	0.11	0.2057	0.29	0.765
	Obese class I (30 to <35)	0.22	0.4247	0.49	0.3783	0.14	0.328	0.36	0.5188
	Obese class II-III (35+)	0.22	0.6233	0.31	0.3045	0.19	0.6293	0.28	0.7473
	Normal weight (18.5 to <25)	0.19	.	0.41	.	0.27	.	0.31	.

*All models controlled for sex, age, marital status, education, exercise behaviour, and the Charlson comorbidity.

Statistical analysis

- To obtain the prevalence of different glycaemic levels and cardiovascular comorbidities in the total adult Mexican population, weighting was applied to the prevalence within the general population sample.
- Comparisons between BMI categories were carried out using chi-squared tests and one-way ANOVAs.
- Generalised linear models were used to predict health outcomes, controlling for covariates.
- Analyses were replicated for those with T2D, pre diabetes, and hypertension.
- Indirect productivity costs were calculated by multiplying the mean level of productivity loss at each BMI class by the average wage in Mexico (12,850 MXN).⁶

Results

- The overall sample was 50.62% male with a mean age of 40.66 (±14.50) years and 40.62% belonging to the highest SES level (AB; Higher & intermediate managerial, administrative, professional occupations).
- 1.39% were underweight, 35.88% were normal weight, 38.31% had overweight, 16.93% had class I obesity, 5.26% class II, and 2.23% class III.
- Prevalence of glycaemic and cardiovascular comorbidities by BMI class is shown in Figure 1.
- Extrapolating the data to the total Mexican population estimated that 4.64 million adults currently have a BMI ≥35 kg/m² and 75.2% are dysglycaemic.

Figure 1 Prevalence of glycaemic levels and cardiovascular comorbidities by BMI class.

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- Of those with dysglycaemia, 1.39 million are estimated to have T2D and 2.10 million to have pre-diabetes.
- The prevalence of T2D and hypertension increased with BMI class (Figure 2).
- Males were more likely to have overweight, while females were more likely to have obesity ($p<0.05$).
- Increasing BMI was associated with being older, having fewer qualifications, fewer days exercised in the past month, and higher CCI scores (all $p<0.05$).
- In the general population, as BMI increased, HR-QoL decreased and work impairment and HCRU increased (Table 1), with the strongest effects observed among those with class II/III obesity.
- With the exception of HCRU and productivity, similar findings to the general population were observed in those with T2D, pre-diabetes, and hypertension (Table 1).
- Estimated indirect costs increased as BMI class increased.

Limitations

- As data were self-reported, no objective confirmation of BMI or HCRU was available.
- The study was cross-sectional, so it was not possible to determine causality.
- Indirect costs were calculated based on estimated wages and although the sample was representative with respect to age and sex, it is unclear to what extent other variables may affect generalisability.

Figure 2 Prevalence of type 2 diabetes and hypertension by body mass index (BMI) class.

All data were weighted to project to the total adult population. Error bars represent 95% confidence intervals.

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Conclusions

- The results suggest a significant effect of increasing BMI on comorbidities and a significant association between BMI class and health outcomes, particularly HR-QoL.
- Results were similar to the general population for patients with T2D, pre-diabetes, and hypertension. Given the severity of the obesity epidemic in Mexico, improvements in the management of obesity could have significant benefits to the patient and larger society.

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