

Workshop: Policy Analysis and Decision-Making with Emphasis on Chronic Non-communicable Diseases

Bridgetown, Barbados

October 15-17, 2007

The economic impact of Obesity

“The Economic Impact of Obesity in Latin American and the Caribbean” developed by R. M. Suarez-Berenguela*; Dr. E. Jacoby**; A. Gordillo-Tobar*; P.Vane*, from the Health Policies and Systems Development Unit*; and, from the Chronic Diseases Unit** of the Pan American Health Organization/World Health Organization
PAHO/WHO

The economic impact of Obesity

Introduction

Methodology

Prevalence estimates, Cost estimates (Direct & Indirect)

Magnitude of the Obesity Epidemic

Economic Impact of Obesity-related Chronic Diseases

Summary of Findings and Conclusions

The economic impact of Obesity: Introduction

- *Obesity, the global epidemic as it has been named by the World Health Organization (WHO) seems to be affecting population of all ages. Obesity has been publicly acknowledged in the LAC Region in technical documents (Matorell, 1998; Matorell, 1999; Uauy, 2001; Filozof, 2001; Kain, 2003; Fraser, 2005; Andrade, 2006; Perel, 2006)*
- *Obesity has been described associated with the main causes of death (WHO, 1998) and associated with poverty (PAHO, 2000) in LAC.*

The economic impact of Obesity

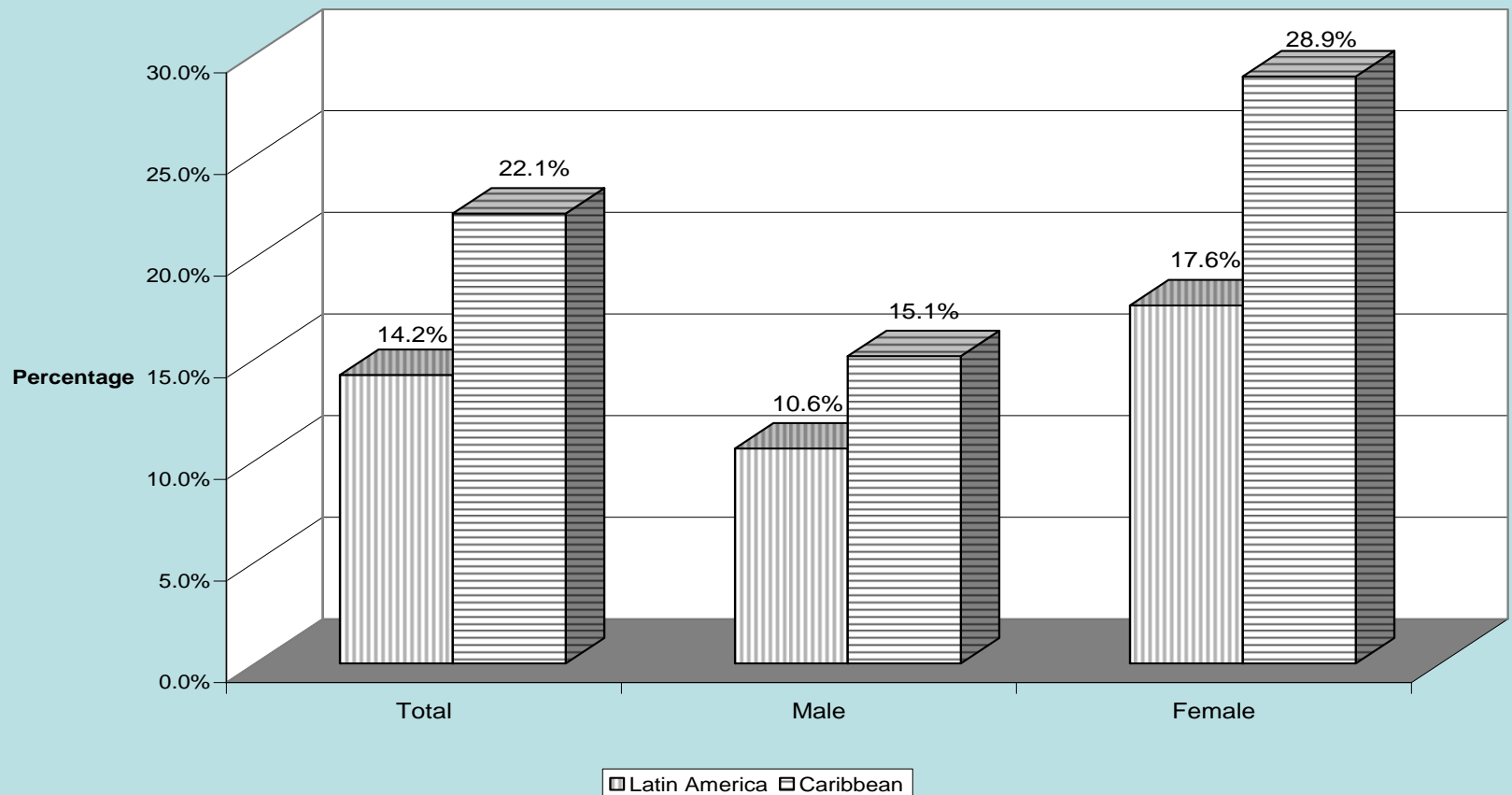
- *Obesity's risk factor for chronic diseases among population in working age has become more of a common knowledge (WHO, 2003a; WHO 2003b). Increased levels of obesity prevalence seem to obey mainly to changes on life styles in favor of more sedentary habits and reduced physical activity as a consequence of an increasing process of urbanization, availability of a diet high in saturated fat and energy density (Bermúdez O. and K. Tucker, 2003; Uauy, 2001). Income and education levels seem to cause a more differentiated effect depending on the stage of the demographic and nutritional transition process of the countries (Monteiro C, et.al. 2001; 2003; Cortez R, et.al. 2002; Jacoby, E. et.al., 2003).*
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The economic impact of Obesity: Methodology

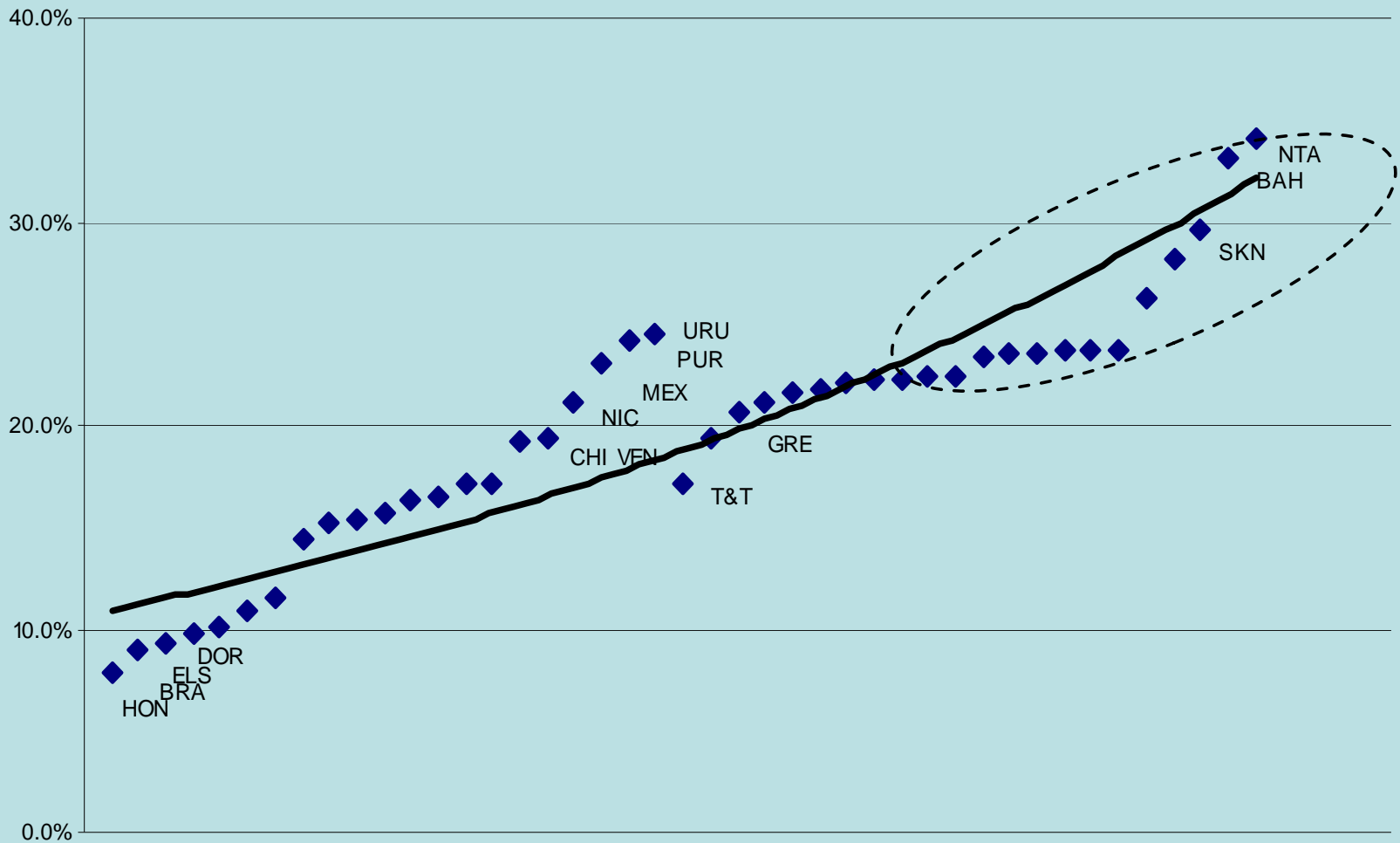
- *Prevalence estimates*
- *Estimates on the current rates of prevalence of obesity (2005) were derived from published prevalence overweight/obesity data reported in available household surveys and studies since 1994-1995.*
- *The estimated-adjusted rate of prevalence by age and sex from countries with complete information or some information were applied to the countries with no information; considering the specific country population age structure and sex composition.*

The economic impact of Obesity: Magnitude of the problem

Obesity prevalence rates in Latin American and the Caribbean by sex. 2005

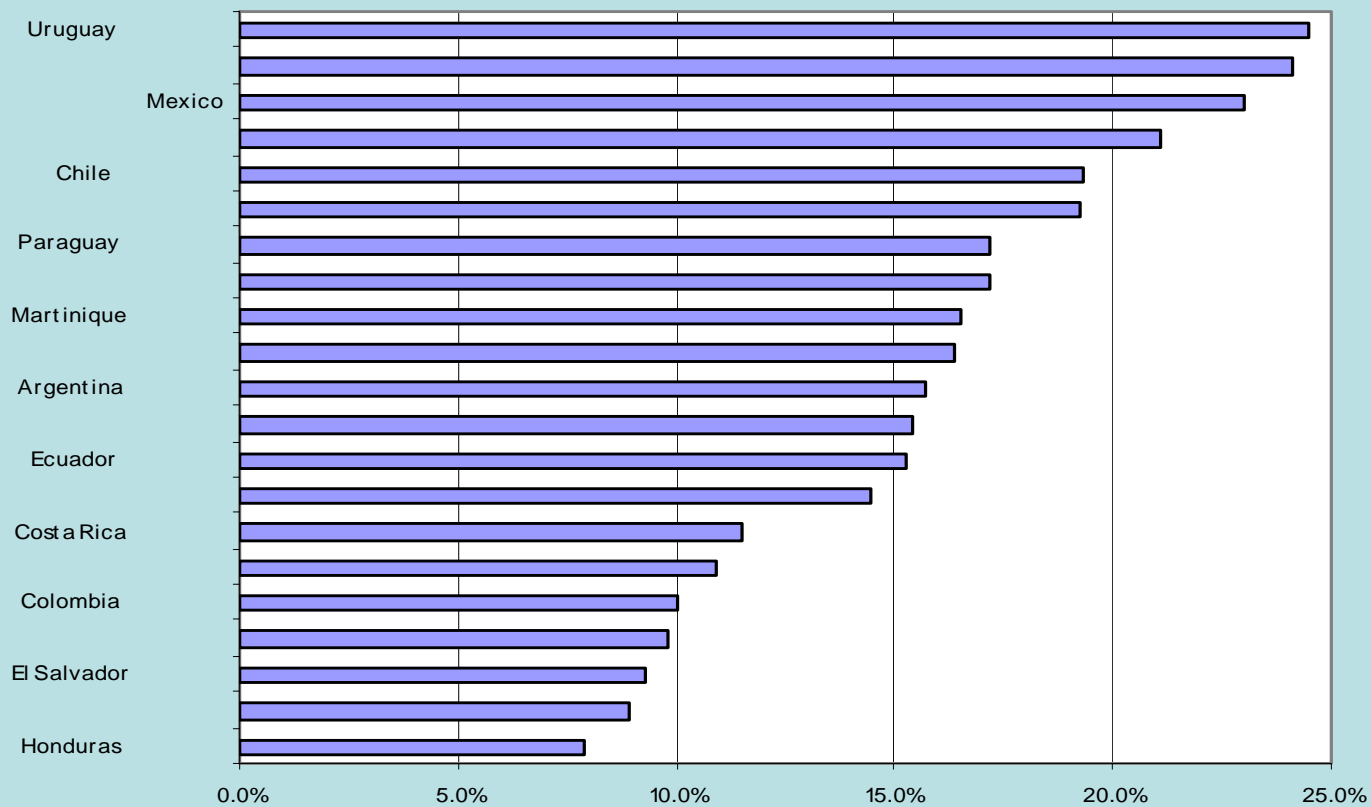


Obesity Prevalence in Latin America and the Caribbean Countries, 2005



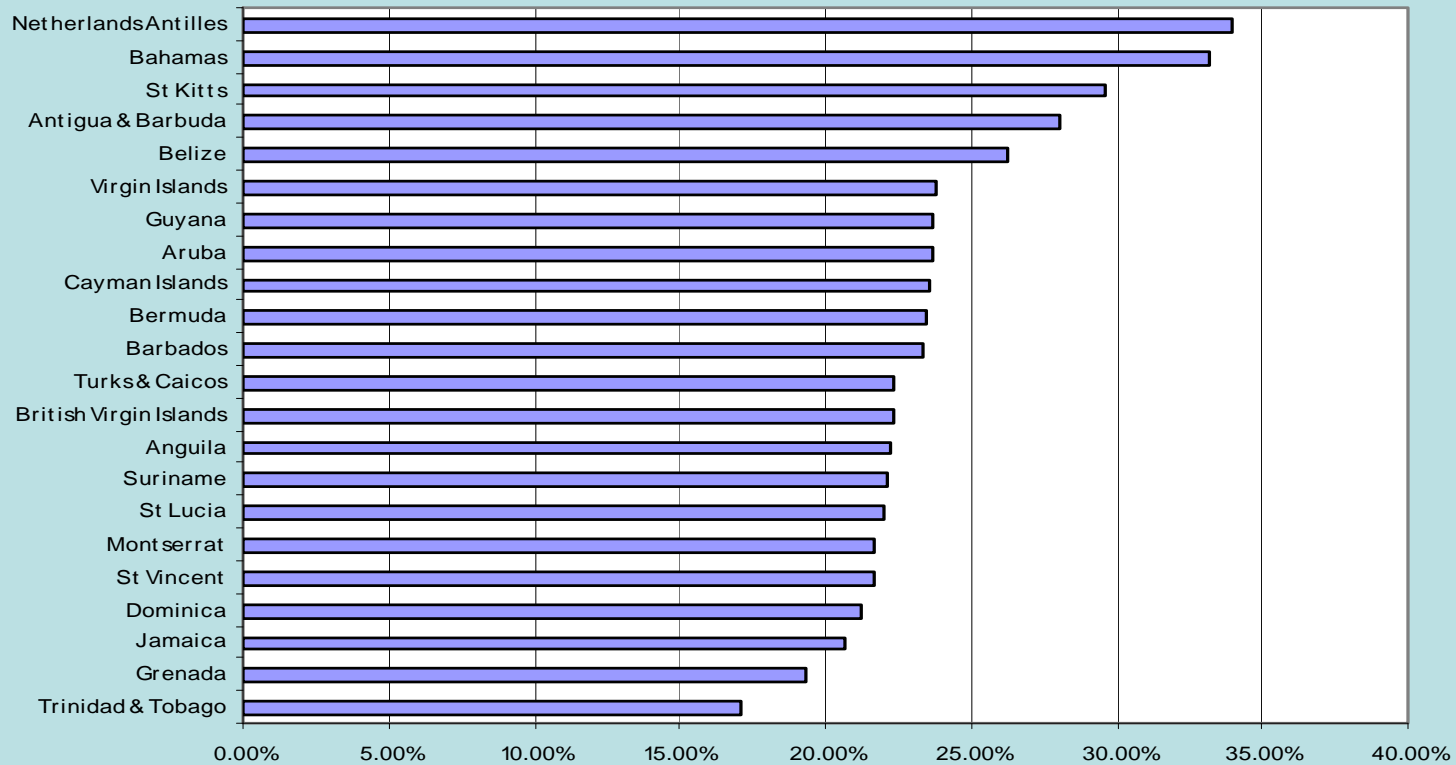
The economic impact of Obesity: Prevalence

Obesity prevalence in Latin America, 2005



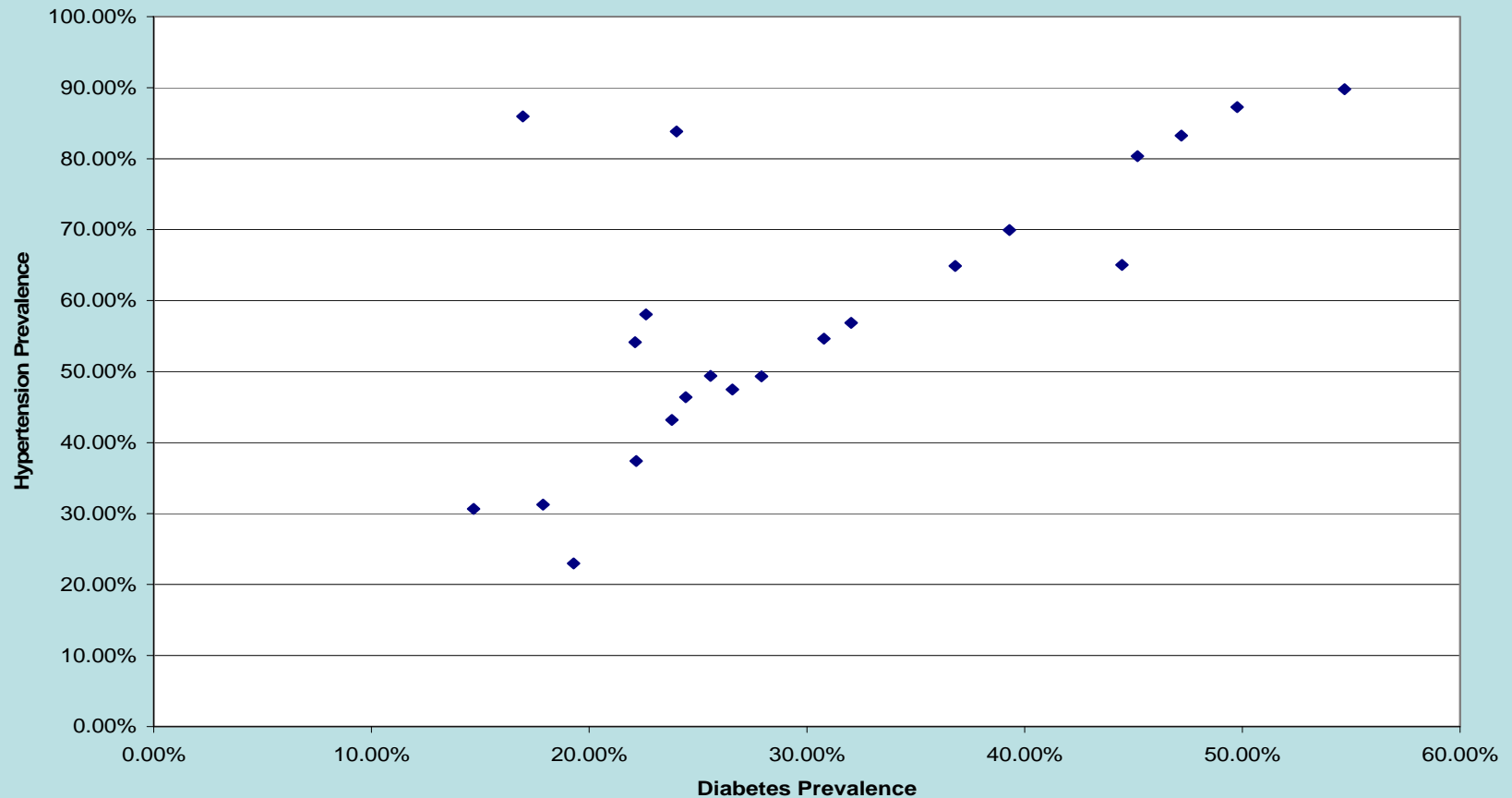
The economic impact of Obesity: Prevalence

Obesity prevalence in the Caribbean, 2005



The economic impact of Obesity: Magnitude of the problem

Diabetes and Hypertension prevalence among Obese population, Latin America 2005



The obesity in the Caribbean, 2005

Country	M/F	M	F
Anguila	22.3%	15.4%	29.5%
Antigua & Barbuda	28.1%	18.5%	37.5%
Aruba	23.7%	15.4%	30.9%
Bahamas	33.2%	26.2%	39.7%
Barbados	23.4%	16.0%	30.1%
Belize	26.3%	20.8%	31.8%
Bermuda	23.5%	15.5%	31.0%
British Virgin Islands	22.3%	15.4%	29.7%
Cayman Islands	23.5%	15.6%	31.0%
Dominica	21.2%	9.6%	32.9%
Grenada	19.4%	17.5%	21.5%
Guyana	23.7%	16.8%	30.3%
Jamaica	20.7%	13.9%	27.0%
Montserrat	21.7%	14.8%	28.1%
Netherlands Antilles	34.0%	22.8%	43.5%
St Kitts	29.6%	20.4%	38.4%
St Lucia	22.0%	15.1%	28.4%
St Vincent	21.6%	15.1%	28.4%
Suriname	22.2%	15.2%	29.2%
Trinidad & Tobago	17.1%	10.9%	23.6%
Turks & Caicos	22.4%	15.6%	29.9%
Virgin Islands	23.7%	15.5%	31.0%
Non Latin Caribbean	22.1%	15.1%	28.9%

The economic impact of Obesity: Costs

These estimates of the Cost of diabetes and hypertension are based on the complete treatment protocols for obesity, diabetes, hypertension

1. Direct cost estimates to treat diabetes and hypertension during the first year after diagnosis need to be distinguished from the treatment required in subsequent years.
2. This costs include more clinical laboratory tests and medical visits than any subsequent year of treatment. Subsequent years include follow up medical visits, clinical laboratory check ups and medication. Subsequent year estimates are a good measure of the general population expenditure at the national or regional level.

The economic impact of Obesity: Costs

- Maximum and minimum dosages of medicines are used to estimate cost ranges.
- Direct costs estimates include medicines (drugs), clinical laboratory & complementary tests, medical visits (main consultation and referrals), other medical professional's consultations (nutritionists). It does not include the price of sports equipment or clothes to practice exercise (considered for behavioral change).
- Direct costs of treatment of diabetes and hypertension including its complications could be estimated by adding lump sums of the identified complications, for example, retinopathy or kidney disease.

Behavioral change		Unitary cost	Annual cost
Diet-food-hypo-caloric diet, reduction on saturated fat and cholesterol intake	x		
Physical activity -exercise -(aerobic, walks)	x		
Pharmaco Therapy for diabetes II	g/mg per day	COSTS	US Dollars 2004
Generic (brand name)			
Biguanides			
Metformin (glucophage)	1-2.5g/day		
ECU: 500 mg 60 units a .29 each tablet (dosis maxima)		0.29	529.25
dosis minima			211.7
or Alfa-glucosidase inhibitors (with 2 choices)			
arcabose (precose)			
<u>Treatment if response to metformin or alfa-glucosidase is inadequate, add:</u>			
or/ and Sulfonylurea (there are 9 types- I include only 2 choices)			
Glyburide (diabeta, micronase)			
<u>Treatment if still not response Addition of insulin</u>			
and NHP insulin dose of 70/30			
Humalog Mix 75/25			
Medical and Lab needs		COSTS	US Dollars 2004
First year: First visit			
Initial visit (First-evaluation)	1	20	20
Laboratory analysis:			
Blood test:			
Glycated hemoglobin measurements f/	1	6.91	6.91
Lipid profile: Cholesterol, HDL, tryglicerids, and LDL	1	21.88	21.88
Serum creatine	1	5.23	5.23
Normal fasting glucose	1	3.91	3.91
Urinalysis			
Glucosuria, Ketonuria and sediment	1	8.34	8.34
Electrocardiogram	...	40	40
Referral visits			
Visit to Ophthalmologist	1	40	40
Family planning (among women in reproductive age)	1	30	30
Diabetes educator (if not provided by physician or nurse)	1	20	20
First year: Follow up			
Subsequent medical visits	1 every three months	30	120
Laboratory analysis:			
AIC (average glicemia over preceding 2-3 months)	1 every three months	6.91	27.64
Subsequent visits with the nutritionist	1 per month	20	120
or provider to maintain the treatment			
Second -or Subsequent years			
Annual medical visits (obese+diabetes)	3 per year	40	120
Annual visit to Ophthalmologist	1	30	30
Electrocardiogram	1	40	40
Lab test			
Blood test:			
AIC (average glicemia over preceding 2-3 months)	2 or 3 per year	3.91	15.64
lipid profile	1	21.88	21.88
Review of Self monitoring of blood glucose (cost of equipment) g/	x		
Urinalysis			
Glucosuria, Ketonuria and sediment	1	8.34	8.34
Subsequent visits with the nutritionist	2 per year	20	40
Total first year maximum dossague			993.16
Total per subsequent years maximum dossaguec/			805.11
Total first year at minimum dossague			675.61
Total per subsequent minimum dossage			487.56

This other alternatives could also be estimated. It could provide different scenarios with different types of drugs. However, cost will be in the range of the drug used for the estimations (glucophage)

Secondary Hypertension /a

Elements	Dosage	One drug treatment (50%)		and Two drug treatment (50%)		or Multiple drug treatment (50%)	
		Unitary cost	Total cost	Unitary cost	Total cost	Unitary cost	Total cost
Treatments							
Behavioral change							
Pharmaco Therapy	daily						
<u>Diuretics: Thiazides and related</u>							
Generic name (brand name)							
A	Hydrochlorothiazide (Esidix, Hydro-Diurill)	12.5-50 mg					
B	<i>Metolazone (Zaroxolyn)</i>	<i>1.25-5 mg</i>					
C	<i>Metolazone (Mykrox)</i>	<i>0.5-1mg</i>					
	<i>ECU: Hidroclorotiazida + inalapril (25mg de 30 unidades =\$11.22)</i>				0.374		
	<i>Minimun dosague</i>					68.255	
	<i>Maximun dosague</i>					273.02	
	<i>ECU: Lasix (24 tab 40mg =\$2.8)</i>						0.07
	<i>Minimun dosague</i>	20mg					12.78
	<i>Maximun dosague</i>	80mg					51.10
Recommended to use for estimations: (each drug replaces each other, this case to cost we use Enalapril)							
<u>ACE inhibitor (Angitensin-Converting Enzyme)</u>							
Generic name (brand name)							
C	Trandolapril (Mavik) or	1-8mg					
D	Lisonopril (Prinivil, Zestril) or	5-40 mg					
E	<i>Enalapril (Vasotec)</i>	<i>5-40mg</i>					
	<i>* ECU: Enalapril (5mg de 10 unidades =\$1.17)</i>			0.117			
	<i>Minimun dosage</i>				42.705		42.705
	<i>Maximun dosage</i>				341.64		341.64
	<i>* ECU: Enalapril (10mg de 10 unidades =\$3.18)</i>			0.318			
	<i>Minimun dosage</i>				58.035		
	<i>Maximun dosage</i>				464.28		
Medical and Lab needs additional							
	*Yearly monitoring of blood lipids + ECG every 2 years + Medical visit (40+21.81+20=40)		40	40		40	40
	renal function tests (urea, creatinine)	1	22.3	22.3		22.3	22.3
	Potassium levels	1	3.71	3.71		3.71	3.71
	Total per subsequent years minimun (using the 5mg presentation) c/			108.715		134.265	121.49
	Total per subsequent years minimun (using the 10mg presentation)			124.045			
	total per subseq year maximun (using the 5mg presentation)			407.65		339.03	458.75
	total per subseq year maximun (using the 10mg presentation)			530.29			
* To integrate costs within a diabetic patient/obese costs of treatment, not more medical visits have been included							
** Adjustments made after second inquiry of the costs associated with this drug							

Italics: Alternative prescription for the same purpose (cost will differ)

a/ Hypertension as consequence or addition to obesity is usually known as Secondary Hypertension.

Patients with Stage I Hypertension with other associated risk factors might require pharmacological treatment. Always individualized assessment of the benefit –to-risk ratio of drug therapy should precede pharmacologic management.

Around 50% could successfully control hypertension with diuretics only, but the remain might need a combination therapy

Patients with Stage III are those with specific indications: post-myocardial infarction (beta-blockers, ACE inhibitors) patients with diabetic nephropathy (ACE inhibitors, ARBs)

Multidose regimes usually needed in patients with high systolic pressures and in diabetes. One suggestion to make a generalization of treatmet among patients with diabetes and hypertension.

ARB Angiotensine Receptor Blockers

ACE Angitensin-Converting Enzyme

Drug therapy of patients with stage II and III hypertension reduces the incidence of stroke by 30-50%, congestive hearth failure by 40-50%, and progression to accelerated hypertension syndromes. And, it reduces only from 10 to 15% the ratio of fatal and non fatal coronary heart disease and cardiovascular mortality



Source: Gordillo, T. A.. (2006) Direct Cost of Treatment of Diabetes and Hypertension in Ecuador; HDP/HSS, Pan American Health Organization; Washington, DC. January, mimeo.

The economic impact of Obesity: Results

Diabetes cost- Estimates of the annual direct medical care cost per person with diabetes in countries of the Latin American and Caribbean region ranged from around **US\$ 300** in Brazil, to around **US\$ 900** in countries of the Caribbean. For the United States of America the estimate of the annual costs of diabetes was US\$ 986

Hypertension cost- varied from close to **US\$ 120** in Jamaica, Cuba and Mexico, to around US\$ 220 in Barbados, US 360 in Brazil, and close to US\$ 500 in Barbados. Higher estimates of US\$ 648 and **US\$ 970** were reported in studies from Peru and Ecuador. For the United States of America the cost of treatment of hypertension was reported in U\$ 1,800 dollars.



The economic impact of Obesity: Results

•In deriving these estimates we assume that the average annual costs of treating all the persons with diabetes or hypertension, considering the different degrees of severity of the disease, would be of US\$ 650 for the case of diabetes and US\$ 450 for the case of hypertension.

Attributable risk

(In 2025)... Close to 60% of the cases of diabetes (14 millions of cases) and and 44 % of the cases of hypertension (22 millions) are cases that may be attributed to obesity.



Assessing the Economic Impact of Obesity and associated chronic diseases: Latin America and the Caribbean

Cost of Obesity in Latin America and the Caribbean, 2005 Millions of US Dollars, of 2005

	Direct Cost	Indirect Cost	Total Cost	%
Diabetes Total	9,562	8,125	17,687	100%
of which due to Obesity:				
Latin America	8,357	4,670	13,027	74%
The Caribbean	107	187	294	2%
Total LAC	8,465	4,857	13,321	75%
Hypertension Total	20,172	1,247	21,419	100%
of which due to Obesity:				
Latin America	8,683	531	9,213	43%
The Caribbean	162	27	189	1%
Total LAC	8,845	557	9,402	44%
Total Cost of Diabetes & Hypertension	29,734	9,372	39,106	100%
Total Cost of Diabetes and Hypertension due to Obesity	17,309	5,414	22,723	58%

Source: *The Economic Impact of Obesity in Latin America and the Caribbean*; PAHO 2006.

The economic impact of Obesity: Methodology

Indirect Costs: Economic Losses due to early mortality and disability

- Indirect costs of diabetes and hypertension as co morbidities of obesity includes the value of the years or days of productive life lost due to early mortality or
- disability due to obesity related diabetes and hypertension by the working age population.
 - This cost does not include the cost of co-morbidities derived from the delays in the treatment or complications of cardiovascular diseases attributed to diabetes and hypertension related to obesity.

The economic impact of Obesity: Methodology

Indirect Costs: Economic Losses due to early mortality and disability

- The estimated value of annual economic losses due to early mortality and partial and permanent disability due to diabetes and hypertension is estimated in around US\$ 9.3 billions of dollars, per year.
- This represents an annual loss of 0.28 % of annual GDP of the region. More than half of this losses, 58%, are losses due diabetes and hypertension related attributed to obesity.

The economic impact of Obesity: Methodology

- The estimates presented on two of the chronic diseases highly correlated with obesity - diabetes and hypertension, suggest that a significant part of the direct medical cost, and the indirect cost of the economic losses due to early mortality and disability of the working age population could be reduced by the prevention of obesity: approximately 58% of the direct and indirect costs

Economic Burden of Disease for Jamaica (2002)

Cost Item	Diabetes (J\$)	Hypertension (J\$)
Direct Cost		
Hospitalization	135,464,269 (8%)	84,753,708 (7%)
Clinic/Doctor's Visits	332,500,000 (21%)	415,652,000 (33%)
Drugs	113,800,284 (7%)	203,519,628 (16%)
Laboratory/Diagnostic Tests	873,487,154 (54%)	357,874,984 (29%)
Indirect Cost		
Productivity Loss	156,291,630 (10%)	186,339,706 (15%)
Total Economic Burden	1,611,543,337	1,248,140,027
Value in US\$ (1US\$=J\$49.73)	33,070,867	25,613,380

Report of the Caribbean Commission on Health and Development. 2006

Impact of diabetes on health expenditure in Barbados

Changing Epidemiological Profile - Impact of Diabetes on Health Expenditures in Barbados

Primary Causes

Obesity

Family History

Sedimentary Lifestyle

Assumptions:

Data set, 1988-1992

Population age (20-79 years)

Prevalence rate 14.8% Male & 19.4% Female, Both 17.5%

Unit Cost is only Direct Cost (Medicines, Doctors Visits and Insulin)

Source

Prepared by the country team at the Sub-Regional Workshop on Health Accounts and Health Financing in the Caribbean: Barbados, Trinidad & Tobago and OECS Member States, November 8-9, 2006

	<i>Scenario 1</i>	<i>Scenario 2</i>	<i>Scenario 3</i>
Total Population	270,000	270,000	270,000
Population (20-79 years)	189,000	189,000	189,000
Sample size	70%	70%	70%
Prevalence rate			
Male	14.8%	14.8%	14.8%
Female	19.4%	19.4%	19.4%
Both	17.5%	17.5%	17.5%
Unit treatment Direct Cost (US)	\$ 650.00	\$ 500.00	\$ 900.00
Estimated Pop with Diabetes (20 -79 Years)	33,075	33,075	33,075
Estimated Population with Diabetes (20 -79 Years) %	12%	12%	12%
Estimated Direct Expenditure for Diabetes treatment	21,498,750.00	16,537,500.00	29,767,500.00
Tot MOH Exp (US\$)	142,549,473.00	142,549,473.00	142,549,473.00
% of MOH Budget used to treat diabetes	15%	12%	21%
Estimated Unit Cost of Prevention - Approx. 10%	65	50	90
Estimated savings US\$	2,149,875	1,653,750	2,976,750
Potential Savings as % of MOH Expenditure	1.51%	1.16%	2.09%
GDP (Estimated)	3,000,000,000.00	3,000,000,000.00	3,000,000,000.00
Diabetes Expenditure as % of GDP	0.72%	0.55%	0.99%
Potential Savings as a % of GDP	0.07%	0.06%	0.10%

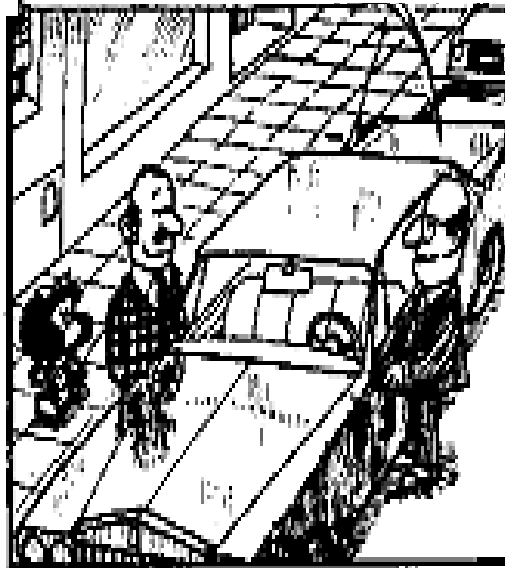
Prepared by the Barbados' country team at the Sub-Regional Workshop on Health Accounts and Health Financing in the Caribbean: Barbados, Trinidad & Tobago and OECS Member States, November 8-9, 2006

And not to lose perspective

Change the world?
Oh, things of
young people!



Even I had those
ideas When I was a
teenager And you
see...



Guys! We are in trouble!
If we do not hurry to
change the word,
the world would
change us!



Do not let the world change you... keep the
perspective and make a change!!

Workshop: Policy Analysis and Decision-Making with Emphasis on Chronic Non-communicable Diseases

Bridgetown, Barbados

October 15-17, 2007

Assessing the Economic Impact of Obesity and associated chronic diseases: Latin America and the Caribbean



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Assessing the Economic Impact of Obesity and associated chronic diseases: Latin America and the Caribbean

Table 3

Estimated population composition by age, selected data: 2020

(in percentage) years	age			Obesity prevalence*
	< 20	>=20	>=65	
Region	33.4%	66.6%	8.5%	19.7%
Latin America	33.5%	66.5%	8.4%	19.7%
Caribbean	26.9%	73.1%	12.8%	21.6%

Assessing the Economic Impact of Obesity and associated chronic diseases: Latin America and the Caribbean

Revised Estimates on the Rates of Prevalence and Number of Cases of Obesity, Diabetes and Hypertension

English Speaking Caribbean Countries: Rates of Prevalence and Number of cases of Obesity, Diabetes and Hypertension; Population older than 20
Estimates for 2000

Summary Statistics	Obesity	Diabetes	Hypertension
Weighted Average	17.7%	5.5%	20.5%
Average	18.1%	5.5%	20.9%
Maximum	25.2%	8.4%	26.1%
Minimum	14.4%	3.9%	14.9%
Standard Deviation	3.4%	1.2%	2.9%
Prevalence Rates			
Min 2 (-2 STDEV)	11.3%	3.1%	15.2%
Min 1 (- 1 STDEV)	14.7%	4.3%	18.1%
Average	18.1%	5.5%	20.9%
Max 1 (+ 1 STDEV)	21.6%	6.7%	23.8%
Max 2 (+2 STDEV)	25.0%	8.0%	26.7%
Number of Cases			
Min 2 (-2 STDEV)	483,017	133,432	650,773
<i>Min 1 (- 1 STDEV)</i>	<i>630,538</i>	<i>185,352</i>	<i>774,292</i>
Average	778,059	237,271	897,811
<i>Max 1 (+ 1 STDEV)</i>	<i>925,580</i>	<i>289,191</i>	<i>1,021,331</i>
Max 2 (+2 STDEV)	1,073,101	341,110	1,144,850

Source: Authors elaboration; see methodological notes

Assessing the Economic Impact of Obesity and associated chronic diseases: Latin America and the Caribbean

Diabetes: Annual cost per person of diabetes care by country groups (around 2000)

<i>Countries</i>	<i>Average Cost (US\$) per person</i>
Trinidad & Tobago, Barbados (1)	\$ 577.00
Chile, Mexico (1)	607.00
Ecuador, Guatemala, Jamaica (1)	491.00
Bolivia (1)	550.00
Bahamas (2)	895.00
Barbados (2)	962.00
Jamaica (2)	778.00
Brazil (3)	316.00
Mexico (3)	222.00
US (3)	689.00
Ecuador (4)	676 - 993

Estimates include 3 visits to a general practitioner, one visit to an ophthalmologist, one HbA1c test, one lipid profile one electrocardiogram, one proteinuria test and an average of the cost of insulin and oral drugs

(1) Data From Barcelo, 2003

(2) Data from Forrester, 2005

(3) Not comparable, data may include different (not all) cost components. See methodological notes for references.

(4) Data from Gordillo, 2005

Assessing the Economic Impact of Obesity and associated chronic diseases: Latin America and the Caribbean

Hypertension: Annual cost per person of hypertension care by country (around 2000)

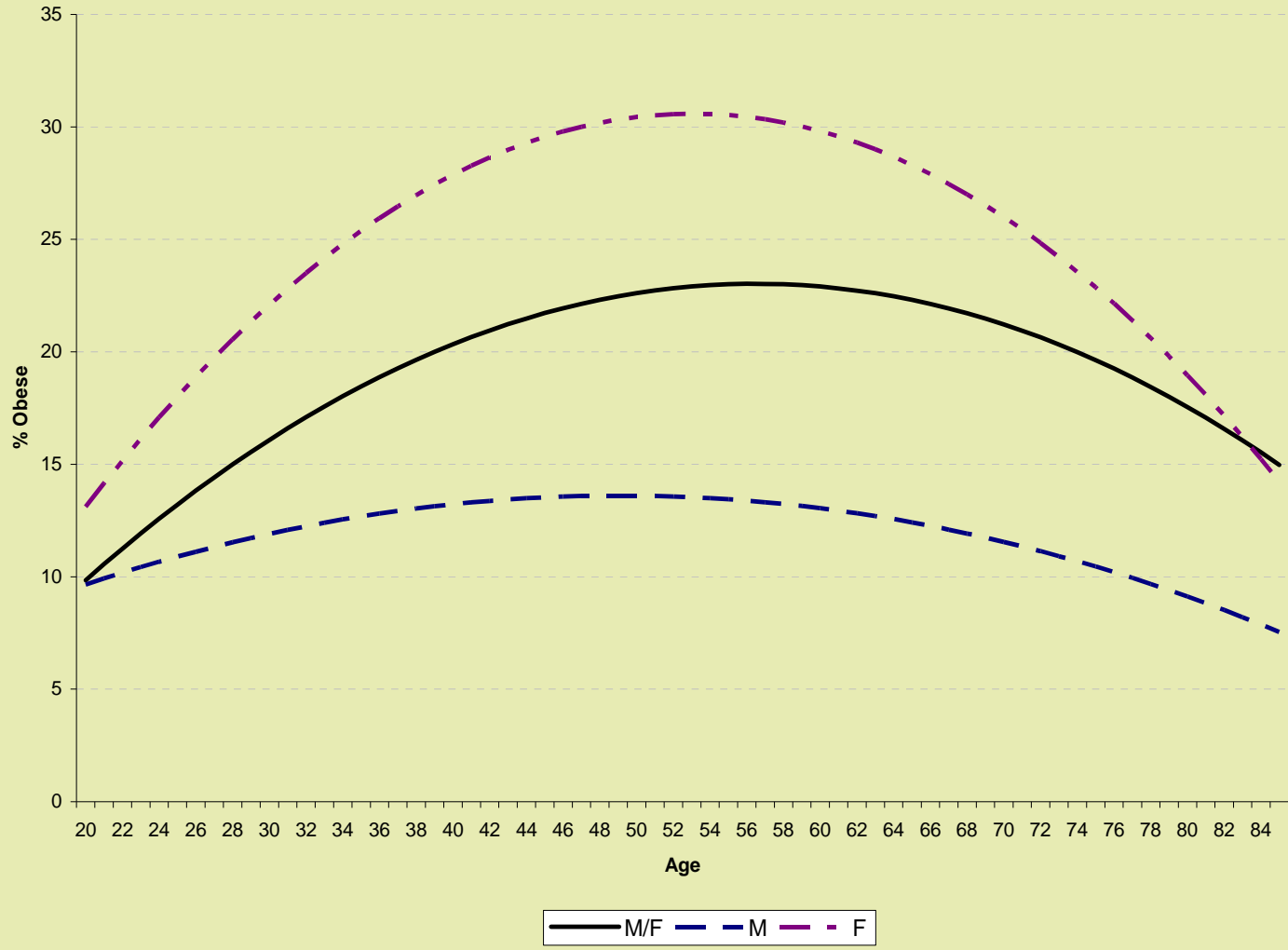
<i>Countries</i>	<i>Average Cost (US\$) per person</i>
Bahamas (2)	\$ 485.00
Barbados (2)	226.00
Jamaica (2)	112.00
Brazil (3)	362.00
Peru (3)	268 - 648
Cuba (3)	61 - 189
Mexico (3)	143.00
US (3)	1,803.00
Ecuador (4)	179 - 971

(2) Data from Forrester, 2005. Includes hospitalizations, consultations and diagnostics (no medications included)

(3) Not comparable, data may include different (not all) cost components. See methodological notes for references.

(4) Data from Gordillo, 2005

Rate of Prevalence of Obesity by Age and Sex in the Non Latin Caribbean; Around 2000



Assessing the Economic Impact of Obesity and associated chronic diseases: Latin America and the Caribbean

Chart 1. Estimated obese prevalence in Latin America from 2000 to 2025

