SPECIAL COMMUNICATION

Trends and affordability of cigarette prices: ample room for tax increases and related health gains

G E Guindon, S Tobin, D Yach

Tobacco Control 2002;**11**:35–43

See end of article for authors' affiliations

Correspondence to: G Emmanuel Guindon, World Health Organization, Tobacco Free Initiative, Avenue Appia 20, 1211 Geneva 27, Switzerland; guindone@who.int

Manuscript received 30 March 2001 and revision requested 20 June 2001. Accepted 30 November 2001

Background: Increasing the price of tobacco products is arguably the most effective method of curbing the prevalence and consumption of tobacco products. Price increases would reduce the global burden of disease brought about by tobacco consumption.
Objectives: To compare cigarette price data from more than 80 countries using varying methods, examine trends in prices and affordability during the 1990s, and explore various policy implications pertaining to tobacco prices.
Design: March 2001 cigarette price data from the Economist Intelligence Unit are used to compare cigarette prices across countries. To facilitate comparison and to assess affordability, prices are presented in US dollars, purchasing power parity (PPP) units using the Big Mac index as an indicator of PPP and in terms of minutes of labour required to purchase a pack of cigarettes. Annual real percentage changes in cigarette prices between 1990 and 2000 and annual changes in the minutes of labour required to buy cigarettes between 1991 and 2000 are also calculated to examine trends.
Results: Cigarette prices tend to be higher in wealthier countries and in countries that have strong tobacco control programmes. On the other hand, minutes of labour required to purchase cigarettes vary vastly between countries. Trends between 1990 and 2000 in real prices and minutes of labour indicate, with some exceptions, that cigarettes have become more expensive in most developed countries but more affordable in many developing countries. However, in the UK, despite recent increases in price, cigarettes are still more affordable than they were in the 1960s.
Conclusions: The results suggest that there is ample room to increase tobacco prices through taxation. In too many countries, cigarette prices have failed to keep up with increases in the general price level of goods and services, rendering them more affordable in 2000 than they were at the beginning of the decade. Opportunities to increase government revenue and improve health through reduced consumption brought about by higher prices have been overlooked in many countries.

In a 1999 report, the World Bank examined the effectiveness of an array of interventions and concluded that both price (taxes) and non-price measures (advertising bans, information campaigns, smoking restrictions, etc) can reduce the demand for cigarettes.[1] This article will briefly review the effect that price increases have on smoking behaviour and compare cigarette price data from more than 80 countries using different methods. As well, trends in prices and affordability during the 1990s will be examined*. Finally, this article will explore various policy implications that pertain to tobacco prices.

PRICE INCREASES AND SMOKING BEHAVIOUR

Increasing the price of tobacco products is arguably the most effective method of curbing the prevalence and consumption of tobacco products. Individuals who do not use tobacco may refrain from starting, and thus avoid addiction. It can also induce current users to consume less tobacco or persuade them to quit, as well as prevent ex-users from starting again†. Price increases would therefore reduce the global burden of disease brought about by tobacco consumption.

In a 1999 report, the World Bank concludes that on average, a price rise of 10% would be expected to reduce demand for tobacco products by about 4% in high income countries and by about 8% in low and middle income countries.[1] Using a model of cohort smokers alive in 1995, it is estimated that tax increases that would raise the real price of cigarettes by 10% worldwide would cause about 42 million of these smokers to quit and prevent a minimum of 10 million tobacco related deaths.[6] These conclusions have tremendous implications for public health.

Furthermore, increases in tobacco prices affects more the behaviour of the young and the poor who tend to be more responsive to price changes than older and wealthier individuals for several reasons. Firstly, because of the addictive nature of tobacco, long term users are less able to curb consumption and therefore adjust less rapidly to changes in tobacco prices, compared to younger individuals who may not yet be addicted to nicotine.[7] Secondly, youth smoking is said to be determined more by peer behaviour than adult smoking—that is, an increase in price will first reduce the number of young smokers; then, through less peer smoking, it will again reduce the number of young smokers, hence multiplying the effect of price changes.[7] Thirdly, youths and the poor spend a larger share of their relatively smaller disposable income on

*Affordability is defined as cost in terms of income.
†Grossman and colleagues[2] conclude that one consistent result throughout most price elasticity studies is that about 50% of the change generated by price increases is caused by a reduction in consumption among remaining smokers. More recently, Harris,[3] Chaloupka and Wechsler,[4] and Farrelly and Bray[5] found similar results.
‡For recent development on cigarette smuggling issues, see Action on Smoking and Health web site http://www.ash.org.uk/?smuggling

Abbreviations: CPI, consumer price index; EIU, Economist Intelligence Unit; EU, European Union; FCTC, Framework Convention on Tobacco Control; GCC, Gulf Cooperation Council; LCU, local currency unit; PPP, purchasing power parity; UBS, Union Bank of Swizerland

tobacco than wealthy adults do.[8] Therefore, these individuals tend to be more responsive to increases in the price of tobacco products. There is supporting evidence. For example, in the UK, it was found that the price responsiveness was inversely related to social class.[9] In the USA, less educated individuals were found to be more responsive to price than educated ones,[4 10] and smokers from lower income and minority groups were more likely to quit in response to price increases.[5] Similarly, in South Africa, young adults (16–24 years old) and low income individuals appeared to be more responsive to increases in prices.[11]

The tobacco industry realises the implications that higher taxes would have on their sales volume. Secret industry documents obtained in US litigation, from Philip Morris and British American Tobacco, express well the industry's concerns:

> "Of all the concerns, there is one—taxation—that alarms us the most. While marketing restrictions and public and passive smoking do depress volume, in our experience taxation depresses it much more severely. Our concern for taxation is, therefore, central to our thinking about smoking and health."[12]

> "Increases in taxation, which reduce consumption, may mean the destruction of the vitality of the tobacco industry."[13]

It is therefore not surprising that the tobacco industry vehemently opposes increases in tobacco taxes. The tobacco industry usually contends that increasing tobacco taxes will inevitably lead to illegal contraband of tobacco products, notably cigarettes. Discrepancies in tobacco prices between countries, it is argued, create an incentive to smuggle.[14] In 1994, this argument persuaded the Canadian government to lower dramatically its tobacco taxes. Sweden in 1998 and more recently the Ukraine, too, lowered their taxes or excise duties in the hope that it would diminish the magnitude of the contraband market. Not surprisingly, government's revenue from tobacco dipped after the tax cut in Sweden, Canada, and the Ukraine.[14 15] It is also important to note that there does not appear to be any documented cases of reduced tax revenues when tobacco taxes were increased.[14] Moreover, the World Bank stresses that the determinants of smuggling are much more than price alone. Using indicators of corruption levels based on the Transparency International's Index, the World Bank observed that the level of tobacco contraband tends to increase with the degree of corruption in a country.[1]

For many years, many have believed that the tobacco industry was not only trying to influence public policy by publicising the myth of the negative impact that tobacco taxes could bring, but also that it was involved directly or indirectly in the contraband of cigarettes. Recent developments from Canada and the UK seem to indicate that these fears were not unfounded. In 1997 two British American Tobacco managers pleaded guilty to charges related to tobacco smuggling between Canada and the USA.[16] In early 2000, the *Guardian* and the International Consortium of Investigative Journalists published revelations about British American Tobacco's involvement with smuggled tobacco products[17] which prompted the UK Department of Trade and Industry to launch an investigation in October 2000. In August 2001, the European Commission filed a complaint on behalf of the European Community and several member states against two US cigarette manufacturers‡.

SOURCES AND METHODS

The Economist Intelligence Unit (EIU)§ conducts every six months a worldwide cost of living survey, collecting prices in about 130 cities covering nearly 90 countries per survey. The price data for over 160 items are collected in the first week of March and September and include three tobacco products: (1) cigarettes, Marlboro or nearest equivalent international brand¶ (pack of 20); (2) cigarettes, local brand (packs of 20); and (3) pipe tobacco, MacBaren type (50 g).

March 2001 cigarette price data are presented in local currency units (LCU) and in US dollars in order to allow for some comparison between countries. The US dollar figures were calculated from the EIU cigarette price expressed in local currencies and the exchange rate at the time of the survey (exchange rate data provided by the EIU). For countries where prices were sampled in more than one city, averages of all the city prices were calculated**.

Price comparisons in terms of US dollars are often flawed. The fundamental problem in comparing tobacco prices in US dollars stems from the fact that there are numerous determinants of exchange rates, they are influenced not only by inflation differentials, but also by interest rate differentials, current account deficit, political stability, etc. A more appropriate measure of comparison would therefore be based on the theory of purchasing power parity (PPP). The PPP conversion factor (the number of units of a country's currency required to buy the same amount of goods and services in the domestic market as $1 would buy in the USA) exists, but price data become available much sooner than PPP conversion factor estimates. It is therefore not feasible to construct recent cigarette affordability indices using available PPP conversion factors. There is also considerable debate over the choice of an appropriate "basket" for making purchasing power comparisons.[18]

The Economist circumvented these problems by using the price of a Big Mac (McDonalds hamburger) as an indicator of PPP. Using the Big Mac is an attractive option because its composition is uniform in most countries. However, Big Mac local prices may be distorted by trade barriers on beef, sales tax or significant differences in the cost of inputs such as rents. More recently, it was pointed out that bovine spongiform encephalopathy may soon begin to distort Big Mac prices in Europe††. Despite these flaws, several academic studies have concluded that the Big Mac index is not only a good indicator of PPP, it is also an unexpectedly accurate predictor of exchange rates in the long run.[18–20]

Using Big Mac prices to assess the affordability of cigarettes was proposed by Michelle Scollo[21] in 1996 and provides a light hearted comparison tool for recent cigarette price estimates by weighting cigarette prices by the Big Mac PPP index. Simply put, the Big Mac PPP index is the exchange rate that would mean hamburgers cost the same in the USA as abroad. Big Mac prices published in *The Economist* were used to construct an affordability index. March 2001 cigarette prices were in turn weighted by the implied Big Mac PPP.

§The Economist Intelligence Unit, part of The Economist Group, is a business information provider with offices in London, New York, Hong Kong Special Administrative Region of China, Singapore, and Cambridge (USA).

¶Where the Marlboro brand is not available, the EIU surveys the nearest equivalent international brand. For example, in Zimbabwe where the Marlboro brand is not available, the data refers to Benson and Hedges and Dunhills.

**Cigarette prices can be significantly different within countries.

††For more details on the advantages and disadvantages of using the Big Mac as an indicator of PPP see Pakko and colleagues[20] and The Economist Big MacCurrencies, 29 April 2000. URL: http://www.economist.com/markets/bigmac/displaystory.cfm?story_id=305167

Table 1 Cigarette prices: March 2001

	Local brand		Marlboro*	
	LCU	$US	LCU	$US
WHO-AFRO				
Cameroon	700	0.99	1000	1.42
Côte d'Ivoire	500	0.71	650	0.92
Gabon	860	1.22	930	1.32
Kenya	70	0.90	120	1.55
Nigeria	100	0.86	100	0.86
Senegal	200	0.28	500	0.71
South Africa	10.40	1.34	10.40	1.34
Zimbabwe	36.00	0.65	63.40	1.15
WHO-PAHO				
Northern America				
Canada	4.46	2.88	5.27	3.40
USA	3.60	3.60	3.71	3.71
Caribbean, Latin America				
Argentina	1.50	1.50	1.70	1.70
Brazil	1.65	0.80	1.75	0.85
Chile	850	1.43	1000	1.69
Colombia	1460	0.64	2340	1.03
Costa Rica	240	0.75	240	0.75
Ecuador	1.30	1.30	1.90	1.90
Guatemala	7.50	0.97	10.00	1.29
Mexico	12.00	1.24	15.00	1.55
Panama	1.20	1.20	1.20	1.20
Paraguay	3500	0.93	4150	1.10
Peru	4.70	1.34	5.00	1.42
Puerto Rico	–	–	2.50	2.50
Uruguay	18.00	1.42	40.00	3.14
Venezuela (Bolivarian Republic of)	900	1.28	1000	1.42
WHO-EMRO				
Bahrain	–	–	0.50	1.32
Egypt	4.50	1.16	4.50	1.16
Iran (Islamic Republic of)	3800	0.46	8000	0.96
Jordan	700	0.98	1450	2.04
Kuwait	–	–	0.34	1.10
Libyan Arab Jamahiriya	1.00	1.82	2.50	4.55
Morocco	14.50	1.36	28.00	2.63
Pakistan	32.00	0.53	50.00	0.83
Saudi Arabia	3.50	0.93	4.87	1.30
Syrian Arab Republic	30.00	0.56	60.00	1.12
Tunisia	–	–	2.70	1.96
United Arab Emirates	4.75	1.29	6.50	1.77
WHO-SEARO				
Bangladesh	45.00	0.83	68.00	1.26
India	42.50	0.91	57.50	1.24
Indonesia	6250	0.62	6250	0.62
Sri Lanka	140	1.66	150	1.78
Thailand	30.00	0.69	47.00	1.08
WHO-WPRO				
Australia	6.28	3.20	6.78	3.46
Brunei Darussalam	–	–	3.00	1.70
Cambodia	–	–	–	0.90
China	11.58	1.40	13.03	1.57
"China, Hong Kong SAR"	38	4.87	30	3.85
"China, Province of Taiwan"	25	0.77	40	1.23
Japan	250	2.09	280	2.34
Malaysia	4.10	1.08	4.30	1.13
New Zealand	8.78	3.69	8.83	3.71
Papua New Guinea	6.00	1.85	6.00	1.85
Philippines	24.50	0.51	32.00	0.67
Republic of Korea	1600	1.26	1900	1.50
Singapore	6.20	3.52	6.90	3.92
Viet Nam	8350	0.57	10500	0.72
WHO-EURO				
Western Europe				
Austria	44.90	3.04	48.90	3.31
Belgium	127.00	2.93	127.00	2.93
Denmark	32.00	4.00	32.00	4.00
Finland	21.40	3.35	23.80	3.73
France	19.35	2.75	22.00	3.13
Germany	5.77	2.75	5.90	2.81
Greece	600	1.64	750	2.05
Iceland	389	4.53	380	4.43
Ireland	3.80	4.47	3.80	4.47
Israel	7.90	1.91	13.30	3.22
Italy	4000	1.93	5600	2.70
Luxembourg	82.40	1.90	97.00	2.24
Netherlands	6.04	2.56	6.60	2.80
Norway	57.00	6.48	57.00	6.48
Portugal	380.00	1.77	400.00	1.86
Spain	205.00	1.15	385.00	2.16
Sweden	35.50	3.64	36.50	3.75
Switzerland	4.65	2.80	4.65	2.80
Turkey	8000000	0.89	11000000	1.23
UK	4.25	6.25	4.25	6.24
Eastern Europe				
Czech Republic	42.00	1.13	52.90	1.42
Hungary	219	0.77	310	1.09
Poland	4.50	1.13	6.00	1.51
Romania	24.00	0.88	27.50	1.01
Azerbaijan	1500	0.33	4000	0.88
Russian Federation	17.00	0.59	28.00	0.98
Ukraine	–	–	4.35	0.80
Uzbekistan	750	1.11	–	–
Croatia	11.00	1.33	17.00	2.06
Yugoslavia	18.00	0.28	60.00	0.94

*Marlboro or nearest equivalent international brand.
LCU, local currency unit.
Source: Economist Intelligence Unit.

The World Health Organization also proposed to assess tobacco affordability by examining how many minutes of labour are required to purchase a pack of cigarettes.[22] The Union Bank of Switzerland (UBS) Swiss Economic Research conducts a survey of international prices and wages in more than 50 cities every three years. Data from the most recent survey, conducted in the second quarter of 2000,[23] were utilised with the September 2000 EIU tobacco price data to calculate how many minutes of work‡‡ are required to purchase one pack of Marlboro and one pack of local brand cigarettes.

Annual real percentage changes in price between 1990 and 2000 were calculated by taking the percentage difference in local currency prices while taking into account or "discounting" for inflation. Inflation is the proportionate rate of change in the general price level within each country. The calculation was facilitated by creating an inflation index (CPI) based upon the consumer price index estimates provided by the EIU. Unless otherwise noted, the data shown represent prices in the first week of September of 1990 and 2000. One cannot understate the importance to correct nominal changes in price for changes in inflation. For example, the price of one pack of Marlboro in Turkey jumped from 2500 Lira in 1990 to 875 000 Lira in 2000. However, during the same period, general prices increased by about 28 000%. Even in countries with low inflation, it is instrumental to correct for inflation. For example, in

‡‡Average wages are based on actual wages in 12 occupations after taking into account working time, holidays, and vacations. The 12 occupations are: primary school teachers, bus drivers, automobile mechanics, building labourers, skilled industrial workers, cooks, department managers, electrical or mechanical engineers, bank credit clerks, secretaries, saleswomen, and female industrial workers.

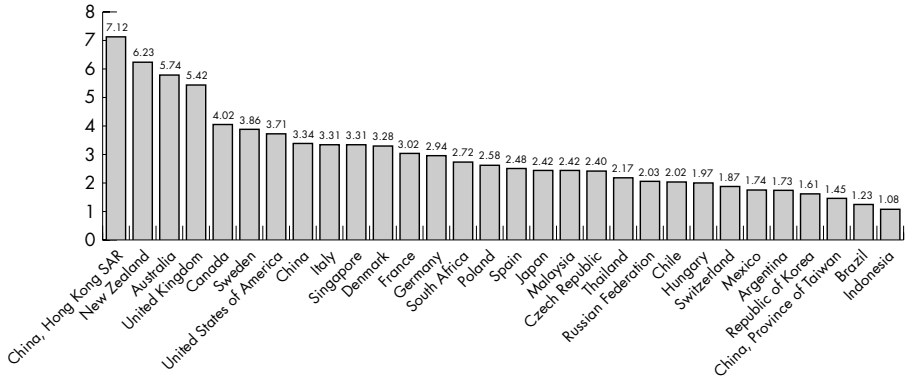

Figure 1 Marlboro* prices March 2001: pack of 20 at purchasing power parity (PPP) (implied by Big Mac PPP). Source: Economist Intelligence Unit and *The Economist*. *Marlboro or nearest equivalent international brand.

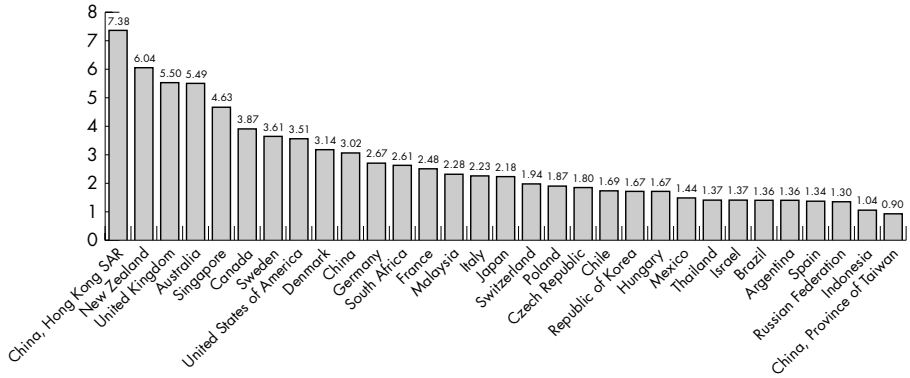

Figure 2 Local brand prices March 2001: pack of 20 at purchasing power parity (PPP) (implied by Big Mac PPP). Source: Economist Intelligence Unit and *The Economist*.

an economy in which inflation averages just 5% annually, prices would more than double in less than 15 years.

It is important to note that an increase in the real price of cigarettes does not necessarily mean that cigarettes are less affordable (or more costly) since increases in income levels are not taken into account. Generally, income is positively related to cigarette consumption.[24] That is, everything else remaining the same, an increase in income will lead to an increase in tobacco consumption. In other words, even if the real price increased, increased income may offset, partially or even fully, the increase in real price. To control for changes in income levels, annual changes between 1991 and 2000 in the minutes of labour required to buy cigarettes were calculated based on the UBS 1991 and 2000 surveys.

RESULTS

Table 1 presents March 2001 cigarette prices in LCUs and in US dollars for 87 countries, provinces, and territories. As expected, cigarette prices are higher in wealthier countries and in countries that have strong tobacco control programmes such as the UK, Norway, Hong Kong Special Administrative Region of China, New Zealand, and Australia.

Figures 1 and 2 presents Marlboro and local brand price data in terms of their domestic affordability calculated from prices in local currencies weighted by the Big Mac implied PPP conversion factors. As expected, countries in which tobacco taxes were used as a pubic health instruments, such as Hong Kong Special Administrative Region of China, the UK, Sweden, New Zealand, and Ireland, appear towards the top of the index while countries like Switzerland and Japan where the household incomes are very high and tobacco control policies poor show up towards the bottom of the scale.

Table 2 presents cigarette affordability in terms of minutes of labour required to buy one pack of cigarettes in 56 cities. In order to also allow us to assess the affordability of cigarettes within countries, these results are presented alongside minutes of labour required to purchase one Big Mac, 1 kg of bread, and 1 kg of rice calculated by UBS. Minutes of labour required to purchase cigarettes vary vastly between countries, from about 10 minutes in Japan and Switzerland to close or more than 100 minutes in Kenya and India. It is interesting to compare the affordability of cigarettes relative to that of bread, rice, and a Big Mac. In most developed countries, cigarettes are more expensive than bread, rice, and Big Macs while in many developing countries cigarettes are cheaper. In some developing countries such as India, Panama, and Kenya, cigarettes appear prohibitively expensive which may explain why prevalence and consumption of manufactured tobacco tends to be very low in many low income countries.

Figures 3 and 4 provide trends in Marlboro and local brand price data from September 1990 to September 2000. Although cigarettes prices are determined by many factors other than taxes—and it is important to understand these competing determinants—what is ultimately more important for public health is how affordable tobacco products are. Even though the changes in cigarette prices presented may only partially reflect changes in domestic tobacco tax policy that have occurred during the 1990s, these estimates provide vital insight into trends in the price of cigarettes.

The diverging trends in price changes between certain countries are startling. For example, in the European Union (EU), while the real price of both local brand and Marlboro cigarettes increased by more than 5% per year in France and the UK, it remained fairly stable or even decreased in Austria, Germany, and Denmark. With the exception of Poland, the real prices of cigarettes have decreased during the past decade among EU applicants. Real Marlboro prices have decreased in more countries than local brand prices (33 out of 68 *v* 19 out of 64). These results are not surprising considering the recent evidence uncovered by *The Economist* alleging that major transnational companies conspired to fix cigarette prices.[25] The companies were not initially fixing prices high to raise margins; they were allegedly fixed to mislead governments into thinking that new foreign brands would not become very

Table 2 Minutes of labour† required to buy a pack of cigarettes (Marlboro or local brand) compared with a Big Mac, bread, and rice: 2000

Country	City	Minutes of labour				
		Marlboro*	Local brand	Big Mac	Bread (1 kg)	Rice (1 kg)
Argentina	Buenos Aires	21	15	29	23	22
Australia	Sydney	28	24	13	13	7
Austria	Vienna	22	20	16	13	11
Bahrain	Manama (Bahrain)	18	–	27	29	26
Belgium	Brussels	22	20	21	13	17
Brazil	Rio de Janeiro	22	18	45	52	13
	Sao Paulo	17	17	36	27	11
Canada	Montréal	19	16	14	12	9
	Toronto	21	17	13	10	11
Chile	Santiago de Chile	38	33	62	19	25
China	Shanghai	62	56	55	103	47
"China, Province of Taiwan"	Taipei	11	7	20	22	12
"China, Hong Kong SAR"	Hong Kong	27	27	9	15	7
Colombia	Bogota	25	16	57	29	15
Denmark	Copenhagen	23	23	19	12	11
Finland	Helsinki	29	27	25	28	26
France	Paris	20	18	19	17	20
Germany	Berlin	18	19	17	10	11
	Frankfurt	17	17	16	9	18
Greece	Athens	24	17	20	10	10
Hungary	Budapest	71	54	82	25	42
India	Mumbai	102	77	105	34	79
Indonesia	Jakarta	62	62	146	85	28
Ireland	Dublin	31	30	16	8	18
Israel	Tel Aviv	29	17	42	16	13
Italy	Milan	26	19	21	22	22
Japan	Tokyo	9	8	9	14	15
Kenya	Nairobi	158	92	178	64	109
Luxembourg	Luxembourg	12	10	15	11	14
Malaysia	Kuala Lumpur	21	20	22	20	25
Mexico	Mexico city	49	40	66	49	25
Netherlands	Amsterdam	19	17	16	10	10
New Zealand	Auckland	35	33	15	9	7
Norway	Oslo	38	38	21	14	15
Panama	Panama	81	81	41	32	15
Philippines	Manila	42	32	75	52	46
Poland	Warsaw	56	40	54	21	23
Portugal	Lisbon	26	26	32	15	13
Republic of Korea	Seoul	27	17	25	25	22
Russian Federation	Moscow	71	43	74	25	152
Singapore	Singapore	43	40	22	31	14
South Africa	Johannesburg	20	20	19	11	9
Spain	Barcelona	21	11	20	9	9
	Madrid	21	11	21	9	9
Sweden	Stockholm	28	27	19	18	23
Switzerland	Geneva	12	12	16	9	11
	Zurich	11	11	15	10	7
Thailand	Bangkok	35	23	43	23	14
Turkey	Istanbul	30	22	52	13	31
United Arab Emirates	Abu Dhabi	20	11	37	15	19
UK	London	40	40	18	6	8
USA	Chicago	18	18	13	9	8
	Houston	17	15	13	15	8
	Los Angeles	20	20	11	18	8
	New York	18	18	12	15	9
Venezuela	Caracas	29	29	93	62	19

*Marlboro or nearest equivalent international brand.
†Price divided by the weighted net hourly wage in 12 occupations.
Source: Union Bank of Switzerland (2000) and Economist Intelligence Unit.

popular, and thus avoid strong and effective tobacco control measures.

Table 3 presents annual changes in the minutes of labour required to purchase one pack of Marlboro and one pack of local brand cigarettes between 1991 and 2000. Trends in minutes of labour required to purchase cigarettes show somewhat similar trends to those witnessed by changes in real prices§§. In 11 countries out of 42, cigarettes were more affordable in 2000 than they were at the beginning of the decade. The direction of the changes in prices were mostly similar but not identical while the magnitude of the change in prices showed no discernible pattern. Comparable data were available for 35 countries and the direction of the changes in Marlboro and local brand prices were the same in 29 and 28 countries, respectively.

§§Correlation coefficient (*r*) between annual changes in real price and annual change in minutes of labour is 0.55 for Marlboro and 0.53 for local brand (n = 35).
¶¶Correlation coefficients between real change in prices (Marlboro and local brand) and gross domestic product per capita at PPP in the year 2000 are 0.45 and 0.29 (n = 67 and n = 63), respectively. The 2000 per capita gross domestic product PPP data were obtained from the EIU (http://countrydata.bvdep.com/).

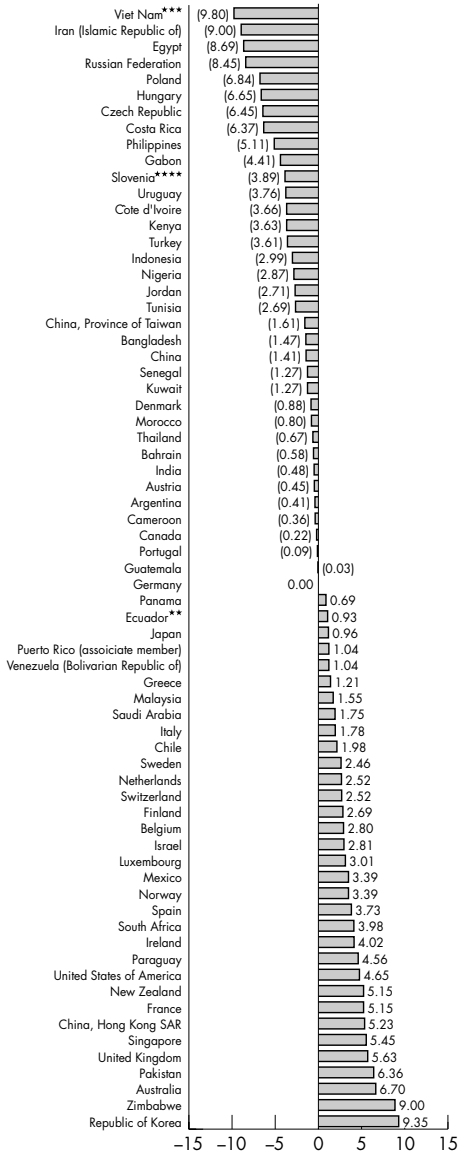

Figure 3 A decade of real change. Marlboro* annual price change in real terms 1990–2000 (%). Source: Economist Intelligence Unit. *Marlboro or nearest equivalent international brand. **March 1990 to March 2000. ***September 1993 to September 2000. ****September 1992 to September 2000.

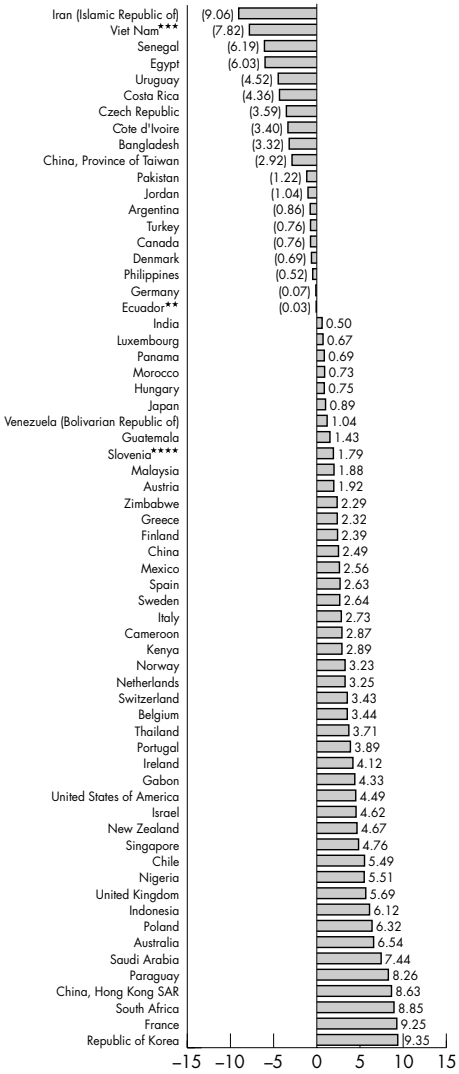

Figure 4 A decade of real change. Local brand annual price change in real terms* 1990–2000 (%). Source: Economist Intelligence Unit. *Deflated by consumer price index. **March 1990 to March 2000. ***September 1993 to September 2000. ****September 1992 to September 2000.

These results also indicate, with some exceptions, that over the past 10 years, cigarettes have become more expensive in most developed countries, but relatively more affordable in many developing countries¶¶. It is also quite troubling to see that cigarette prices have decreased by more than 50% between 1990 and 2000 in the Islamic Republic of Iran, Egypt, and Viet Nam while they steadily increased in countries that have fairly strong tobacco control programmes such as Australia, Hong Kong Special Administrative Region of China, New Zealand, Singapore, and South Africa. In the UK, despite recent increases in price, cigarettes are still more affordable than they were in the 1960s.[26]

DISCUSSION

Policy implications

Ample room for increases in tobacco taxes

The trends outlined above suggest that there is ample room to increase tobacco taxes. In too many countries, cigarette prices have failed to keep up with increases in the general price level of goods and services, rendering them more affordable in 2000 than they were at the beginning of the decade. Opportunities to increase cigarette prices, increase government revenue, and improve health have been overlooked in many countries.

Recently, several countries have acknowledged the impact that increases in tobacco prices can have on the health of their population. In December 1998, in "Smoking Kills –A White Paper on Tobacco", the UK Secretary of State for Health recommended that tobacco prices be increased to improve health outcomes.[26] The UK Chancellor announced increases in tobacco taxes of, on average, at least 5% a year in real terms. Similarly, in September 1999 in France, the "Rapport Recours" on Health Policy and Tobacco Fiscal Policy recommended a 20% increase in the price of tobacco products to discourage smoking.[27] Armenia, Canada, France, Ireland, South Africa, Thailand, and the UK are examples of this increasing commitment by national governments to use fiscal policy to advance public health.

Tax all tobacco products

The data presented above, combined with the price data available for pipe tobacco (not shown here), suggests that in many countries there are wide discrepancies in changes in cigarette

Table 3 Minutes of labour required to buy cigarettes† 1991–2000

Country	City	Minutes of labour 2000		Minutes of labour 1991		Annual change 1991–2000 (%)	
		Marlboro *	Local brand	Marlboro*	Local brand	Marlboro*	Local brand
Argentina	Buenos Aires	20.5	15.4	19.5	15.3	0.58	0.07
Australia	Sydney	28.4	24.0	13.3	12.8	8.77	7.28
Austria	Vienna	21.8	20.0	23.8	17.2	–0.96	1.67
Bahrain	Manama (Bahrain)	17.6	–	–	–	–	–
Belgium	Brussels	22.0	20.4	15.9	13.8	3.68	4.40
Brazil	Rio de Janeiro	21.8	18.4	8.5	6.3	11.05	12.69
	Sao Paulo	17.2	17.2	8.0	7.6	8.93	9.51
Canada	Montréal	19.4	15.5	22.2	22.6	–1.48	–4.06
	Toronto	20.7	17.5	22.4	22.4	–0.88	–2.70
Chile	Santiago de Chile	38.4	32.6	–	–	–	–
China	Shanghai	61.8	56.2	–	–	–	–
"China, Province of Taiwan"	Taipei	11.4	7.1	12.5	8.9	–1.01	–2.47
"China, Hong Kong SAR"	Hong Kong	27.4	27.4	17.2	12.5	5.29	9.08
Colombia	Bogota	24.9	16.0	–	–	–	–
Denmark	Copenhagen	23.0	23.0	24.4	23.9	–0.65	–0.45
Finland	Helsinki	28.7	26.7	19.7	18.8	4.31	3.96
France	Paris	20.5	18.2	14.3	9.6	4.07	7.34
Germany	Berlin	18.4	18.7	–	–	–	–
	Frankfurt	17.3	17.3	15.7	14.9	1.14	1.69
Greece	Athens	24.0	17.1	16.2	10.4	4.45	5.73
Hungary	Budapest	71.4	54.5	–	–	–	–
India	Mumbai	102.5	76.8	116.2	83.6	–1.38	–0.94
Indonesia	Jakarta	61.7	61.7	–	–	–	–
Ireland	Dublin	30.6	30.3	27.4	26.8	1.25	1.36
Israel	Tel Aviv	29.3	17.4	24.2	12.1	2.15	4.16
Italy	Milan	26.0	18.6	17.8	11.6	4.31	5.40
Japan	Tokyo	8.9	7.9	9.0	8.2	–0.14	–0.43
Kenya	Nairobi	157.6	91.9	119.8	36.3	3.09	10.87
Luxembourg	Luxembourg	12.0	10.2	8.5	9.1	3.89	1.27
Malaysia	Kuala Lumpur	20.7	19.8	31.9	29.5	–4.68	–4.34
Mexico	Mexico city	49.4	39.5	30.0	26.0	5.69	4.76
Netherlands	Amsterdam	18.5	17.0	15.1	12.8	2.34	3.15
New Zealand	Auckland	35.3	33.4	–	–	–	–
Norway	Oslo	38.5	38.5	26.6	27.1	4.17	3.99
Panama	Panama	81.4	81.4	24.4	24.4	14.33	14.33
Philippines	Manila	41.8	32.0	73.0	34.9	–6.02	–0.95
Poland	Warsaw	55.7	40.2	–	–	–	–
Portugal	Lisbon	26.2	26.2	33.0	33.0	–2.54	–2.54
Republic of Korea	Seoul	26.6	16.6	12.0	7.5	9.24	9.24
Russian Federation	Moscow	71.3	42.8	–	–	–	–
Singapore	Singapore	42.6	39.9	37.4	37.4	1.44	0.71
South Africa	Johannesburg	19.5	19.5	15.0	9.5	2.97	8.34
Spain	Barcelona	21.1	10.9	–	–	–	–
	Madrid	21.4	11.1	12.4	7.2	6.23	4.98
Sweden	Stockholm	27.6	26.8	33.2	31.7	–2.04	–1.85
Switzerland	Geneva	12.5	12.5	7.8	7.8	5.43	5.43
	Zurich	11.1	11.1	7.8	6.5	3.97	6.02
Thailand	Bangkok	35.0	23.3	–	–	–	–
Turkey	Istanbul	30.0	22.3	–	–	–	–
United Arab Emirates	Abu Dhabi	19.7	11.1	–	–	–	–
UK	London	39.7	39.7	24.6	24.6	5.46	5.46
USA	Chicago	18.0	18.0	12.1	12.1	4.46	4.46
	Houston	16.9	14.6	16.5	16.5	0.25	–1.36
	Los Angeles	20.0	20.0	10.4	10.4	7.55	7.55
	New York	17.6	17.6	11.4	11.1	4.90	5.26
Venezuela	Caracas	28.5	28.5	13.0	13.0	9.16	9.16

*Marlboro or nearest equivalent international brand.
†Price divided by the weighted net hourly wage in 12 occupations
Source: UBS and Economist Intelligence Unit.

prices across brands and across tobacco products. In order to maximise the policy objective, taxes should be implemented uniformly to all products so as not to encourage substitution.

Earmark revenues to fund tobacco control

The WHO recommends earmarking a portion of government revenues from tobacco to fund activities that will advance tobacco control and activities that will ease the effects of short-run transition of tobacco farmers, whose livelihoods may be affected by reduced consumption.[28]

Recently, several countries have decided to fund tobacco control activities or broader public health programmes through tobacco higher taxes. In the UK in November 1999, Gordon Brown, the Chancellor of the Exchequer, announced that the National Health Service was to benefit from increases in tobacco taxes.[29] In December 1999, Ireland's Minister for Finance and Minister for Health and Children announced that the revenue equivalent to a new tax increase would fund health provisions. During the 52nd World Health Assembly, Saudi Arabia's health minister proposed to Gulf

Cooperation Council members to standardise the levy imposed on tobacco products and that 5% be dedicated to tobacco control activities.[30] To date Qatar has earmarked tobacco taxes to fund similar efforts. Other countries such as Australia, Egypt, the Islamic Republic of Iran, Thailand, and several US states such as California and Massachusetts earmark a portion of tobacco taxes to fund tobacco control programmes activities such as counter-advertising or broader public health activities.[31 32]

Regional cooperation

As indicated earlier, discrepancies in tobacco prices between countries can create an incentive to smuggle. However, neighbouring countries can minimise the incentive to smuggle by harmonising taxes on tobacco products. The EU adopted three directives in October 1992 (92/78/EEC, 92/79/EEC, and 92/80/EEC) that aimed at decreasing tobacco price disparities between EU member countries. The first directive defined the taxation structure of tobacco products while the latter two fixed a minimum tax level of at least 70% of the retail price. These three directives have been in force since 1 January 1993. A new directive was adopted in 1995 (95/59/CE) and directive 92/78/EEC was amended to harmonise further this process.

In 1996, the six nation Gulf Cooperation Council (GCC) agreed to increase gradually customs duty on tobacco and related products to 100% by 2000 from less than 30% in the 1980s. Saudi Arabia, Bahrain, Qatar and Oman have already increased tobacco duty to 100% while the United Arab Emirates increased it to 90% in 1999 and Kuwait to 70% in 1997.[33] However, these achievements are at risk. The tobacco industry is pressuring the GCC members to lower their duties, stressing that their fiscal revenue from tobacco duties will soon begin to fall because of increased smuggling.[17] In early 2000, Lithuania, Latvia, and Estonia announced plans to harmonise their respective tobacco fiscal policies as they are required to raise their rates in order to qualify for membership in the EU.[34] The EU should continue its efforts to harmonise tobacco prices, and countries of economic groups such as the Commonwealth of Independent States (CIS), Latin American Economic System (SELA), Caribbean Community (Caricom), and South Asian Association for Regional Cooperation (SAARC) should follow suit.

Implement CPI adjustments and remove tobacco from the CPI

Because general prices and wages tend to rise over time, and because even small annual changes can significantly affect price levels over a decade (a 10% annual change will double prices in less than 8 years), it is recommended, at the very least, to adjust cigarette prices with increases in the CPI. Australia has adopted such a measure and now adjusts cigarette prices twice a year.[35]

In today's economies, the CPI is an indicator of great importance. Not only is it often used within the framework of monetary policy, but changes in CPI (inflation) are often used, for example, to index pension funds and adjust wage settlements. Because tobacco taxes generally lead to higher prices, increasing tobacco taxes can affect, albeit only marginally, a country's inflation. Given the importance of the CPI as the benchmark for inflation, raising taxes on tobacco products (which provide upward pressure on CPI) is in conflict with low inflationary policies set by central banks and may create a disincentive to raise tobacco taxes. Also, the impact of increasing tobacco taxes in an attempt to discourage tobacco consumption would be offset, to some extent, by adjustments in income tied to CPI movements.[36] The aforementioned potential barrier to higher tobacco taxes should not be downplayed. The 2000 Ireland budget speech by Charlie McCreevy, Minister for Finance, illustrates the importance of the CPI in setting tax policies:

What this paper adds

Increasing the price of tobacco products is arguably the most effective method of curbing the prevalence and consumption of tobacco products. International comparisons of levels and trends of cigarette prices and affordability are scarce, notably in developing countries.

This paper examines trends in real cigarette prices and their affordability in more than 80 countries. It also compares prices across countries using different methods. The results suggest that there is ample room to increase tobacco taxes, which would reduce consumption, increase government revenue, and improve health.

> "I propose accordingly to increase the excise duty on cigarettes from midnight by 50p per packet of 20 inclusive of VAT with corresponding increases in other tobacco products. This will raise £132 million in a full year and add 0.75% to the CPI."[37]

Fortunately, there exists a solution to these problems: the calculation of two distinct CPIs with and without tobacco. The EU has already recommended its member countries to exclude tobacco products from their respective CPIs.[38] Luxembourg (1 January 1991), France (1 January 1992), and Belgium (1 January 1994) have removed tobacco products from their respective CPI.[39]

Support the WHO Framework Convention on Tobacco Control

The member states of the WHO are currently negotiating a Framework Convention on Tobacco Control (FCTC). The FCTC has the potential to enhance various aspects of tobacco control and could include provisions for cooperation in research, programme, and policy development and protocols that aim to foster better price harmonisation and anti-smuggling measures.[40 41] The FCTC may provide a framework similar to that of the EU where countries agree to harmonise tobacco prices, thus minimising the incentive to smuggle, so that the full benefits of increases in tobacco taxes—lower smoking rates and better health—are achieved.

Conclusion

Empirical work to date indicates that increasing the price of tobacco products will indeed reduce consumption while also increasing government revenue. As we are all well aware, reducing the consumption of tobacco will not only reduce the global burden of disease but also, among other things, increase the wellbeing of the individuals around us. Therefore, the policy implications inherent in pricing tobacco products take on a vital role. The evidence presented heretofore illustrates that there is indeed room to increase the prices of tobacco products. Specifically, in order to maximise the policy objective, taxes should be implemented uniformly to all products so as not to encourage substitution. Policy makers should encourage regional coordination to reduce the incentive to smuggle and remove tobacco prices from the CPI. These measures will ensure that tobacco consumption will be subject to the full effect of the price increase.

However, from the limited evidence provided here it is sufficient to say that more data need to be gathered and analysed. The dataset currently being worked on will enable us to understand better the relation between price and consumption and in turn the vital role of policy makers in increasing taxes and reducing the global burden of disease attributable to tobacco consumption.

ACKNOWLEDGEMENTS

We would like to thank Joy de Beyer, Karen Klimowski and two anonymous reviewers for their comments, and Helen Green for her editing assistance. We alone are responsible for the remaining errors in this paper.

Authors' affiliations

G E Guindon, World Health Organization, Tobacco Free Initiative, Geneva, Switzerland
S Tobin, Organisation for Economic Co-Operation and Development, Paris, France
D Yack, World Health Organization, Noncommunicable Diseases and Mental Health, Geneva, Switzerland

REFERENCES

1 **The World Bank**. *Curbing the epidemic: governments and the economics of tobacco control*. Series: Development in practice. Washington DC: The World Bank, 1999. URL: http://www1.worldbank.org/tobacco/reports.htm
2 **Grossman M**, Sindelar JL, Mullahy J, *et al*. Policy watch: alcohol and cigarette taxes. *Journal of Economic Perspectives* 1993;**7**:211–22.
3 **Harris JE**. A working model for predicting the consumption and revenue impacts of large increases in the US federal cigarette excise tax. National Bureau of Economic Research Working Paper: 4803, p 12. July 1994.
4 **Chaloupka FJ**, Wechsler H. Price, tobacco control policies and smoking among young adults. *J Health Econ* 1997;**16**:359–73.
5 **Farrelly MC**, Bray JC. Office of Smoking and Health. Response to increases in cigarette prices by race/ethnicity, income, and age groups –United States, 1976-1993. *MMWR Morb Mortal Wkly Rep* 1998;**47**:605–9.
6 **Ranson K**, Jha P, Chaloupka FJ, *et al*. The effectiveness and cost-effectiveness of price increases and other tobacco-control policies. In: Jha P, Chaloupka FJ, eds. *Tobacco control in developing countries*. New York: Oxford University Press, 2000.
7 **Lewit EM**, Coate D, Grossman M. The effects of government regulation on teenage smoking. *Journal of Law and Economics* 1981;**24**:545–69.
8 **Grossman M**, Chaloupka FJ. Cigarette taxes: the straw to break the camel's back. *Public Health Reports* 1997;**112**:290–7.
9 **Townsend J**, Roderick P, Cooper J. Cigarette smoking by socioeconomic group, sex and age: effects of price, income, and health publicity. *BMJ* 1994;**309**:923–7.
10 **Chaloupka FJ**, Pacula RL. Sex and race differences in young people's responsiveness to price and tobacco control policies. *Tobacco Control* 1999;**8**:373–7. URL: http://tc.bmjjournals.com/cgi/content/full/8/4/373
11 **van Walbeek C**. Recent trends in smoking prevalence in South Africa: some evidence from AMPS data. The Economics of Tobacco Control Project, Research Release No. 3, preliminary report, January 2001.
12 **Philip Morris International document**. Smoking and health initiatives. Bates No. 2023268329-49. Minnesota Tobacco Document Depository, 1995.
13 **Excise Taxation of Tobacco Products (Bingham)**. Public Affairs International Conference 12-16 July 1992, BAT (File No. BA0462). Bates No. 502649609-796.
14 **Warner KE**. The economics of tobacco: myths and realities. *Tobacco Control* 2000;**9**:78–89.
15 **Alcohol and Drug Information Centre –Ukraine**. *Tobacco or health in Ukraine*, 2001 update. URL: http://www.adic.org.ua/adic/reports/toh-2001/
16 **The Guardian**. Special Report: BAT exposé. How smuggling helps lure generations of new smokers. 31 January 2000. URL: http://www.newsunlimited.co.uk/bat/article/0,2763,130692,00.html
17 **The Guardian**. Special Report: BAT exposé. January and February 2000. URL: http://www.newsunlimited.co.uk/bat/
18 **Ong LL**. Burgernomics: The economics of the Big Mac standard. *Journal of International Money & Finance*. 1997;**16**:865–78.
19 **Cumby R**. Forecasting exchange rates and relative prices with the hamburger standard: is what you want what you get with McParity? National Bureau of Economic Research Working Paper: 5675. p 13. July 1996.
20 **Pakko MR**, Pollard PS. For here or to go? Purchasing power parity and the Big Mac. *Federal Reserve Bank of St Louis Review* 1996;**78**:3–21
21 **Scollo M**. The Big Mac index of cigarette affordability. *Tobacco Control* 1996;**5**:69.
22 **World Health Organization**. *Guidelines for controlling and monitoring the tobacco epidemic*. Geneva: World Health Organization 1998. WHO monograph.
23 **Union Bank of Switzerland (UBS)**. *Prices and earnings around the globe: 2000 edition*. Union Bank of Switzerland, 2000. URL: http://www.ubs.com/e/index/about/research/pcc/publications.html
24 **Chaloupka FJ**, Warner KE The economics of smoking. In: Culyer AJ, Newhouse JP, eds. *Handbook of health economics*, Amsterdam: Elsevier, 2000.
25 **The Economist**. The price is not quite right, 7 July 2001.
26 **Department of Health**. *Smoking kills - a White Paper on tobacco*. URL: http://www.official-documents.co.uk/document/cm41/4177/4177.htm
27 **Recours A**. Politique de santé et Fiscalité du tabac. Rapport à Monsieur le Premier Ministre, septembre 1999. URL: http://www.premier-ministre.gouv.fr/pm/rapports.htm
28 **World Health Organization**. *The world health report 1999. Making a difference*. Geneva: WHO 1999. URL: http://www.who.int/whr/
29 **Beecham L**. Tobacco tax to be ringfenced for NHS. *BMJ* 1999;**319**:1322.
30 **Info-Prod Research (Middle East) Ltd**. Tobacco duties and warnings for smokers to be standardized. 16 June 1999.
31 **Holman CD**, RJ Donovan, B Corti, *et al*. Banning tobacco sponsorship: replacing tobacco with health messages and creating health-promoting environments. *Tobacco Control* 1997;**6**:115–21.
32 **Hu TW**, Xu XP, Keeler T. Earmarked tobacco taxes: lessons learned. In: Abedian I, van der Merwe R, Wilkins N, Jha P, eds. *The economics of tobacco control: towards an optimal policy mix*. Cape Town: University of Cape Town, 1998:102–18.
33 **Ghantous G**. Tobacco duties lead to Gulf smuggling. 17 January 2000. Reuters.
34 **Tobacco Reporter**. Business around the globe. February 2000:8-15.
35 **Kent R**. Tobacco taxes and health promotion. Malta consultation on effective collaboration between the health and financial sectors for tobacco control, 7–8 September 2001, St Julians Malta.
36 **Alchin TM**. A note on tobacco product prices in the Australian CPI. *Applied Economic Letters* 1995;**2**:473–7.
37 **McCreevy C**. Financial statement of the Minister for Finance, 1 December 1999. URL: http://www.ireland.com/special/budget/2000/speech/miscellaneous.htm
38 **Baille JC**. L'Union Européenne et la tabac. Thèse de Docteur en Médecine. Faculté de médecine de Marseille, Université de la Méditerranée Aix-Marseille II. p 72.
39 **European Union**. *European Bureau for Action on Smoking Prevention, Tobacco and Health in the European Union: an overview*. Brussels, 1994.
40 **Joossens L**. *Improving public health through an international framework convention for tobacco control*. WHO technical document: FCTC technical briefing series. Geneva: WHO, 1999.
41 **Bettcher DW**, Yach D, Guindon GE. Global trade and health: key linkages and future challenges. *Bull WHO* 2000;**78**:521–34.