Response to Increases in Cigarette Prices by Race/Ethnicity, Income, and Age Groups—United States, 1976-1993

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1 table, 1 figure omitted
TOBACCO USE, particularly cigarette smoking, remains the leading cause of preventable illness and death in the United States.1 Studies have shown that decreases in the price of cigarettes will decrease the prevalence of smoking and the number of cigarettes smoked by youth and adults.1,2 However, the potential impact of price increases on minority and lower-income populations is an important consideration.1,3 This report summarizes the analysis of data for 14 years from the National Health Interview Survey (NHIS), which indicates that lower-income, minority, and younger populations would be more likely to reduce or quit smoking in response to a price increase in cigarettes.

Data from the NHIS from 1976 to 1980, 1983, 1985, and 1987 to 1993 were pooled to conduct the analysis. The NHIS was administered to a nationally representative multistage probability sample of the noninstitutionalized civilian population aged ≥18 years. Smoking histories were obtained for these years in supplements to the NHIS; the overall response rate for these supplements was approximately 80%. Before 1992, participants were asked, “Have you smoked at least 100 cigarettes in your entire life?” and “Do you smoke cigarettes now?” In 1992 and 1993, participants were asked, “Do you now smoke cigarettes every day, some days, or not at all?” Current smokers were persons who reported having smoked ≥100 cigarettes during their lifetimes and who currently smoked cigarettes. Current smokers were asked, “On average, how many cigarettes do you smoke per day?” Information on race/ethnicity, income, age, and other demographic factors were obtained from the core of the NHIS questionnaire. Using data reported by the Tobacco Institute,4 the average price of a pack of cigarettes for each state, adjusted for inflation, was merged into the NHIS data by year and state of residence. The 14 cross-sections of the NHIS have 367,106 respondents; of these, 355,246 respondents had complete demographic and price data (approximately 24,000 respondents per year).

Two types of multiple regression models were estimated. A probit (limited dependent variable) model was used with the full sample (n=355,246) to estimate the change in the probability of smoking (one for current smokers and zero for all other respondents) for a change in the inflation-adjusted price (1982-1984 dollars). An ordinary least squares model, restricted to current smokers (n=112,657) with self-reported number of cigarettes smoked per day as the dependent variable, was used to estimate the relation between inflation-adjusted price and quantity of cigarettes consumed. Both models controlled for year, region of the country (Northeast, South, Midwest, and West),* age, sex, race/ethnicity, education, marital status, family income, and urbanicity (based on residence in a metropolitan statistical area [MSA] central city, MSA city, or rural area). Separate subpopulation models were estimated by race/ethnicity (Hispanics, non-Hispanic blacks, and non-Hispanic whites), by age group (aged 18-24, 25-39, and ≥40 years), and by income group. Self-reported family incomes from all survey years were inflation-adjusted to 1982-1984 dollars, and the sample median was computed for all respondents reporting family income data. Respondents with incomes equal to or below the median were compared with those above the median income ($33,106 in 1997 dollars). All subpopulation models included the control variables used in the full models.

For all models, the effect of price is expressed as price elasticities. Price elasticity is a standardized measure indicating the percentage change in the dependent variable (i.e., smoking prevalence or number of cigarettes consumed per day) for a 1% change in the inflation-adjusted price of cigarettes (independent variable).5 Prevalence price elasticity, using price coefficients from the probit regression models, is the percentage reduction in the prevalence of smoking that would be predicted from a 1% price increase. Consumption price elasticity, using price coefficients from the linear regression models, is the percentage reduction in the average number of cigarettes smoked by persons who continue to smoke after a 1% price increase. Total price elasticity is the sum of smoking prevalence and cigarette consumption price elasticities.

For all respondents, the models estimated a prevalence price elasticity of −0.15 and a consumption price elasticity of −0.10, yielding a total price elasticity estimate of −0.25. Therefore, a 50% price increase could cause a 12.5% reduction in the total U.S. cigarette consumption (i.e., 50% × −0.25 = −12.5%), or approximately 60 billion fewer cigarettes smoked per year. In the age-specific model, younger smokers were more likely than older smokers to quit smoking, and after controlling for income, education, and other nonprice variables, Hispanic smokers and non-Hispanic black smokers were more likely than white smokers to reduce or quit smoking in response to a price increase. This pattern was consistent for all age groups. Among both non-Hispanic blacks and Hispanics, smokers aged 18-24 years were substantially more price-responsive than smokers aged ≥40 years. Lower-income populations also were more likely to reduce or quit smoking than those with higher incomes. The total price elasticity was −0.29 for lower-income persons compared with −0.17 for higher-income persons.

Reported by: MC Farrelly, PhD, JW Bray, MA, Research Triangle Institute, Research Triangle Park, North Carolina. Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, CDC.
price responsive.1,2,7 In this study, smokers with family incomes equal to or below the study sample median were more likely to respond to price increases by quitting than smokers with family incomes above the median (e.g., 10% quitting compared with 3% quitting in response to a 50% price increase). After controlling for income and education, Hispanics and non-Hispanic blacks are substantially more price responsive than other smokers. Data from this model suggest that Hispanic smokers were the most price responsive. Non-Hispanic black smokers would respond to price increases primarily by quitting rather than reducing the number of cigarettes smoked per day.

This study is subject to at least five potential limitations. First, because the analysis is based on pooled cross-sectional surveys, the estimates of price elasticity could underestimate the long-term response to price changes that would be observed from longitudinal surveys. Second, this analysis does not control fully for other factors unrelated to price (e.g., differences between states in social and policy environments) that could reduce demand and be confounded with the state’s excise tax level. Third, because not all respondents for whom price data was available reported family income, the analysis by income categories could be less representative than other subpopulation analyses. Fourth, the sample sizes in subpopulation analyses by race and age are reduced and make the estimation of price elasticities within specific age groups by race less stable. Nevertheless, the pattern and magnitude of the estimated parameters are consistent with those observed in previous studies, and parameters for the control variables remained stable across models. Finally, because of the changing composition (e.g., Mexican, Cuban, or Puerto Rican) and smaller size of the Hispanic samples within the 14 NHIS samples used in this analysis, the estimates for Hispanics are subject to greater error than those for non-Hispanic blacks and non-Hispanic whites.

Comprehensive measures for promoting cessation and reducing the prevalence of smoking include increasing tobacco excise taxes, enforcing minors’ access laws, restricting smoking in public places, restricting tobacco advertising and promotion, and conducting counter-advertising campaigns. Because state tax increases and tobacco-use prevention and cessation programs1,2 should be combined with such programs to increase their public health impact. Court settlements with several states and other market factors have resulted in the tobacco industry increasing the wholesale price of cigarettes by 12.2% since January 1997.9 Although this and potential future industry price increases will reduce smoking prevalence and consumption—particularly among adolescents and young adults1—most adult smokers will continue to smoke and pay the higher cigarette prices. Tobacco-use prevention and cessation programs should be made available to benefit those populations paying the greatest share of the increased prices. Smoking prevention will always remain a primary public health objective, but public health efforts encouraging cessation particularly are needed for smokers aged ≥40 years, who would be the most likely group to continue smoking and paying the higher cigarette prices. In addition, tobacco-use prevention and cessation programs need to be directed toward lower-income and minority populations in which the burden of tobacco-related disease is high.10

References

Progress Toward Poliomyelitis Eradication—West Africa, 1997-September 1998

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In 1988, the World Health Assembly adopted the goal of global eradication of poliomyelitis by 2000.1 Although substantial progress has been reported in many parts of the world toward achieving this goal,2 West Africa remains a major reservoir of poliovirus transmission.3,4 This report summarizes progress achieved in the 15 countries of the World Health Organization (WHO) West African subregion (excluding Nigeria) during 1997-1998, reviews the implementation of polio eradication strategies, and suggests that, if activities are intensified and adequate resources are provided, achieving the eradication goal by the target date remains feasible.

Reported routine coverage with three doses of oral poliovirus vaccine (OPV3) among children aged <1 year remains low in most countries. In 1997, only three (Algeria, Benin, and The Gambia) of 15 countries reported that >70% of children were vaccinated routinely with OPV3. During January 1997-June 1998, all but two countries (Sierra Leone and Liberia) in the subregion administered supplementary OPV doses during National Immunization Days (NIDs). Efforts are under way to conduct NIDs in these two countries before the end of 1998. NIDs were held for the first time during January-1997 June 1998 in The
Gambia, Guinea, Guine-Bissau, Mali, Niger, and Senegal. Vaccination coverage in all countries was reported at ≥80% for both rounds.

As of September 1998, surveillance for acute flaccid paralysis (AFP) had not been established in The Gambia, Liberia, Mauritania, and Sierra Leone. During January-September 1998, 189 cases of AFP were reported in the West African subregion; the nonpolio AFP rate for the subregion (an indicator of the sensitivity of the surveillance system) was 0.40 cases per 100,000 children aged <15 years (target: nonpolio AFP rate of ≥1 per 100,000). Most countries reported nonpolio AFP rates of ≤0.30, except Algeria (0.66), Benin (0.43), Ghana (0.49), and Côte d’Ivoire (0.72). In 44% of AFP cases, two specimens were collected within 14 days of onset of paralysis. In all countries, the geographic distribution of reported AFP cases did not cover more than half of the country; cases were concentrated near the capital city and/or near the coast. In Ghana, 42% of AFP cases had stool specimens collected >21 days after onset of paralysis, and 23% were collected >28 days after onset. Almost none of reported AFP cases had a 60-day follow-up examination.

During January-September 1998, wild poliovirus type 1 was isolated from 15 AFP cases in Benin (one case), Burkina Faso (three), Ghana (three), Côte d’Ivoire (four), Niger (two), and Senegal (two). In Benin, Burkina Faso, Ghana, and Côte d’Ivoire, wild poliovirus type 1 was isolated after the second year of NIDs. Partial genomic sequence analysis of virus isolates from AFP cases with onset of paralysis in 1998 from Benin, Burkina Faso, Côte d’Ivoire, Ghana, and Niger indicates that transmission is still occurring within and between these countries. Sequence analysis indicates three different genotypes of wild poliovirus type 1 were isolated after the second NID round both in Ougadougou, Burkina Faso, and Abidjan, Côte d’Ivoire.

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CDC Editorial Note: In 1989, the WHO African Regional Committee adopted

the global goal of eradicating poliomyelitis by 2000, and polio eradication remains a high priority in the African Region. The countries of the Organization of African Unity (OAU) emphasized in the declaration of Yaoundé, Cameroon, on July 1996 their determination to achieve this goal by implementing the WHO-recommended strategies. In August 1996, the WHO Regional Office launched the initiative “Kick Polio Out of Africa.”

Substantial progress toward polio eradication has been made, although widespread transmission of poliovirus continues throughout Western Africa because of (1) intense poliovirus transmission before the start of NIDs associated with very low routine OPV3 coverage rates, and (2) actual coverage rates lower than reported coverage rates with supplemental OPV doses during NIDs. Program reviews are planned to gain a better understanding of the factors associated with the continuing high level of wild poliovirus transmission.

The performance of AFP surveillance remains at low levels in most countries. There is a lack of rapid case investigation, collection of adequate stool specimens, and 60-day follow-up examination, limiting the probability that polio cases are confirmed based on isolation of wild poliovirus. High-quality AFP surveillance is essential to assess the impact of polio eradication strategies and, at later stages, to guide interventions aimed at interrupting transmission of wild poliovirus in the remaining virus reservoirs.

Emphasis should be placed on active surveillance at the provincial level to improve the completeness and timeliness of detection, reporting and investigation of AFP cases, and collection of adequate stool specimens. Additional personnel are needed immediately to conduct active surveillance, and additional provisions are required to support operational expenses, especially transportation at the provincial level.

A functional regional laboratory network has been established to provide rapid virus isolation, intratypic differentiation, and genomic sequencing. However, the usefulness of this network is limited by insufficient surveillance for AFP and limited collection of stool specimens.

Rapid success of polio eradication activities in West Africa is substantially constrained by relatively low levels of routine vaccination coverage in several countries. In some countries, it will not be possible to increase routine OPV3 coverage levels to at least 80% of the population aged <1 year by 2000. Additional vaccination rounds during NIDs are required in most areas to achieve the eradication goal.

The experience from the Americas and the Western Pacific Region indicates that poliovirus transmission can be interrupted even in the absence of high routine OPV3 coverage levels if comprehensive, high-quality vaccination campaigns, complemented by high quality AFP surveillance and “mopping-up” activities, are conducted. Financial support is committed for NIDs and surveillance; however, additional financial resources will be needed for additional vaccination rounds and “mopping-up.”

Governments in the West African subregion are pursuing polio eradication vigorously, even though meningitis, measles, and other diseases are of higher immediate priority in many countries. The polio eradication initiative helps to build integrated surveillance systems and to develop strategies to extend routine vaccination services to previously unreached populations. Provided that additional resources are made available, countries of the subregions will be able to accelerate the initiative to ensure interruption of poliovirus transmission by 2000.

References

* Mass campaigns over a short period (days to weeks) in which two doses of oral poliovirus vaccine are administered to all children in the target group (usually aged 0-4 years) regardless of previous vaccination history, with an interval of 4-6 weeks between doses.
† Focal mass campaigns in high-risk areas during a short period (days to weeks) in which two doses of OPV are administered during house-to-house visits to all children in the target age groups, regardless of previous vaccination history, with an interval of 4-6 weeks between doses.
‡ The polio eradication initiative is supported by individual countries in which polio is endemic. In addition, external support for Africa is provided primarily by WHO; United Nations Children’s Fund (UNICEF); the governments of Canada, Germany, Japan, United Kingdom, and United States (through USAID and CDC); and Rotary International.