

RESEARCH PAPER

Building capacity for tobacco control research and policy

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The Fogarty International Center (FIC) initiative, "International Tobacco and Health Research Capacity Building Program" represents an important step in US government funding for global tobacco control. Low- and middle-income countries of the world face a rising threat to public health from the rapidly escalating epidemic of tobacco use. Many are now parties to the Framework Convention on Tobacco Control (FCTC) and capacity development to meet FCTC provisions. One initial grant provided through the FIC was to the Institute for Global Tobacco Control (IGTC) at the Johns Hopkins Bloomberg School of Public Health (JHSPH) to support capacity building and research programmes in China, Brazil, and Mexico. The initiative's capacity building effort focused on: (1) building the evidence base for tobacco control, (2) expanding the infrastructure of each country to deliver tobacco control, and (3) developing the next generation of leaders as well as encouraging networking throughout the country and with neighbouring countries. This paper describes the approach taken and the research foci, as well some of the main outcomes and some identified challenges posed by the effort. Individual research papers are in progress to provide more in-depth reporting of study results.

The Fogarty International Center (FIC) initiative, "International Tobacco and Health Research Capacity Building Program", represents important progress in the US government funding for global tobacco control. The initiative is a long-overdue step, taken over 100 years following the rise of the modern tobacco industry (an industry characterised by its extraordinarily effective marketing of an addictive and deadly product), 50 years after the first convincing scientific evidence that tobacco use causes cancer, and 20 years after the first reports that even passive smoking causes lung cancer in never smokers.^{1,2} Most importantly, the initiative follows 10 years of rapid expansion of the multinational tobacco companies into low- and middle-income nations, an expansion driven in part by the decline in markets in the higher-income countries and the need to pay costs arising from legal actions in the United States, including the Master Settlement Agreement.³ The FIC global tobacco control initiative, with its emphasis on building research capacity for tobacco control, is especially timely because low- and middle-income countries of the world face an increasing threat to public health from an escalating epidemic of tobacco use.^{4,5} Many of these countries are now party to the Framework Convention on Tobacco Control (FCTC), which promotes evidence-based tobacco control efforts, including restrictions that provide protection from exposure to secondhand tobacco smoke in public places, mandatory health warnings, and a comprehensive ban on all forms of tobacco-related advertising, promotion, and sponsorship.⁶ However, most low- to middle-income countries lack the infrastructure needed to implement FCTC provisions.⁷

One FIC grant was to the Institute for Global Tobacco Control (IGTC) at the Johns Hopkins Bloomberg School of Public Health (JHSPH) to support capacity building and research programmes in China, Brazil, and Mexico.⁵ This paper describes the approach taken and the research foci, as well as some of the main outcomes and some challenges posed by the effort. Individual research papers are in progress to provide more in-depth reporting of study results.

DEVELOPING NATIONAL TOBACCO CONTROL CAPACITY

Many different approaches to national capacity development have been applied and the literature is replete with factors

that might serve as the basis for measures of capacity development.^{8–11} However, no single existing definition or model fully encapsulates capacity development because models used have varied from simple training approaches to multi-level and multi-factorial approaches aimed at systemic change.¹²

The IGTC capacity development model combines research skills development and mentorship and is focused on obtaining country-specific data to help in the implementation of relevant tobacco control policies or programmes. The model serves as a guide for programme development and implementation with a focus on three priorities: skill and tools development, building networks and leadership, and collection of local empirical data.¹³ The approach evolved from research collaborations in China during the 1990s and from a 1997 workshop on research needs for tobacco control in developing countries, as well as from in-country experience gained during the Rockefeller Foundation Trading Tobacco For Health project in Southeast Asia.¹³ For example, the Rockefeller initiative enabled the development of low-resource data-collection tools, so that locally relevant data were collected. In addition, tobacco control professionals received training and mentorship as they used the tools and collected the data. The Rockefeller initiative also led to the formation of the Southeast Tobacco Control Alliance, which remains a positive force for tobacco control networking and training throughout Southeast Asia. Although the Rockefeller Foundation discontinued the programme, fortunately its investment led to the development of the Thai Action on Smoking and Health Foundation, which has remained a regional force. Funding from the Thai Health Promotion Foundation aids in the development of a network of advocates and researchers that continues to be a strong force for tobacco control in this region. This example illustrates how an initiative ultimately can be sustained nationally or regionally.

Empirical evidence also supports the priorities of the IGTC approach. A recent large-scale evaluation quantified state-

Abbreviations: FCTC, Framework Convention on Tobacco Control; FIC, Fogarty International Center; IGTC, Institute for Global Tobacco Control; INCA, Brazilian National Cancer Institute; INSP, Mexican National Institute for Public Health; JHSPH, Johns Hopkins Bloomberg School of Public Health

level capacity development and demonstrated that leadership, network and coalition development, and staff experience predicted lowered consumption rates at the end of the eight-year project.^{14 15}

SPECIFIC RESEARCH FOCI AND STRATEGIES

Our previous collaborative work in China, Brazil, and Mexico provides the context for understanding the research foci and strategies of the IGTC model. Each country receives a different level of funding, based on our previous collaborative efforts and priorities identified for each. Table 1 summarises the specific activities that address the three priority areas of the project. The activities range from developing new surveillance methods (Mexico) to conducting large-scale surveillance activities and implementing an intervention (China). This contextual information is also useful in understanding the challenges posed in moving a research agenda forward in three very different countries.

In addition to the research projects and in-country trainings and technical assistance, selected researchers from each country are receiving in-depth training at JHSPH. The focus and length of training has varied, depending on the backgrounds of the researchers and their individual research interests. For example, collaborators in Mexico and China wanted training in measurement of airborne nicotine since they wanted to establish their own laboratory facilities. Another major component of this initiative is formation of official Centers of Excellence for tobacco control training and research. Each of the Centers of Excellence is based at an agency (academic or governmental) with the needed mix of expertise, and resources for research and training. Sustaining these centres after FIC funding ends is the long-term goal; at present, FIC funding is serving as a catalyst for the development of a more comprehensive research agenda. China may be an exception, however, since the Center for Excellence in China has been established at an academic institution that is wholly dependent on donor funds to continue operation.

China: overview

China ratified the FCTC in May 2005 and the Chinese are increasingly aware of the significant impact of the tobacco epidemic on their society.¹⁶ However, concerns about the possible negative economic impact of tobacco control policies dominate decision-making.¹⁷ For example, in China's rural and western regions, tobacco is considered by the farmers and local officials as paramount to their economic survival.¹⁸ Furthermore, the Chinese government tightly controls the tobacco trade and there is a close relationship between the national economy and tobacco production and consumption. Smuggling and counterfeiting of cigarettes are rampant, and the recent Altria deal with China National Tobacco is a concern.¹⁹

China does have a designated lead agency for tobacco control, the National Tobacco Control Office, but the challenge this agency faces is great: an estimated 350 million Chinese smoke some 1.7 trillion cigarettes a year (one third of the world's total). Another serious problem is that funding for tobacco control is severely limited, and there are few full-time personnel dedicated to tobacco control.

The IGTC worked with China's National Tobacco Control Program (NTCP) from 1996 to 2002. This relationship facilitated the second national survey of smoking and follow-up studies (1996, 1998) and developed the first national tobacco control plan in China; IGTC was instrumental in locating funding for these activities. The NTCP was reorganised in 2002 by the Chinese government, with a new director and new priorities. Our Principal Investigator in China (Dr Gonghuan Yang) is the former director of the NTCP and is

now Professor at the Peking Union Medical College and the Director of the Department of Public Health Surveillance and Information Science. Working with an academic institution, not the designated lead agency for tobacco control, presents a challenge to disseminating information obtained by the project. An additional challenge lies in motivating the various groups engaged in tobacco control research to share information and integrate their activities.

In China the majority of smokers are male; women and children are the primary victims of secondhand smoke.²⁰ Most secondhand smoke exposure occurs in the home, with 71% and 81% of exposure in urban and rural areas, respectively.²¹ In January 1997, the Ministry of Health, Ministry of Rail Transportation, Ministry of Road Transportation, Ministry of Construction and Civil Aviation Bureau issued a regulation to forbid smoking in public transportation vehicles and in waiting rooms in the country. By April 2000, 14 provinces and 88 cities in China passed local bans forbidding smoking in public places, including hospitals, schools, government offices, traffic stations, and transportation vehicles. However, enforcement and public compliance with smoking bans are poor, especially in rural areas, where resources are limited and many pressing problems compete for attention.

To date, the main strategies reported in the literature related to China have included mass media campaigns, World Health Organization Quit and Win contests, counselling by physicians for tobacco free households, and health-education materials in the community. In addition, The World Bank developed a comprehensive programme for healthy communities, including tobacco control, that has been shown to be effective.²² Despite these successes, tobacco control in China is weak and tobacco control programmes are rare, especially in the rural areas where approximately 75% of the population lives.¹⁸

China: research foci

The FIC project in China addresses this disparity by working in rural areas to reduce secondhand exposure and increase tobacco control capacity. Three provinces (Sichuan, Henan, and Jiangxi) were selected based on county-level officials' expressed willingness to consider secondhand smoke policies and the interest of local health departments and CDC officials in participating. The research team at Peking Union Medical College held meetings with local government officials focusing on developing local smoke-free policies for schools, hospitals and government buildings. Additional meetings were held with community leaders, school principals, and hospital directors to discuss developing policies to restrict smoking and educational campaigns for the local populations.

Qualitative and quantitative fieldwork was conducted from September to November 2004 in the three provinces. First, a household survey was administered to approximately 15 000 individuals to collect data on smoking behaviour and secondhand smoke exposure in the designated study sites as well as to determine the factors that influence smoking and secondhand smoke exposure in Chinese individuals age 18 and over. Secondhand smoke exposure monitoring was conducted in a total of 273 public places, including hospitals, secondary schools, government buildings, restaurants and entertainment establishments and in 60 homes in the three provinces and Beijing. Focus groups (n = 80) were conducted with doctors, nurses, students, farmers, and community leaders to ascertain their smoking behaviours and their knowledge and attitudes toward smoking restrictions at home or in public places. Groups also discussed access to information, the importance of establishing health education classes in schools, the role of physicians in providing patient

Table 1 Summary of activities in China, Brazil, and Mexico

Country	Lead agency	Evidence-research foci	Skills and leadership	Science-policy outcomes
China	Peking Union Medical College; Institute of Basic Medical Sciences, and the Chinese Academy of Medical Sciences	Determine the smoking prevalence, and level of SHS exposure in rural China. Develop a community-based SHS intervention model in rural schools, hospitals, homes and communities.	Center of Excellence established to teach tobacco control research and surveillance skills (e.g. train provincial and local-level CDC to conduct surveys and measure SHS. Train at least 1 PhD and 1 MPH at JHSPH. Established laboratory to analyse cotinine and nicotine samples.	Work with local officials to develop and implement SHS policies in public places and educate locals about health risks of SHS exposure.
Brazil	Surveillance and Prevention Department (CONPREV) of the Brazilian National Cancer Institute (INCA)	Conduct the Non-Communicable Disease and Risk Factor Survey. Conduct studies to determine the prevalence of smoking, and factors associated with smoking initiation in adolescents and young adults in cities across Brazil.	Center of Excellence established focusing on qualitative and quantitative methodologies. Provides training and a networking for Brazil and MERCOSUL region of South America. Also works in partnership with the Pan American Health Organization to provide workshops. Training and mentorship to pre-doctoral student at JHSPH for 3 months.	Develop better surveillance mechanism. Develop a multi-city research endeavour. Develop intervention strategies to reduce youth access to cigarettes.
Mexico	National Institute for Public Health, Tobacco Research Department (INSP)	Conduct studies to assess mortality attributable to tobacco use as well as estimate medical costs associated with major tobacco-related diseases. Conduct studies on income and household expenditures on tobacco. Surveillance of tobacco products and point of purchase marketing and product packing and labelling. Cotinine levels in Mexican smokers, assessing secondhand smoke exposure in restaurants and bars in Mexico City and assessing tobacco use in adolescents.	Center for Excellence conducts summer training programs in Mexico for tobacco control researchers through out Latin America and the Caribbean region. Train 1 MPH student at JHSPH and provide training at JHSPH Summer Institute for 4 researchers in biostatistics and epidemiology Provide training for 1 lab scientist to learn cotinine and nicotine analysis to develop a lab at the INSP. Provide funding to support thesis research and preparation for 2 doctoral students.	Develop better surveillance methods. Develop new methods to monitor FCTC. Obtain data to push for increase in tobacco taxes. Develop laboratory facilities.

CDC, Centers for Disease Control and Prevention; FCTC, Framework Convention on Tobacco Control; JHSPH, Johns Hopkins Bloomberg School of Public Health; SHS, secondhand smoke.

health education, and suggestions for developing tobacco control programmes in the future.

China: preliminary results

Preliminary analysis of the household survey found that ~31% of adults are current smokers, 57% of males and 3% of females. About 60% of non-smokers reported being exposed to secondhand smoke for at least one day per week. Only 25% of individuals reported knowing that secondhand smoke caused heart disease; 40% reported knowing that secondhand smoke caused lung cancer. Secondhand smoke passive monitoring showed that nicotine was detected in 91% of the locations confirming the self-report of smoking behaviour found in the survey. The highest concentrations were found in restaurants and entertainment venues, and the lowest were found in schools. Overall, secondhand smoke exposure levels are higher than in Latin American countries previously studied by our group.²³ The survey data will help orient and strengthen interventions aimed at protecting the population from the health risks of secondhand smoke. The monitoring method could also be a useful component of a surveillance system for evaluating trends in SHS exposure as they relate to clean indoor air policies in the city/county.

Focus group findings indicate that implementing smoke-free policies will be challenging, since most people expressed the view that smoking was a private matter of individual choice, and interventions by others were considered as inappropriate. Offering a guest a cigarette is still regarded as a social courtesy. Few school or hospital

personnel viewed smoking control as an important issue or relevant to their work. Although the results indicate huge challenges exist, this qualitative work provides valuable insights into previously unstudied populations and gives a voice to the community in the development of intervention strategies.

Brazil: overview

Brazil has a long history in tobacco control: it was able to reduce the annual per capita consumption of cigarettes during the 1990s. In 1986, the annual consumption was 1950 cigarettes per capita, while in 1998 the annual consumption per capita was estimated to be 1337 cigarettes.²⁴

However, smoking prevalence rates remain high for both men and women (rates for adult men and women 15 years and older are 38.2% and 29.3%, respectively).²⁴

Brazil is the fourth largest producer of tobacco leaf in the world, with a total of ~250 000 hectares under plantation by 140 000 producers.²⁴ The strength of the tobacco industry is a major challenge in Brazil. For example, Brazil was the second country to sign the FCTC, but the formal ratification was blocked for some time by the manoeuvres of Brazil's powerful tobacco industry. Ultimately, the Brazilian National Cancer Institute (INCA) prevailed and Brazil ratified the FCTC in November 2005.²⁵

IGTC's partner in Brazil is INCA, an agency of the Brazilian Ministry of Health. INCA is federally mandated to serve as Brazil's lead agency for cancer control. INCA is charged with

the design, implementation, and operation of effective and equitable programmes in the areas of cancer prevention, diagnosis, treatment, and education. INCA is responsible for the country's cancer registries and is also the lead agency in charge of planning preventive interventions, training state and county professionals for effective implementation, and evaluating intervention processes, structures and outcomes.²⁶ INCA was awarded the American Cancer Institute's Luther Terry Award in 2003 for their outstanding tobacco control programme. INCA works in conjunction with the state and municipal health departments in developing and implementing countrywide policies and strategies with a focus on schools, workplaces, and health care units. Brazil has an impressive policy record and has conducted large-scale national studies as well as specific epidemiologic studies. For example, in February 2002 Brazil implemented pictorial health warnings over a 100% of one side of the cigarette package.²⁷ In addition, Brazil's leadership in tobacco control has solidified since the WHO's 192 Member States elected the Brazilian delegation to head the FCTC negotiation procedures.²⁸

Johns Hopkins and INCA signed a formal agreement in 1998 and conducted a joint research study on smoking behaviour and attitudes toward secondhand smoke in Rio de Janeiro. The study found a drop in smoking prevalence among adults (age 15 years and older) from 30% in 1989 to 21% in 2002. Attitudes were found to support tobacco control measures even among smokers. Of the smokers interviewed, 85% were aware that passive smoke caused disease; 53% supported a total ban on smoking in restaurants; 70% supported a ban on all advertising; and 76% supported a ban on sports sponsorship by the tobacco industry.²⁹

Brazil: research foci

One of the main strengths of research conducted by the Surveillance and Prevention Department (CONPREV) of INCA is that its findings can be efficiently translated into public health practice and policy, given INCA's country-wide coordination of prevention activities in primary health units, and the close and frequent interface of the Health Ministry, to which INCA belongs, with the Brazilian legislative bodies. In addition, a national survey of tobacco use and tobacco-related knowledge, attitudes and behaviour is underway and will supplement the information available from Brazil's national morbidity and mortality survey. This survey, the first of its kind to be undertaken in Brazil, has the potential to provide needed evidence for policy advocacy as well as for building intervention models.

Brazil: preliminary results

The Non-Communicable Disease and Risk Factor Survey was conducted in the capital cities of 16 Brazilian states. Twenty-six thousand individuals in more than 10 000 households participated in the survey. The data collection made it possible to estimate the prevalence of tobacco use in different areas of the country in order to explore heterogeneity in the extent of tobacco use. The prevalence of tobacco use in 16 Brazilian cities ranged from 16.9–28.2% among males, and 10.0–22.9% among females. Brazil's south had the highest prevalence, and it is also the biggest tobacco-producing area of the country. Future research projects include a six-city qualitative research study focusing on tobacco initiation, and a study using both qualitative and quantitative methods to ascertain university students' beliefs and attitudes related to smoking.

In addition, support provided by the FIC was used to strengthen the South American network for tobacco control and surveillance, for which Brazil is the focal country. In October of 2004, in partnership with the IGTC, INCA held a

workshop, "Building a tobacco control surveillance system in MERCOSUL", in which representatives from the Ministry of Health discussed the FCTC, with an emphasis on article 20—Research, Surveillance and Exchange of Information. As a result of this meeting, a number of recommendations were made supporting FCTC ratification and the establishment of a tobacco surveillance system in the MERCOSUL countries. INCA has established a Center of Excellence for Training on Tobacco Control and Research in INCA's Prevention and Surveillance Department. The centre's main objectives are twofold: building capacity for tobacco control and surveillance and conduct of qualitative tobacco related research in South America and Portuguese speaking countries.

Mexico: overview

Mexico was the first country in the Western Hemisphere to ratify the FCTC. In Mexico, tobacco control activities are coordinated by the National Council Against Addictions (CONADIC by its acronym in Spanish), an institution within the Ministry of Health. In 1988 the Mexican Ministry of Health conducted the first National Survey of Addictions, which was repeated in 1993, 1998 and 2002. These surveys provided national time trends and estimates for the prevalence and distribution of tobacco consumption for the urban population between ages 12 and 65 years old. According to a review that involved these surveys, tobacco consumption in Mexico shows little variation over time.³⁰ The reported estimates for current smokers were 25.8, 25.1, 27.7 and 26.4, for years 1988, 1993, 1998 and 2002, respectively. A research project funded by FIC that conducted a combined analyses for years 1988 through 1998 concluded that prevalence among Mexican males has remained relatively stable.³¹ While a 13% increase in the prevalence has been observed among females, the study also documented that high socioeconomic status is positively associated with the risk of smoking. Participants who were in the higher categories—measured either by income or education attainment—were close to two times more likely to be current smokers. This association was more apparent for females and adolescents of either sex.

IGTC's partner in Mexico is the National Institute for Public Health (INSP). The INSP is within the Ministry of Health and is Mexico's leading institution for public health training and research, and is also a key resource for Central and South America. Since 2000, the INSP identified tobacco as a priority for research and capacity building. With expertise provided by the IGTC, and funding through the FIC, the Centers for Disease Control and Prevention, and the Pan American Health Organization, the INSP has successfully implemented training as well as research activities. The INSP's Department for Tobacco Research held one-week summer courses in 2001, 2003, and 2004. Each course had over 40 students from across Mexico as well as key personnel from Ministries of Health in the Latin American and Caribbean countries.

Mexico: research foci

The INSP conducted the first study in Mexico to estimate the health-care costs related to smoking. Results from this study will be used to support decision makers to increase taxes on tobacco in Mexico. In order to produce a cost evaluation, medical files were analysed to obtain information regarding: patient encounters (the interaction between the patient and healthcare providers); laboratory, radiology and pathology services, dispensed pharmaceuticals; and applicable hospital services, such as intensive care unit, coronary care unit, radiotherapy, chemotherapy, and pulmonary rehabilitation. In addition, data on the elements of patient care were used to determine the cost of each encounter within four categories:

(1) *Direct costs*—the cost of time spent directly with a patient, the cost of significant procedures for individual encounters allocated to each specific encounter; (2) *Indirect costs*—salary costs and costs of consumable goods or services spread across all ambulatory encounters; (3) *Overhead costs*—all costs incurred in providing services (for example, electricity, cleaning and infrastructure costs); (4) *Diagnostic costs*—patient-specific data relating to radiology, pathology and pharmaceutical use.

Additional research has focused on measuring cotinine levels in Mexican smokers, assessing secondhand smoke exposure in restaurants and bars in Mexico City, and assessing tobacco use among adolescents.³² Other research is focusing on FCTC provisions concerning advertising. The work is aimed at analysing implementation and enforcement since even appropriate legislation is ineffective or meaningless without proper implementation and enforcement efforts. The group at INSP is also conducting research to adequately track the tobacco epidemic in Mexico in relation to tobacco attributable deaths and time trends in smoking prevalence.

Mexico: preliminary results

The pilot evaluation of the health-care costs of three major tobacco-related diseases has been completed.³³ The estimated annual average cost of medical care (for acute myocardial infarction, chronic obstructive pulmonary disease, and lung cancer) attributable to tobacco consumption corresponds to an equivalent to 7.3% of the annual budget of the social security delegation in the state of Morelos. Results from a national level study are scheduled to be released on 31 May 2006. The group at INSP also conducted a preliminary evaluation of the fiscal policy implemented during this administration that increased tobacco taxes from 100% to 105% from year to 2000 to 2002, to 107% in 2003 and 110% in 2004. Preliminary information suggests that the tax increase was associated with an increase of 10.3% in tax revenues associated with tobacco and a decrease in the prevalence of households reporting expenditure in tobacco from 8.7% to 6.7%. The project continues and will provide the final analyses that will evaluate the overall impact of this policy. The project aimed to estimate mortality attributed to tobacco and provided new estimates and more conservative estimates to deaths attributed to tobacco consumption. Using an adaptation of dose response functions from the United States, the INSP estimated that approximately 25 000 deaths a year in Mexico are attributed to tobacco use.

The INSP produced the first comprehensive review of tobacco control in Mexico, "Primer Informe Sobre el Combate al Tabaquismo: México ante el Convenio Marco para el Control del Tabaco".³⁴ Using the FCTC as an organising structure, this publication provides information on the tobacco control research being conducted in the country. It includes description of the smoking epidemic and its effects on mortality, cost of medical attention, tobacco consumption among youth, tax policy, secondhand smoke, current legislation, and interventions. The Spanish version is available at <http://www.insp.mx/tabaco/informe/index.html>

CONCLUSIONS

The IGTC has learned much about carrying out long-term capacity-building programmes in low-resource environments with different social, political, and cultural realities. Prior experience and collaboration with China, Brazil, and Mexico has proved invaluable in overcoming some of the usual start-of-project challenges faced by international collaborations, including building working relationships, establishing trust, determining how decisions are made, and reconciling ownership issues related to data and publications. Currently, the

challenges are related to sustaining ongoing, long-distance research efforts.

Our international collaborators are established researchers with sufficient seniority and credibility as national or regional leaders to serve as principal investigators; as a result they determine the research foci for their respective national projects. However, internal and external bureaucratic and political issues continue to be an issue. For instance, US State Department clearance is necessary for Brazil to receive US research funding. The process is long and notification of clearance is not done in a timely manner, leading to delays in project initiation. Even transfer of funds from one institution to another takes a great deal of time and patience. In addition, political situations can distract researchers, especially those in government. For example, in 2004 the Mexican government made an agreement with the tobacco industry in return for contributions to a public health fund.³⁵ The terms of the agreement included abandoning tax increases and restricting health warnings on cigarette packages, resulting in a hindrance to progress Mexico's tobacco control agenda.³⁶

Long distance collaboration is very time consuming, and there can be protracted lag times between decision-making and actual implementation. There is also tension between action and research, with questions about when evidence is sufficient to justify an intervention or make policy change. Furthermore, investigators from inside or outside of the country may view decisions differently, and miscommunication and misunderstandings can raise problems for coordinating the project across great distances. Open and direct communication is the goal, but it is not the norm in some cultures. There may be a tendency to not raise problems, since problems are viewed as evidence of lack of competency instead of as part of a learning process. Face-to-face communication is often best for preventing these problems, but is not cost-effective across great distances. The world wide web, however, can provide a low-cost alternative to face-to-face meetings. The Global Tobacco Research Network, for example, has developed a research assistance matching programme (Program RAM), which helps facilitate collaboration over distance by providing researchers with an online platform to share and exchange information.^{37 38} Technological advances in the area of voice over IP (VoIP) can also be utilised to increase communication.

Capacity development occurs collaboratively and sustaining capacity requires ongoing commitment to our international partners. Moreover, national and regional networks are important resources for information exchange, technical assistance, and mentoring relationships that could help tobacco control researchers and policy advocates in developing countries maximise scarce resources. They are increasingly important if external investment does not increase or if funding diminishes. At present, there is no guarantee that FIC will continue to fund tobacco control efforts, but its funding to date has been useful and has served as a catalyst, especially for Mexico and Brazil, to develop a more comprehensive programme effort.

It is important to note that available resources to support tobacco control capacity building initiatives in low- and middle-income countries worldwide are insufficient, especially in the context of a highly aggressive and well-funded tobacco industry, which is focused on maintaining and expanding its global market. Although tobacco control efforts obviously can save millions of lives around the world, investment remains inexplicably modest. The Gates Foundation has made a major investment in infectious disease and the FIC has made a sustained commitment to AIDS programmes, but no similar commitment has been forthcoming for tobacco control.^{39 40} There are 1.1 billion smokers in the world and 82% of these smokers live in low-

What this paper adds

This paper addresses building national capacity for tobacco control in three low- to middle-income countries through funding from The Fogarty International Center initiative, "International Tobacco and Health Research Capacity Building Program". While each country focused on obtaining different evidence and conducting different types of research, building capacity was the guiding principle. The model guiding the research is especially important since the resulting networks and collaborations can improve information and knowledge exchange, maximise scarce resources, and lead to sustainable relationships to promote ongoing tobacco control research.

and middle-income countries.⁴¹ Unless smoking behaviour changes, in 2030 premature deaths in these countries will exceed the expected deaths from AIDS, tuberculosis, malaria and complications from childbirth combined. China, Brazil and Mexico are among the countries that will be burdened by these premature deaths making capacity development for tobacco control research a priority.

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