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Tobacco Use in Six Economically Disadvantaged Communities in the Dominican Republic

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Abstract

The Dominican Republic (DR) is a tobacco-growing country and tobacco control efforts have been virtually nonexistent. This study provides a first systematic surveillance of tobacco use in 6 economically disadvantaged DR communities (2 small urban, 2 peri-urban, 2 rural; half were tobacco-growing). Approximately 175 households were randomly selected in each (total N=1048) and an adult household member reported on household demographics and resources (e.g., electricity), tobacco use and health conditions of household members, and household policies on tobacco use. Poverty and unemployment were high in all communities, and significant gaps in access to basic resources such as electricity, running water, telephones/cell phones, and secondary education were present. Exposure to tobacco smoke was high, with 38.4% of households reporting ≥ 1 tobacco user, and 75.5% allowing smoking in the home. Overall, 22.5% reported using tobacco, with commercial cigarettes (58.0%) or self-rolled cigarettes (20.1%) the most commonly used types. Considerable variability in prevalence and type of use was found across communities. Overall, tobacco use was higher in males, illiterate groups, ages 45+, rural dwellers, and tobacco-growing communities. Based on reported health conditions, tobacco attributable risks, and WHO mortality data, it is estimated that at least 2254 lives could potentially be saved each year in the DR with tobacco cessation. While it is expected that the reported prevalence of tobacco use and health conditions represent underestimates, these figures provide a starting point for understanding tobacco use and its prevalence in the Dominican Republic.

Introduction

Tobacco use is increasing globally, with the increases and resulting morbidity and mortality burden occurring disproportionately in low- and middle income countries (Jha, *et al.*, 2002). Tobacco smoking has been estimated to kill more people worldwide than malaria, maternal mortality, major childhood conditions, and tuberculosis combined (WHO 2002). WHO estimates that global deaths from tobacco use will rise from 3 million in 1990 to 8.4 million

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A copy of the full surveillance instrument in English and Spanish is available from the first author upon request at deborah_ossipklein@urmc.rochester.edu.

in 2020 and 10 million in 2030, with 70% of these deaths occurring in developing countries (WHO, 1997). Tobacco is also a driver of poverty: in tobacco growing regions, arable agricultural land is converted to tobacco growing, making local populations dependent on tobacco companies for food and livelihood. Tobacco related diseases are also costly to families in terms of medical costs and lost productivity of key sustenance producers, and as much as 10% of household income in poorest households in low-income countries is spent on tobacco, depriving families of resources for food and other necessities (de Beyer, Lovelace, & Yurekli, 2001).

In Latin America, tobacco related diseases are expected to triple from 3.3% of total deaths in 1990 to 9.4% in 2020 (Murray & Lopez, 1996). Latin America has been classified at Stage 2 of the tobacco epidemic, with increasing smoking prevalence in men, a beginning increase in prevalence among women, and a smoking-attributable mortality for men that has not yet peaked (da Costa e Silva & Koifman, 1998; Thun, Yach, & Eriksen, 2000)[†].

The true prevalence of tobacco use in the Dominican Republic (DR) has not been well studied, though it has been ranked as first or twelfth in the region depending on survey cited (da Costa e Silva & Koifman, 1998; PAHO, 1992, Rio, 1998). Smoking increased during the 1990's, with a 3.7 fold increase between 1962 and 1988 (Vincent, Bradham, Rojas, & Fisher, 1993). Though survey methodologies and study samples have varied (e.g., differing definitions of smoking, urban vs. national sample, sampling methods), estimates of adult smoking prevalence range from 15.8%–66.3% for males and 10.9%–33.1% for females (Aono, 1997; de los Santos, 1990; Mackay, Eriksen, & Shafey, 2006; Vincent, et al., 1993; Shafey, Dolwick, & Guindon, 2003). In addition, 65.1% of female smokers report having smoked during most of their pregnancies, and 34.5% of physicians report smoking (Vincent, *et al.*, 1993; Pimentel, *et al.*, 1991). The burden of tobacco-related diseases is considerable. In 2002, noncommunicable diseases accounted for 68.8% of all deaths in the DR, with 55.4% of these deaths due to cardiovascular diseases and 19.1% due to malignant neoplasms (WHO, 2002a).

The Dominican Republic has been a key country to study in the Latin American/Caribbean region, in that it has been at a very early stage of tobacco control. There has been no national surveillance system in place for tobacco use, there have been no active political or public health infrastructures in place for tobacco control, and until very recently, there were no public health awareness campaigns regarding tobacco risks and cessation. The few regulations that exist have been generally unknown by the population and poorly enforced (Dozier, *et al.*, 2006), and there has been no significant movement towards signing the Framework Convention on Tobacco Control, a global treaty negotiated under the auspices of the World Health Organization (WHO) and adopted by WHO member states in 2003 to reduce tobacco related death and disease around the world. In addition, the Dominican Republic is a tobacco-growing country, and tobacco companies have actively attempted to thwart tobacco control efforts in the region (Sebrie, *et al.*, 2005). Engaging such early stage countries in tobacco control research and capacity building will be key to reducing tobacco use and the burden of tobacco-caused illnesses globally.

The current project is one of a number of studies funded by the Fogarty International Center at the NIH, in partnership with other NIH agencies, to link experienced US investigators with partners in low- and middle-income countries to address tobacco use. The goals of the current project are to understand the landscape of tobacco use, establish and evaluate tobacco control

[†]Four stages have been identified for the smoking epidemic globally, characterized by increases in male smoking prevalence occurring first (Stages 1–3), followed by increases in smoking related deaths among men (Stages 2–3), and then a decrease in smoking among men beginning in Stage 4; a parallel but delayed pattern of tobacco uptake and disease has been found among women (Stages 2–4) (da Costa e Silva & Koifman, 1998; Thun, Yach, & Eriksen, 2000).

and cessation activities using community-based participatory research (for example, partnering with local workgroups, training and hiring community members; Riley, Jossy, Nkinski, & Buhi, 2001), and build research capacity in the DR with a focus on six economically disadvantaged communities. The project is conducted by a joint team of US- and DR-based investigators, and uses the name “Proyecto Doble T” (PDT; “Project Double T”, for Tobacco Control and DR-based Technology Centers with which the project is affiliated). To begin to characterize tobacco use in these communities as a starting point, qualitative assessments of communities were conducted and reported previously (Dozier, *et al.*, 2006). The project then conducted systematic, quantitative surveys of households, community members, and smokers in these same communities. This paper provides the household surveillance results for tobacco use and health conditions. These surveillance data also provide a test of a subset of themes that emerged from the qualitative research: the perception that everyone smokes, the lack of a culture of quitting, cigarettes as the most common form of tobacco use with variation across communities, higher use of self rolled tobacco in tobacco growing communities, in rural areas, and in older adults, comparable tobacco use rates among men and women, higher tobacco use overall in older adults, and higher use in young adults in urban vs. other areas (Dozier, *et al.*, 2006). Results of the community- and smoker surveys will be reported separately.

METHODS

Study Sample

Participating Communities—The surveillance was conducted in 6 economically disadvantaged communities in the Dominican Republic from April-August, 2004. Communities represented two each of Small Urban (population >25,000), Peri-Urban (population 6–10,000, have structure of urban community but in remote geographic location), and Rural (population <2,000) areas. One member of each pair was a tobacco growing community. Unemployment was high in all communities, and communities varied in access to basic services including electricity, running water, telephone service, post-primary education, paved roads, and healthcare resources (see Dozier, *et al.*, 2006, for a more complete description of communities).

Household Selection—Approximately 175 households in each community were surveyed by in-person household interviews. To identify households, the DR-based team of investigators provided maps and master lists of all households in each participating community. The US team then generated a randomly selected list of households for targeting and provided these lists to trained DR data collectors who approached listed households sequentially until the full sample was obtained. A total of 207–241 households per community were approached, for a completion rate of 73.0%–84.5%. Reasons for noncompletion of targeted households were: home vacant (6.8%–17.2%), address was non-residential (0–6.6%), and other (e.g., visited 3 times and no one home, refused, address does not exist; 7.3–14.5%). The final number of households surveyed ranged from 172–176 per community, for a total of 1048 households.

Adults who consented were asked to list all household members, and to provide basic demographics as well as tobacco use and health information for each; only data for adults (age 18+) are reported in this paper. Data were obtained for a total of 2331 adult household members across the six communities.

Measure

The surveillance instrument was developed to assess the following domains, guided by prior US and global research and the project team's prior qualitative results (Dozier, *et al.* 2006): basic demographics (e.g., gender, age, employment, education, literacy - can read and write), tobacco use (current, ex-user, or nonuser, and type of tobacco used), and health conditions/

symptoms for each family member, household resources (e.g., electricity, running water), and smoking policy in household (whether/where smoking is allowed). Items were drawn from the 2003 National Health Interview Survey (U.S. Department of Health and Human Services, 2004), International Tobacco Control Policy Survey (Fong, *et al.*, 2006), and 2002 World Health Survey (WHO, 2002b), as well as the Dominican Republic 2002 national census, and the Ficha Familiar (a demographic tool used in the DR to gather health data for households; supported by SESPAS, the Ministry of Health and Social Welfare) for culturally appropriate formatting and wording. The instrument was initially developed in English, and then translated into Dominican Spanish by the project team. Following the Brislin back-translation approach, the instrument was next back-translated from Spanish to English and the back-translated items were compared to the original English items to ensure equivalence (Brislin, 1970). The instrument was pre-tested by both the US- and DR-based teams for formatting, readability, and content, and then pilot tested by a combined US/DR team with 25 households in a comparable peri-urban community in the DR that was not participating in Proyecto Doble T. Items whose format and content were not readily understood by community members were adjusted.

Data Collectors

A locally based data collection team was assembled and trained in each community, as part of the project's goal of building in-country research capacity, as well as to increase the likelihood of acceptability of the survey and avoid trust issues that may arise when an outside team is present. Each local team included two site coordinators (12 total) and 4–6 data collectors/ community (28 total; communities with larger geographic areas to cover were allotted more data collectors). Local team members were 18+ years of age and had at least a high school education. Site coordinators were generally staff who also served as coordinators for local Community Technology Centers (CTC's; formerly LINCOS) with whom the current project partners (Dozier, *et al.*, 2006); data collectors were local “vigilantes” (community health watchers), trained by the health and environment component of the LINCOS program to engage in other community health promotion and prevention activities. Training for data collection teams took place through three mechanisms. First, the DR-based research team conducted on-site training in basic computer skills, basic survey methodology, and preliminary bioethics training using the Spanish-version of the Belmont Report (<http://www.hmc.mil.ar/HMC/documentos/Belmont.pdf>). Second, all teams were brought to a central site for a 2-day group training by the DR- and US teams in: 1) bioethics – a 4-hour training session was provided by a DR-based faculty and ethics committee member at the Universidad Autónoma de Santo Domingo (UASD; Dr. Franklin Gomez), and included basic concepts, types and applicability, models and principals, and values and judgments in bioethics. This bioethics training was approved by both the DR-based Ethics Committee at UASD and the RSRB at the University of Rochester; and 2) survey administration using the surveillance instrument, and data management and tracking - training included interactive sessions with supervised role plays of survey administration. Teams were provided with training manuals, which included project policies, expectations, and data collection procedures. A supplemental session was held for Site Coordinators for training in logistics of overseeing and managing survey administration and their data collectors. Finally, immediately prior to surveillance launch, the DR project team conducted on-site refresher training for each community, and provided hands-on assistance with survey administration and supervision during the first weekend of implementation. During the survey administration period, Site Coordinators confirmed that data collectors were sampling households per protocol, tracked number of households surveyed, and checked forms for completeness. Incomplete or incorrect surveys were returned to the field with data collectors for correction. Site Coordinators also held daily debriefing meetings with data collectors. The core DR team maintained ongoing contacts with Site Coordinators through weekly telephone and/or instant messaging contact (when telephone and/or internet services were available), and weekly (during initial data collection) and then

bi-weekly site visits. Site Coordinators began the first round of data entry; however, because of multiple entry errors and logistic challenges in electronic communication (electricity and phone service were unreliable), all data entry and verification was shifted to the core DR team (see Data Management).

Procedures

Data collectors obtained master household lists from Site Coordinators in each community, and approached households sequentially until the complete sample was obtained. Following a protocol approved by IRBs in the US and the DR, data collectors approached the first available adult in each household for the surveillance. Data collectors introduced themselves, stated that they were from PDT and the local community technology center and represented a project dealing with tobacco use in the DR, and invited the household member to participate in the interview. The interview was described (“Right now, we are interviewing various households in the community about general health information and attitudes and beliefs about tobacco from smokers and non-smokers”) along with the anticipated length of the interview (40 minutes). Data collectors discussed confidentiality of responses and freedom to not answer particular questions or to withdraw at any time without risk, and obtained verbal consent for participation. Verbal consent was approved in lieu of written consent in recognition of cultural differences in concerns among participants regarding providing written consent in the Dominican Republic vs. the United States. Participants were provided with a business-sized card describing the survey and listing project contact information should additional questions arise after the interview. If the first available adult household member did not have time to participate, data collectors attempted to identify another adult member who was available. If no other members were available, and the original adult was willing to participate some other time, the data collector scheduled an alternative time. If no household members wanted to participate, the data collector moved to the next home on the list. Participants who completed the interview were provided with a small appreciation gift (a clay vase engraved with “Proyecto Doble T”). In compliance with DR human subject committee regulations, participants were not informed of the appreciation gift until after the interview was completed.

Data Management

Surveys were stored in locked CTC files in each community until all surveys were completed, and then securely transported by the DR project team to project headquarters in Santiago, DR where they were placed in locked files. Data were entered by the DR-based project team into a password-protected Microsoft Access database by one team member, and visually verified by an independent team member. The dataset was then sent to the US team and cross checked with the master list of households surveyed for congruence, as well as completeness and integrity; incomplete records or erroneous fields were sent to the DR team for corrections and final verification by both teams. Data were analyzed using SAS/STAT software, Version 9.1.3 of the SAS System for Windows.

Data Analyses

Descriptive data (percents and ranges across communities) are provided for community characteristics; percentages, ranges, and 95% confidence intervals are reported for tobacco use and household smoking policies; chi-square analyses were conducted to determine differences in tobacco use by population characteristics (including examining relationships identified in the prior qualitative study, Dozier et al. 2006); and risk estimates, attributable risk (%), and a first estimate of potential annual deaths attributable to tobacco use were calculated as detailed below.

Results

Sample Characteristics

Table 1 presents sample characteristics, with data for the total sample, as well as ranges across communities. Overall, about half of the sample was male, unemployment was high, and up to about one-fifth worked in a tobacco-related job. About 70% of the sample had less than a high school education, though literacy (ability to read and write) was relatively high (72.3%–92.8% across communities). Age ranged from 18–107 years, with a mean age across communities of 43.3 (SD=17.8); the largest age grouping was from 25–44 years (35.0%–43.8% across communities) and 45–64 years (23.5%–34.4%).

Availability of household resources is also listed in Table 1. Electricity and running water were available to most households in urban areas, but virtually nonexistent in more remote communities. A similar pattern was found for telephone access, which was generally less prevalent across all areas. Radios were the most consistently available resource across all communities. Automobiles were uncommon in all communities, and home computers were virtually nonexistent. This pattern of findings is generally consistent with project team observations in these economically disadvantaged communities; however, the reliability of specific percentages is unclear. Data collectors noted both underreporting and overreporting of resources in some households. Data collectors hypothesized that underreporting was motivated by a fear that either the resource would be taken away if reported or that the government would provide the resource if the household said they did not have it, while overreporting may have resulted from embarrassment at not having that resource.

Tobacco Use Prevalence

Prevalence Across Communities—Tobacco use status is presented in Table 2, with communities coded by type to protect confidentiality of individual communities (U=urban communities, P=peri-urban, R=rural). Overall, 38.4% of households reported having at least 1 tobacco user (range 24.3%–48.9% across communities). Of the 2331 adult household members, 22.5% were reported to be current tobacco users, with considerable variability across communities (range 12.0%–32.6%). Very few former tobacco users were identified (5.6% overall, range 0.3%–10.3%). Among tobacco users, commercially manufactured cigarettes were the most common form of tobacco use reported (58.0%, range 25.7–87.2%), followed by self-rolled tobacco (20.1%, range 3.8%–43.7%), cigars (14.6%, range 6.0–34.8), and pipes (6.7%, range .7%–23.8%). Considerable variability in both prevalence rates as well as type of tobacco used was found across communities. For example, although commercially available cigarettes were most often used overall, use of self-rolled cigarettes equaled commercial cigarettes in one peri-urban community, and exceeded commercial cigarette use in one rural community. Chewed tobacco was rarely reported (1.4%, range 0–2.9%).

Prevalence by Population Characteristics—Data on tobacco use by population characteristics are presented in Table 3. Based on report of the target household member surveyed, tobacco use rates were significantly higher among males ($X^2(1)=27.2, p<.0001$), mid-life or older adults (ages 45+; $X^2(1)=142.9, p<.0001$), persons unable to read and write ($X^2(1) = 109.1, p<.0001$), rural community dwellers ($X^2(2)=31.7; p<.0001$), and persons living in a tobacco-growing community ($X^2(1)=12.5; p<.0005$). The prior qualitative research finding that smoking in young adults was perceived to be higher in urban vs. other areas was not confirmed; no differences were found in tobacco use by young adults across urban, peri-urban, and rural areas, though the sample of young adult tobacco users was small (N=21).

Type of Tobacco by Population Characteristics—To further examine findings from the Dozier et al. (2006) paper regarding variations in tobacco used, type of tobacco was

compared among tobacco users by age, gender, community type (urban, peri-urban, and rural), and whether the community was tobacco-growing or not. Data were not analyzed for chewing tobacco, because the prevalence was so low. Results are presented in Table 4. Consistent with qualitative findings, relative to younger adults, older adults were more likely to use self-rolled tobacco ($X^2(1)=23.64$; $p<.0001$) as well as cigars ($X^2(1)=17.75$; $p<.0001$). Self-rolled tobacco was also more commonly used in peri-urban and rural areas relative to urban communities ($X^2(1)=26.70$, $p<.0001$; $X^2(1)=59.27$, $p<.0001$, respectively), with use highest in peri-urban communities. Relative to peri-urban and urban communities, rural communities were more likely to use pipes ($X^2(1)=9.23$, $p<.005$; $X^2(1)=6.55$, $p<.05$, respectively) and cigars ($X^2(1)=10.81$, $p<.001$; $X^2(1)=12.44$, $p<.0005$, respectively). Variations in tobacco type by gender were also found, with men more likely to smoke commercially available cigarettes ($X^2(1)=4.50$, $p<.05$) and women more likely to smoke pipes ($X^2(1)=10.65$, $p<.005$). Finally, in communities that grew tobacco relative to those that did not, cigarette use was more common ($X^2(1)=47.57$, $p<.0001$), whereas non-tobacco growing communities were more likely to use self-rolled tobacco and pipes ($X^2(1)=46.60$, $p<.0001$ and $X^2(1)=25.52$, $p<.0001$, respectively). In contrast to qualitative findings, non-tobacco growing communities were more likely than tobacco growing communities to use self-rolled tobacco ($X^2(1)=46.60$, $p<.0001$), and tobacco growing communities were more likely to use cigarettes and pipes ($X^2(1)=47.57$, $p<.0001$ and $X^2(1)=25.52$, $p<.0001$, respectively).

Household Policies Regarding Smoking

Household smoking policies are presented in Table 5. Approximately three-quarters of households allowed some level of smoking, with nearly half not restricting smoking at all, only 10% designating smoking areas, and about one-quarter allowing smoking for some people only.

Prevalence, Risk Estimate, and Attributable Risk of Tobacco-Related Health Conditions

Table 6 provides data on health conditions of household members across communities. Health conditions assessed included respiratory conditions (persistent cough, pulmonary problems, respiratory problems, asthma), hypertension, heart problems, and cancer. Only one case of cancer was reported, so this condition was omitted from the analyses.

Given the associations of both tobacco use and health conditions with age and gender, prevalence rates were standardized across four age strata (18–24, 25–44, 45–64, and 65+). Risk estimates and attributable risks were calculated from these age- and gender adjusted rates. Attributable risks for tobacco use ranged from 0–57.3% for males, with greater risks associated with tobacco use for all health conditions except asthma and hypertension. For females, tobacco attributable risks ranged from 0–64.9%, with greater risks associated with tobacco use for all conditions assessed except asthma and heart problems. Overall, the average attributable risk of health conditions related to tobacco use was 36.6% for males and 24.4% for females. Using these rates in combination with World Health Organization mortality data (WHO, 2003), estimates of the number of deaths annually in persons over age 35 that could be theoretically prevented in the DR through smoking cessation are presented in Table 7. Overall results suggest that eliminating tobacco use could potentially prevent 1468.6 male deaths and 785.4 female deaths (2254 total deaths) each year.

Discussion

The Dominican Republic is a tobacco-growing country in which tobacco control efforts have been nearly nonexistent. This study provided a first systematic look at tobacco use in six economically disadvantaged communities. These are communities that are not typically studied: poverty and unemployment are high in all; there are significant gaps in access to basic

resources such as electricity, running water, and telephones/cell phones; most members have less than a high school education; and four of the communities are remote and access to them is challenging. Within this context, using community partnering, local data collectors and coordinators were trained to gather surveillance data on the landscape of tobacco use.

Overall, exposure to tobacco smoke was high: nearly 40% of households reported having at least one tobacco user. In addition, only about a quarter of households completely banned smoking, thus potentially further increasing the environmental tobacco smoke (ETS) exposure in homes. A focus on protecting nonsmokers from ETS exposure may be useful in shifting social norms regarding tobacco use, and increases in restrictive household smoking policies may be a useful intermediate indicator of change.

Tobacco use prevalence was 23% for the total sample, with considerable variability in prevalence across communities (12.00%–32.63%). This is at odds with the widespread perception in the communities that “everyone smokes”, and more consistent with the estimate of 20–40% based on observations by the qualitative team (Dozier, et al. 2006). These results are also lower than some prior estimates, though higher than the recent World Health Survey Report (13.4% nationally) using a similar methodology (Mackay, et al., 2006). Whether this represents true changes over time in prevalence or differences between samples across studies is unclear (e.g., large urban areas were not assessed in the current study). It is also possible that tobacco prevalence rates in the current study were underestimated. Results were based on the report of a targeted household member in each surveyed home who reported on tobacco use for the entire household, and the report may have been inaccurate. For example, youth tobacco use data were collected but not used, as there was evidence that they were invalid. Notably, in one community, tobacco use among youth was reported as nonexistent. This was clearly at odds with the observations of the data collectors, who hypothesized that either adult household members were not aware of the youths’ tobacco use (data collectors observed “hidden” smoking behind buildings, and hidden smoking was previously reported in other communities; Dozier, et al., 2006), or they were ashamed or afraid to report the use because they were aware that this was a “bad” behavior. Further, the respondents may simply have had no reason to report accurately to data collectors for these or other survey questions. It is possible that these same factors influenced reporting of tobacco use among other subgroups, such as young adults, women, or women of childbearing age, who may be more likely to hide their smoking (Dozier, et al., 2006). Therefore, the reported prevalence rates might most accurately be viewed as a *conservative* estimate of tobacco use in these communities, and a baseline estimate against which change can be measured.

Most users smoked commercially available- or self-rolled cigarettes, though considerable variability in both prevalence and type of tobacco product used was found across communities. The high use of commercially available (i.e., purchased) cigarettes is consistent with qualitative reports, and with the experience in other developing countries in which poverty is worsened when household income is diverted to cigarette purchases, instead of being spent on food, health care, or education (de Beyer, et al., 2001). Of note, even in these already economically disadvantaged communities, a socioeconomic status differential was reported in tobacco use, with use significantly higher among illiterate community members (42% vs. 18%). The reported literacy rate (81%) in the communities is consistent with national census data for the DR, thus increasing the confidence in the accuracy of this self-reported variable. Tobacco use was also significantly higher among males (contrary to qualitative findings, though pipe smoking was higher in females in both studies), mid-life and older adults (consistent with qualitative findings), rural dwellers, and, predictably, in tobacco-growing communities. In contrast to the qualitative findings, no differences were found in tobacco use by young adults across urban, peri-urban, and rural areas, though the sample of young adult smokers was low. Considerable variability was found in type of tobacco product used. Notably, self-rolled

tobacco use was more common in older adults and rural and peri-urban areas (consistent with qualitative findings) as well as in non-tobacco growing communities (counter to qualitative findings).

Consistent with the project's earlier qualitative findings, there did not appear to be a culture of quitting. The percent of exsmokers was very low across all communities, from less than 1% in one community to only 10% at the highest. These results are consistent with the project's prior qualitative report of very few quit attempts and little interest in quitting by smokers, and the difficulty community members had in identifying ex-smokers (Dozier, *et al.*, 2006). Tracking the number of exsmokers may provide a second important indicator of change in social norms regarding smoking across time, and the presence of increasing numbers of exsmokers would provide important role models for promoting further change.

Age and gender adjusted attributable risks for tobacco use averaged 36.6% for males and 24.4% for females across a range of respiratory problems and symptoms. Using World Health Organization mortality data (WHO, 2003), approximately 2254 adult deaths may be theoretically attributed to tobacco use in the DR. Stated differently, at least 2254 lives could potentially be saved each year in the DR with tobacco cessation if this study sample is representative of the DR population as a whole. As with tobacco use prevalence, it is likely that this is an underestimate. Health conditions may have been underreported by the target household member, who may not have been aware of the health conditions, may not have been willing to report the condition, or the health condition may have been undiagnosed due to limited access to or use of health services. In addition, for a portion of the population, duration of tobacco use may not have been sufficiently long for health damage to emerge. Finally, the prevalence of both tobacco use and health conditions may have differed from rates in other similar communities, or from larger urban areas that were not studied in this project; if tobacco use and disease differ in these large population centers, national projected death rates from tobacco could be altered. Nevertheless, this figure provides a starting point for understanding tobacco use and its potential impact in the Dominican Republic, and estimates can be updated as broader data become available.

This report provides a first systematic look at tobacco use in six economically disadvantaged communities in the Dominican Republic. Quantification of the scope and impact of use provides a base for the development of tobacco control interventions and infrastructures for change, and provides a baseline against which change can be measured. Integration of quantitative and qualitative methodologies provide a cultural context for measuring and understanding tobacco use and for targeting/designing interventions. Such efforts may be key in developing partnerships with low- and middle-income countries to avoid the epidemic of tobacco related illnesses experienced by high-income countries around the globe.

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Table 1
Sample Characteristics for Six Dominican Republic Communities

Characteristic	N	% Overall	Range Across Communities (%)
Total Sample	2331		
Male	1120	48.05	41.25–51.65
Age			
18–24 years	398	17.07	11.08–19.70
25–44 years	931	39.94	35.04–43.75
45–64 years	665	28.53	23.50–34.35
65+ years	337	14.46	10.17–18.87
Married/Civil Union	1343	57.61	45.75–69.47
Employed	722	30.97	11.70–49.15
Tob-related job	62	8.49	3.90–22.33
Education Level			
None	362	15.57	7.25–23.27
<Elementary	755	32.43	12.37–48.20
<High School	521	22.35	13.29–30.46
Compl High School	472	20.25	14.13–25.25
>High School	218	9.35	5.09–23.00
Read and Write	1896	81.37	2.26–92.75
Household Resources (Based on 1048 households)			
Electricity	832	79.31	2.29–99.43
Running Water	753	71.78	2.30–96.05
Telephone or Cell	235	22.40	2.29–60.45
Radio	666	63.49	50.86–76.27
Television	671	63.97	14.29–89.66
Automobile	231	22.13	9.83–40.68
Computer	25	2.38	.57–5.08

Note: Denominators for each vary depending on # missing responses/item

Table 2

Tobacco Use Prevalence by Community

Tobacco Use (%)	U1	U2*	P1	P2*	Community			Total	95%CI
					R1*	R2	R2		
# households	175	172	175	176	175	175	175	1048	
≥1 Household Smokers	24.29	40.91	33.14	40.57	48.85	42.86	42.86	38.40	35.46, 41.35
Tobacco Use Prevalence									
N	400	472	371	361	334	391	391	2329	
Non-User	82.75	71.61	76.01	66.48	58.68	73.15	73.15	71.83	70.00, 73.66
Current User	12.00	22.46	19.95	23.27	32.63	26.60	26.60	22.54	20.84, 24.24
Former User	5.25	5.93	4.04	10.25	8.68	.26	.26	5.62	4.69, 6.56
Type of Tobacco Used [†]									
N	69	133	71	122	138	105	105	638	
Cigarettes	59.42	87.22	43.66	61.48	57.97	25.71	25.71	58.00	54.17, 61.83
Self-Rolled (Tubano, Pachuche)	11.59	3.76	43.66	29.51	5.07	39.05	39.05	20.07	16.96, 23.18
Cigars	14.49	6.01	11.27	8.20	34.78	8.57	8.57	14.58	11.84, 17.32
Pipe/Cachimba	13.04	2.26	2.82	2.46	.72	23.81	23.81	6.74	4.80, 8.69
Chewed	1.45	1.50	0	0	2.17	2.86	2.86	1.41	.50, 2.33

* Tobacco-growing community

[†] Note: totals may add up to >100%, as multiple responses were allowed; based on current + former smokers

Table 3

Tobacco Use by Population Characteristics

Characteristic	N	% Use Tobacco	<i>p</i> value
Gender			
Male	305/1120	27.23	<.0001
Female	220/1209	18.20	
Age			
18–24	21/397	5.29	<.0001
25–44	161/931	17.29	
45–64	219/664	32.98	
65+	124/337	36.80	
Literacy			
Can Read and Write	345/1895	18.21	<.0001
Cannot Read and Write	166/392	42.35	
Community Type			
Urban	154/872	17.66	<.0001
Peri-Urban	158/732	21.58	
Rural	213/725	29.38	
Tobacco Growing Community Status			
Tobacco-Growing	299/1167	25.62	<.0005
Not Tobacco-Growing	226/1162	19.45	

Table 4

Type of Tobacco Used by Population Characteristics*

Tobacco Use (%)	Cigarettes	Self-Rolled	Pipes	Cigars
Age				
Older (45+)	45.10	26.71	8.90	19.29
Younger (18-44)	81.76	8.24	4.71	5.29
<i>p</i>	<.0001	<.0001	NS	NS
Gender				
Male	61.46	19.79	4.17	14.58
Female	52.05	21.46	11.87	14.61
<i>p</i>	<.05	NS	<.005	NS
Community Type				
Urban	82.12	4.64	4.64	8.61
Peri-Urban	54.36	32.89	3.36	9.40
Rural	41.55	23.19	12.56	22.71
<i>p</i>	<.0001	<.0001	<.005	<.0001
Tobacco Growing				
No	39.81	34.72	14.35	11.11
Yes	70.45	9.97	2.41	17.18
<i>p</i>	<.0001	<.0001	<.0001	NS

* Analyses conducted for tobacco users only; N=507

Table 5

Household Smoking Policies

Policy	% Overall ¹	95% CI	Range Across Communities
Smoking is never allowed in your home	24.52	21.92, 27.33	17.71–33.90
Smoking is allowed in your home	48.10	45.07, 51.12	37.14–54.55
Smoking is allowed in your home for some people	26.90	24.22, 29.59	15.25–38.86
Smoking is allowed in your home just in some places	10.17	8.34, 12.00	2.87–25.57

Note: Totals add up to >100%, as multiple responses were allowed.

¹Based on 1048 households

Table 6 Age- and Gender-Adjusted Prevalence Rates, Risk Estimates, and Attributable Risks of Tobacco-Related Health Conditions in Tobacco Users Compared to Non-Users

Health Condition	Males				Females			
	Tob User (%)		Risk Estimate	Attributable Risk (%)	Tob User (%)		Risk Estimate	Attributable Risk (%)
	Yes	No			Yes	No		
Persistent cough	8.9	3.8	2.34	57.3	12.5	4.6	2.72	63.2
Hypertension	10.0	11.7	0.85	0	23.0	21.7	1.06	5.7
Heart problem	4.0	3.0	1.33	25.0	4.3	4.3	1.00	0
Pulmonary problem	5.6	2.9	1.93	48.2	5.7	2.0	2.85	64.9
Respiratory problem	7.2	4.5	1.60	37.5	6.4	5.6	1.14	12.5
Asthma	3.1	1.5	2.07	51.6	3.3	3.5	0.94	0

Age adjustment using gender-specific weights from all household members

Table 7
Potential DR Annual Deaths Attributable to Tobacco Use*

Cause of Death	Number of Cases		Deaths Attributable to Smoking	
	Males	Females	Males	Females
Lung Cancer	214	127	78.3	31.0
Chronic Obstructive Lung Disease	93	46	34.0	11.2
Respiratory Disease	138	88	50.5	21.5
Heart Disease	1487	1068	544.2	260.4
Stroke	1194	977	437.0	238.2
Other Circulatory Diseases	887	915	324.6	223.1
Lives Saved: Subtotal			1468.6	785.4
Total			2254	

* Source of Mortality Data: World Health Organization (2003).