TABLE 2—*Continued*

Alcohol dependence	4.45* (3.37, 5.88)	3.61* (2.72, 4.80)
Binge drinking	0.71* (0.51, 1.00)	0.58* (0.42, 0.80)
Drug dependence	0.80 (0.50, 1.29)	0.88 (0.57, 1.37)
Drug abuse	1.57* (1.26, 1.97)	0.99 (0.77, 1.29)
Price elasticity estimate (95% CI)	-0.40 (-1.14, 0.34)	-1.82* (-3.10, -0.54)

Note. ADM = alcohol, drug, or mental; CI = confidence interval. For the full sample, n = 7530; for the ADM sample, n = 1206.
*$P < .05$.

smokers had comorbid alcohol, drug, or mental disorders. We found that smoking participation for individuals with the specified alcohol, drug, or mental disorders was significantly sensitive to cigarette prices: a 10% price increase would result in an 18.2% decline in smoking participation. However, our cross-sectional data analyses could not determine if this relationship was causal. As our data did not contain information on quantities of tobacco products consumed, we could not identify the relationship between cigarette prices and consumption. Therefore, our estimates likely underestimate the overall price effect on smoking behavior. The latest data available for us were from 2001 to 2002. Timely data sets and further analyses on this topic are needed to capture more recent smoking patterns among these individuals.

Our study suggests that increasing cigarette prices through tobacco taxation could be an effective policy tool for reducing smoking among individuals with alcohol, drug, or mental disorders, except among those with alcohol dependence. Whether recent cigarette price increases have reduced smoking among individuals with such disorders, and whether the identified association is causal, are questions requiring further study. ■

About the Authors

Michael Ong and Qiong Zhou are with the Division of General Internal Medicine and Health Services Research, Department of Medicine, University of California, Los Angeles. Hai-Yen Sung is with the Institute for Health and Aging, University of California, San Francisco.

Correspondence can be sent to Michael Ong, MD, PhD, Division of GIM & HSR, UCLA Department of Medicine, 911 Broxton Ave, 1st Floor, Los Angeles, CA 90024 (e-mail: mong@mednet.ucla.edu). Reprints can be ordered at http://www.ajph.org by clicking on the "Reprints/Eprints" link.

This brief was accepted July 10, 2009.

Contributors

M.K. Ong conceptualized and supervised the study and led the writing. Q. Zhou conducted the analyses and assisted with the writing. H.-Y. Sung assisted with the study, analyses, and writing.

Acknowledgments

This work was supported by funding from the Robert Wood Johnson Foundation's Substance Abuse Policy Research Program (No. 61104); a research seed grant from the Jonsson Cancer Center Foundation at the University of California, Los Angeles (UCLA); and the UCLA-RAND NIMH Partnered Research Center for Quality Care (NIMH P30 MH082760).

We thank Teh-wei Hu and Theodore Keeler for comments on prior versions of this brief.

Human Participant Protection

This study was approved by the institutional review board at the University of California, Los Angeles, with a waiver from obtaining informed consent from participants.

References

1. Lasser K, Boyd JW, Woolhandler S, Himmelstein DU, McCormick D, Bor DH. Smoking and mental illness: a population-based prevalence study. *JAMA.* 2000; 284(20):2606–2610.
2. Breslau N. Psychiatric comorbidity of smoking and nicotine dependence. *Behav Genet.* 1995;25(2):95–101.
3. Glassman AH, Helzer JE, Covey LS, et al. Smoking, smoking cessation, and major depression. *JAMA.* 1990; 264(12):1546–1549.
4. Goff DC, Henderson DC, Amico E. Cigarette smoking in schizophrenia: relationship to psychopathology and medication side effects. *Am J Psychiatry.* 1992;149(9): 1189–1194.
5. Gonzalez-Pinto A, Gutierrez M, Ezcurra J, et al. Tobacco smoking and bipolar disorder. *J Clin Psychiatry.* 1998;59(5):225–228.
6. Kelly C, McCreadie RG. Smoking habits, current symptoms, and premorbid characteristics of schizophrenic patients in Nithsdale, Scotland. *Am J Psychiatry.* 1999;156(11):1751–1757.
7. Saffer H, Dave D. Mental illness and the demand for alcohol, cocaine, and cigarettes. *Econ Inq.* 2005;43(2): 229–246.
8. Sturm R, Gresenz C, Sherbourne C, et al. The design of Healthcare for Communities: a study of health care delivery for alcohol, drug abuse, and mental health conditions. *Inquiry.* 1999;36(2):221–233.
9. Orzechowski W, Walker RC. *The Tax Burden on Tobacco.* Vol 42. Arlington, VA: Orzechowski and Walker; 2007.
10. *Diagnostic and Statistical Manual of Mental Disorders, Revised Third Edition.* Washington, DC: American Psychiatric Association; 1987.
11. Saunders JB, Aasland OG, Babor TF, Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons With Harmful Alcohol Consumption-II. *Addiction.* 1993;88(6):791–804.
12. Health Services Research Center, University of California, Los Angeles. Healthcare for Communities. Household survey public use files: user's guide & codebook (round two, release 1). 2004. Available at: http://www.hsrcenter.ucla.edu/research/hcc/userguide.pdf. Accessed May 24, 2009.

Connecting Discovery and Delivery: The Need For More Evidence on Effective Smoking Cessation Strategies for People Living With HIV/AIDS

Jenine K. Harris, PhD

Smoking prevalence among the 1.1 million Americans living with HIV/AIDS is 2 to 3 times higher than the 19.8% rate among the general population. Since 1990, scientists have worked toward the discovery of health risks related to smoking in people living with HIV/AIDS; however, few studies have evaluated the delivery of smoking cessation interventions for this population. Increasing linkages between discovery science and delivery science may facilitate a faster transition to delivery of smoking cessation interventions for people living with HIV/AIDS. (*Am J Public Health.* 2010;100:1245–1249. doi:10.2105/AJPH.2009.172460)

Health research often focuses on the discovery of risk factors associated with disease and death.[1] Although discovery of health risks is necessary to protect health, the delivery of interventions to improve health is equally important.[1–5] Information regarding how science moves from discovery to delivery points to substantial time lag and little cross-talk between discovery and delivery research.[1,6] This may be especially problematic in areas such as HIV/AIDS and smoking, where delay between discovery of smoking-related health outcomes in people living with HIV/AIDS and the delivery of interventions to reduce smoking among this population has serious consequences.

Smoking prevalence in people living with HIV/AIDS is 2 to 3 times higher than is the 19.8% rate among the general population.[7–16] Discovery research has concluded that smokers with HIV/AIDS are more likely to be nonadherent to treatment, have a greater chance of being diagnosed with an AIDS-defining condition or dying, and report lower quality of life than do nonsmoking persons with HIV/AIDS.[13,17–21] Smokers living with HIV/AIDS have a higher risk of disease and opportunistic infection than do smokers who do not have HIV/AIDS.[9,22–34]

Delivery research indicates that population-specific smoking cessation interventions can be effective.[35–52] Although few studies have examined such strategies for persons living with HIV/AIDS,[35] a recent study found that 86% of smokers with HIV/AIDS would not benefit from standard cessation programs.[53] I used citation network analysis[54–56] to examine the characteristics of—and possible relationships between—discovery research relating health outcomes to smoking in persons living with HIV/AIDS and delivery research on interventions to reduce smoking among this population.

TABLE 1—Characteristics of Citation Network of Journal Articles on Smoking and HIV/AIDS: Articles Indexed on Web of Science, 1980–2008

Characteristics	All Categories	Discovery Research	Delivery Research	Review Articles
No. of articles (%)	272 (100)	237 (87.5)	6 (1.8)	29 (10.7)
No. of unlinked articles (degree = 0)	57	52	1	4
Year of first publication	1990	1990	2004	1995
No. of times an article cited another article, mean (SD)	2.45 (3.56)	2.11 (3.28)	6.50 (4.51)	4.41 (4.43)
No. of times an article was cited, mean (SD)	2.45 (4.49)	2.70 (4.74)	1.17 (2.04)	0.69 (1.29)
No. of citation links,[a] no. (%)				
Discovery research cites discovery research	491 (73.6)	. . .	. . .	. . .
Discovery research cites delivery research	2 (0.3)	. . .	. . .	. . .
Discovery research cites review articles	7 (1.0)	. . .	. . .	. . .
Delivery research cites discovery research	35 (5.2)	. . .	. . .	. . .
Delivery research cites delivery research	3 (0.4)	. . .	. . .	. . .
Delivery research cites review articles	1 (0.1)	. . .	. . .	. . .
Review article cites review articles	12 (1.8)	. . .	. . .	. . .
Review article cites discovery research	114 (17.1)	. . .	. . .	. . .
Review article cites delivery research	2 (0.3)	. . .	. . .	. . .
No. of articles in main path	41	36	4	1
No. of journals[b]	136	118	5	25
No. of articles in each journal type				
HIV/AIDS focus	63	59	2	2
Tobacco focus	5	3	2	0
Other focus	204	175	2	27
Mean journal impact factor	3.41	3.74	3.20	1.90

Note. Ellipses indicate data are not applicable.
[a]The total number of citation links was N = 667.
[b]A journal may contribute articles to more than 1 category, so it may be represented in multiple columns.

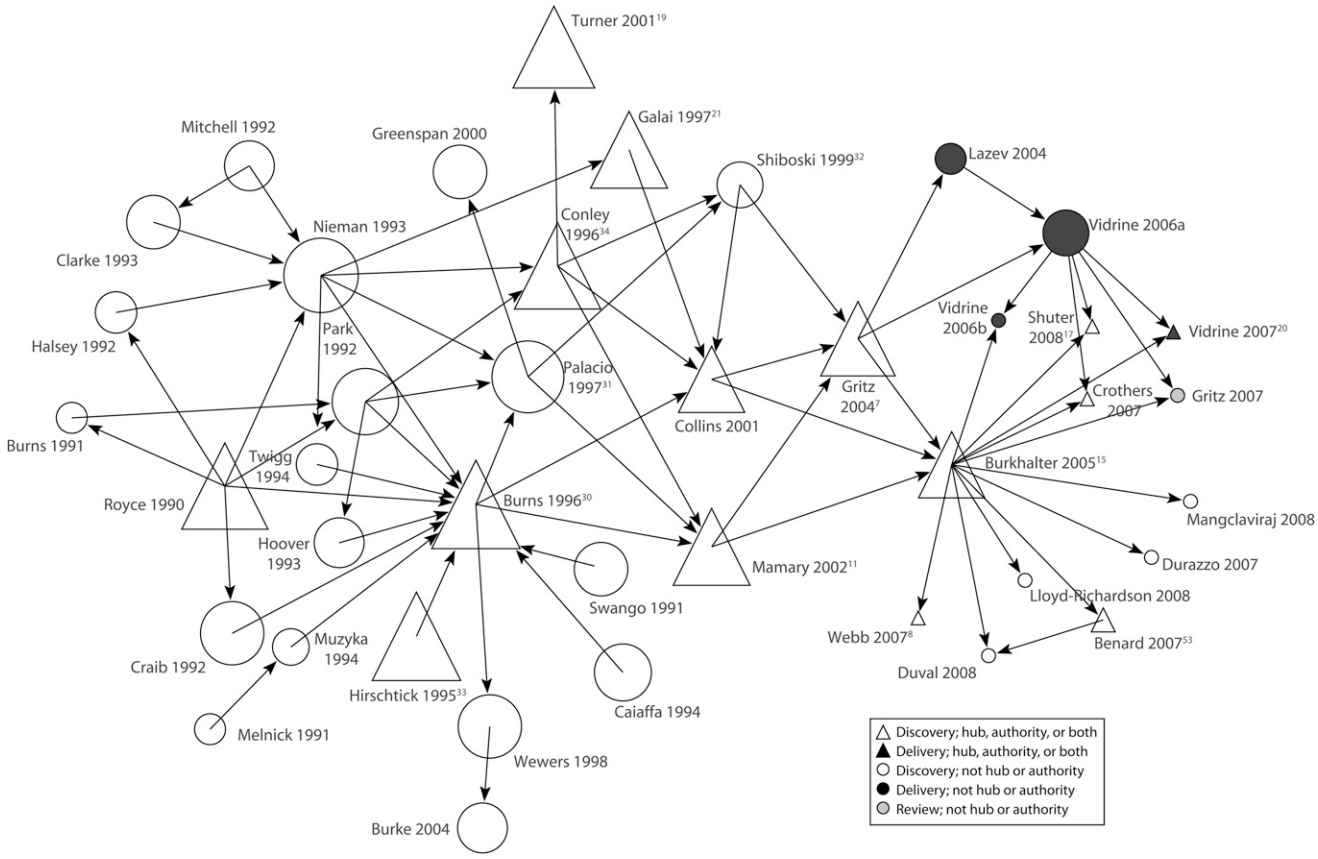
METHODS

I used the online database Web of Science to identify 1532 articles with keywords related to smoking and HIV/AIDS published from 1980 through 2008 (Web of Science search algorithm listed in Appendix A, available as a supplement to the online version of this article at http://www.ajph.org). I classified each article into 1 of the following 4 categories:

1. *Discovery:* empirical article examining the relationship between smoking and HIV/AIDS.
2. *Delivery:* empirical article examining an intervention to prevent or reduce smoking among persons living with HIV/AIDS.
3. *Review:* article reviewing or synthesizing previous research on smoking and HIV/AIDS.
4. *Excluded:* no examination of the relationship between smoking and HIV/AIDS.

Two coders (including myself) classified 5% of articles to establish coding reliability, with 88% agreement and a κ of 0.75.[57] I classified the remaining articles. Articles without abstracts (n = 21; 1.3%) were classified by title. Excluded articles were dropped, leaving 272 relevant articles (listed in Appendix B, available as a supplement to the online version of this article at http://www.ajph.org).

We examined article, journal, and network characteristics; article prominence; main citation path (i.e., the path across the network comprising articles and links critical to holding the network together); and stochastic network models for the 272 articles (see Appendixes C and D, available as supplements to the online version of this article at http://www.ajph.org). Article prominence measures (e.g., out-degree, hubs, and authorities) indicate how often articles cite or are cited by others within a network.[56,58] Main citation paths identify articles that integrate information from previous research and add substantial new knowledge to a field.[56] Stochastic network models go beyond descriptive measures to allow prediction of a citation link (i.e., an article citing another article) based on article or network characteristics.



Note. The size and shape of nodes indicate article prominence within the larger network (n = 272). Arrows point to articles cited by the article in which the arrow originates. Sample sizes were as follows: discovery research, n = 36; delivery research, n = 4; review articles, n = 1.

FIGURE 1—Main network-analysis path (n = 41) showing citation linkages among journal articles related to smoking and HIV/AIDS: articles indexed on Web of Science, 1980–2008.

RESULTS

Most of the articles were in the discovery category, followed by review and then delivery (Table 1). The discovery category had the oldest publication history; that is, articles on discovery research started being published earlier than articles in any other area. The delivery category had the youngest publication history. Sixty-three articles were published in HIV/AIDS-focused journals, 5 in a tobacco-focused journal, and 204 in other journals. Discovery articles were most prominent in the network according to all measures used, comprising 36 of the 41 "main path" articles (Table 1; Figure 1). Whereas there were 35 citations of discovery articles by the 6 delivery articles, delivery articles were only cited twice by the discovery articles (Table 1; see Appendix E, available as a supplement to the online version of this article at http://www.ajph.org). There was evidence of a small increase in delivery research starting in 2004; 6 delivery articles were published from 2004 to 2007, and 4 were included at the end of the main path.

After control for the number of citation links, journal impact factor, publication year, journal focus (tobacco, HIV/AIDS, other), and publication in the same journal, stochastic models indicated that the probability of a citation link significantly increased when the citing article was delivery or review (see Appendix F, available as a supplement to the online version of this article at http://www.ajph.org). There was no significant difference in the probability of citation between articles based on whether the cited article was discovery, delivery, or review. So, although discovery articles were more prominent than were delivery articles, delivery articles were just as likely to be cited.

DISCUSSION

The accumulation of nearly 2 decades of discovery research leaves little doubt that smoking is a widespread problem and a major modifiable risk factor for disease and death in people living with HIV/AIDS. The present study found a lack of delivery research on smoking among this population and a scarcity of connections between discovery and delivery research.

Although there is still a need for additional discovery of health effects associated with smoking for persons living with HIV/AIDS, it is time to disseminate evidence related to

delivery of effective cessation interventions for this population. I have 2 recommendations to this end: (1) researchers and practitioners in the HIV/AIDS field should increase their collaborations with tobacco control researchers and practitioners, who have experience in population-specific cessation programs, and (2) because most discovery researchers are likely working toward a delivery goal (i.e., facilitating the reduction of smoking among persons living with HIV/AIDS), discovery researchers should report their findings in the context of how their contribution might aid intervention development or implementation. Increasing collaborations among discovery and delivery researchers and linkages between discovery and delivery literature may facilitate more efficient synthesis of new evidence across the field and a faster transition from discovery of health risks to delivery of effective interventions. ■

About the Authors

Jenine K. Harris is with the Department of Community Health, School of Public Health, Saint Louis University, St. Louis, MO, and the Center for Tobacco Policy Research, St. Louis.

Correspondence should be sent to Jenine K. Harris, Department of Community Health, Saint Louis University School of Public Health, 3545 Lafayette Ave, Suite 300, St. Louis, MO 63104 (e-mail: harrisjk@slu.edu). Reprints can be ordered at http://www.ajph.org by clicking the "Reprints/Eprints" link.

This brief was accepted August 25, 2009.

Acknowledgments

I thank Donna Halloran, Sarah Shelton, and Sarah Moreland-Russell for their helpful comments on drafts of this brief. I also thank Caroline Geremakis for her assistance with the initial data coding.

Human Participant Protection

No protocol approval was needed because no human research participants were involved in this study.

References

1. Harris JK, Luke DA, Zuckerman R, Shelton SC. Forty years of secondhand smoke research: the gap between discovery and delivery. *Am J Prev Med.* 2009;36(6):538–548.

2. Mueller NB, Burke RC, Luke DA, Harris JK. Getting the word out: multiple methods for disseminating evaluation findings. *J Public Health Manag Pract.* 2008;14(2):170–176.

3. Brownson RC, Ballew P, Brown KL, et al. The effect of disseminating evidence-based interventions that promote physical activity to health departments. *Am J Public Health.* 2007;97(10):1900–1907.

4. Rabin BA, Brownson RC, Kerner JF, Glasgow RE. Methodologic challenges in disseminating evidence-based interventions to promote physical activity. *Am J Prev Med.* 2006;31(4):24–34.

5. National Institutes of Health. *The Nation's Progress in Cancer Research: An Annual Report for 2003.* Bethesda, MD: National Institutes of Health, US Dept of Health and Human Services; 2004. NIH publication 04-5536.

6. Balas EA, Boren SA. Managing clinical knowledge for health care improvement. In: Bemmel J, McCray AT, eds. *Yearbook of Medical Informatics 2000: Patient-Centered Systems.* Stuttgart, Germany: Schattauer Verlagsgesellschaft mbH; 2000:65–70.

7. Gritz ER, Vidrine DJ, Lazev AB, Amick BC, Arduino RC. Smoking behavior in a low-income multiethnic HIV/AIDS population. *Nicotine Tob Res.* 2004;6(1):71–77.

8. Webb MS, Vanable PA, Carey MP, Blair DC. Cigarette smoking among HIV+ men and women: examining health, substance use, and psychosocial correlates across the smoking spectrum. *J Behav Med.* 2007;30(5):371–383.

9. Clifford GM, Polesel J, Rickenbach M, et al. Cancer risk in the Swiss HIV Cohort Study: associations with immunodeficiency, smoking, and highly active antiretroviral therapy. *J Natl Cancer Inst.* 2005;97(6):425–432.

10. Niaura R, Shadel WG, Morrow K, Flanigan T, Abrams DB. Smoking among HIV-positive persons. *Ann Behav Med.* 1999;21(suppl):S116.

11. Mamary EM, Bahrs D, Martinez S. Cigarette smoking and the desire to quit among individuals living with HIV. *AIDS Patient Care STDs.* 2002;16(1):39–42.

12. Tesoriero JM, Gieryic SM, Carrascal A, Lavigne HE. Smoking among HIV positive New Yorkers: prevalence, frequency, and opportunities for cessation [published online ahead of print September 7, 2008]. *AIDS Behav.* doi:10.1007/s10461-008-9449-2.

13. Crothers K, Griffith TA, McGinnis KA, et al. The impact of cigarette smoking on mortality, quality of life, and comorbid illness among HIV-positive veterans. *J Gen Intern Med.* 2005;20(12):1142–1145.

14. Miguez-Burbano MJ, Ashkin D, Rodriguez A, et al. Increased risk of *Pneumocystis carinii* and community-acquired pneumonia with tobacco use in HIV disease. *Int J Infect Dis.* 2005;9(4):208–217.

15. Burkhalter JE, Springer CM, Chhabra R, Ostroff JS, Rapkin BD. Tobacco use and readiness to quit smoking in low-income HIV-infected persons. *Nicotine Tob Res.* 2005;7(4):511–522.

16. Centers for Disease Control and Prevention. State-specific prevalence and trends in adult cigarette smoking—United States, 1998–2007. *MMWR Morb Mortal Wkly Rep.* 2009;58(9):221–226.

17. Shuter J, Bernstein SL. Cigarette smoking is an independent predictor of nonadherence in HIV-infected individuals receiving highly active antiretroviral therapy. *Nicotine Tob Res.* 2008;10(4):731–736.

18. Feldman C. Pneumonia associated with HIV infection. *Curr Opin Infect Dis.* 2005;18(2):165–170.

19. Turner J, Page-Shafer K, Chin DP, et al. Adverse impact of cigarette smoking on dimensions of health-related quality of life in persons with HIV infection. *AIDS Patient Care STDs.* 2001;15(12):615–624.

20. Vidrine DJ, Arduino RC, Gritz ER. The effects of smoking abstinence on symptom burden and quality of life among persons living with HIV/AIDS. *AIDS Patient Care STDs.* 2007;21(9):659–666.

21. Galai N, Park LP, Wesch J, Visscher B, Riddler S, Margolick JB. Effect of smoking on the clinical progression of HIV-1 infection. *J Acquir Immune Defic Syndr Hum Retrovirol.* 1997;14(5):451–458.

22. Chattopadhyay A, Patton LL. Risk indicators for HIV-associated jointly occurring oral candidiasis and oral hairy leukoplakia. *AIDS Patient Care STDs.* 2007;21(11):825–832.

23. Kohli R, Lo Y, Homel P, et al. Bacterial pneumonia, HIV therapy, and disease progression among HIV-infected women in the HIV epidemiologic research (HER) study. *Clin Infect Dis.* 2006;43(1):90–98.

24. Minkoff H, Feldman JG, Strickler HD, et al. Relationship between smoking and human papillomavirus infections in HIV-infected and -uninfected women. *J Infect Dis.* 2004;189(10):1821–1828.

25. Palefsky JM, Holly EA, Ralston ML, Arthur SP, Hogeboom CJ, Darragh TM. Anal cytological abnormalities and anal HPV infection in men with Centers for Disease Control group IV HIV disease. *Genitourin Med.* 1997;73(3):174–180.

26. Engels EA, Brock MV, Chen J, Hooker CM, Gillison M, Moore RD. Elevated incidence of lung cancer among HIV-infected individuals. *J Clin Oncol.* 2006;24(9):1383–1388.

27. Bedimo R, Chen RY, Accortt NA, et al. Trends in AIDS-defining and non-AIDS-defining malignancies among HIV-infected patients: 1989–2002. *Clin Infect Dis.* 2004;39(9):1380–1384.

28. Monforte A, Abrams D, Pradier C, et al. HIV-induced immunodeficiency and mortality from AIDS-defining and non-AIDS-defining malignancies. *AIDS.* 2008;22(16):2143–2153.

29. Petrache I, Diab K, Knox KS, et al. HIV associated pulmonary emphysema: a review of the literature and inquiry into its mechanism. *Thorax.* 2008;63(5):463–469.

30. Burns DN, Hillman D, Neaton JD, et al. Cigarette smoking, bacterial pneumonia, and other clinical outcomes in HIV-1 infection. *J Acquir Immune Defic Syndr Hum Retrovirol.* 1996;13(4):374–383.

31. Palacio H, Hilton JF, Canchola AJ, Greenspan D. Effect of cigarette smoking on HIV-related oral lesions. *J Acquir Immune Defic Syndr Hum Retrovirol.* 1997;14(4):338–342.

32. Shiboski CH, Neuhaus JM, Greenspan D, Greenspan JS. Effect of receptive oral sex and smoking on the incidence of hairy leukoplakia in HIV-positive gay men. *J Acquir Immune Defic Syndr.* 1999;21(3):236–242.

33. Hirschtick RE, Glassroth J, Jordan MC, et al. Bacterial pneumonia in persons infected with the human-immunodeficiency-virus. *N Engl J Med.* 1995;333(13):845–851.

34. Conley LJ, Bush TJ, Buchbinder SP, et al. The association between cigarette smoking and selected HIV-related medical conditions. *AIDS.* 1996;10(10):1121–1126.

35. Fiore MC, Jaen CR, Baker TB, et al. *Treating Tobacco Use and Dependence, 2008 Update. Clinical Practice Guideline.* Rockville, MD: Public Health Service, US Dept of Health and Human Services; 2008.

36. Azjen I, Fishbein M. *Understanding Attitudes and Predicting Social Behavior.* Angle Cliffs, NJ: Prentice-Hall; 1980.

37. The Tobacco Use and Dependence Clinical Practice Guideline Panel, staff, and consortium representatives. A clinical practice guideline for treating tobacco use and dependence—a US Public Health Service report. *JAMA.* 2000;283(24):3244–3254.

38. Orleans CT, Fishman J. Tailored communications for smoking cessation. *Tob Control.* 2000;9(suppl 1):i49.

39. Ahluwalia JS, McNagny SE, Clark WS. Smoking cessation among inner-city African Americans using the nicotine transdermal patch. *J Gen Intern Med.* 1998;13(1):1–8.

40. Lipkus IM, Lyna PR, Rimer BK. Using tailored interventions to enhance smoking cessation among African-Americans at a community health center. *Nicotine Tob Res.* 1999;1(1):77–85.

41. Royce JM, Ashford A, Resnicow K, Freeman HP, Caesar AA, Orlandi MA. Physician- and nurse-assisted smoking cessation in Harlem. *J Natl Med Assoc.* 1995; 87(4):291–300.

42. Orleans CT, Boyd NR, Bingler R, et al. A self-help intervention for African American smokers: tailoring cancer information service counseling for a special population. *Prev Med.* 1998;27(5, pt 2):S61–S70.

43. Leischow SJ, Hill A, Cook G, Muramoto M, Lundergan LL. The effects of transdermal nicotine for the treatment of Hispanic smokers. *Am J Health Behav.* 1996;20(5):304–311.

44. Leischow SJ, Nilsson F, Franzon M, Hill A, Otte P, Merikle EP. Efficacy of the nicotine inhaler as an adjunct to smoking cessation. *Am J Health Behav.* 1996;20(5): 364–371.

45. Munoz RF, Marin BV, Posner SF, Perez-Stable EJ. Mood management mail intervention increases abstinence rates for Spanish-speaking Latino smokers. *Am J Community Psychol.* 1997;25(3):325–343.

46. Ershoff DH, Mullen PD, Quinn VP. A randomized trial of a serialized self-help smoking cessation program for pregnant women in an HMO. *Am J Public Health.* 1989;79(2):182–187.

47. Edwards N, Sims-Jones N. Smoking and smoking relapse during pregnancy and postpartum: results of a qualitative study. *Birth.* 1998;25(2):94–100.

48. Greenwood G. *Smoking Cessation Interventions in San Francisco's Queer Communities.* San Francisco: Center for AIDS Prevention Studies, University of California San Francisco; 2002. Available at: http://www.ari.ucsf.edu/science/s2c/queertip.pdf. Accessed March 30, 2010.

49. King TK, Borrelli B, Black C, Pinto BM, Marcus BH. Minority women and tobacco: implications for smoking cessation interventions. *Ann Behav Med.* 1997;19(3): 301–313.

50. Shadel WG, Mermelstein RJ. Individual differences in self-concept among smokers attempting to quit: validation and predictive utility of measures of the smoker self-concept and abstainer self-concept. *Ann Behav Med.* 1996;18(3):151–156.

51. Shadel WG, Shiffman S, Niaura R, Nichter M, Abrams DB. Current models of nicotine dependence: what is known and what is needed to advance understanding of tobacco etiology among youth. *Drug Alcohol Depend.* 2000;59(suppl 1):S9–S22.

52. Barron J, Petrilli F, Strath L, McCaffrey R. Successful interventions for smoking cessation in pregnancy. *MCN Am J Matern Child Nurs.* 2007;32(1):42–47.

53. Benard A, Bonnet F, Tessier JF, et al. Tobacco addiction and HIV infection: toward the implementation of cessation programs. ANRS CO3 Aquitaine Cohort. *AIDS Patient Care STDS.* 2007;21(7):458–468.

54. Moore S, Shiell A, Hawe P, Haines VA. The privileging of communitarian ideas: citation practices and the translation of social capital into public health research. *Am J Public Health.* 2005;95(8):1330–1337.

55. Hummon N, Dereian P. Connectivity in a citation network: the development of DNA theory. *Soc Netw.* 1989;11(1):39–63.

56. de Nooy W, Mrvar A, Batagelj V. *Exploratory Social Network Analysis With Pajek.* New York, NY: Cambridge University Press; 2005.

57. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics.* 1977;33(1): 159–174.

58. Kleinberg J. Authoritative sources in a hyperlinked environment. *J ACM.* 1999;46(5):604–632.

Epidemiology and Burden of Hepatitis A, Malaria, and Typhoid in New York City Associated With Travel: Implications for Public Health Policy

Rosemary Adamson, MB, Vasudha Reddy, MPH, Lucretia Jones, MPH, Mike Antwi, MPH, Brooke Bregman, MPH, Don Weiss, MD, Michael Phillips, MD, and Harold W. Horowitz, MD

We examined New York City Department of Health and Mental Hygiene surveillance data on hepatitis A, malaria, and typhoid to determine the proportion of these diseases related to travel and their geographic distribution. We found that 61% of hepatitis A cases, 100% of malaria cases, and 78% of typhoid cases were travel related and that cases clustered in specific populations and neighborhoods at which public health interventions could be targeted. High-risk groups include Hispanics (for hepatitis A), West Africans living in the Bronx (for malaria), and South Asians (for typhoid). (*Am J Public Health.* 2010;100:1249–1252. doi:10.2105/AJPH.2009.178335)

Travel to developing countries is associated with hepatitis A, malaria, and typhoid infection, and travelers who are visiting friends and relatives are at considerably higher risk than are tourists of acquiring these diseases.[1–3] Diseases acquired during travel are problematic in New York City (NYC) because the percentage of immigrants residing in the city, with 36% of residents born abroad, is approximately 3.5 times the national percentage. In addition, NYC residents account for 12% of US air travelers to overseas destinations while representing only 3% of the US population.[4–6]

Using data collected by the NYC Department of Health and Mental Hygiene, we assessed the burden of hepatitis A, malaria, and typhoid (3 diseases targeted by the US Department of Health and Human Services with respect to prevention efforts[7]) carried back to the city by travelers. We focused on people who had traveled to visit friends and relatives in their home countries in an attempt to determine whether particular high-risk groups (as well as particular areas of NYC) should be targeted for prevention interventions. We classified travelers visiting friends and relatives as immigrants who were ethnically or racially distinct from the majority population of the United States and who returned to their homeland to visit friends or relatives.[2,8]

METHODS

We used SAS version 9.1 (SAS Institute Inc, Cary, NC) to analyze hepatitis A data from July 5, 2005, through December 31, 2006 (18 months); malaria data from January 1, 2004, through December 31, 2006 (36 months); and typhoid data from January 1, 2000, through December 31, 2005 (72 months). GIS ArcMap version 9.2 (ESRI, Redlands, CA) was used to create maps indicating the geographic locations of cases. We calculated NYC incidence rates using US Census Bureau's 2005 intercensal population estimates.[9] For each variable assessed, we calculated percentages using as the denominator the number of patients for whom data for that variable were available. Data on durations of hospitalization for malaria cases reported between 2004 and 2006 were obtained from the NYC Health and Hospitals Corporation (J. Goldstein, MPA, New York City Health and Hospitals Corporation, written communication, November 2007).

A case was considered travel related if the patient was outside the 50 US states for the usual incubation period of each disease. The